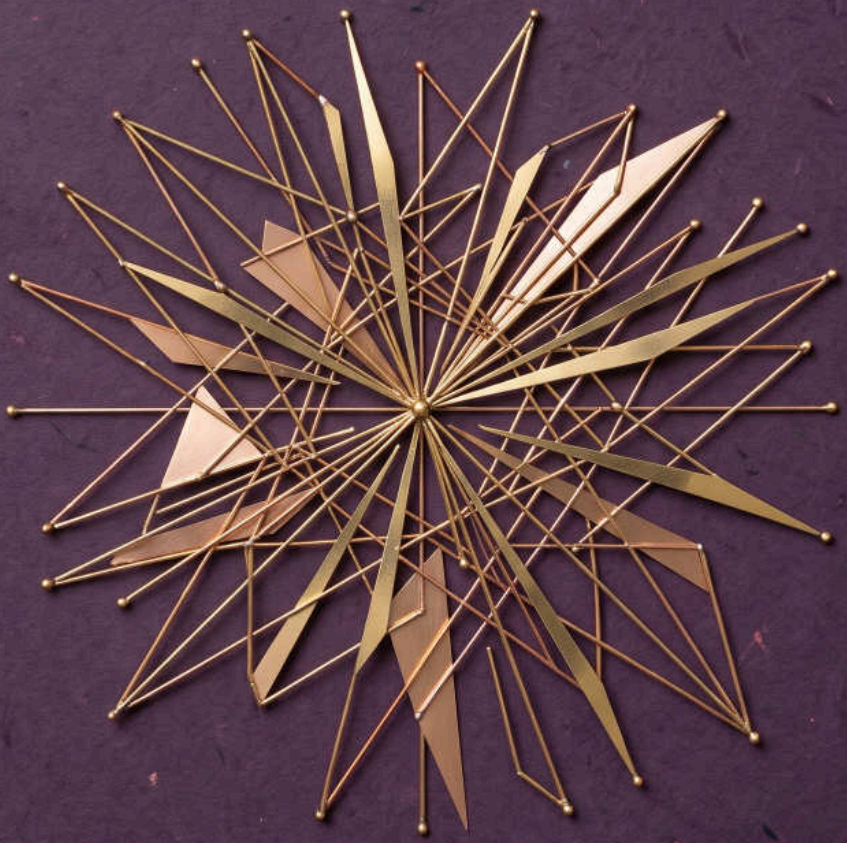
CLEVERINI SERIES

CREATIVITY PRACTITIONER GUIDE



Generating, shaping and testing ideas

DAVID PETROSIAN MKERVALI

MINDCRAFT INC.

Creativity Practitioner Guide

Understanding, Developing and Sustaining Your Creativity Throughout Life

David Petrosian Mkervali

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Author’s preface

CLEVERINI BEGAN LONG BEFORE it had that name.

My father built its earliest predecessors on computers that used magnetic tapes and floppy disks. One of his systems was called TTK Intellect, a testing and training complex for mental abilities. Other programs followed, becoming more sophisticated as the work continued.



An early computer and its magnetic tapes, where the first versions began.

I think about those early versions when I consider what it means to create something. The project we have today came through many

attempts. There was always another version to make and another possibility to explore.

My family worked in science and education, and I grew up around that willingness to investigate how things could be improved. It shaped my understanding of learning. I wanted education to help people develop the abilities they would need when an answer had yet to be found.

My own mind was certainly active. At school, thoughts moved quickly from one subject to another. Staying with any of them was much harder. I could have plenty of ideas while struggling with the attention and orderly reasoning needed to do something with them.

That experience has influenced the kind of creativity book I want to write. I am interested in what happens after an idea occurs to you. How do you choose something worth pursuing? What can you do when the first attempt disappoints you? How do you keep working long enough to discover what the idea might become?

Creativity was part of my doctoral research into the foundations of learning. I wanted it to have a deliberate place in education, alongside the abilities involved in acquiring information and reasoning with it. Students would need opportunities to try unfamiliar approaches and work on questions without a ready-made solution.

I still care about that. I would like more people to feel able to make something of their own, even when they are unsure where to begin.

This book asks you to work on ideas as you read. Choose something you would enjoy making or improving. It could be a story, an original puzzle, or a better way of doing something that regularly frustrates you. The scale matters less than having enough interest to stay with it.

Keep your early attempts. A rough version gives you something specific to examine. You can decide which part to change, test another

approach, or ask someone what they understood from it. As the work develops, you will have decisions to make that no general exercise can make for you.

The other books in this series can help with parts of that work. You may need to pay closer attention to what is in front of you, recall useful material, or examine whether an idea makes sense. Here, the emphasis is on using those resources to develop something you have chosen to create.

I am forty-four as I write this. Looking from my father's early programs to the possibilities of AI, I feel that many of the things we hoped to build are finally becoming practical. I want to use that opportunity to make learning tools more accessible.

Cleverini is our latest project. Its games are free, with no advertising or paywalls, and we do not sell users' personal information. Those are choices we have made because I believe access to education and opportunities for mental development should be available to everyone.

A person's willingness to learn is worth taking seriously, wherever they live and whatever they earn.

For this book, I ask you to give that same consideration to your own work. Set aside some time for an idea you care about. Let the first attempt be rough enough that you can actually make it. Then look at what you have and decide what to do next.

By the time you reach the last page, I hope there will be something beside the book that wasn't there when you began.

David Petrosian Mkervali

How to Use This Book

THIS BOOK HAS ONE aim, which is to **train creativity through regular practice**.

> 🔑 **Key Concept:**
>
> Intellect and creativity. In this book, intellect is **solving tasks where the variables are identified**. A variable is any part of a task that can change. Creativity is solving tasks where the variables are not identified, so part of the creative work is finding them.

The ten modules move **from understanding creativity to a training plan of your own**.

1. Understanding Creativity
2. How Creativity Works with Memory, Attention and Intellect
3. Developing the Core Skills of Creativity
4. Methods for Developing Creativity
5. Training Creativity in Different Fields
6. Sleep, Movement and Food
7. Keeping Creativity Active Over Time
8. Creativity at Different Ages

9. Technology, AI and Cleverini Games
10. Your Training Program, Practice Plan and Practitioner Levels



Ten flat stones crossing a shallow stream towards a small wooden workshop with its door open on the far bank.

Modules 3, 4 and 5 and section 10.2 are the core of the training, with methods, exercises and creative projects. Module 10 sets your starting point and weekly routine.

A few boxes appear again and again, and each has one job. A Science Says box gives a research finding with its source. A Key Concept box defines a term. An Exercise box gives you steps to try. Each section ends with a Key idea line that sums up its main point.

Read a section, then do its exercises the same day. Practice tends to stay close to the task you practised (Thorndike & Woodworth, 1901), so most exercises ask you to bring a task from your own life.

> Exercise:
>
> Getting the most from each exercise.
>
> 1. Read the whole section first.
> 2. Use a real task of your own wherever the exercise allows it.
> 3. Write **what you tried and what changed** in your journal.
> 4. Come back to the same exercise on another day and compare your notes.

Keep a practice journal for those notes. The journal and the practitioner levels in Module 10 are this book's own tools and have not been tested, so use them as a guide. The first plan runs for twelve weeks, and you can stretch or shorten it when life gets busy.

The book tells you **where each claim comes from and when the research is weak or mixed**.

Key idea:

Creativity grows with regular practice, so bring a real task to every exercise.



Module

1

Understanding Creativity

1.1 What We Mean by Creativity

1.1.1 Creativity, Imagination, Intellect and Innovation, and Their Partners: Attention, Memory and Knowledge

You open the fridge at seven in the evening with no plan at all. There is half an onion, two eggs, some cold rice and a lemon. Twenty minutes later a meal you have never cooked before is on the table. **Something in your mind made that meal up**, and I want to find out which part it was.

Four words get mixed up whenever people talk about moments like this one. They are creativity, imagination, intellect and innovation. **Each word names a different job**, and your meal needed more than one of them.

Four words get mixed up

- Creativity
- Imagination
- Intellect
- Innovation



An open fridge in a dim kitchen, half an onion, two eggs and a lemon on its shelves, and a woman looking in with one hand on her chin.

Creativity comes first. Scientists give it a short standard answer, which is that something creative is **both original and effective** (Runco & Jaeger, 2012). Original means new, and effective means it works, fits or is useful for the job. As a word formula, Creativity = Originality + Effectiveness.

Creativity as a word formula

Originality + Effectiveness = Creativity

> Definition:
>
> **CREATIVITY, IN THE STANDARD DEFINITION IN RESEARCH:** making something that is both original and effective (Runco & Jaeger, 2012).

Your fridge meal passes **both tests at once**. It was new to you, and it fed you well. A plate of cold rice with a whole lemon squeezed over it might be original, and nobody would want to eat it, so it fails the second test.

> **Key Concept:**
>
> Anything new counts. Vygotsky wrote, "Any human act that gives rise to something new is referred to as a creative act" (Vygotsky, 1930/2004). I like how wide that net is, because **any act that makes something new counts**. A new route home or a new way to fold a shirt fits his line just like a painting.

Imagination is the next word. It is **picturing what is not in front of you**, such as the taste of a meal before you cook it. One paper sorted imagination into five kinds, from pictures in the mind's eye to "altered psychological states" (Abraham, 2016).

Only some of those kinds make anything new. You can picture your grandmother's kitchen in fine detail, and **picturing it creates nothing**. The creative kind, in that paper's words, is "novel combinatorial or generative processing" (Abraham, 2016), which means joining old pieces into something that was not there before.

Picturing and creating

Picturing your grandmother's kitchen	The creative kind
Picturing it creates nothing	→ Joining old pieces into something that was not there before

Intellect is the third word. In this book, intellect is **solving tasks where the variables are identified**, like a recipe with every amount listed. A variable is any part of a task that can change, such as an amount or a time.

Being good at tests and being creative **go together a little**. One study that combined 21 studies and 45,880 people found a link of r = .174 between intelligence and creativity (Kim, 2005). A newer one, with 112 studies and 34,610 people, put the link at r = .25 (Gerwig et al., 2021).

The letter r stands for a correlation, a number for **how strongly two things go together**. A correlation of 0 means no link at all, and 1 means a perfect match. Height and shoe size work this way. Across a crowd, tall people tend to have bigger feet, and you still meet tall people with small feet.

A link of .174 or .25 is **a loose one, with plenty of exceptions**. A top student can freeze in front of an open art task, and someone with middling school marks can fill a notebook with good inventions. Never judge your creativity from a test score.

Intelligence and creativity



21 studies and 45,880 people: r = .174



112 studies and 34,610 people: r = .25



A loose one, with plenty of exceptions

> **Science Says:**
>
> Some researchers proposed a threshold, a level of IQ that creativity needs before it can grow. IQ is **the score on an intelligence test**. Kim wrote, "This study does not support threshold theory" (Kim, 2005). Another team found thresholds "only for measures of creative potential but not for creative achievement" (Jauk et al., 2013). The question is still open.

A larger project of eight studies with 12,255 people found "a consistent pattern that supports the necessary-but-not-sufficient relationship" between the two (Karwowski et al., 2016). In plain words, **creativity needs some intelligence**, and intelligence alone does not bring creativity with it.

Innovation is the fourth word

Research into creativity	Innovation studies
⊕ The stage of idea generation	⊖ Also included the latter phase of idea implementation

> **Science Says:**
>
> Intellect and creativity **share some control skills**. One team found that "fluid intelligence was strongly predicted by updating, but not by shifting or inhibition. Creativity was predicted by updating and inhibition" (Benedek, Jauk, Sommer, et al., 2014). Fluid intelligence is reasoning through a new problem. Updating is swapping old information in your head for new, and inhibition is holding back an answer that jumps in early.

Innovation is the fourth word, and it begins **when the idea leaves your head**. A review of research in organisations noted that "research into creativity has typically examined the stage of idea generation, whereas innovation studies have commonly also included the latter phase of idea implementation" (Anderson et al., 2014). Implementation means putting the idea into use.



A chef in a white apron carrying a new dish on a tray from the kitchen into a full dining room.

A kitchen can hold all four words at once. Imagination pictures a dish nobody has cooked, and creativity cooks a new dish that tastes good. Intellect follows a recipe with every amount listed. Innovation is **the new dish on a restaurant menu**, served to everyone who walks in.

A kitchen can hold all four words



> **Key Concept:**
>
> Four words. Intellect is **solving tasks where the variables are identified**, and creativity is solving tasks where the variables are not identified. Imagination runs from "perceptual/motor related mental imagery" to "altered psychological states" (Abraham, 2016). Innovation is "a new or improved product or process" that is "made available to potential users" or "brought into use" (OECD & Eurostat, 2018).

The kitchen picture stops at real people, because a real mind **mixes all four jobs at once**, often within one minute at the fridge. Creativity leans on three partners as it works, and they are attention, memory and knowledge.

> **Science Says:**
>
> Memory and imagination draw on **the same store of past experience**. One review found that picturing a future event "requires a system that can draw on the past in a manner that flexibly extracts and recombines elements of previous experiences" (Schacter & Addis, 2007). It found "considerable overlap" between remembering the past and imagining the future.

Mednick described creative thinking **in terms of links between ideas**. He set out "three ways in which creative solutions may be achieved", naming them "serendipity, similarity, and mediation" (Mednick, 1962). A later team pictured his view as "flat" links that reach far and "steep" ones with "few, common associations" (Kenett et al., 2014). In their study, less creative people's memory networks looked more rigid.

Three ways creative solutions may be achieved



Memory can even be **warmed up before an idea task**. In one experiment, a short exercise aimed at memory for specific past events "enhances divergent creative thinking", the kind that produces many different ideas (Madore et al., 2015). A second experiment "replicated the specificity-induction effect on divergent thinking", though both measured a lab task over a short time.

Attention is the partner that **points the mind where it needs to look**. In one brain study, people either came up with new ideas or

recalled old ones (Benedek, Jauk, Fink, et al., 2014). The team called idea generation "a state of focused internally-directed attention involving controlled semantic retrieval", which means the mind turns its light inward and searches memory on purpose.

Attention can help in a second way, by **letting a little more of the world in**. In a study of 84 people, divergent thinking "was associated with selective sensory gating, whereas real-world creative achievement was associated with 'leaky' sensory gating" (Zabelina et al., 2015). Sensory gating is the brain's filter for sights and sounds, and a leaky one lets more through.

A study of 84 people

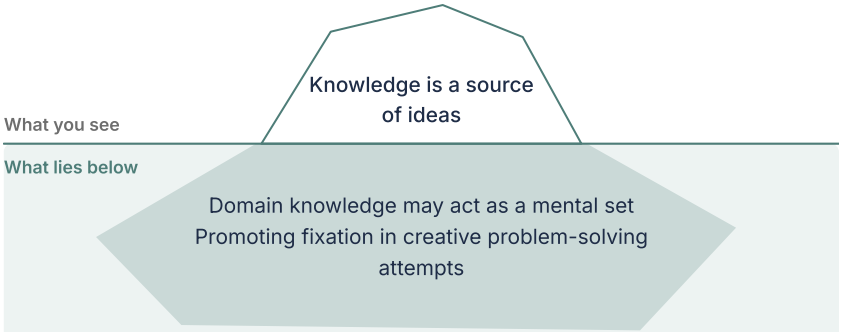
Divergent thinking	Real-world creative achievement
⊕ Selective sensory gating	⊖ Leaky sensory gating

> **Science Says:**
>
> The same team suggested that "leaky sensory gating may help people integrate ideas that are outside of focus of attention" (Zabelina et al., 2015). It was **one study of 84 people**, and it measured a link only. The two kinds of creativity it tested went in opposite directions.

Knowledge is the third partner. Amabile named "domain-relevant skills, creativity-relevant skills, and task motivation" as the parts creativity needs (Amabile, 1983). Domain-relevant skills are **what you know and can do in one field**, such as cooking or music. Cropley wrote that knowledge "is a source of ideas, suggests pathways to solutions, and provides criteria of effectiveness and novelty" (Cropley, 2006).

Knowledge has **a second edge**. In three experiments, Wiley found that "domain knowledge may act as a mental set, promoting fixation in creative problem-solving attempts" (Wiley, 1998). A mental set is a habit of seeing a problem one way, and fixation is getting stuck there. The study showed this only under certain conditions.

Knowledge has a second edge



Every creative job needs **two moves**. Cropley described creative thinking as "generation of novelty (via divergent thinking) and evaluation of the novelty (via convergent thinking)" (Cropley, 2006). Divergent thinking spreads out to many possible answers, and convergent thinking narrows them down to the best one.

> **Exercise:**
>
> Try it. In thirty seconds, name two uses for a spoon. Then name two more that nobody at your table would think of. It is a short form of the Alternate Uses Task (Haase et al., 2025).

You may notice that the first two ideas came easily and the last two took more stretching. Choosing **which of your four ideas would actually**

work is the convergent move. Cropley wrote of convergent thinking, “Both too little and too much is bad for creativity” (Cropley, 2006).

> **Key Concept:**
>
> Two moves. Divergent thinking **opens out**, finding many possible answers to one task. Convergent thinking closes in, judging those answers and keeping the best. Creative work swings between the two, first opening and then closing.

Back at the fridge



Attention picked out the eggs and the lemon

Memory brought back a dish you once ate

Knowledge told you that rice and egg cook well

Imagination pictured the plate

Back at the fridge, every partner had a job. Attention picked out the eggs and the lemon, memory brought back a dish you once ate, and knowledge told you that rice and egg cook well in one pan. **Imagination pictured the plate**, divergent thinking offered three ways to cook it, and convergent thinking chose one.

> **Exercise:**
>
> Spot the partners.
>
> 1. Pick one thing you made or fixed this week.
> 2. Write which partner helped most, **attention, memory or knowledge**.
> 3. Write one moment where imagination came in, and what it pictured.

4. Next time you make something, ask your weakest partner for help first, and note what changes.

Key idea:

Creativity, in the standard definition, makes something new that works, and it leans on attention, memory and knowledge to do it.

Something new that works

- It must be original
- It must be effective
- It leans on attention, memory and knowledge

Quick check:

What two tests must an idea pass to count as creative under the standard definition? Answer: it must be original, and it must be effective.

1.1.2 Definitions Through the Ages, and This Book's Definition

Ask a hundred people where a good new idea comes from, and you will hear a hundred answers. People have argued about it for more than two thousand years. **The oldest answer is that the idea is not yours at all.**

In Plato's dialogue Ion, Socrates calls a poet "a light and winged and sacred thing, and is unable ever to indite until he has been inspired and

put out of his senses" (Plato, 1925a). To indite is an old word for to write. On this view, **the poem arrives from outside**, and the poet is only the pipe it flows through.

Socrates on poets

P1

Plato, 1925a

- A light and winged and sacred thing
- Unable ever to indite until he has been inspired
- For not by art do they utter these things



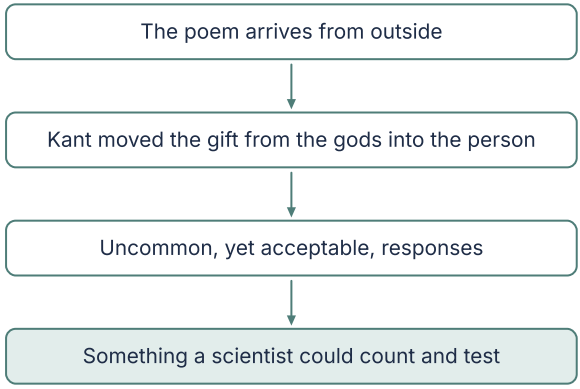
An ancient singer resting under an olive tree with his eyes closed, while a small winged figure hovers beside his ear.

A few lines later Socrates says of poets, "For not by art do they utter these things, but by divine influence" (Plato, 1925a). Art here means skill or craft. If the gift came from the gods, then **nobody could learn to be creative**, and nobody could get better at it with practice.

Over two thousand years later, the German philosopher Immanuel Kant moved the gift from the gods into the person. He wrote, "Genius

is the talent (or natural gift) which gives the rule to Art" (Kant, 1790/1914, § 46). For Kant, **a genius makes new rules that other people then follow**, and the gift is something you are born with.

Where the gift came from



In 1950, Guilford gave **an address to his fellow psychologists**. Runco and Jaeger write that he "is often credited with publishing the first compelling argument that creativity can be studied scientifically" (Runco & Jaeger, 2012). Guilford described novelty as "uncommon, yet acceptable, responses" (Guilford, 1950, as cited in Runco & Jaeger, 2012).

Uncommon means few people give that answer. Acceptable means the answer still has to make sense, so a random noise would never count. The gift from the gods had become **something a scientist could count and test**, and something an ordinary person could hope to grow.

> **Science Says:**
>
> Stein wrote, “The creative work is a novel work that is accepted as tenable or useful or satisfying by a group in some point in time” (Stein, 1953). He explained, “By ‘novel’ I mean that the creative product did not exist previously in precisely the same form” (Stein, 1953). Runco and Jaeger judged that Stein “was the first to offer the standard definition in an entirely unambiguous fashion” (Runco & Jaeger, 2012).

Tenable means **it holds up when people test it**. Stein tied the judgement to a group and a time, so a work that nobody accepts today might be accepted by a later group. A joke that makes one friend laugh and leaves everyone else cold has passed for that small group, at that moment.

Barron set a similar test. He wrote that an original response “must be to some extent adaptive to reality” (Barron, 1955, as cited in Runco & Jaeger, 2012). Adaptive to reality means **the idea has to work in the real world**, the way a bridge has to carry real lorries. A bridge made of jelly would be new, and it would fail his test on the first morning.

A bridge has to carry real lorries



An original response must be adaptive to reality



The idea has to work in the real world



A bridge made of jelly would fail his test

> **Key Concept:**
>
> The standard definition. Back in 1.1.1 you met the short form, and the full one names its two parts. "The standard definition is bipartite: Creativity requires both originality and effectiveness" (Runco & Jaeger, 2012). Bipartite means **in two parts**. Effectiveness "may take the form of (and be labeled as) usefulness, fit, or appropriateness" (Runco & Jaeger, 2012).

Runco and Jaeger say Barron and especially Stein "should be cited whenever the standard definition is used" (Runco & Jaeger, 2012). The definition is about seventy years old, and **it still holds the field today**.

A third test came later. Simonton built on "the three criteria used by the United States Patent Office" and wrote, "The modified version uses the criteria of novelty, utility, and surprise" (Simonton, 2012). **Surprise is the little jolt** you feel at an idea you could never have predicted.

Three lists of tests

	Stein (1953)	Simonton (2012)	Boden (2007)
New	A novel work	Novelty	New
Of value	Tenable or useful or satisfying	Utility	Valuable
And also	Accepted by a group	Surprise	Surprising

Boden gave a similar list, writing, "Creativity is the ability to come up with ideas or artefacts that are new, surprising, and valuable" (Boden,

2007). Artefacts are **things people make**, from a teapot to a computer program. Her last word does the job that effective does in the standard definition.

Definitions had piled up by the middle of the last century. In 1961, Rhodes gathered "forty definitions" of creativity and "sixteen of imagination" (Rhodes, 1961). He found that **they fell into four groups**, which he called the "four P's of creativity" (Rhodes, 1961).

> **Key Concept:**
>
> The four P's. A later writer listed them as "the 4 P's of creative expression: person, process, product, and press" (Glăveanu, 2013). Person is **the one who creates**, process is how the work gets made, and product is what comes out. Press is the world around the person, such as a home or a team.

Glăveanu proposed five A's in their place, "actor, action, artifact, audience, affordances" (Glăveanu, 2013). His list **brings in the audience**, the people who see and use the work. A song nobody ever hears is still waiting for its audience. An affordance is what a thing lets you do, the way a chair lets you sit or stand on it.

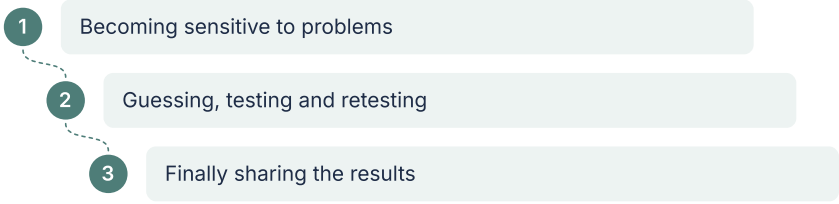
Lists in place of a definition

Rhodes: the four P's	Glăveanu: five A's
⊕ Person	⊖ Actor
⊕ Process	⊖ Action
⊕ Product	⊖ Artifact
⊕ Press	⊖ Audience
	⊖ Affordances

> **Science Says:**
>
> Torrance described creativity as a process that starts with "becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies" (Torrance, 1966, as cited in Alabbasi et al., 2022). The process then moves through guessing, testing and retesting, and **finally sharing the results**.

With so many lists, **the word stays loose**. Plucker and two colleagues warned of "the preponderance of myths and stereotypes about creativity" (Plucker et al., 2004). They wrote, "The root cause of these stereotypes is the lack of adequate precision in the definition of creativity" (Plucker et al., 2004). A clear definition gives practice a target you can aim at.

Torrance's creative process

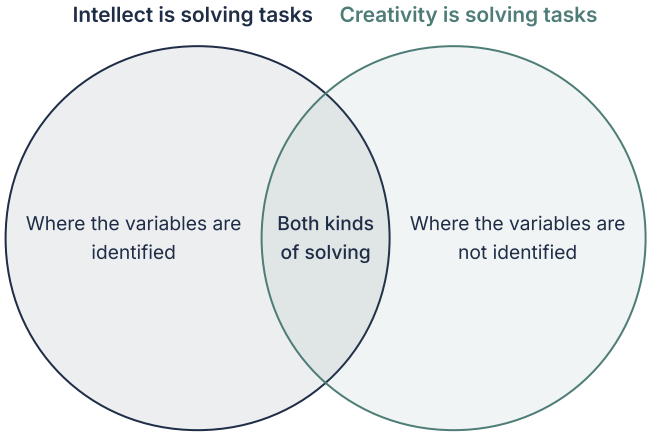


For training, I needed a definition **you can act on in a kitchen or an office**. This whole book uses the one below, and it tells you what to do next with any task in front of you. I built it with the definition of intellect, and the two belong together.

> **Key Concept:**
> This book's definition. Intellect is **solving tasks where the variables are identified**. Creativity is solving tasks where the variables are not identified. A variable is any part of a task that can change, such as an amount, a time, a place or a material. Thinking is not the same as intellect.

A daydream on a bus solves no task, and **you can think all day without solving anything**. In this book, intellect and creativity are both kinds of solving. The difference lies in how much of the task is handed to you.

Both kinds of solving



Picture two treasure maps. One has a red X, so you know where to dig and only need to plan the route. The other has no X at all, and part of your job is deciding **where the treasure might be** and what counts as treasure.

A birthday shows the definition at work. Planning a party with a fixed budget, a fixed guest list and a fixed menu is a task where **the variables**

are identified. Being told "make this birthday special" leaves the variables open, so your first job is to find them, from the place to the surprise.

The maps stop short of real life, where **most tasks sit somewhere between the two**. A jigsaw with the picture on its box is the identified kind. A box of loose pieces with no picture and a few pieces missing is the open kind, and many jobs at home and work look more like that box.



A half-built jigsaw with gaps in it on a low coffee table, loose pieces spilling from a lidless box, and a cat asleep nearby.

My definition sits closest to one idea in the science. Simon wrote, "The boundary between well structured and ill structured problems is vague, fluid and not susceptible to formalization" (Simon, 1973). A well structured problem **has its variables set**, so my line follows his, and like his it is a sliding scale with grey cases in the middle.

> **Science Says:**
>
> One study watched "31 advanced art students" set up objects and draw a still life (Csikszentmihalyi & Getzels, 1971). The authors reported, "A positive relationship was found between discovery-oriented behavior at the problem-formulation stage and the originality (but not the craftsmanship) of the creative product". Students who **explored more while setting up their problem** made more original drawings. The study measured a link, and the drawing skill itself showed no such link.

It parts from the science in two places



Boden: an aspect of human intelligence in general



Judging ideas is the second place



The task line is my own

> **Science Says:**
>
> Guilford wrote, "I believe that creativity and creative productivity extend well beyond the domain of intelligence" (Guilford, 1950). He added, "Examination of the content of intelligence tests reveals very little that is of an obviously creative nature" (Guilford, 1950). He saw **creativity reaching past what intelligence tests measure**.

Guilford's point is that creativity reaches beyond intelligence. **The task line is my own**, and it parts from the science in two places. Boden calls creativity "not a special 'faculty', but an aspect of human intelligence in general" (Boden, 2007). In 1.1.1 we saw tested intelligence and

creativity overlap a little, which fits **two partners that share some skills** better than one single ability.

Judging ideas is the second place, and judging sits close to what I call intellect. Cropley puts an evaluation step inside creative work (Cropley, 2006). A study that combined many training studies found that convergent training, which trains judging, worked better than divergent training (Haase et al., 2025). **The judging step belongs in creative training**, so this book trains both.

Table: Definitions through the ages

Source	Main idea
Plato (1925a)	Poets speak "by divine influence"
Kant (1790/1914, § 46)	Genius "gives the rule to Art"
Guilford (1950, as cited in Runco & Jaeger, 2012)	"uncommon, yet acceptable, responses"
Stein (1953)	A novel work accepted by a group
Runco & Jaeger (2012)	Original and effective
Boden (2007)	"new, surprising, and valuable"
This book	Solving tasks where the variables are not identified

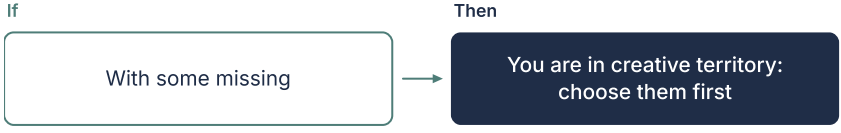
> **Exercise:**
>
> Try it. Take one task with every fact given, such as a recipe. Remove one fact and notice how the task opens up.

Identified or not identified

	The variables are identified	The variables are not identified
Treasure maps	One has a red X	The other has no X at all
A birthday	A fixed budget, a fixed guest list and a fixed menu	"Make this birthday special"
A jigsaw	A jigsaw with the picture on its box	A box of loose pieces with no picture

The standard definition **judges the product**, the thing you made, once it exists. My definition looks at the task before you start, and asks how much of it is given. The two stand side by side, and this book uses both.

When a task feels stuck



When a task feels stuck, **count its missing variables** before you start. With none missing, follow the steps. With some missing, you are in creative territory, and your first job is to choose them.

Exercise:

Name the variables.

1. List six tasks from your week.
2. Mark each one "variables identified" or "variables not identified".
3. Pick one marked "variables not identified" and write three things that could change in it.
4. Choose one of those, try it, and note **what you found**.

Key idea:

In this book, intellect solves a task once its variables are identified, and creativity works where they are not, so part of the work is finding them.

Quick check:

Is planning a party with a fixed budget, guest list and menu a task for intellect or for creativity in this book? Answer: intellect, because its variables are identified.

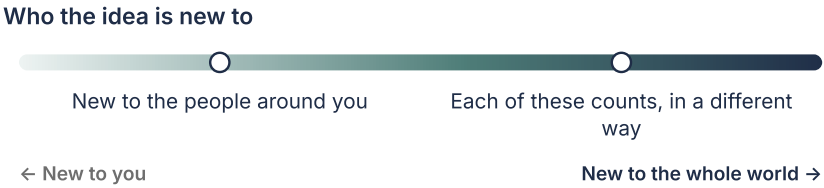
Part of the work is finding them

- Variables identified: intellect
- Variables not identified: creativity
- Count its missing variables

1.1.3 Everyday Creativity, Expression and Invention: New to You or New to Others

You find a new way to fold a fitted sheet, the kind with elastic round the corners. For years it came out as a lumpy ball, and today it is a neat square. Millions of people may have found the same trick before you. **Whether your fold counts as creative is a real puzzle**, and scientists have an answer.

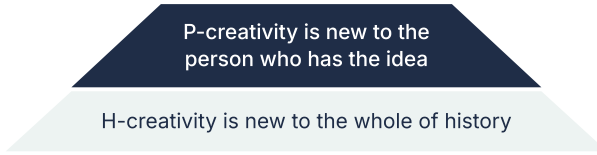
The answer depends on **who the idea is new to**. An idea can be new to you, new to the people around you or new to the whole world. Each of these counts, in a different way.



Boden split creativity into two kinds. She wrote, "P-creativity involves coming up with a surprising, valuable idea that's new to the person who comes up with it. It doesn't matter how many people have had that idea before" (Boden, 2007). **Your fitted sheet fold is P-creative**, because it was new to you.

H-creativity is the rarer kind. An idea is H-creative when "(so far as we know) no-one else has had it before: it has arisen for the first time in human history" (Boden, 2007). Boden wrote that she would "make a distinction between 'psychological' creativity and 'historical' creativity" (Boden, 2007). In her terms, **P means psychological and H means historical**.

New to whom



> **Key Concept:**
>
> New to you, new to others. P-creativity is **new to the person** who has the idea, however many people had it first. H-creativity is new to the whole of history. Boden adds, "H-creativity is a special case of P-creativity" (Boden, 2007), because every idea that is new to history was first new to the one person who had it.

In 1.1.2 you met Boden's test for a creative idea. The P and H split answers the next question, which is **new to whom**. Both kinds pass her test, and only the size of the audience changes.



A small boy crouched beside a red tricycle, turning a tiny screwdriver on its silver bell while his dog watches.

Stein used a small story to make the same split. A child fixes the bell on a tricycle in a way that is new to him (Stein, 1953). **The experience is creative for the child**, even though the product is nothing new to the adults around him.

A small story

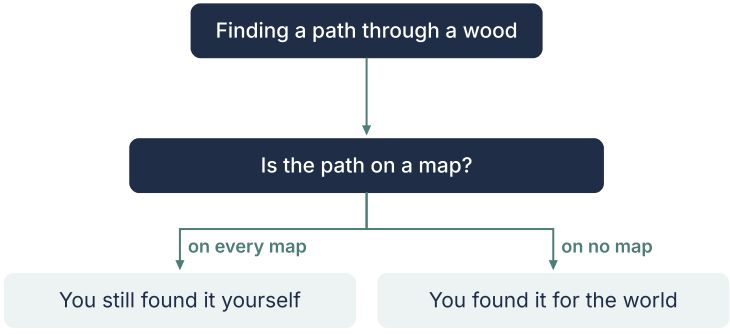
S1

Stein, 1953

- A child fixes the bell on a tricycle
- In a way that is new to him
- The experience is creative for the child

Finding a path through a wood works the same way. If the path is on no map, you found it for the world. If it is on every map and you never saw one, **you still found it yourself**, and the walk taught you the same things about roots and mud.

Finding a path through a wood



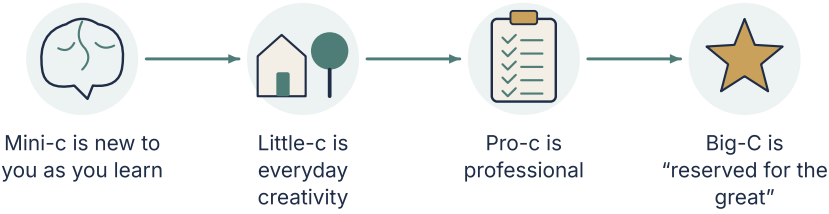
The path picture stops at what happens next. A path on no map can change how everyone walks, so **the world notices H-creativity** in a way it rarely notices yours. For your own practice, the walk is what counts.

Creativity comes in sizes, like football. A kick about in the park, a Sunday league, a professional club and a cup final are **the same game at four sizes**. Nobody says the kick about is not football. The ball and the rules stay the same, and only the crowd changes.

Kaufman and Beghetto gave creativity four sizes in the same way. Big-C is "reserved for the great" (Kaufman & Beghetto, 2009), the work that changes a field for everyone. Pro-c is "the developmental and effortful progression beyond little-c that represents professional-level expertise in any creative area" (Kaufman & Beghetto, 2009). Put simply, **Pro-c is the skill of an expert in a creative field**, built with effort.

Little-c is everyday creativity, and it "can be found in nearly all people" (Kaufman & Beghetto, 2009). Mini-c is the smallest size. It "refers to the creative processes involved in the construction of personal knowledge and understanding" (Beghetto & Kaufman, 2007). In plain words, **mini-c is learning something in your own way**.

The Four C model



> **Key Concept:**
>
> The Four C model. Mini-c is **new to you as you learn**, like a cook who first works out why onions go sweet. Little-c is everyday creativity, like a home cook's new supper. Pro-c is professional, like a chef's new menu. Big-C is "reserved for the great" (Kaufman & Beghetto, 2009), like a dish that changes how a whole country eats.

Most of the practice in this book happens at the two smaller sizes, because **those are the sizes you can reach every day**. A mini-c moment can be as plain as finally seeing why a cake recipe asks for baking powder, worked out in your own kitchen. Researchers who study everyday creativity look at the same ordinary days you live.

> Definition:
>
> **EVERYDAY CREATIVITY:** "creative actions that are common among ordinary people in daily life, such as drawing, making recipes, writing, and any activity done with the purpose of being creative" (Silvia et al., 2014).

One team checked in with young adults at random moments across a week. They found that "people who reported feeling happy and active were more likely to be doing something creative at the time" (Silvia et al., 2014). **Openness to experience**, which means enjoying new ideas, and conscientiousness, which means being careful and organised, "had large effects".

Moods and creative activity

Feeling happy and active	Feeling low or tense
⊕ More likely to be doing something creative	⊖ Did not reliably predict creative activity

> Exercise:
>
> Try it. Write down one thing you did this week that was new to you, however small.

The same team looked at bad moods. Feeling low or tense, and the worrying side of personality, did not reliably predict creative activity in

their data (Silvia et al., 2014). **Low moods were no ticket to creative work**, which sits awkwardly with the old picture of the tortured artist.

Thirteen days of diaries

More creative activity than usual → Higher activated PA and flourishing

A second team asked 658 young adults to keep a diary for 13 days (Conner et al., 2018). People "felt higher activated PA and flourishing following days when they reported more creative activity than usual". PA stands for positive affect, which means **good feelings**, and activated ones are lively, like feeling full of energy.

> **Science Says:**
> The same team wrote, "The other direction ... was not supported" (Conner et al., 2018). Feeling good one day did not predict more creative activity the next. The study **found a link over time**, and a link like this one cannot prove that being creative makes people feel better.

Creative work points two ways, and both count. **Expression** says something, like a song or a story. Invention makes something work, like a tool or a fix. A birthday poem is expression, and a homemade rack for muddy boots is invention.

Expression and invention

	Expression	Invention
What it does	Says something	Makes something work
Like	A song or a story	A tool or a fix
The test	A song only has to move its listeners	A new tin opener has to open tins

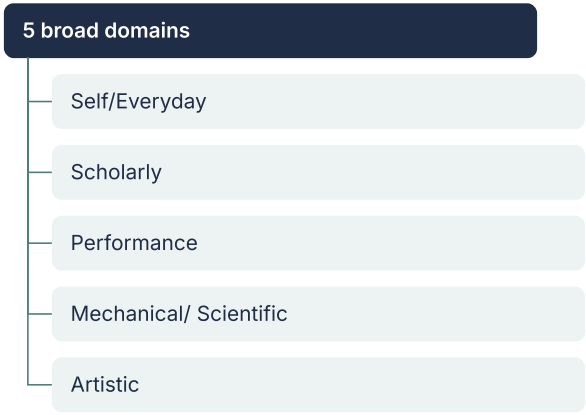
Inventions often face a stricter test than songs. The United States Patent Office judges an invention on three criteria, and Simonton borrowed them for his own definition of creativity (Simonton, 2012). **A song only has to move its listeners**, while a new tin opener has to open tins.



A teenage girl playing a guitar on a back step while her younger brother takes apart an old radio on the grass beside her.

When Kaufman asked students about their own creativity, "2,318 college student responses led to 50 items and 5 broad domains" (Kaufman, 2012). The domains were "Self/Everyday, Scholarly, Performance (encompassing writing and music), Mechanical/ Scientific, and Artistic" (Kaufman, 2012). **Artistic and scientific creativity sit in separate domains**, which fits the split between expression and invention.

5 broad domains



Another questionnaire, the Creative Achievement Questionnaire, "assesses achievement across 10 domains of creativity" (Carson et al., 2005). When the team looked for families among the domains, one answer was "Expressive, Scientific, and Performance" and another was "an Arts factor and a Science factor". **Arts and science keep turning up as two families.**

> **Key Concept:**
> Expression and invention. Expression **says something**, through words or music. Invention makes something work, through tools and fixes. Research on creative domains keeps finding an arts family and a science family, so practice in one may not carry over to the other.

Baer argued that "creativity trainers would be wise to assume that creativity is domain specific" (Baer, 1998). Domain specific means **skill in one field may not carry over to another**. His own summary says "More research is needed to settle this issue", so for now, practise in the field you care about.

Domain specific



> **Science Says:**
> A newer questionnaire, the ICAA, "provides independent scales for the frequency of engagement in everyday creative activity and the level of creative achievement across 8 creative domains" (Diedrich et al., 2018). It was tested on an "overall N = 1,566", where N is **the number of people**. The team found that "the assessment of creative activity is particularly suited for Little-C creativity".

Activity is **how often you do something**, such as baking or writing songs. Achievement is what it has brought you, such as a prize or a sale.

Most of us have plenty of activity and little achievement, and the ICAA counts both separately.

A study that combined 26 studies with 8,189 people found a link of r = .14 between creativity and well-being (Acar et al., 2021). On that scale, **.14 is a small link**.

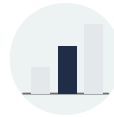
Creativity and well-being



26 studies with 8,189 people: r = .14



Creative activity and behavior: r = .22



Divergent thinking tasks: r = .06

> **Science Says:**
>
> The link was "significantly higher when creativity was measured by instruments focusing on creative activity and behavior (r = .22) than the divergent thinking tasks (r = .06)" (Acar et al., 2021). **Doing creative things** went with feeling well more than scoring on idea tests did. These are correlations, and they cannot prove that making things causes happiness.

Of all the kinds in this section, **the everyday kind shows the clearest link with feeling well**. It is the kind you can practise this afternoon, with whatever is in front of you, and every small first you notice is a rep in the gym.

Exercise:

A week of small firsts.

1. Each day for a week, do one ordinary thing a new way, such as your walk to the shops or your breakfast.
2. Write it down in one line.
3. Mark each one “new to me” or “maybe new to others”.
4. At the end of the week, pick the one you liked most and **take it one step further**.

Key idea:

An idea can be new to you or new to everyone, and **everyday creativity is where practice begins.**

Where practice begins

- New to you
- New to everyone
- Everyday creativity is where practice begins

Quick check:

If you find a trick that millions found before you, is it P-creative or H-creative? Answer: P-creative, because it is new to you.

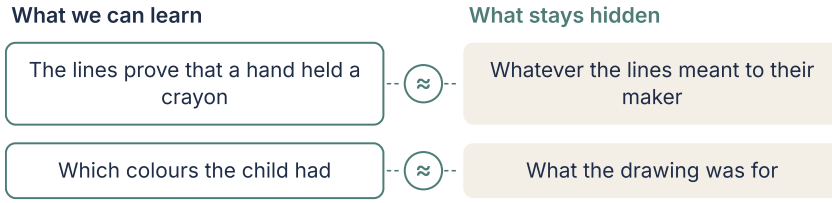
1.2.1 From Early Tools, Images and Stories to the First Writers on Creativity

Someone in a cave on the South African coast once drew crossing lines on a small stone flake with a crayon of ochre, an earthy pigment. The flake lay in layers about 73,000 years old (Henshilwood et al., 2018). One puzzle keeps pulling me back, **how much a few lines tell us** about the hand that drew them.

The cave is called Blombos, and the drawing is **an abstract pattern**, like the shading in a pencil sketch. It shows no animal and no person. Its finders say it comes before the earliest abstract and figurative drawings known until then "by at least 30,000 years" (Henshilwood et al., 2018). Figurative means showing a figure, such as a person.

An old object can show a skill, and **its meaning is always our guess**. The lines prove that a hand held a crayon and moved it with care. Whatever the lines meant to their maker was lost when the maker was gone.

The find and the guess



Imagine finding a child's drawing folded in a box in an attic, with no name and no date on it. You can learn a lot from the paper, such as which colours the child had and how hard the crayon pressed. **What**

the drawing was for, a present or a game, stays hidden unless someone wrote it down.

> **Key Concept:**
> The find and the guess. The find is **what was dug up and dated**, such as a drawn flake from layers about 73,000 years old. The guess is what people say it meant. Careful readers of the past keep the two apart, and you can do the same whenever you read about old objects.

The same cave held older pieces. Researchers reported "thirteen additional pieces of incised ochre" from layers about 75,000 to 100,000 years old (Henshilwood et al., 2009). Incised means cut with lines. The team argued that **"symbolic intent and tradition were present"**, and that is their reading of the finds.

The scratches are facts you could hold. **The word "symbolic" is the finders' choice**, and it means the marks stood for something beyond themselves. Thirteen pieces from layers spread over a long stretch of time make a pattern that lasted, which is why the team spoke of tradition.

The facts and the reading



Thirteen pieces of incised ochre



From layers spread over a long stretch of time



'Symbolic' is the finders' choice

Making things is far older than drawing. At Kokiselei 4, in West Turkana in Kenya, **shaped hand axes** of a kind called Acheulian

pushed the first known date for this tool back to 1.76 million years ago (Lepre et al., 2011). The Acheulian is “characterized by shaped bifacial stone tools”, stones worked on both faces into a set form.

Shaping a hand axe

1. Hold the finished shape in mind
2. Knock off flakes from both sides
3. Until the stone matched it

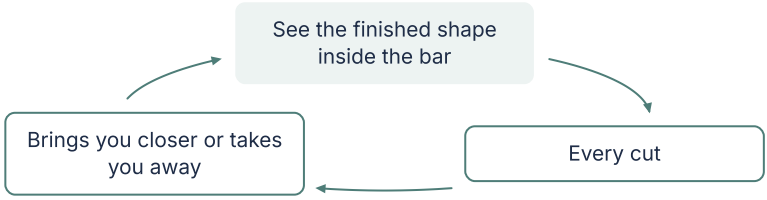
A shaped hand axe asks a lot of its maker. **The maker had to hold the finished shape in mind** and knock off flakes from both sides until the stone matched it. Tools of another style, called Oldowan, lay at the same site (Lepre et al., 2011), so two ways of working stone were in use there together.



A chipped stone hand axe lying on pale sand next to a smaller rough flake and a round hammer stone.

You can feel the same job with a bar of soap and a blunt knife. Before the first cut, you have to **see the finished shape inside the bar**, perhaps a fish, and every cut brings you closer or takes you away. The stone workers at Kokiselei had the same problem to solve.

Every cut



> **Exercise:**
> Try it. Press a fingertip into some flour and draw one pattern. Ask a friend what it means.

Many people imagine one sudden spark, a single moment when humans began to make art and music. McBrearty and Brooks argued against that picture, and **their case rests on finds** spread across a very long time and a whole continent.

> **Science Says:**
> Their paper makes the case for "a gradual assembling of the package of modern human behaviors in Africa" (McBrearty & Brooks, 2000). In their view, **the idea of a sudden revolution** "stems from a profound Eurocentric bias", a habit of reading the human story mainly from finds in Europe. Their paper is one well-argued position.

A big river grows in a similar way. It forms from many small streams, and **nobody can point to the one drop** where the streams turned into a river. The picture has a limit, because finds from the deep past are patchy, so our map of the river has wide gaps in it.

A sudden spark or a gradual assembling

One sudden spark	A gradual assembling
A single moment when humans began to make art and music	Finds spread across a very long time Many small streams form a river

Music leaves fewer traces than stone, and a few have survived. In caves in southwestern Germany, among them Hohle Fels, researchers found **flutes made of bone and ivory** (Conard et al., 2009). The flutes, they wrote, show "a well-established musical tradition at the time when modern humans colonized Europe, more than 35,000 calendar years ago".

A flute is hard to get right. Its holes have to sit in the right places along the tube, or the notes come out sour. A tradition means **know-how passed from one player to the next**, so whatever those first makers learned by trying did not die with them.

Some caves carry images on their walls. At the decorated cave of Chauvet-Pont d'Arc in France, a team gathered more than 350 dates, 259 of them by radiocarbon, a method that reads the age of old plant and animal remains (Quiles et al., 2016). The dates show **two separate periods** when people used the cave.

The first period ran from about 37,000 to 33,500 years ago, and the second from about 31,000 to 28,000 years ago (Quiles et al., 2016).

Between them lies a gap of about 2,500 years. **People came back to the same cave** after a very long time away.

Finds and their dates

1.76 million years ago	shaped hand axes
75,000 to 100,000 years	incised ochre
About 73,000 years old	the Blombos drawing
37,000 to 33,500 years	the first Chauvet period
More than 35,000 years	bone and ivory flutes

Some of the oldest known images come from Indonesia. On Muna Island, off Sulawesi, a hand stencil in the cave of Liang Metanduno is **at least 67,800 years old**, among the oldest known (Oktaviana et al., 2026). A stencil is made by spraying or dabbing paint around a hand held on the rock, so its outline stays behind.

Some of the oldest known images



Look closely at the words “at least”. Dates for Sulawesi art come from **mineral crusts that grew over the images** (Aubert et al., 2014), so the paint is older than the crust by some unknown amount. The first study there gave a minimum of 39,900 years, and a minimum age can never prove a picture was the first.

Science Says:

Other caves on Sulawesi gave other minimum ages. A painted pig in Leang Tedongnge has a "minimum age of 45.5 ka" (Brumm et al., 2021), where ka means thousand years. A scene in Leang Karampuang was "Painted at least 51,200 years ago" (Oktaviana et al., 2024). Each new date **pushed the minimum further back**, and each one is still only a minimum.

Key Concept:

Reading a date. Many old dates are **ages of layers or of visits**. The Blombos ages come from the layers the finds lay in (Henshilwood et al., 2018). At Lascaux, new dates place people in the cave about 21,500 to 21,000 calibrated years ago, meaning corrected to calendar years, and the link to the paintings lies outside that study (Ducasse & Langlais, 2019). A date answers when, and every guess about meaning stays a guess.

Stories leave no trace at all, so scientists have to learn about them another way. Wiessner listened to **Ju/'hoan people talking by day and at night** and compared the two (Wiessner, 2014).

Each new date pushed the minimum further back



A minimum of 39,900 years



A minimum age of 45.5 ka

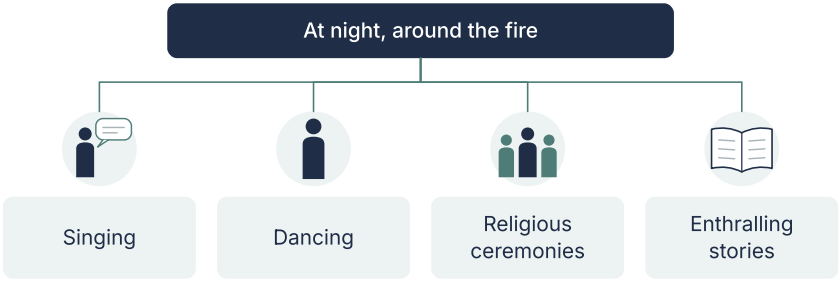


Painted at least 51,200 years ago

At night, around the fire, the talk changed. It turned "to singing, dancing, religious ceremonies, and enthralling stories" (Wiessner,

2014). **Her study is of one people living today**, so it is a model for the deep past and no direct record of it.

At night, around the fire





A small circle of people round a fire under a starry sky, one of them telling a tale with open hands while the others lean in.

Your own home can test the idea. Daytime talk at most kitchen tables runs to plans and chores, and **the stories tend to come out after dark**. A story is a made thing, like a flute or a hand axe, and anyone can make one with no tools.

A story is a made thing



Like a flute



Or a hand axe



Anyone can make one with no tools

> **Science Says:**
>
> Wiessner's study used **174 conversations and 68 translated texts** from one group of people (Wiessner, 2014). It shows what firelight talk is like among the Ju/'hoan today, and it cannot show what people said round fires many thousands of years ago.

Making went on long after the caves. In the Americas, at the Xihuatoxtla shelter in the Central Balsas River Valley of Mexico, starch grains and phytoliths, tiny bits of plant silica, "indicate that maize was present by 8,700 calendrical years ago" (Piperno et al., 2009). **Growing a crop is making stretched over many lifetimes**, and nobody signs the result.

Far away in the Pacific, a study of "1,434 radiocarbon dates" put **the earliest settlement of East Polynesia** in the Society Islands at about AD 1025 to 1120 (Wilmshurst et al., 2011). People then spread "in one major pulse to all remaining islands" at about AD 1190 to 1290.

Reaching islands scattered across open ocean meant **building boats and finding the way** over huge distances, and that is making on a very large scale. The dates are one team's reading of the evidence, and the speed they show is part of their argument.

Back in Africa, the Nok terracottas of Nigeria are figures of baked clay, which Breunig and Ameje describe as the oldest figurative art of Africa

south of the Sahara (Breunig & Ameje, 2006). Their article follows **a Nigerian craftsman making a copy** of one figure.

A copy is a way in. To rebuild an old figure, a maker has to **work out each step the first maker took**, from shaping the clay to baking it hard. The copy teaches the hands what the eyes alone would miss.

A copy is a way in



Making happened at the size of whole towns. UNESCO says Great Zimbabwe was "built between 1100 and 1450 AD" and calls it **a "unique artistic achievement"** (UNESCO World Heritage Centre, n.d.). Finds there include "glass beads and porcelain from China and Persia, and gold and Arab coins from Kilwa".

Making after the caves



Each of those goods was made somewhere else, by someone else. **Every made object carries its making with it**, for anyone who looks closely at how it was put together.

> **Key Concept:**
> Making before writing. Tools, drawings, flutes, stories, clay figures and stone walls were **all made long before anyone wrote** a theory of making. The skill came first, and the words about it came very late.

Two Greek writers gave early answers about where a poem comes from. Plato gave the credit to the Muses, the goddesses of the arts. In the Phaedrus he writes that **"a third kind of possession and madness comes from the Muses"** (Plato, 1925b).

He goes further, and warns that "he who without the divine madness comes to the doors of the Muses, confident that he will be a good poet by art, meets with no success" (Plato, 1925b). **For Plato, skill alone could not make a poet**, and the spark came from outside. His Ion makes a close point about poets (see 1.1.2).

If Plato were right, practice would be **a waste of your evenings**, since the gift either comes or it does not. Every exercise in this book bets on a different answer, and the next writer gave it.

If Plato were right

If Plato were right	Every exercise in this book
⊕ The gift either comes or it does not	⊖ Bets on a different answer
⊕ Practice would be a waste of your evenings	

Aristotle saw the poet's work in another light. In the Poetics he sets poetry beside history, where **"one tells what happened and the other**

what might happen" (Aristotle, 1932). He judged that "poetry is something more scientific and serious than history".

Two first answers

	Plato	Aristotle
Where a poem comes from	From the Muses	The poet's own making of stories
The poet	Skill alone could not make a poet	The poet was a maker

Poetry beside history

History	Poetry
⊕ Tells what happened	⊖ What might happen ⊖ Something more scientific and serious than history

For Aristotle, the poet was a maker. He wrote that "the poet must be a 'maker' not of verses but of stories, since he is a poet in virtue of his 'representation,'" and the stories are the made thing (Aristotle, 1932). Representation here means **showing life as it might be** in a made thing such as a play.

> **Key Concept:**
>
> Two first answers. Plato put the source of a poem **outside the poet**, in the Muses. Aristotle put it in the poet's own making of stories about what might happen. A story about what might happen has no fixed answer, and its variables are still open, which is where creativity works.

Put the whole road together and one lesson stands out. Long before the first theory, people made tools, drawings, flutes, stories, figures and walls, and **each skill grew in small steps**. You can learn to create the same way, by making first and explaining later.

Each skill grew in small steps

- Tools
- Drawings
- Flutes
- Stories
- Figures and walls

> **Exercise:**
>
> Make it the old way.
>
> 1. Tell a short story to someone **with no notes**, in three minutes or less.
> 2. Draw one scene from it with the plainest tool you have, such as a pencil.
> 3. Make a simple sound pattern to go with it by clapping or tapping.

4. Write which of the three felt easiest and which felt new. Repeat the newest one tomorrow and note what changed.

Key idea:

People made tools, images, music and stories **long before anyone wrote about creating**, and the skill grew slowly.

Quick check:

What did Plato say a poet needs besides skill? Answer: the “divine madness” that comes from the Muses.

Making first, explaining later

People made tools, images, music and stories → Long before anyone wrote about creating

1.2.2 How People Trained and Measured Creativity Through Craft, Play and Learning

Imagine starting work in a small bakery, where for your first month you make one loaf. Every morning you shape it the way the head baker does, and every morning he points at what is wrong. **Copying seems like the opposite of creating**, and yet a year later your own breads could be the best in the shop.

Copying seems like the opposite of creating

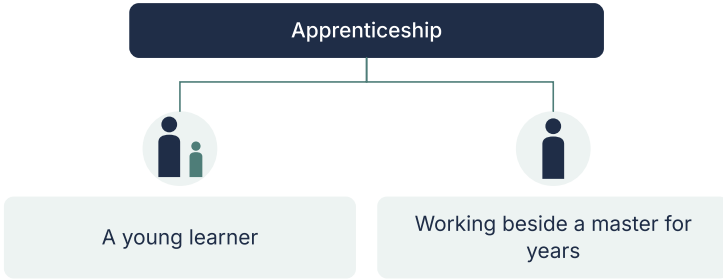
For your first month	A year later
⊕ You shape one loaf the way the head baker does	⊖ Your own breads could be the best in the shop



A young baker in a floured apron shaping a round loaf at a wooden counter while an older baker watches with folded arms.

Copying first is one of the oldest ways people trained new makers. The old name for it is **apprenticeship**, a young learner working beside a master for years. In this section I follow that line from the workshop to the playroom to the test sheet, and then look at what the numbers say about training.

The old name for it

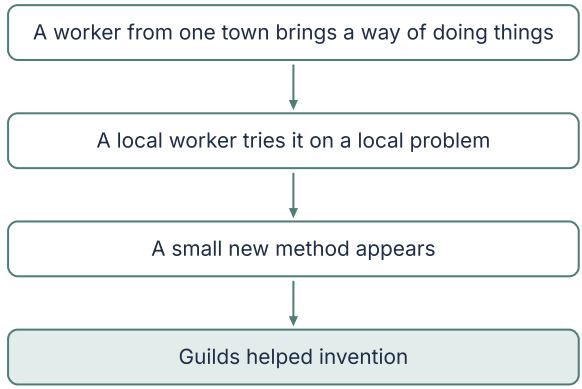


In medieval Europe, many trades were run by guilds, clubs of master craftsmen who set the rules of a trade. The economic historian Epstein argues that "medieval craft guilds emerged in order to provide transferable skills through apprenticeship" (Epstein, 1998). **Transferable skills** are skills a worker could carry from one workshop to another.

Picture a young joiner finishing his years with a master and setting off with his tools on his back. **What he learned in one workshop could travel** to the next town, and he would pick up a trick or two on the way. That road is the thread Epstein follows next.

Epstein makes a second point I like even more. Guilds, he argues, "contributed to technological invention by stimulating technical diffusion through migrant labor" (Epstein, 1998). In plain words, **trained workers moved from town to town**, and their tricks moved with them.

A trick that travels



> **Science Says:**
>
> Epstein writes as an economic historian, so his case about guilds is **an argument from history** (Epstein, 1998). It explains why guilds trained apprentices and how skills spread between towns. It does not measure how creative any apprentice became.

A trick that travels meets new hands. A worker from one town brings a way of doing things, a local worker tries it on a local problem, and **a small new method appears** that neither had before. Epstein's point is that guilds helped invention through this kind of spread.

A family recipe passed between neighbours changes in a similar way. One kitchen adds a little garlic, the next swaps the herbs, and after a few houses **the dish has become a new one**. Nobody set out to invent it, and yet each cook copied first and then changed one thing.

> **Key Concept:**
> Copy, then vary. An apprentice copies a master's work until the hands know it, then **changes one thing at a time** until the work becomes their own. The copy builds skill, and the change is where something new starts. A guitar learner who plays a song note for note, then alters one line, is doing the same thing.

You can see the pattern in the bakery scene. You copy one loaf for a month, then add seeds, then change the flour. **Each change is small**, and each rests on the skill the copying has built.

Copy, then vary

Copy	Then vary
You copy one loaf for a month	Then add seeds Then change the flour

Copying works for a simple reason. While you copy, **your hands and eyes learn the parts** of a thing, and once you know the parts you can move them around. A learner who has never copied a loaf has no loaf to change. Musicians learn other people's songs before writing their own for the same reason.

> **Exercise:**
> Try it. Copy a simple doodle from any page, then change one thing about it. Notice which part feels like yours.

Children seem to invent all day long. A box becomes a ship, a stick becomes a horse, and a sofa becomes a mountain. Many parents and

teachers hope that **pretend play builds creativity**, and the hope is easy to share.

Children seem to invent all day long

A thing	Becomes
A box	A ship
A stick	A horse
A sofa	A mountain



Two small children kneeling behind an upturned cardboard box as a shop counter, one passing a handful of shiny buttons to the other while teddies sit in a queue.

A review of the research looked hard at that hope. Lillard and her colleagues wrote that for creativity and some other abilities, “inconsistent correlational results from sound studies and nonreplication with masked experimenters are problematic for a causal position” (Lillard et al., 2013). **The trouble was mixed results** in good studies.

The hope and the review

The hope	The review
⊕ Pretend play builds creativity	⊖ Existing evidence does not support strong causal claims

Their summary was blunt, saying that "existing evidence does not support strong causal claims about the unique importance of pretend play for development" (Lillard et al., 2013). **A claim of cause says one thing makes another happen**, and that is the claim the review could not back.

> **Science Says:**
> Lillard's team found that studies on play and creativity gave mixed results, and **some findings vanished** when the experimenters did not know which children were in which group (Lillard et al., 2013).

A masked experimenter is **someone who does not know** which children got the special treatment. When the adults were kept in the dark, some of the effects of play went away.

None of this makes play bad. Play is worth doing for its own joy, and the review only says **the evidence for a causal link is weak**. For adults, the safer lesson is to train creative skills directly and enjoy play as play. A child building a cardboard castle is having a good afternoon either way.

Training needs a way to tell whether it worked, and creativity is hard to measure. After Guilford's 1950 address (see 1.1.2), **tests followed in the 1960s**, among them Mednick's test of remote links between ideas (Mednick, 1962).

The Torrance Tests of Creative Thinking were first published in 1966 (Alabbasi et al., 2022). Each test gave researchers **something people could do on paper**, so a score taken before training could be set beside a score taken after.

Tests followed



> **Key Concept:**
>
> Measuring creativity. A test takes **a fuzzy ability and turns it into a task** with a score. Every test catches only part of the ability, the way a bathroom scale tells you your weight and nothing about your strength. Scores are useful for comparing training methods, and they never give the full picture of a person.

Many people work on ideas in groups. One careful study found that "production blocking accounted for most of the productivity loss of real brainstorming groups" (Diehl & Stroebe, 1987), which means **waiting your turn to speak** costs ideas.

Real brainstorming groups



The best way to judge training is to collect many training studies and look at them together. Scott, Leritz and Mumford did this with 70 studies, and wrote that "well-designed creativity training programs typically induce gains in performance" (Scott et al., 2004). **The words "well-designed" carry weight** in that sentence.

Collect many training studies



> **Science Says:**
>
> The better programmes, Scott's team found, "focus on development of cognitive skills and the heuristics involved in skill application, using realistic exercises" (Scott et al., 2004). A heuristic is a rule of thumb, such as listing ten ideas before you judge any. Realistic exercises look like real tasks, such as a teacher redesigning **next week's actual lesson**.

Imagine two classes running the same course every week. One class trains with a coach, and the other just runs, which makes it **the control group**, the group used for comparison. Runners in each class are spread out, some fast and some slow, so a single runner tells you little.

An effect size compares the two classes against that usual spread. An effect of about 0.5 means the trained class's average runner finishes

about half the usual spread ahead of the other class's average runner. Ma notes that 0.5 is "the medium (0.5) of Cohen's guidelines" (Ma, 2009).

An effect of about 0.5



The control group, the group used for comparison



The trained class



About half the usual spread ahead

> **Key Concept:**
>
> Effect size. An effect size shows **how big a difference is** compared with the normal spread between people. In the running picture, it is how far ahead the trained class runs, measured in units of the usual gap between runners. A medium effect is easy to see, and plenty of slow runners in the trained class still finish behind fast runners in the other.

The running picture has a limit. **An average says nothing certain about you**, because some programmes help a lot and others very little. Gains on average from well designed programmes are **a good reason to train** (Scott et al., 2004), and a poor reason to expect a miracle.

Try a small version of this test on yourself. **Keep a record of your tries**, such as how many ideas you list in five minutes each Monday, and compare the first week with the sixth. A record is no study, and it still shows you whether your own training is moving.

Training tends to stay close to what you practised (Thorndike & Woodworth, 1901). Drawing a hundred chairs makes you **better at**

drawing chairs first. The way round this is to practise on tasks like the ones you care about, which matches the realistic exercises in the better programmes.

Three old roads



Put the three old roads together. Craft taught by copying and changing, play gave children room to try, and tests let researchers check whether training helped. **Your own practice can borrow from all three**, by copying a good model, changing it bit by bit and checking what improved.

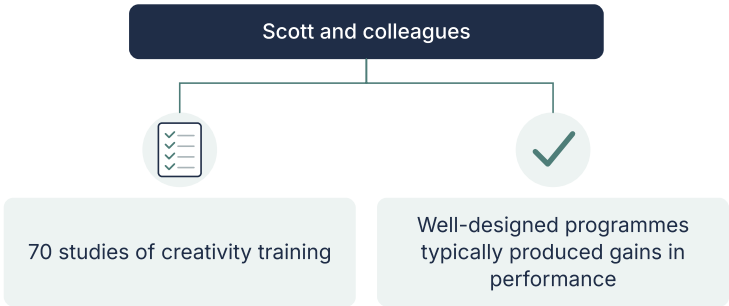
> **Exercise:**
>
> Copy, vary, make.
>
> 1. Pick an everyday object near you, such as a mug or a chair.
> 2. Sketch it or describe it in a few lines, **as closely as you can**.
> 3. Change one feature, such as the handle or the legs, and sketch or describe the new version.

4. Change two more features and give the object a use nobody planned for it. Write one line on what each change taught you.

Key idea:

People have long trained creativity through craft, play and learning, and **practice in creative skills tends to help.**

Across 70 studies



Quick check:

What did Scott and colleagues find across 70 studies of creativity training?
Answer: well-designed programmes typically produced gains in performance.

1.2.3 Remarkable Creators at Work, and the Brain Behind New Ideas

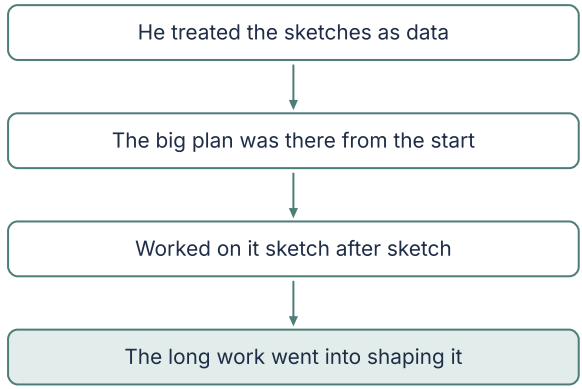
When you stand before Picasso's Guernica, it can look as if it burst out of him in one go. I used to picture it that way, as **one flash of genius** followed by fast brushwork. His sketches tell a different story, and that story is the puzzle of this section.



A painter on a tall wooden ladder before an enormous grey canvas, rough pencil studies pinned to the studio wall around him.

The psychologist Weisberg studied those sketches closely. He used "quantitative methods", meaning counting and coding, on "a single work of art", an unusual thing to do with a painting (Weisberg, 2004). **He treated the sketches as data**, the way a scientist treats the results of an experiment. Each sketch became a clue.

Elaborating a kernel idea



What he found surprised me when I first read it. The preliminary works "were drawn from a very limited subject matter", and "the overall structure of the painting can be seen from the very first sketches" (Weisberg, 2004). Put simply, **the big plan was there from the start**, and the long work went into shaping it.

> 🗝 **Key Concept:**
>
> The kernel idea. Weisberg describes Picasso's process as "elaborating a kernel idea" (Weisberg, 2004). A kernel is **a seed**, small and plain, holding the shape of what grows from it. Picasso planted one seed and then worked on it sketch after sketch, the way a gardener keeps pruning one young tree.

A cook working on a new soup goes the same way. The first pot already has the main idea, perhaps tomato with ginger, and **each later pot adjusts the same soup** with a little more salt or a little less heat. The tenth pot tastes far better than the first, and it is still the same soup.

The kernel idea works in your own projects. When you start one, **write your seed in one sentence**, such as a birthday party that feels like a

picnic in winter. Every later change has something to grow from, and you can check each version against the seed. If a change drifts away, drop it or write a new seed.

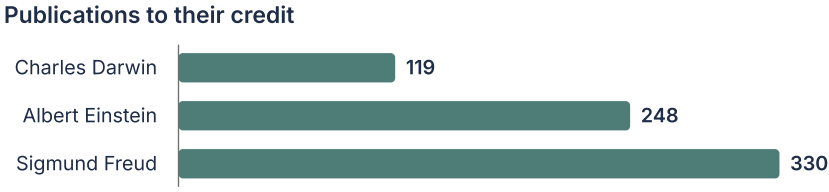
The kernel idea works in your own projects

- [x] Write your seed in one sentence
- [x] Check each version against the seed
- [x] If a change drifts away, drop it or write a new seed

Creators at work share a second habit, which is **making a great deal of work**. Simonton counted it. He wrote that "Thomas Edison held 1,093 patents", which was "still the record granted to any one person by the U.S. Patent Office" when he wrote in 1997 (Simonton, 1997).

> Science Says:
>
> A patent is **an official right to an invention**, granted by a government office. Edison's 1,093 patents were the record for one person in 1997, according to Simonton, and later records were not checked for this book (Simonton, 1997). A count tells you how much a person made, and it says nothing on its own about which works were good.

The counts for others run high. In Simonton's words, "Albert Einstein had around 248 publications to his credit, Charles Darwin had 119, and Sigmund Freud had 330" (Simonton, 1997). He puts Picasso's output at **more than 20,000 works**, among them paintings and drawings.



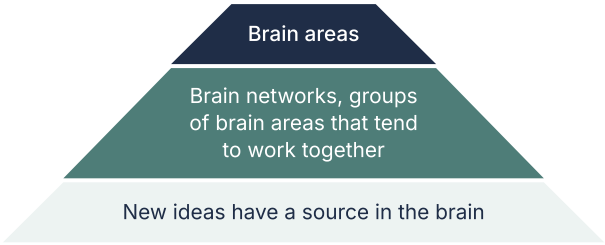
The numbers differ from field to field, since a scientist's paper and a painter's sketch take very different amounts of time. What they share is **a regular stream of finished pieces**. Darwin's 119 and Freud's 330 sit far below Picasso's thousands, and every one of those counts is large for one lifetime.

A long list of tries gives you two gifts. Each try **teaches your hands and eyes something**, and each one is another chance at a good result. Five tries cost a few minutes, and choosing among five is easier than defending one. Picasso worked one seed through many sketches, Edison worked through many patents, and both kept going.

> Exercise:
>
> Try it. Make five quick sketches of one idea, such as a sign for your front door, before you choose one.

Inside the person, new ideas have a source in the brain. Brain scientists study it with neuroimaging, **machines that show which parts of the brain are busy** while a person works on a task. They often look at brain networks, groups of brain areas that tend to work together.

Inside the person



> **Key Concept:**
>
> Brain network. A brain network is **a team of areas** in different parts of the brain that tend to switch on together. A football team is a fair picture, with players spread across the pitch working on one game. Scanners show the team at work as an average over many people and many moments.

Beaty and his colleagues reviewed this research and named two networks in particular. They wrote that "the default and executive control networks, which can show an antagonistic relation, tend to cooperate during creative cognition and artistic performance" (Beaty et al., 2016). **Antagonistic means pulling against each other**, so these two usually take turns, and during creative work they team up.

Two cooks who usually argue can still make a fine meal when each sticks to one job. **Creative work asks the two networks to share the kitchen**, one bringing ingredients and the other deciding what goes in the pot. Neither cook could make that meal alone.

Two cooks share the kitchen



One bringing ingredients



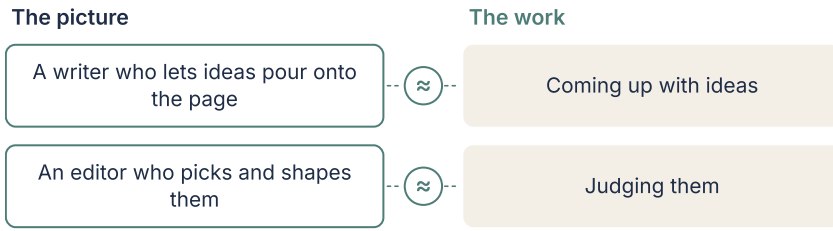
The other deciding what goes in the pot



Neither cook could make that meal alone

A picture I find useful is a writer and an editor. One network acts like **a writer who lets ideas pour onto the page**, and the other acts like an editor who picks and shapes them. This matches the two kinds of work in creativity, coming up with ideas and judging them (see 1.1.1).

Writer and editor



> **Key Concept:**
>
> Writer and editor. The picture has **a limit worth knowing**. Each network is many brain areas spread across the brain, and there is no little writer and no little editor inside your head. Nobody hears two voices. The picture only shows two kinds of work that go on together while you create. In practice, let the writer run first and call the editor in later.

You can climb the idea in small steps. A child might say **part of your brain dreams up ideas** and part picks the good ones. A student might add that these parts are networks of areas, which usually take turns.

Climb the idea in small steps

1. A child: part of your brain dreams up ideas
2. A student: these parts are networks of areas
3. A scientist: the two networks cooperate

A scientist adds that during creative work the two networks cooperate (Beaty et al., 2016). In daily life, **a birthday card verse shows it**, as silly rhymes tumble out and you keep the one that will make your friend smile. Both steps can happen in a single minute at the shop counter.



A softly painted human brain seen from the side, washed in two overlapping colours of blue and warm orange.

A later study by Beaty's team built a brain network "comprised of cortical hubs within default, salience, and executive systems" (Beaty et al., 2018). Cortical means in **the outer layer of the brain**, and the salience system helps the brain notice what stands out.

Like a weather forecast

What it can do	What it cannot do
⊕ Reliably predict the creative quality of ideas	⊖ Read any one person's next idea
⊕ Says what is likely	

Their model "can reliably predict the creative quality of ideas generated by novel participants", meaning new people who were not used to build it (Beaty et al., 2018). Like a weather forecast, it works on averages and says **what is likely**, and it cannot read any one person's next idea.

> **Science Says:**
>
> In one study, sudden aha solutions showed "increased activity in the right hemisphere anterior superior temporal gyrus for insight relative to noninsight solutions" (Jung-Beeman et al., 2004). The team saw a burst of fast brain activity there about 0.3 seconds before those answers. They added that "all problem solving relies on a largely shared cortical network", so **this is one brief moment**.

A moment of insight like this gives no support to an old belief, that creative people are right-brained. **The left-brain and right-brain types are a myth**, and the two studies below show it plainly.

No single creative spot



72 experiments, reported in 63 articles



Not especially associated with right brains



The brains of 1011 individuals

Dietrich and Kanso looked at "72 experiments, reported in 63 articles" (Dietrich & Kanso, 2010). They found that creative thinking "does not appear to critically depend on any single mental process or brain region, and it is not especially associated with right brains", which leaves **no single creative spot** to find.

> Science Says:
>
> Nielsen and his colleagues **scanned the brains of 1011 individuals**. They wrote that "our data are not consistent with a whole-brain phenotype of greater 'left-brained' or greater 'right-brained' network strength across individuals" (Nielsen et al., 2013). Phenotype is a scientist's word for a type you can see or measure in a person.

One single brain gives no shortcut either. Falk, Lepore and Noe described Einstein's brain "from 14 recently discovered photographs" (Falk et al., 2013). The features they saw are "tentatively interpreted", and they chose careful words such as "may have contributed". **One brain is one case**, and his 248 publications came from years of work that no photograph can show.

One single brain gives no shortcut



Put the two halves of this section side by side. Creators at work grew one idea through many tries and made a great deal of work. Inside the head, **free-flowing and shaping networks cooperate** while you

create. Your practice can copy both, by making many tries first and then choosing and shaping the best.

> Exercise:
>
> Ten tries.
>
> 1. Pick a small task, such as a name for a club or a title for a photo.
> 2. Write ten options in five minutes **without judging any of them**.
> 3. Wait an hour, then circle the best two.
> 4. Improve one of the two and write a line on what you changed and why.

Key idea:

Creators make many tries before one works, and new ideas come from **brain networks that free up ideas and others that shape them.**

Quick check:

What did Weisberg find in the very first Guernica sketches? Answer: the overall structure of the painting could already be seen.

Brain networks

- Many tries before one works
- Networks that free up ideas
- Others that shape them

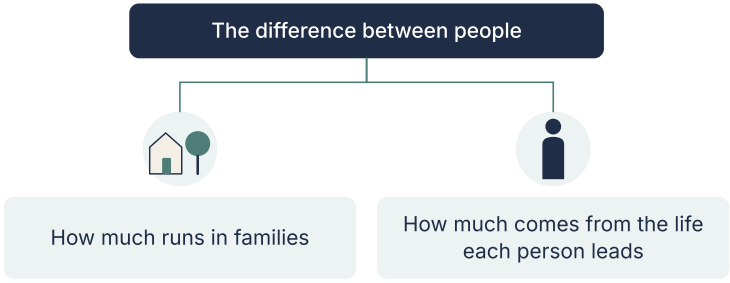
1.3 What Can Change?

1.3.1 Talent, Experience and Practice

Imagine someone telling you, with a shrug, "I cannot draw." They say it the way people say they cannot sing or cannot cook, as if a door had locked itself years ago. **I want that door open again**, and this section looks at three things that shape what you can make, talent, experience and practice.

Some people do seem born ready to make new things. Others take years before their work starts to feel free. Twin studies help us see **how much of the difference between people runs in families**, and how much comes from the life each person leads.

How much of the difference





Two small gardens side by side in soft morning light, seedlings of different heights rising from dark soil in each bed.

Picture two gardens planted with the same kind of seed. The seeds differ a little, and so do the soil and the watering. Heritability is a number about a whole group of plants. **It tells you how much of the height difference between those plants came from the seeds**, and it says nothing about what extra water would do for the plant in your own pot.

Two gardens

The gardens		Heritability
The seeds differ a little, and so do the soil and the watering	≈	How much of the height difference came from the seeds
The plant in your own pot	≈	It says nothing about what extra water would do

A twin study of creative achievement with 338 adult twins found heritability estimates “ranged from 43% to 67%”, with the rest linked to nonshared environment plus measurement error (Piffer & Hur, 2014).

Nonshared environment means **the parts of life that twins do not share**, such as different friends or jobs. The shared family part was "negligible" in that sample.

338 adult twins



Heritability estimates ranged from 43% to 67%



Nonshared environment plus measurement error



The shared family part was negligible

> **Key Concept:**
>
> Heritability in plain words. Heritability is **a fact about differences in a group**, never a fixed share locked inside one person. A high number in a twin sample does not mean your own creativity is fixed. It means that, in that sample, seed differences explained a large part of the gap between people.

Early twin studies, Piffer and Hur note, "yielded a significant amount of shared family environmental influences" (Piffer & Hur, 2014). Their own adult sample pointed the other way. Age and the kind of test used can change the picture, so **one study is never the whole story**.

Across thousands of human traits in general, a huge review of twin studies put the average heritability at 49% (Polderman et al., 2015). That figure is **context only**, an average across 17,804 traits of every kind. It is not a creativity score.

Two German twin studies found a further split. "Perceived creativity showed links to openness to experience and extraversion, whereas tested figural creativity was associated with intelligence and also with openness" (Kandler et al., 2016). Perceived creativity is **how creative**

you think you are, and tested figural creativity is how you score on picture tasks.

Multiple traits and abilities



> **Science Says:**
>
> The same team wrote that "A primary source of individual differences in creativity was due to environmental influences" (Kandler et al., 2016). Genes mattered too, and **environment carried a large share**. That finding balances the higher twin numbers above and keeps talent from sounding like fate.

Barbot and Eff put the gene story even more plainly. They wrote that "there is not one single 'creativity gene.'" Creativity "involves multiple traits and abilities" (Barbot & Eff, 2019). **No single switch turns creativity on**, and no single switch turns it off.

Personality joins the picture next. A study that combined many personality studies found that "creative people are more open to new experiences, less conventional and less conscientious" (Feist, 1998). The comparisons were between scientists and nonscientists, and between artists and nonartists, so **the pattern describes groups of jobs** and does not describe you alone.

Creative people, in groups of jobs



More open to new experiences



Less conventional



Less conscientious

Openness shows up in small daily choices as well as in careers. Trying a strange fruit, opening a book outside your usual shelf or walking home by a new street are **tiny acts of the same trait**. None of them needs a special gift, and each one stretches the habit of welcoming the unfamiliar.

Talent and temperament give a start, and years of work give another. Glaveanu and colleagues wrote, "It is widely accepted today that acts of historical or Big C creativity require many years of training, something formalized by Hayes (1989) as the 'ten-year rule.'" (Glaveanu et al., 2013). The same writers note that **the length of preparation "varies depending on domain"**.

> 🗝 **Key Concept:**
>
> The ten-year rule. The ten-year rule is **a name for a long training stretch**, credited to Hayes by later writers (Hayes, 1989, as cited in Glaveanu et al., 2013). It is not a stopwatch that rings at year ten. Fields differ, and the rule is a rough guide for historical-level work. It makes no promise for everyday practice.

Practice helps, and it leaves a lot unexplained. Macnamara, Hambrick and Oswald combined many studies of practice and skill. They found that "deliberate practice explained 26% of the variance in performance for games, 21% for music, 18% for sports, 4% for education, and less

than 1% for professions" (Macnamara et al., 2014). Deliberate practice means **practice done on purpose to improve**.

Variance explained by deliberate practice



> **Science Says:**
>
> The same team wrote that "deliberate practice is important, but not as important as has been argued" (Macnamara et al., 2014). Practice moved the needle most in games and music, and **barely at all in ordinary professions**. The rest of the differences between people were left unexplained by practice.

Read those numbers with care. Each one is **a share of the differences in performance between people** that practice accounted for, and none of them tells you how much skill one hour buys. In games about a quarter of those differences went with practice, and in professions less than one in a hundred did. That is why this book treats practice as one piece of the story.

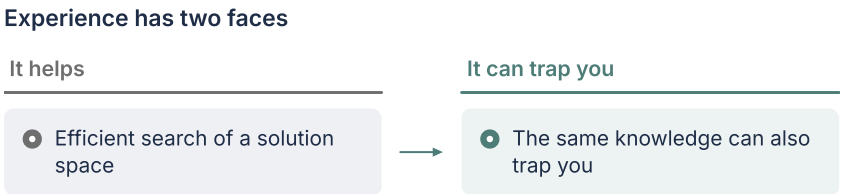
Read those numbers with care

Each one is	None of them tells you
⊕ A share of the differences in performance between people	⊖ How much skill one hour buys

Age and achievement have been studied for more than a century. Simonton reviewed "the longitudinal connection between personal age and outstanding achievement in domains of creativity and leadership", including "the typical age curve and its variations across disciplines" and "the linkage between quantity and quality of output over the course of a career" (Simonton, 1988). The age curve **varies across disciplines**, so this section gives no single age to aim at.

Training programmes can still help many people grow (Scott et al., 2004). **The exercises in this book ask you to use a real task of your own**, so your practice starts with work you already care about.

Experience itself has two faces. Experts often do better because their "well-structured, easily activated knowledge allows for efficient search of a solution space" (Wiley, 1998), and a solution space is **the set of paths you can try**. The same knowledge can also trap you, as 1.1.1 first noted with Wiley's fixation finding.





A worn dirt path crossing a green field, with a faint new track leaving it towards a distant gate.

A well-worn path across a field is easy to walk and hard to leave. Your feet know every dip. **A new track feels slow and foolish at first**, and it is often where a fresh idea waits. The path picture stops at real minds, because people can choose to step off, and dirt paths cannot.

> **Key Concept:**
>
> The well-worn path. Experience speeds you up on the old route and can **hide the side tracks**. Picture driving to work by the same road for years. You get quick and sure, and you stop seeing the lanes that branch off it. The exercise below asks you to take one of those lanes on purpose.

> **Exercise:**
> Try it. Draw a simple cup with your non-writing hand. Notice which lines come out differently from your usual drawing.

Belief adds a fourth piece to the picture. Tierney and Farmer studied creative self-efficacy, "employees' belief[s] that they can be creative in their work roles" (Tierney & Farmer, 2002). Across data "from two different firms", those beliefs "predicted creative performance beyond the predictive effects of job self-efficacy" (Tierney & Farmer, 2002). Job self-efficacy is **belief that you can do the job in general**, and creative self-efficacy is belief that you can make something new in that job.

Two kinds of belief



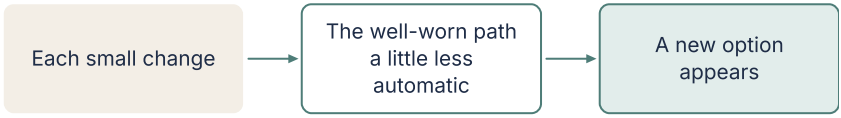
> **Science Says:**
> The same study found that "job tenure, job self-efficacy, supervisor behavior, and job complexity contribute to creative efficacy beliefs" (Tierney & Farmer, 2002). Tenure means **time in the job**. The finding is a link from workplaces, and it cannot prove that belief alone creates good work.

A cook who always makes the same Sunday dish knows the old path by heart. One week she changes the pot, the spice or the order of steps, and

suddenly she tastes something the old route had hidden. Small changes of route are practice for larger ones.

You can use the same move outside the kitchen. Change the chair you write in, the tool you reach for first or the order of your morning. **Each small change makes the well-worn path a little less automatic**, and that is often when a new option appears.

Change the route



Put the three parts side by side. Talent and temperament give a start you did not choose, while experience and knowledge build skill and can also fix your eyes on one answer. Practice grows what you can do, especially when you step off the well-worn path. **Belief that you can make something new** went along with creative work in two firms, as a link only.

> **Exercise:**
>
> Change the route.
>
> 1. Pick a task you know well, such as fixing a recipe, planning a weekend or tidying a cupboard.
> 2. Write the first way your experience tells you to do it.
> 3. Write three ways a complete beginner might try it, and try one this week.

4. Note what you noticed that **the old way had hidden**.

Key idea:

Talent gives a start, and **practice and fresh experience grow creativity**, as long as old habits do not take over.

Practice and fresh experience

- Talent gives a start
- Practice and fresh experience grow creativity
- As long as old habits do not take over

Quick check:

What does heritability describe, a fixed share inside one person or a pattern of differences in a group? Answer: a pattern of differences in a group.

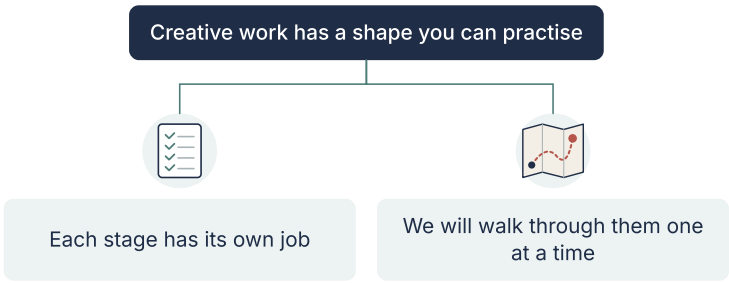
1.3.2 How Creative Work Happens: Preparation, Incubation, Insight and Revision

You wrestle with a problem all evening, give up and go to bed. Next morning in the shower the answer arrives as if someone had slipped a note under the door. **Where that note came from** is the puzzle of this section, and the short name for the wait is incubation.

The four stages of creative work get their full turn here, because **creative work has a shape you can practise**, even when the flash itself

feels like luck. Each stage has its own job, and we will walk through them one at a time.

A shape you can practise

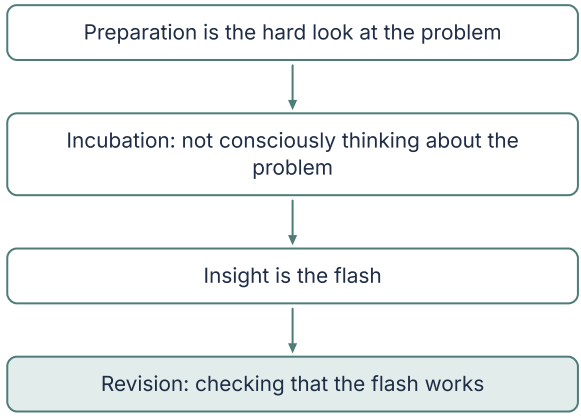




A person in a steamy shower with eyes wide open, water beading on the tiles around them.

The classic map has four stages, named by Wallas as Preparation, Incubation, Illumination and Verification (Wallas, 1926). Preparation is the hard look at the problem, and incubation is the time you are "not consciously thinking about the problem". Illumination is the flash, and verification is **checking that the flash works**. This book uses the words Insight and Revision for those last two stages.

The four stages



A quieter moment sits beside the flash. Wallas called it Intimation, the "'fringe-conscious' psychological events which precede and accompany the 'flash' of Illumination" (Wallas, 1926). Intimation is **the sense that something is coming**, before you can say what it is.

One clear report of a flash comes from Henri Poincaré. He wrote, "Having reached Coutances, we entered an omnibus to go some place or other. At the moment when I put my foot on the step the idea came to me, without anything in my former thoughts seeming to have paved the way for it" (Poincaré, 1908/1913). He added, "I did not verify the idea", and later, "On my return to Caen, for conscience' sake I verified the result at my leisure." **The bus step was his flash**, and the quiet check came later at home (Poincaré, 1908/1913).

Poincaré's step onto the bus is a story about his own mind, **not a laboratory result**, and Wallas built his stages partly from reports like that one. The stages are a map people still find useful, and maps are not the land itself.



A baker lifting a cloth from a bowl of risen dough, flour dust on the table around it.

Bread dough left to rise is my favourite picture of incubation. You do the kneading first, then you step away, and **the dough keeps working while you do something else**. The picture stops at what nobody knows for sure, which is what the mind is doing during the wait.

Bread dough and incubation

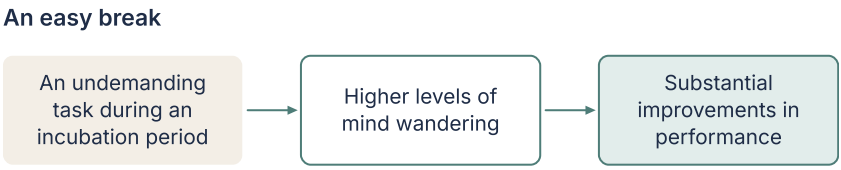
The dough		The stage
You do the kneading first	≈	Preparation
The dough keeps working while you do something else	≈	Incubation

> **Key Concept:**
>
> Four stages in order. Preparation loads the problem. Incubation is a real break. Insight is the flash. Revision is **the check that the flash works**, the step Poincaré took at home in Caen.

A study that combined many incubation experiments found "a positive incubation effect, with divergent thinking tasks benefiting more than linguistic and visual insight tasks" (Sio & Ormerod, 2009). Longer preparation before the break **"gave a greater incubation effect"** (Sio & Ormerod, 2009).

> **Science Says:**
>
> For some language insight problems, "low cognitive demand tasks yielded a stronger incubation effect than did rest" (Sio & Ormerod, 2009). An easy task during the break beat doing nothing. **Hard work first still mattered**, because longer preparation meant a larger gain from the break.

Unusual-uses problems got the same kind of test from Baird and colleagues. They found that "engaging in an undemanding task during an incubation period led to substantial improvements in performance on previously encountered problems", compared with "a demanding task, rest, or no break" (Baird et al., 2012). The easy break went with **higher levels of mind wandering**.



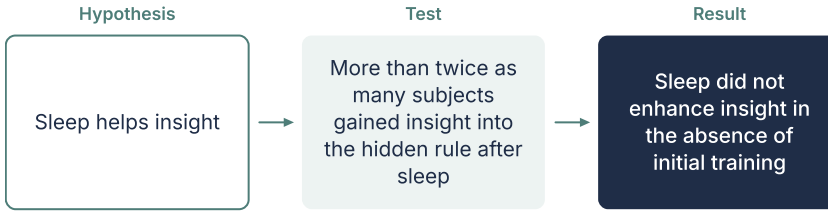
Climb the idea in small steps. A child might say **a break can help a stuck problem**. A student might add that an easy task during the break often helps more than hard effort or plain rest. A scientist cites the combined studies and the mind-wandering link (Baird et al., 2012; Sio & Ormerod, 2009), notes that a later test found no evidence for that

link (Murray et al., 2024), and your rule is to work hard first, then take a real break.

> Exercise:
>
> Try it. Fix a candle to a wall using only the candle, a box of thumbtacks and a matchbox. Then read on and compare.

The shower answer fits that rule. Evening work loaded the problem, the night and the shower gave the break, and **the flash had something ready to work on** because preparation came first. Preparation is the part people skip when they hope for a miracle, and one sleep study found that "more than twice as many subjects gained insight into the hidden rule after sleep as after wakefulness", yet "Sleep did not enhance insight in the absence of initial training" (Wagner et al., 2004). Sleep gets **one line here**, and the useful line is that with no preparation there is no gain from the wait.

One sleep study



Insight is the flash itself. In one review, "Insight occurs when a person suddenly reinterprets a stimulus, situation, or event to produce a nonobvious, nondominant interpretation" (Kounios & Beeman, 2014). It can be "a solution to a problem (an 'aha moment'), comprehension of a joke or metaphor, or recognition of an ambiguous

percept" (Kounios & Beeman, 2014). A nondominant interpretation is **a reading that was not your first guess**.

One classic block on the way to insight is functional fixedness. A modern paper describes Duncker's candle problem with these words, "participants are instructed to fix and light a candle on a wall. However, they only have a matchbox and a box of thumbtacks besides the candle" (Kroneisen et al., 2021). The solution is to "empty the box of thumbtacks, use the thumbtacks to nail the box to the wall, put the candle into the box", so **the box must change jobs** from thumbtack holder to tiny shelf (Kroneisen et al., 2021).



> **Science Says:**
> "Functional fixedness means that participants struggle to see the box as a device to hold the candle" (Kroneisen et al., 2021). The box arrives as a container for thumbtacks, and **that first use hides the second**. Fixation of this kind gets only this short core here.

A second classic puzzle uses two strings hanging far apart. One review of insight describes "Maier's seminal study (Maier 1931), in which seeing a rope swinging helped people solve a two-string problem" (Ammalainen & Moroshkina, 2022). The swing "changed the representation to the 'rope as a pendulum'" (Ammalainen & Moroshkina, 2022). A hint in the room **shifted what the rope could be**.

Feelings of getting warmer give little warning before an insight flash. Metcalfe and Wiebe found that "the patterns-of-warmth ratings, which reflect subjects' feelings of approaching solution, differed for insight and noninsight problems" (Metcalfe & Wiebe, 1987). They added that "Algebra problems and noninsight problems showed a more incremental pattern over the course of solving than did insight problems" (Metcalfe & Wiebe, 1987). In plain words, **warmth built up more gradually on algebra**.

Reading a cool feeling



On a step-by-step task: keep grinding



On an insight task: you need a new view



A short walk or a fresh sketch

> Science Says:
>
> "insight-problem solution was characterized by a sudden, unforeseen flash of illumination" (Metcalfe & Wiebe, 1987). On an ordinary algebra task you often feel yourself getting closer. On an insight task **the feeling stays cool until the answer arrives**. A slow rise of warmth can mislead you when the work needs a new view.

The warmth pattern is useful once you know it. On a step-by-step task, a cool feeling can mean you should keep grinding. On an insight task, **the same cool feeling can mean you need a new view**, a short walk or a fresh sketch, before more effort helps.

> **Key Concept:**
> Warmth and the flash. In Metcalfe and Wiebe's study, a "subjective feeling of knowing predicted performance on algebra problems but not on insight problems" (Metcalfe & Wiebe, 1987). **Feeling far from the answer on an insight task** tells you little about how close you are.

Brain studies add a little more. In their 2014 review, Kounios and Beeman note that brain imaging had been applied to insight "only during the past decade", and that this work shows "internally focused attention preceding and during problem solving" (Kounios & Beeman, 2014). People who tend to solve insightfully show "different patterns of resting-state brain activity" (Kounios & Beeman, 2014). Internally focused attention means **looking inward at thoughts**.

Brain studies add a little more



Internally focused attention

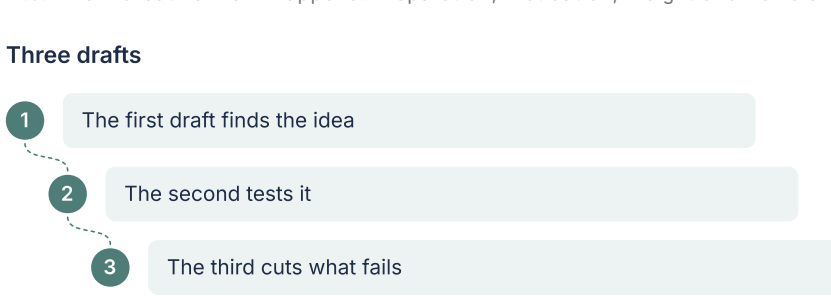


Preceding and during problem solving



Different patterns of resting-state brain activity

Revision is where the flash gets tested. The creative process, in Lubart's words, "refers to the sequence of thoughts and actions that leads to novel, adaptive productions" (Lubart, 2001). He also warns that "Empirical research suggests that the basic 4-stage model of the creative process may need to be revised or replaced" (Lubart, 2001). **Stages are a model**, a useful sketch, and real work may not follow them in neat order.



A desk with three drafts shows revision better than any slogan. The first draft finds the idea, the second tests it and the third cuts what fails. **Each new draft is a fresh check**, and the flash alone never ships the finished thing.

> **Key Concept:**
>
> Revision as a check. Revision asks one plain question of the flash, does it work? Poincaré asked it on his return to Caen, where **"for conscience' sake I verified the result at my leisure"** (Poincaré, 1908/1913).

The shower answer now has a place in the map. Evening work was preparation, sleep and the shower were incubation, the flash was insight and checking that the answer works is revision. **Skip the first stage and the later ones have little to work on**. Skip the last and the flash stays a private feeling.

> **Exercise:**
>
> Work, walk away, return.
>
> 1. Pick a small open problem, such as a gift idea or a better layout for a messy shelf.
> 2. Work on it hard for fifteen minutes and write every idea.

3. Do something easy for an hour, such as a short walk or washing up.
4. Come back, write any new ideas, then pick one and **revise it twice**.

Key idea:

Creative work moves through preparation, incubation, insight and revision, and each stage has its own job, from soaking up the problem to checking the flash.

Quick check:

What are this book's four stages of creative work, in order? Answer: preparation, incubation, insight and revision.

Each stage has its own job

- Preparation
- Incubation
- Insight
- Revision

1.3.3 What a Creativity Test Can and Cannot Tell You

Find a pencil and a sheet of paper, and set a timer for three minutes. Write down **every use you can come up with for an ordinary brick**. You might start with a doorstop, a step for reaching a high shelf and a weight to hold down a tent.

When the timer rings, **your sheet is a small creativity test**, of the same kind as the tests in this section. It shows how you did on one task, on one afternoon, with one timer. I want to show you how such tests are scored, what they have predicted and where their view stops.

A small creativity test

- One task
- One afternoon
- One timer



A single red brick on a wooden desk beside a sharpened pencil, a blank page and a small round kitchen timer.

The brick task has a name. Beaty and Johnson call it “a canonical verbal creativity task (AUT)” (Beaty & Johnson, 2021), where AUT stands for the alternate uses task. Canonical means **standard**, the usual one. Another team calls tasks like it “unusual-uses tasks” (Silvia et al., 2008), and you have just done one.

The Torrance Tests of Creative Thinking, or TTCT, are a bigger set. Kim wrote, “The TTCT was developed by Torrance in 1966” (Kim, 2006). It comes in **a version with words and a version with drawings**, and it has been “translated into more than 35 languages” (Kim, 2006). Its scores count ideas, much like the count on your brick sheet.

The old way of scoring



> **Key Concept:**
> The four scores. Runco’s team listed “the 4 TTCT indexes (fluency, originality, flexibility, and elaboration)” (Runco et al., 2010). In **a 2022 review of the latest Torrance version**, fluency is “the number of relevant responses”, flexibility is “the number of different categories or shifts of ideas”, and originality is “the number of unusual ideas as determined by statistical infrequency” (Alabbasi et al., 2022). Elaboration is detail “beyond the minimum necessary for the response” (Alabbasi et al., 2022).

The first problem with these scores is easy to see. Under the old way of scoring, **every extra idea is one more chance at a point**. A football match works the same way. If one team played for ninety minutes and

the other for forty-five, nobody would be impressed that the first team scored more goals.

A football match works the same way

> - Every extra idea is one more chance at a point
> - One team played for ninety minutes, the other for forty-five
> - Nobody would be impressed that the first team scored more goals

Silvia and his team described the traditional system as “assigning points for infrequent responses and summing the points” (Silvia et al., 2008). Infrequent means **few people gave that answer**, and summing means adding up. They wrote that such systems “face well-known problems” (Silvia et al., 2008). A long list can pile up points simply by being long.

Picture two brick lists. One has twenty ideas, most of them ways to build a wall or hold a door open. The other has five, and one of them is **a brick warmed in the oven and wrapped in a towel to heat a bed**. When you look at any idea score, check the best ideas next to the count.

Two brick lists



Twenty ideas, most of them ways to build a wall



Five, and one of them a brick warmed in the oven



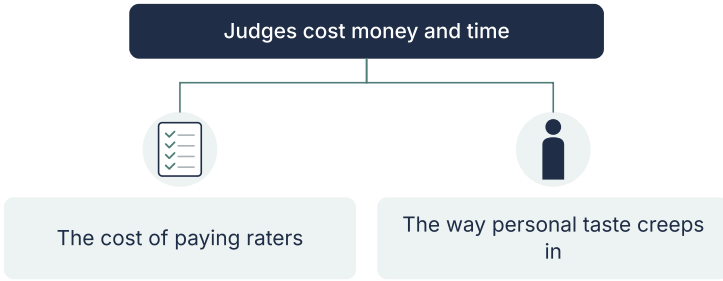
Check the best ideas next to the count

> **Science Says:**
>
> In one fix, people "circle the two responses that they think are their most creative" (Silvia et al., 2008). "Raters then evaluate the responses on a 5-point scale", and the team found these ratings "yield dependable scores with only 2 or 3 raters" (Silvia et al., 2008). Raters are **the people who judge the answers**. The study tested 226 people.

> **Exercise:**
>
> Try it. In two minutes, list uses for a paperclip. Then circle your two best and **rate each from 1 to 5**.

Judges cost money and time, and two judges can disagree. Beaty and Johnson named **the cost of paying raters and the way personal taste creeps in** as the two limits of human rating (Beaty & Johnson, 2021). Their answer was to let a computer do part of the judging.

The two limits of human rating



The computer measures semantic distance, which means **how far apart two words sit in meaning**. Across "five studies", Beaty and Johnson found that a semantic distance score "reliably and strongly predicts human creativity and novelty ratings" (Beaty & Johnson,

2021). Novelty means newness, so the computer's numbers went along with what the human judges said.

Let a computer do part of the judging

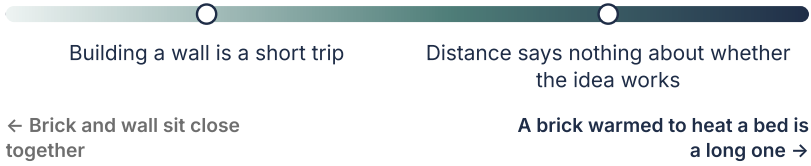




Two small islands far apart on a calm sea, with a rowing boat halfway across the water between them.

The measure works like a map of meanings. Brick and wall sit close together on that map, so building a wall is a short trip, and **a brick warmed to heat a bed is a long one**. Where the map stops is usefulness, because distance says nothing about whether the idea works.

A map of meanings



Tests of ideas are one road. A second road asks **what you have actually done**. In 1.1.3 you met the Creative Achievement Questionnaire, and

its makers called it a “self-report measure”, which means you answer questions about yourself (Carson et al., 2005).

When 117 students filled in the questionnaire twice, **their two sets of answers matched closely**, with r = .81 (Carson et al., 2005). On this scale 1 would be a perfect match. A result near 1 means the questionnaire gives much the same answer on a second try.

In a second check, artists rated a collage, and the questionnaire scores went with the artists’ ratings at r = .59 for 39 people (Carson et al., 2005). **Expert judges and the questionnaire pointed the same way**. Both samples were small groups of students, which limits how far the numbers reach.

Checking the questionnaire



117 students filled it in twice: r = .81



Artists rated a collage: r = .59 for 39 people



Both samples were small groups of students

Science Says:

One team tested four questionnaires of this kind and found they “performed well and covaried highly with each other”, which means their results moved together (Silvia et al., 2012). They wrote that “self-report creativity assessment is probably much better than creativity researchers think it is” (Silvia et al., 2012). A review of many methods was **more cautious**. It found that “the measurement of creativity is an unsettled issue” (Said-Metwaly et al., 2017).

Torrance's tests have one big advantage, which is time. **A longitudinal study follows the same people over years**, the way a family photo album shows the same faces growing older. The TTCT in one such study was "administered in the late 1950s", and the team checked on the same people in a fifty-year follow-up (Runco et al., 2010).

Following the same people



The scores went with personal achievement **to a moderate degree**, and they showed no such link with public achievement (Runco et al., 2010). Those are the team's two names for the kinds of achievement they measured 50 years later. Public achievement did go with intelligence and creativity working together, in the team's words "an interaction of intelligence and creativity" (Runco et al., 2010).

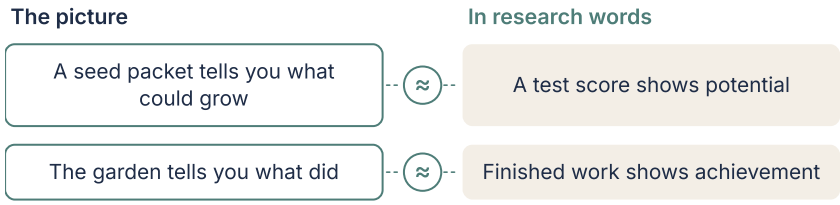
> **Science Says:**
>
> Plucker looked again at Torrance's long-running data and found that "just under half of the variance in adult creative achievement is explained by DT test scores" (Plucker, 1999). Variance means **how much people differ**, and DT stands for divergent thinking. The share from DT was "more than 3 times that of intelligence quotients" (Plucker, 1999), meaning IQ. The data came from one group of people.

A seed packet tells you what could grow, and the garden tells you what did. **A divergent thinking test reads the packet**. Weather and years of care decide the garden, and the packet cannot see either of them. A

packet of good seeds can still end as a bare patch, and a plain packet can fill a whole bed.

Runco and Acar put the seed packet into research words. They wrote, "Certainly DT does not guarantee actual creative achievement, but tests of DT are reliable and reasonably valid predictors of certain performance criteria" (Runco & Acar, 2012). In plain words, **a test score shows potential**, and finished work shows achievement.

The seed packet and the garden



A three-minute list cannot show whether you would keep working on an idea for a year, or what you know about building walls. It sees **one sitting on one day**, with whatever mood you brought to the table. A creativity score and an IQ score are separate numbers, and neither can stand in for the other (Kim, 2005).

Reliability means a test gives much the same result each time, like a bathroom scale that shows the same weight when you step on it twice in a minute. The questionnaire's r = .81 on a second try is a reliability number. A scale that jumps by five kilos between two steps is no use to anyone.

Validity means a test measures what it claims to measure. A bathroom scale can give the same reading every time and still tell you nothing about your height. Runco and Acar wrote that "validity only makes sense relative to particular criteria" (Runco & Acar, 2012).

Criteria are the yardsticks you check a test against, such as later achievement.

Reliability and validity



Reliability is getting the same reading twice



Validity is measuring the right thing



A test needs both

> **Key Concept:**
>
> Reliability and validity. Reliability is **getting the same reading twice**, like a bathroom scale you can trust. Validity is measuring the right thing, like using a tape measure for height and the scale for weight. A test needs both, and its validity always belongs to a particular use, such as predicting later achievement.

When you score your own brick sheet, **compare it only with your own earlier sheets**. Your scores on one day are a snapshot, and your finished projects tell the longer story. Keep both, and read them side by side. A higher count next month shows your fluency on that one task, and only your projects show what the ideas became.

On one day

A creativity test shows	Finished work shows
⊕ How many and how unusual your ideas were	⊖ The rest

Exercise:

Score yourself fairly.

1. List uses for a brick for three minutes, then count them for **fluency**.
2. Sort your ideas into kinds and count the kinds for flexibility.
3. Circle any idea you believe few people would write, for originality.
4. Take your best idea and add three details for elaboration. Date the sheet and keep it in your practice journal to repeat later.

Key idea:

A creativity test shows how many and how unusual your ideas were **on one day**, and finished work shows the rest.

Quick check:

Why can a long list of plain ideas still earn a high score? Answer: under the old way of scoring, every extra idea is one more chance at a point.

Finished work shows the rest

A test shows how many ideas on one day	Finished work shows the rest



Module

2

How Creativity Works with Memory, Attention and Intellect

2.1 Memory: The Raw Material of New Ideas

2.1.1 Memory: Drawing on Knowledge, Experiences and Associations

IMAGINE YOUR NEIGHBOUR ASKS you to help plan a street party with no money and one free Saturday. Within a minute, ideas arrive, a childhood picnic and a school fair with paper bunting. **Every one of those ideas came out of your memory**, and this section shows how memory feeds new ideas and works with your other abilities.

Every one of those ideas came out of your memory

> - A childhood picnic
> - A school fair with paper bunting

New ideas need old pieces. A cook needs food in the cupboard, and a builder needs bricks in the yard. **Memory is the cupboard where your new ideas find their pieces**, and the pieces come in three kinds, which are what you know, what you have lived through and the links between them.

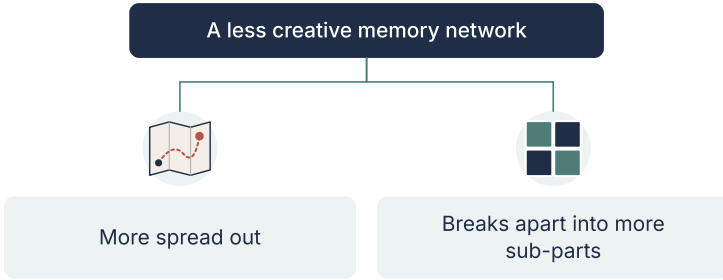


A quiet street with a long trestle table, paper bunting strung between two lamp posts and folding chairs stacked against a garden wall.

> 🗝 **Key Concept:**
>
> Three kinds of pieces. **Knowledge** is what you know, such as how many chairs fit in a hall. Experiences are what happened to you, such as the rainy fair where everyone crowded under one tent. Associations are the links that join one memory to another, so the word rain can bring back the word tent before you even ask.

In 1.1.1 you met Mednick's idea that creative thinking runs on **links between ideas** (Mednick, 1962), and the finding that less creative people's memory networks looked more rigid (Kenett et al., 2014). The new detail is what rigid meant. Their network was "more spread out and breaks apart into more sub-parts" (Kenett et al., 2014).

What rigid meant



Semantic memory is **your store of facts and word meanings**, the part that knows a tent keeps off rain. The team compared a less creative group with a more creative group at one point in time. Their result shows how the two groups differed, and it says nothing about whether training can change a network.

Imagine memory as a town where each idea is a house and each link is a street. **In a rigid town the districts sit apart**, joined by a few long roads. In a well-linked town, a few turns take you almost anywhere. Nobody can see real memory laid out like streets, so the map is only a picture.

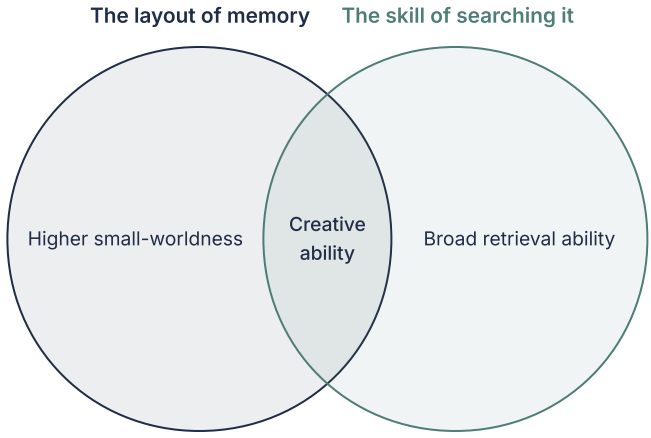
Memory as a town

The idea		What it is like
An idea	≈	A house
A link	≈	A street
A rigid memory	≈	Districts that sit apart, joined by a few long roads

> **Science Says:**
>
> A second team tested two explanations together (Benedek, Kenett, et al., 2017). They found "a correlation between creative ability and broad retrieval ability", which means **people who fetch many things from memory scored as more creative**. They found that "the semantic networks of creative people show higher small-worldness". The network result held with one way of drawing the map and failed with another, so it gives partial support.

Small-worldness is the well-linked town. **Most houses can reach each other in a few steps**, even when they sit in different districts. The study tells us that both the layout of memory and the skill of searching it went along with creative ability (Benedek, Kenett, et al., 2017).

Both went along with creative ability



Memory never works alone. When you search it on purpose, you use the control skills that steer your thinking, and some of those skills belong to intellect. **One team measured memory links and control**

skills in the same people to see which of them fed good ideas (Beaty et al., 2014).

> **Science Says:**
> The team wrote that "As the average semantic distance between verbal fluency responses and cues increased, so did the creative quality of divergent-thinking responses" (Beaty et al., 2014). Semantic distance is **the meaning gap you met in 1.3.3**. A verbal fluency task asks you to name many words for one cue word.

The same study found that idea quality "was predicted by the executive variables" (Beaty et al., 2014). Executive skills are **the control skills that plan and steer**, and one of them was fluid intelligence. Both kinds of skill kept their effects in the same model, "suggesting unique contributions of both constructs" (Beaty et al., 2014).

The team's plain conclusion was that "both associative and executive processes underlie the production of novel ideas" (Beaty et al., 2014). **Memory brings the far links, and control works on them.** As a word formula, New ideas = Memory links + Control.

A word formula



> 🗝 **Key Concept:**
>
> Two partners on one bench. **Memory supplies the pieces**, everything you have collected over the years. Control searches for those pieces and puts them to work. In the study above, each partner added something the other did not.

The first ideas you reach are the ones you already had. A shop shelf works the same way. The goods at the front get grabbed first, and the odd tins at the back are reached only by someone who keeps looking.

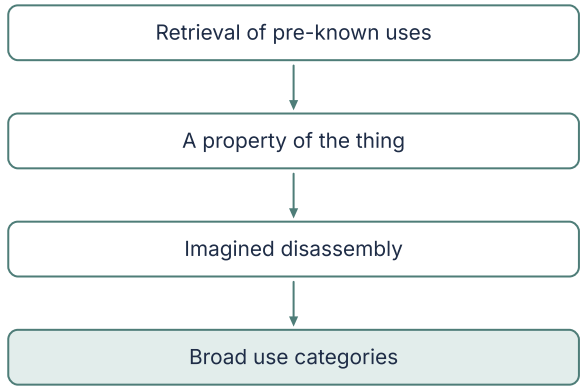
One team asked people to say their thoughts out loud while they thought of uses for everyday objects (Gilhooly et al., 2007). They found that "initial responses were based on a strategy of Retrieval from long-term memory of pre-known uses". **Long-term memory is the store that keeps things for years**, and pre-known uses are ones the person had met before.



A shop shelf in soft light, neat rows of tins at the front and a few odd jars pushed far to the back.

Later answers came from other moves. The team listed “property-use generation, imagined Disassembly of the target object into components and scanning of Broad Use categories” (Gilhooly et al., 2007). In plain words, people used **a property of the thing**, such as being heavy, took it apart in their heads, or ran through big groups of uses such as tools or toys.

First ideas, then other moves



One of those moves stood out. “Novelty of uses was particularly associated with the Disassembly strategy” (Gilhooly et al., 2007). **Taking the thing apart in your head went with the newest uses**, though the study showed a link and did not test it as training.

> **Science Says:**
>
> In a second experiment with 103 people, “participants were asked to indicate which of their responses were new for them” (Gilhooly et al., 2007). The result was that “letter fluency (an executively loading task) was related to production of ‘new’ uses and category fluency was related to production of ‘old’ uses but not vice versa.” **Old ideas and new ideas leaned on different skills.**

Letter fluency means naming words that start with one letter, which needs **a lot of steering**. Category fluency means naming things in one group, such as animals, which leans on the links memory already holds. Recalling an old idea and making a new one are different jobs (Benedek, Jauk, Fink, et al., 2014), and the exercise below uses that difference.

Old ideas and new ideas leaned on different skills

	Letter fluency	Category fluency
Means	Naming words that start with one letter	Naming things in one group
Went with	New uses	Old uses

> ✎ **Exercise:**
>
> Try it. Name one real problem or unfinished project from your own life. Write it at the top of a blank page.

In a ten-minute ideas task with 133 young adults, "creativity increased sharply with time and flattened slightly by the task's end, and fluency was highest in the task's first minute and then dropped sharply" (Beaty & Silvia, 2012). **The easy ideas came fast** and the better ones came later.

In a ten-minute ideas task

Before	After
Fluency was highest in the first minute	Creativity increased sharply with time
The easy ideas came fast	The better ones came later

The team judged that their findings were “more consistent with a view that emphasizes executive processes, particularly processes involved in the strategic retrieval and manipulation of knowledge, than the simple spreading of activation to increasingly remote concepts” (Beaty & Silvia, 2012). Strategic retrieval means **searching memory on purpose**. Steering the search explained the later ideas best.

Back at the street party, the picnic and the fair sat at the front of the shelf. Keep going and take the party apart into food and seats, and **each part can call up a different memory**. A library swap shelf might turn into a table where neighbours trade dishes, a new idea built from an old piece.



Memory reaches beyond one kind of thinking. A study of 265 people found “an associative basis in two distinct creative processes: divergent thinking and convergent thinking” (Lee & Therriault, 2013). **Memory fed both kinds of thinking**, and the same team found that “working memory played a significant role in creative thinking processes”.

Working memory is **the small desk where you hold a few things while you use them**. On the desk you lay out two or three pieces from the cupboard and try them together. A creative job needs both, the cupboard for supply and the desk for building.

The cupboard and the desk

Long-term memory: the cupboard	Working memory: the desk
For supply	For building

> **Science Says:**
> One team measured "forward flow", or "how much present thoughts diverge from past thoughts" (Gray et al., 2019). They found that "forward flow predicts creativity in college students (Study 1) and a representative sample of Americans (Study 2), even when controlling for intelligence." **Forward flow is a measure**, a way to score how far your thoughts travel.

A representative sample is **a group chosen to match the whole country**. Controlling for intelligence means the team took test scores into account, so the link with creativity did not come from intelligence alone. Forward flow predicted creativity beyond what intelligence scores explained.

Forward flow

- How much present thoughts diverge from past thoughts
- Predicts creativity even when controlling for intelligence

The science here is still young. Two of the researchers behind this work wrote, "The role of semantic memory in creativity is theoretically assumed, but far from understood" (Kenett & Faust, 2019). **Treat each finding in this section as a careful step**, a link seen in groups of people, and test the ideas on your own work.

The steps below come from that research. No study has tested them on a problem from daily life, so **they are practice**, and you judge for yourself what they give you.

Treat each finding as a careful step



Exercise:

Draw on your own memory.

1. Starter. For your Try it problem, list what you know or have lived through that bears on it.
2. Middle. Next to each item, write R if you remembered it and N if it is new to you. **Mark where the first N appears.**

3. Advanced. Join two R items, or one R and one N, into one new option for that problem. Write one reason it might work.

Key idea:

Memory supplies the pieces and control steers the search, so **the first ideas are remembered ones** and newer ideas come when you keep going.

Quick check:

In an ideas task, which ideas tend to come first? Answer: remembered ones, pulled from long-term memory.

Memory in one line

Memory supplies the pieces and control steers the search → The first ideas are remembered ones

2.1.2 Imagination: Remembering Details to Picture What Does Not Yet Exist

IMAGINE SOMEONE ASKS YOU to picture the treehouse you would build if money were no problem. Within seconds you see a rope ladder, a round window and a little roof of tin. **Every one of those parts came from something you once saw**, in a park or in a friend's garden.

Imagination feels like magic, as if the picture arrived from nowhere. Look closer and it is made of remembered bits put together in a new way. The treehouse is new, and its parts are old. **In this section I want**

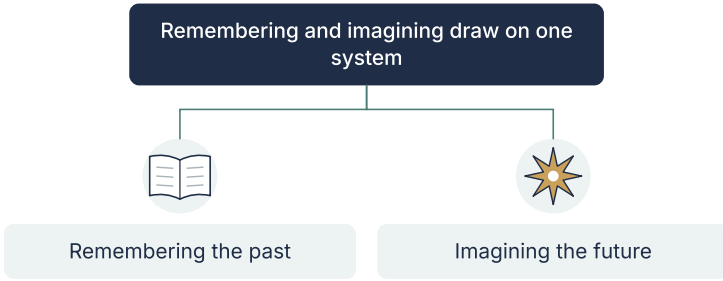
to show how memory feeds imagination, and when you need each one.



A wooden treehouse high in an old oak, a rope ladder hanging down and a round window glowing in the late afternoon.

In 1.1.1 you saw that remembering the past and imagining the future draw on **one shared system** (Schacter & Addis, 2007). The same system lets you pull out old pieces and join them in a new order. A treehouse you have never seen is built from ladders and windows you have already seen.

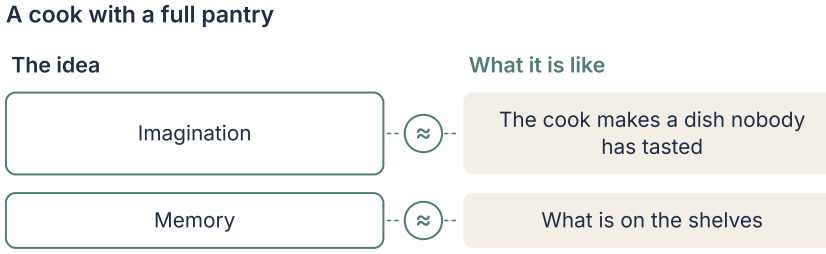
One shared system



Two researchers went a step further, as a view of their own. They wrote, “in this Opinion Article we put forward the idea that all aspects of imagination emerge from semantic memory” (Abraham & Bubic, 2015). In their view, **every picture you imagine is built from what you know**.

> **Science Says:**
>
> The same authors said that “the ‘what-if’ of semantic prospection, counterfactual reasoning and creative thinking” all “emerge from a foundation provided by the ‘what’ of semantic memory operations” (Abraham & Bubic, 2015). **What-if questions grow out of what you know.** Counterfactual reasoning means picturing how things might have gone. They called their paper an opinion, so it is an idea to test.

Imagination works like a cook with a full pantry. The cook can make a dish nobody has tasted, but only from what is on the shelves. Real memory is wider and messier than a pantry, since it holds sounds and feelings along with food.



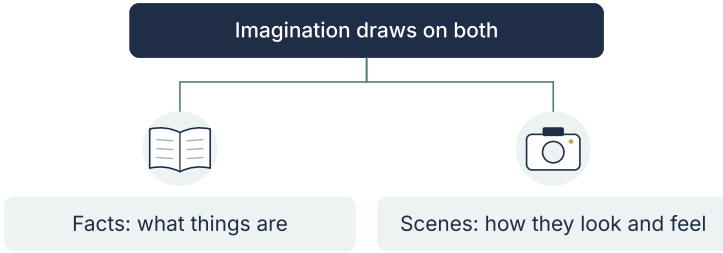
The detail of your memories seems to count. One team found that “Divergent thinking was significantly associated with the amount of

episodic detail for imagined future events" (Addis et al., 2016). Episodic memory is **memory for particular events**, such as one rainy birthday.

The study measured a link only. People who put more detail into imagined future scenes **tended to produce more divergent ideas**, and the study could not show that one caused the other. A detailed memory may be a richer pantry, and the link stays a link until someone tests it.

> **Key Concept:**
>
> Two kinds of memory for imagining. **Imagination draws on both**, the facts for what things are and the scenes for how they look and feel. A treehouse ladder needs what you know a ladder is for and the feel of climbing one at your aunt's house.

Two kinds of memory for imagining

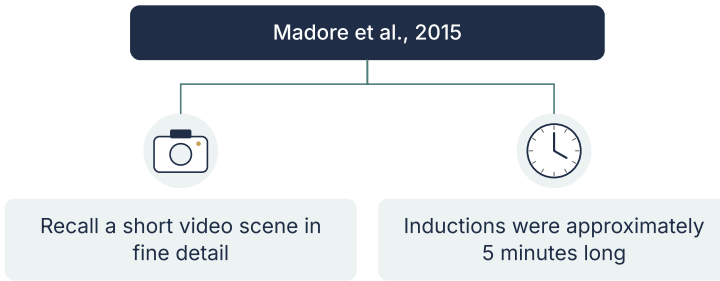


You read in 1.1.1 about **a short memory warm-up** before an ideas task (Madore et al., 2015). The first experiment had only 23 people. Participants watched a short video of a man and a woman doing different things in a house. Then they answered questions that asked them to recall the scene in fine detail.

The questions included "three mental imagery probes" about "the setting, people, and actions" (Madore et al., 2015). The warm-up was short, since "Inductions were approximately 5 minutes long". **An**

induction here means a short warm-up that puts the mind into a certain mode before a task.

A short memory warm-up



A later study combined the results of many such experiments. It covered "21 samples from 16 experiments (reported in ten eligible studies)" (Tomás et al., 2026). The team found **a small gain in the number of ideas** after the warm-up, and that gain "became weaker or null after correction for publication bias" (Tomás et al., 2026).

> Science Says:
>
> Publication bias means that **studies with good results are more likely to get printed**, so the printed record can look rosier than the truth. After correcting for it, the gain shrank or vanished. The same review found "no significant effect of ESI was found on qualitative dimensions of divergent thinking tasks (e.g., originality, subjective creativity, and elaboration)" (Tomás et al., 2026). ESI is the warm-up.

The evidence on the warm-up is mixed. One small study found a boost (Madore et al., 2015), and the combined studies found **a small effect on idea count** that weakened or disappeared after the correction, with

no effect on how original the ideas were. You can try it, and you should expect a small change at most.

The evidence on the warm-up is mixed

Study	Found
One small study (Madore et al., 2015)	A boost
The combined studies (Tomás et al., 2026)	A small effect on idea count, weaker or null after correction
Originality, in the combined studies	No effect

> **Exercise:**
>
> Try it. For about five minutes, recall a recent event in detail, its setting, people and actions. Then list ideas for one small problem.

Memory shapes imagination in a second way, by **giving it a structure**. Ward ran five experiments in which 385 students imagined animals from another galaxy (Ward, 1994). The results fit the idea that creative thinking and ordinary thinking rest on the same kinds of structures and steps (Ward, 1994).



A child's crayon drawing of a creature from another planet, four legs, two eyes and a long tail, pinned to a kitchen wall.

Ward's name for this was **structured imagination**. In plain words, inventing something uses the same kinds of mental order as ordinary thinking, such as the groups you sort things into. His work explored the part played by characteristic properties (Ward, 1994).

Characteristic properties are **the features a group of things usually has**, such as fur on a mammal. Structure helps, since it gives your idea a shape. Starting from creatures you know can keep a new one close to them, and one study tested a way round that.

Structured imagination

- Inventing uses the same kinds of mental order as ordinary thinking
- Such as the groups you sort things into
- Characteristic properties: the features a group of things usually has

Science Says:

In one study, people imagined "life on other planets" with instructions to think "in either very specific ways (e.g., thinking of specific Earth animals) or more abstract ways (e.g., thinking of environmental conditions and general survival needs)" (Ward et al., 2004). **The abstract start won**, since "The latter instructions led to more novel creations" (Ward et al., 2004).

Imagine designing a lunchbox for a child who walks to school in the rain. Start from lunchboxes you know and you get a plastic box with a handle. **Start from the need**, dry food and free hands, and you might picture a bag worn on the back or a pocket sewn into the coat.

Neither one is a lunchbox you have seen before. **Both came from asking what the child needs**, and memory then supplied the bags and

coats to build with. The need set the direction, and memory filled in the parts.

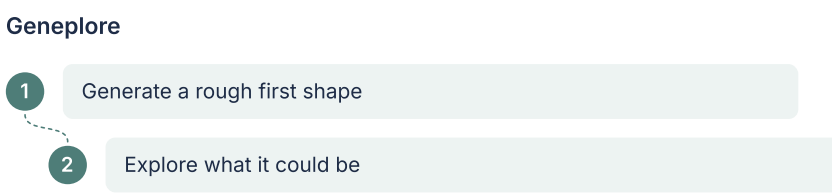
Start from the need

	Start from lunchboxes you know	Start from the need
You get	A plastic box with a handle	A bag worn on the back

> 🗝 **Key Concept:**
>
> Start from the need. **Abstract thinking means starting from the problem**, such as cold air or heavy gravity, before you picture a body. Specific thinking starts from a dog or a fish you know. In that study, starting from the planet's conditions gave newer creatures. It was one study with three experiments, and the effect was measured within one sitting.

Imagination can run in **two phases**, in one model of creative thinking. Finke described "The geneplore model of creative cognition, which describes how preinventive structures such as creative mental images are generated and interpreted" (Finke, 1996). Geneplore joins the words generate and explore, and a preinventive structure is a rough first shape made before you know what it is for.

Finke contrasted "The intentional, structured qualities of creative thinking" with "its spontaneous, unstructured qualities" (Finke, 1996). His paper took up "the general issue of balancing structured and unstructured processes in creative endeavors" (Finke, 1996). **Imagination needs both**, the free scribble and the careful look that follows.



Imagine you scribble a loop with a hook on one side. Looking at it, you might see a teapot or a snail. **Each reading borrows from things you have seen.** The scribble is the free part, and the looking is the careful part.



The same author wrote a book with two colleagues on this wider view. The publisher describes their book as treating creativity as the product of many mental processes, with chapters on visualisation, forming concepts, sorting things into groups, memory retrieval and problem solving (Finke et al., 1992). **Memory retrieval sits in that list**, next to problem solving.

Each tool has its moment. **Detailed memories help when you need material**, such as the look and feel of a place. Starting from a need went with newer creatures in one study (Ward et al., 2004), and a free scribble gives you a shape to explore when you have none yet.

Put the pieces together and you have a simple formula. Imagination = Remembered details + New joins. **Memory brings the details**, and imagination joins them into something that does not yet exist.

A simple formula

Remembered details + New joins = Imagination

Key Concept:

Generate, then explore. **First make a rough shape without judging it**, such as a scribble or a half-formed scene in your head. Then look at it closely and ask what it could be. Finke's model names these two phases.

The levels below build on this section. The warm-up in the Try it has mixed evidence, one study of three experiments found the planet start gave newer creatures, and the starter and the future scene are practice. **No step comes with a promise**, so watch what happens in your own drawings.

No step comes with a promise



The warm-up: mixed evidence



The planet start: one study of three experiments



The starter and the future scene: practice

Exercise:

Two creatures.

1. Starter. Imagine a creature from another planet and draw it. Then **mark which features came from animals you know**.

2. Middle. Draw a second one, starting from the planet's conditions and what it would need to survive. Put the two side by side.
3. Advanced. Imagine one future day when a real project is in use, in detail. List what in that scene does not exist yet and would be needed.

Key idea:

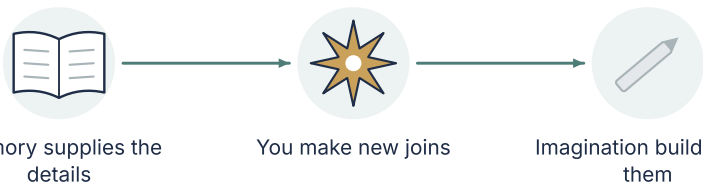
Imagination = Remembered details + New joins, so **memory supplies what imagination builds with.**

Quick check:

In Ward's 2004 study, which instruction led to more novel creatures?

Answer: thinking about the planet's conditions and general survival needs.

What imagination builds with



2.1.3 When Memory Gets in the Way: Examples, Habits and Expertise

Imagine you are asked to design a new chair, and just before you start, someone shows you a photo of a smart red chair with thin metal legs. You pick up your pencil. **Your first sketch has thin metal legs**, and so does your second, even though nobody asked you to copy anything.

Memory gives creativity its pieces. The same memory can pull you back to what you have just seen, or to what you have always done. **In this section I want to show when memory gets in the way**, and what you can do when it does.

The chair photo

Before	After
A smart red chair with thin metal legs	Your first sketch has thin metal legs And so does your second

Recall a song stuck in your head. **Once a tune is playing, a new one is hard to hum.** You try to make up a melody, and the old one keeps slipping back in. Memory can work like that with ideas. The song is only a picture, since real ideas can be steered in ways an earworm cannot.

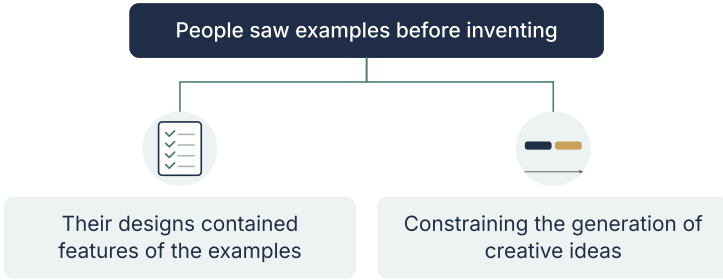


A girl humming at a kitchen sink, a small radio playing on the windowsill beside her.

In 1.3.2 you met fixation. Here the question is **where the stuck idea comes from**. Very often it comes from memory, from an example you saw a minute ago or a habit built over years.

One team asked people to invent new things after seeing examples. They found that "In all three experiments, the designs of subjects who had seen the examples were more likely to contain features of the examples" (Smith et al., 1993). **People copied without meaning to.** The team called it "unintentional conformity, constraining the generation of creative ideas" (Smith et al., 1993).

Unintentional conformity



> **Science Says:**
>
> Time did not wash the copying away. "This conformity effect did not significantly decrease in Experiment 2, when a 23-min task was interpolated" (Smith et al., 1993), which means a 23-minute task in between. A plain order did no better, since "explicitly instructing subjects to create ideas that were very different from the examples did not decrease conformity to the examples". **Being told to be different was not enough.**

Conformity means **going along with what is already there**. The exercise below asks you to name what to avoid, and a later study in this section tested that move.

Time did not wash the copying away

What the team tested	Did conformity decrease?
A 23-minute task in between	Not significantly
Being told to be very different	No

> **Exercise:**
> Try it. Look at a photo of any chair for ten seconds. Then sketch your own chair and count the parts you reused.

Designers have a name for this. Jansson and Smith described design fixation as "a blind adherence to a set of ideas or concepts limiting the output of conceptual design" (Jansson & Smith, 1991). Blind adherence means **sticking to something without noticing you are doing it**, and conceptual design is the early stage where a designer sketches what a thing could be.

Their subjects were "usually engineering design students", and "Typically forty-five minutes was allotted" for each problem (Jansson & Smith, 1991). "Half the subjects (the control group) were given the problem without an accompanying example, and half (the fixation group) were given a sample design". A control group is **the group that gets no example**, so the team could compare the two.

Two groups of design students

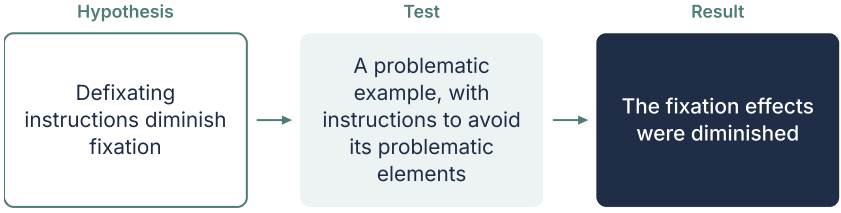
	The control group	The fixation group
Got	The problem with no example	A sample design

> **Science Says:**
> The team wrote that "The results of the experiments clearly demonstrate the existence of design fixation" (Jansson & Smith, 1991). **Design students copied a sample** they had been shown, with forty-five minutes to work. Their training in design did not stop the copying in that study.

Copying would be harmless if the example were perfect. One study found that people "tended to follow the examples even when they included inappropriate elements" (Chrysikou & Weisberg, 2005). **They kept the faults along with the good parts.** The study had 89 people in its first experiment and 60 in its second.

The same team found a way out. They reported that "the fixation effects can be diminished with the use of defixating instructions" (Chrysikou & Weisberg, 2005). The defixating condition was the "inclusion of a problematic example, with instructions to avoid using problematic elements". **A warning about the faults loosened the grip**, in one study of two experiments.

A warning about the faults

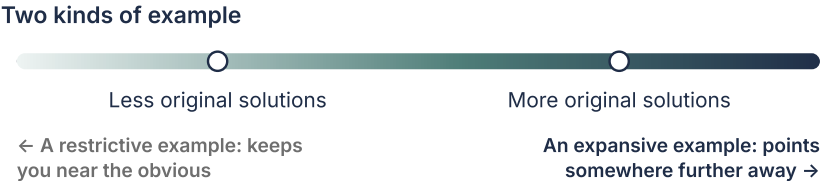


> **Key Concept:**
>
> Name it to avoid it. A general order to make very different ideas did not loosen copying (Smith et al., 1993). **A list of the faults did**, in one study (Chrysikou & Weisberg, 2005). When an example sits in your memory, write down its features and its faults by name. Then build your idea without them.

Examples can stretch you, and they can hold you back. One team defined fixation as "the fact that some knowledge about existing or obvious solutions is spontaneously activated and constrains the

generation of new solutions" (Agogué et al., 2014). **Spontaneously activated means it pops up by itself**, without you calling for it.

The team then compared two kinds of example. "Results from a total of 160 participants confirmed that the solutions proposed by the group exposed to restrictive examples were less original than those given by the group exposed to expansive examples" (Agogué et al., 2014). **A restrictive example keeps you near the obvious**, and an expansive one points somewhere further away.



Other people's ideas enter your memory the same way. In a study of brainstorming, "Exchanging ideas in a group reduced the number of domains of ideas that were explored by participants" (Kohn & Smith, 2011). A domain is **an area of ideas**, and "ideas given by brainstormers conformed to ideas suggested by other participants".

> **Science Says:**
>
> The same team found that fixation "did not influence the number of ideas generated in these experiments" (Kohn & Smith, 2011). **People made as many ideas, over fewer areas.** They added that "Taking a break modulated the natural decline over time in the quantity and variety of ideas", where modulated means changed. The memory point is that ideas you heard a moment ago start steering your own.

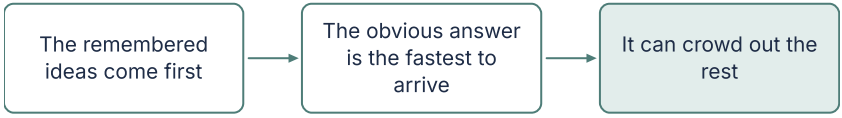
People made as many ideas, over fewer areas



The research is not settled in its details. A review of "25 studies" with "14 manipulated variables" found that, "when scrutinised and compared, they show great variety in the methods used and the results obtained" (Vasconcelos & Crilly, 2016). **Fixation is real, and how strong it is in a given case is still open.**

Habits work on a longer clock. The first ideas you reach are the remembered ones (Gilhooly et al., 2007). **That makes the obvious answer the fastest one to arrive**, and it can crowd out the rest unless something steps in.

Habits work on a longer clock



Control is what steps in. A brain study found activity that rose with idea creativity, "pointing to the role of executive processes for overcoming dominant but uncreative responses" (Benedek, Jauk, Fink, et al., 2014). Here **dominant responses are the ones that shout loudest**, the obvious ideas that arrive first.



Back at the chair, the thin metal legs are the dominant response. **Spotting them is the first step**, and steering away from them is the second, which is a job for control. You might try a chair with no legs at all, or one that hangs from a beam.

> Science Says:
>
> The drill below borrows **one lesson from the studies above**. Those studies used examples people were shown, so the drill on your own first ideas is practice.

> Exercise:
>
> Past your own first ideas.
>
> 1. Pick a problem and write your first three ideas, the remembered kind you learned to spot in 2.1.1.
> 2. Name **the one feature they share**, such as legs on every chair.
> 3. Write three more ideas, with one rule. None may use that feature.
> 4. Compare the second round with the first.

Expertise is the longest habit of all. One writer proposed that “as one acquires domain expertise, one loses flexibility” (Dane, 2010). He called this cognitive entrenchment, “a high level of stability in one’s domain

schemas", where **domain schemas are the fixed plans an expert carries** for how things in the field go.

Cognitive entrenchment

D

Dane

- A theory (2010), a proposal with no new data
- A high level of stability in domain schemas
- The limitations of expertise can be circumvented

Dane's paper is a theory, a proposal with no new data of its own. It holds that entrenchment varies with expertise and with "one's task environment and attentional focus" (Dane, 2010). **Where you work and what you pay attention to can loosen it**, and he argued that "the inflexibility-related limitations of expertise can be circumvented."

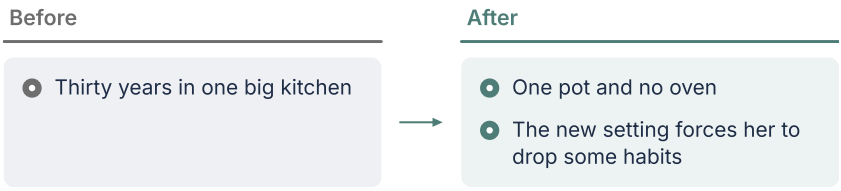


An experienced baker kneading dough at a floury bench, a child beside him shaping a loaf into a strange spiral.

Circumvented means **got around**. His point is that the fixed plans of a field can be loosened, and attention is one of the things he names. Dane names the limit and a way past it in the same paper.

Imagine a cook with thirty years in one big kitchen who is asked to make dinner on a camping trip with one pot and no oven. **Her kitchen habits pull at every step.** The new setting forces her to drop some of them, and a change of task environment is one of the things Dane names in his theory.

A cook on a camping trip



> **Key Concept:**
>
> When to set memory aside. **Lean on memory when you need material**, everything you have stored. Set it aside on purpose when your ideas keep looking like the last example you saw. Naming the example's features, swapping it for a different one or taking a break are moves the studies above looked at.

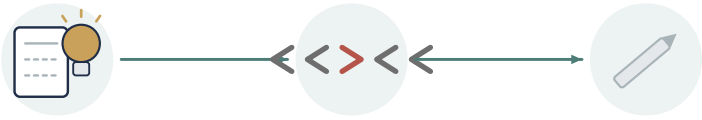
The exercises below come from those studies. The fault list rests on one study of two experiments, and the swap rests on one study of 160 people, so **each is a careful start** that you can test on your own work. The count of reused parts in the Try it and the advanced level are practice.

Exercise:

Name it, then swap it.

1. Starter. Pick an example, such as a bag. List its features and faults by name, then make a version with none of them.
2. Middle. Swap in an example from outside the usual group, such as a bird's nest. Make a second version and **compare**.
3. Advanced. In your own field, collect three existing solutions to a current brief. Name their shared features, then design one option without them.

Each is a careful start



The fault list: one study of two experiments

The swap: one study of 160 people

The count and the advanced level: practice

Key idea:

Memory feeds ideas and can trap them, so **name what you have just seen** and steer past the first answer when your ideas keep copying it.

Quick check:

Did telling people to make ideas very different from the examples stop them copying? Answer: no, it did not decrease conformity to the examples.

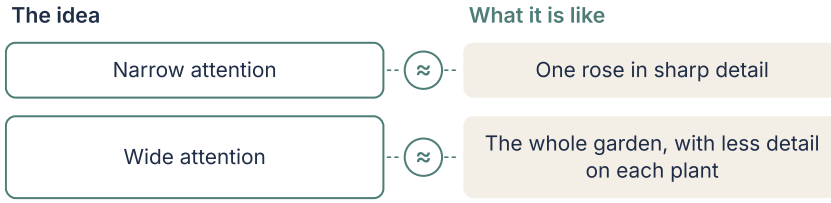
2.2.1 Attention: Observing Closely and Noticing What Others Overlook

Imagine you walk to the corner shop by a street you have used a hundred times. One morning you notice a tiny green door set low in a garden wall. **You had walked past it every day without seeing it.** By evening it has become the start of a story you want to tell your niece.

Memory gives creativity its pieces, and attention decides which pieces get in. **What you notice today is what you can use tomorrow.** In this section I want to show how attention feeds creative work, and when it pays to notice more.

Attention works like a torch in a dark garden. **Point it narrow and you see one rose in sharp detail**, while the rest of the garden vanishes. Widen the beam and you see the whole garden, with less detail on each plant. A real mind changes its beam far faster than any torch, so the picture only goes so far.

A torch in a dark garden



In 1.1.1 you met a study in which real-world creative achievement went with a leaky filter for sights and sounds (Zabelina et al., 2015). The same research group later tested attention in a second way. **The new**

study split two kinds of creativity apart, and each went with its own kind of attention (Zabelina et al., 2016).

> **Science Says:**
>
> The team wrote that "real-world creative achievement is indeed associated with leaky attention, whereas standard laboratory tests of divergent thinking are not" (Zabelina et al., 2016). Their summary **drew a line between two groups**. In their words, "creative achievers may have leaky attention, as suggested by previous literature, whereas divergent thinkers have selective yet flexible attention."

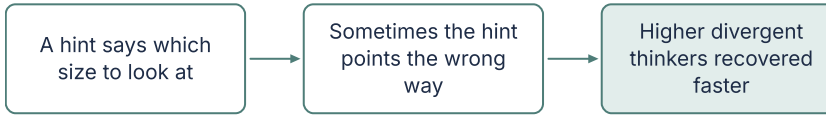
Leaky attention lets **more of the world slip in around the edges**, such as the green door at the side of the street. Selective attention picks one thing and keeps the rest out. Flexible attention can move quickly when the first choice turns out wrong. Each kind has its use, depending on the job in front of you.



A torch beam lighting a single red rose in a dark garden, the other flower beds faint shapes in the shadows around it.

The task in that study used big letters made of small letters, such as a large H built from tiny S shapes. A hint told people which size to look at, and sometimes **the hint pointed the wrong way**. People who scored higher on divergent thinking recovered from those wrong hints faster (Zabelina et al., 2016).

Big letters made of small letters



The team wrote that "this smaller validity effect was associated with higher divergent thinking, suggesting that divergent thinking was related to quicker overcoming of invalid cues, and thus to flexible attention" (Zabelina et al., 2016). An invalid cue is **a hint that points to the wrong spot**, and the validity effect is how much a wrong hint slows you down.

> **Key Concept:**
>
> Two kinds of attention for two kinds of creativity. **Leaky attention went with creative achievement** in real life, the things people made and were known for. Selective yet flexible attention went with divergent thinking in the lab. Both were links found in groups of people (Zabelina et al., 2016).

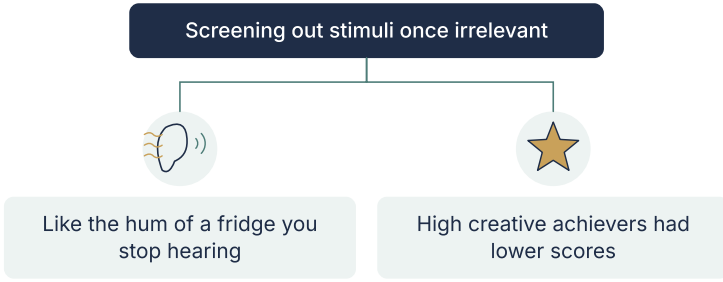
Two kinds of attention for two kinds of creativity

Attention	Went with
Leaky attention	Real-world creative achievement
Selective yet flexible attention	Divergent thinking in the lab

Another team looked at a filter called latent inhibition. They described it as "the capacity to screen from conscious awareness stimuli previously experienced as irrelevant" (Carson et al., 2003). In plain words, it is **the habit of tuning out things that were useless before**, such as the hum of a fridge that you stop hearing after a while.

In "youthful high-IQ samples", "high lifetime creative achievers had significantly lower LI scores than low creative achievers", with an effect size of r = .31 (Carson et al., 2003). LI stands for latent inhibition. **People who had made more creative things tuned out less**, and the samples were all high in IQ, the score on an intelligence test.

Latent inhibition



The same study looked at a very small group of 25 people with unusually high achievement in a single field (Carson et al., 2003). They were seven times more likely to have low latent inhibition scores than high ones. **A group of 25 is very small**, so the result is a hint to keep in mind and no more.

Flexible control showed up in a third study. A team found that "Creative individuals were neither more nor less capable of overriding cognitive conflicts" (Zabelina & Robinson, 2010). **Creative people were no better at the hard part**, which was pushing past a confusing signal.

Where the difference lay

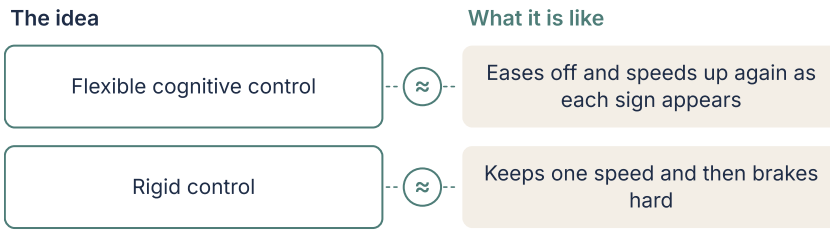
- The difference was not in overriding cognitive conflicts
- It lay in shifting control from trial to trial

Science Says:

The difference lay in how they shifted. The team found that "creative individuals displayed more flexible cognitive control, as defined by greater cognitive control modulation from trial to trial" (Zabelina & Robinson, 2010). **They turned their control up and down more** from one try to the next. It was one small study of 50 people.

Imagine a driver on a road full of sudden roadworks. **A flexible driver eases off and speeds up again** as each sign appears, and a rigid one keeps one speed and then brakes hard. Cognitive control is the steering side of your mind, and the creative people in that study adjusted it more like the first driver.

A driver on a road full of roadworks



You can see the same steering at a stove. A cook watching three pans **turns her attention up for the one about to boil over** and down for

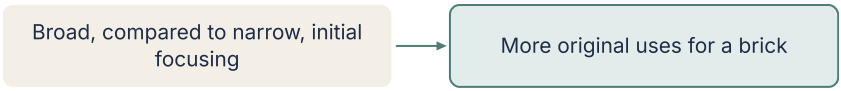
the one simmering on low heat. She never stops watching any of them, and she shifts how much of her beam each one gets.

A cook watching three pans



One team set people's attention before a task. They found that "broad, compared to narrow initial focusing of perceptual attention subsequently led to generation of more original uses for a brick" in a first experiment, and in a second to "more unusual category exemplars" (Friedman et al., 2003). **A wide look first went with more original answers.**

A wide look first



Category exemplars are **examples of a group**, such as robin and penguin for birds, and the penguin is the unusual one. The authors called their results "converging initial support for our attentional priming hypothesis" (Friedman et al., 2003). Priming means setting the mind up with one task so it carries into the next, and here the effect was measured within one sitting.

A wide beam can be a lasting habit. In a study of "Sixty-one participants", "trait breadth of attention was correlated modestly and positively (r = .20) with creative performance" (Kasof, 1997). A trait is **a**

lasting habit of a person, so people whose attention was usually wide did a little better on the creative task.

Imagine writing a birthday poem in a busy café. **The chatter at the next table keeps pulling your beam sideways**, and the lines will not come. A wide beam might catch a lovely phrase from a stranger, and the same width lets the clatter in. One study tested this kind of noise, as the box below shows.

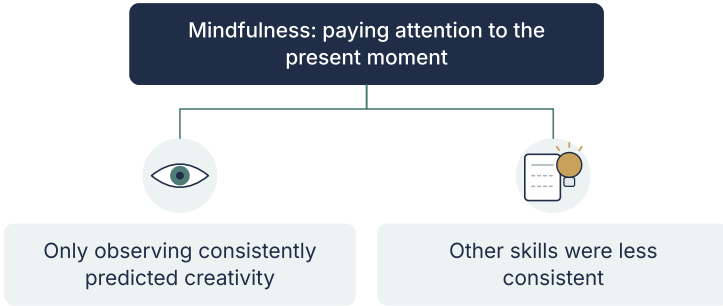
A wide beam lets in both

Useful detail	Distracting chatter
⊕ A lovely phrase from a stranger	⊖ The clatter at the next table

> **Science Says:**
>
> Noise got in the way. Kasof found that "creative performance was impaired by exposure to noise, especially noise that was unpredictable or intelligible" (Kasof, 1997). Intelligible noise is **speech you can make out**, and "noise impaired creative performance more in participants whose trait breadth of attention was wide" (Kasof, 1997). A wide beam lets in useful detail and distracting chatter alike.

The last study comes closest to everyday observing. A team ran "four studies in which mindfulness skills were measured, extensively trained, or manipulated with a short, incidental meditation session" (Baas et al., 2014). Mindfulness means **paying attention to the present moment** on purpose.

Four studies of mindfulness



Of all the skills they measured, one stood out. “Only the ability to observe and attend to various stimuli consistently and positively predicted creativity. Results regarding other mindfulness skills were less consistent” (Baas et al., 2014). **Observing well went with creativity.** The study shows a prediction, and it gives no size for a gain from training.



A child crouched on a pavement studying a snail on a wet leaf, a school bag dropped beside her.

> **Key Concept:**
>
> Observing feeds memory. **What you observe closely is what memory can later hand back.** A detail you never noticed is unlikely to turn up in an idea. Observing on purpose, the skill that predicted creativity in the four studies above, is one way to stock memory with fresh pieces.

Back on the street, the green door got in because your beam was wide for once. **Attention brings in the raw material**, memory stores it, and later you join it into something new. When you need fresh pieces, widen and observe. Next time you walk down a familiar street, widen your beam and see what else turns up.

From the street to a new idea



Building one idea is a different job. None of the studies in this section tested how attention helps you shape or finish a single idea. For that part of the work the studies give no rule, so watch how your own beam behaves.

The wide-look starter below rests on one study with initial support, and the other parts are practice, so **watch what each one does for you**. Do the starter's two parts back to back, as the wide look came just before the ideas task in that study. The quiet place in the advanced level follows one noise study (Kasof, 1997).

> **Exercise:**
>
> Try it. For three minutes, note the sights, sounds and textures around you in detail.

Note in detail

- [x] The sights around you
- [x] The sounds around you
- [x] The textures around you

> **Exercise:**
>
> Wide, then close.
>
> 1. Starter. Scan a whole room for one minute, finding small things across it. Then name five unusual examples of a group, such as vehicles.
> 2. Middle. Look at a tree. Name its whole shape, then one small part, then the whole again. Switch three times.

3. Advanced. In a quiet place, watch one real work scene for ten minutes. List details others would miss and **use one in a current project**.

Key idea:

Attention decides what reaches memory, so a wide, observing beam gathers fresh pieces and a flexible one helps you work with them.

Quick check:

In Zabelina's 2016 study, which kind of attention went with real-world creative achievement? Answer: leaky attention.

Attention in one line



2.2.2 Focused and Open Attention: Knowing When to Narrow and When to Widen

Imagine two jobs on the same Sunday. In the morning you fill in a long form for the council, box by box. **In the afternoon you plan a surprise party** for a friend who hates surprises. The two jobs ask for different kinds of attention, and in this section I want to show which kind each one needs.

The form has one right answer in every box. The party has no right answer at all, only better and worse ideas. **A narrow beam suits the form, and a wide one suits the party**, and the trick is knowing when to switch.

Two jobs on one Sunday

	The council form	The surprise party
Has	One right answer in every box	No right answer, only better and worse ideas
Suits	A narrow beam	A wide one

A camera lens helps me here. **Zoom in and you see one face in sharp detail**, with the crowd behind it blurred. Zoom out and the whole crowd comes into view, with no single face clear. Attention zooms in the same way, and a mind can turn its view inward, which no lens can do.

Your eyes do a small version of this all day. **Reading a word, you zoom in on a few letters.** Stepping out to cross a road, you zoom out to take in the whole street, cars, bikes and all. Neither one is better, and each suits its moment.

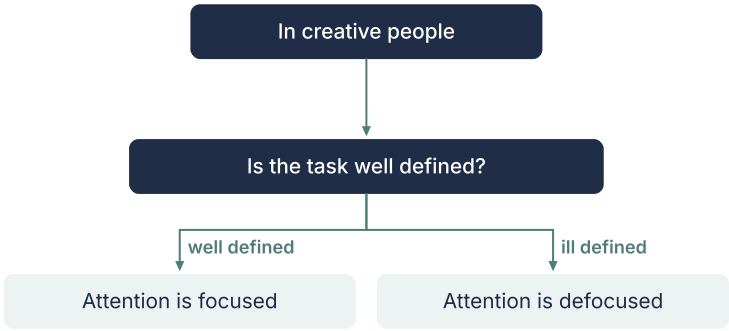
A camera lens

The idea	What it is like
Focused attention	Zoom in: one face in sharp detail
Open attention	Zoom out: the whole crowd comes into view

One writer summed up a set of experiments on creative people. In his words, defocused attention in creative people is "a variable state", and "When the task is ill defined and ambiguity is high, attention is defocused" (Vartanian, 2009). Defocused means **spread wide**, and ambiguity means the task could mean more than one thing.

The other half of the pattern runs the opposite way. In creative people, "when the task is well defined and ambiguity is low, attention is focused" (Vartanian, 2009). **Creative people changed their beam to suit the task**, wide for the muddy jobs and narrow for the clear ones.

Vartanian's pattern



> **Science Says:**
>
> A review set out the cost of over-focusing. Working memory capacity "helps problem solvers to control their attention, resist distraction, and narrow their search through a problem space" (Wiley & Jarosz, 2012). The same review warned that very tight focus can harm performance on creative problem-solving tasks. **Focus helps on clear problems and can hurt on creative ones.**

With a roomy working memory, **you can keep the goal in view and push distractions off the edge**. A problem space is the set of paths

you could try, and narrowing it means trying fewer of them. On a clear problem, fewer paths can mean a quicker answer.

Focus on two kinds of problem

Helps	Can hurt
⊕ Clear problems: keep the goal in view	⊖ Creative problem-solving tasks

Treat a search as a walk down chosen paths, and a narrow search as a walk down very few. **On a creative problem the answer may lie off those paths**, and a narrow search never looks there. In this book's reading, the review's finding fits that picture, since the same focus helped one task and hurt another.



A hiker with a map on a forest trail, a small side path curling away through the ferns towards a hidden clearing.

In this book's terms, a well-defined task is one where **the variables are identified**, such as the council form. An ill-defined task is one where the variables are not identified, such as the surprise party. That link is

my own framing of the findings above, and the two studies do not use these words.

> **Key Concept:**
>
> Narrow or wide. **A clear task with one right answer suits a narrow beam**, and a muddy task with many possible answers suits a wide one, in the pattern Vartanian described. Before you start, ask which kind of task it is. The answer tells you which way to set your beam.

Most real jobs hold both kinds of step. **The party needs a wide beam for ideas** and a narrow one for the guest list, the budget and the date. You switch back and forth many times in one afternoon, often without noticing. Each switch is a small choice about the beam.

The party needs both

- A wide beam for ideas
- A narrow one for the guest list, the budget and the date
- Each switch is a small choice about the beam

Attention can turn inward, away from the world outside. In 1.1.1 you saw a brain study that described idea generation as **attention turned inward** while the mind searches memory (Benedek, Jauk, Fink, et al., 2014). A second study by the same lead author looked at how the mind keeps the outside world from breaking in.

The second team linked a brain signal to “an inhibition of the ventral attention network” (Benedek, Schickel, et al., 2014). **They wrote that this network** “is thought to prevent reorienting to irrelevant

stimulation during goal-driven, top-down behavior, which may serve the executive function of task shielding during demanding cognitive tasks such as idea generation and mental imagery" (Benedek, Schickel, et al., 2014).

Task shielding means **keeping the outside world from barging in** while you work on something in your head. Reorienting means turning towards something new, such as a door banging. Top-down behaviour is action steered by your own goal. A closed study door does the same job in wood.

A closed study door



Task shielding: keeping the outside world from barging in



Reorienting: turning towards something new

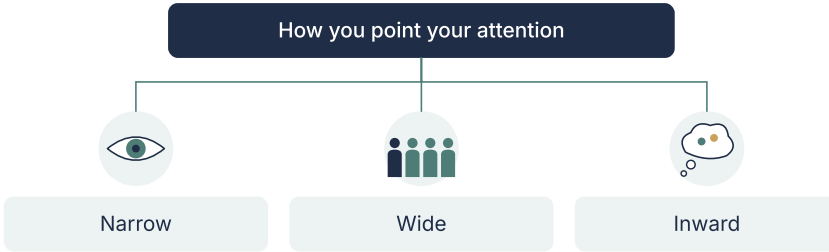


Top-down behaviour: steered by your own goal

> **Key Concept:**
>
> Attention has a third direction. **Narrow and wide are about how much of the world you take in.** Inward is about turning away from the world to search your own memory and imagination. Idea work often needs the inward turn, with the outside world shielded for a while.

You can see shielding on people's faces. One article noted that "when people are engaged in thought they tend to disengage from the external world by blinking or fixating on an empty portion of the visual field, such as a blank wall, or out the window at the sky" (Salvi & Bowden, 2016). **Looking at nothing is a way of looking inward.**

Attention has a third direction



The authors wrote that this habit "appears to indicate (and likely facilitate) a shift of attention from external to internal stimuli" (Salvi & Bowden, 2016). Likely facilitate means **probably makes it easier**, and the article sets out a view with no new test of its own. Blinking is another of the signs they name. The Try it below borrows the habit as practice.

> Exercise:
>
> Try it. Next time you search for an idea, rest your eyes on a blank wall or the sky, or close them.

Focus and openness can work as a team. In 1.2.3 you met two brain networks that usually pull against each other and cooperate during creative work (Beaty et al., 2016). **For attention, the lesson is that narrow and wide can take turns** inside one task, such as widening to gather party ideas and narrowing to book the hall.

Meditation is one way people train their beam. In open-monitoring meditation you **notice whatever comes**, such as a sound or an itch, and let it go. In focused-attention meditation you hold your mind on one thing, such as your breath, and bring it back each time it drifts. The study in the box below used both kinds.

Two kinds of meditation

Open monitoring	Focused attention
Notice whatever comes, and let it go	Hold your mind on one thing, such as your breath

> **Science Says:**
> One team tested both kinds with "Nineteen healthy adults" who were "practitioners of both FA and OM meditation" (Colzato et al., 2012). They found that "OM meditation induces a control state that promotes divergent thinking", and that "FA meditation does not sustain convergent thinking". **It was one small study** of people who already meditated.

The sessions ran under "a certified meditation coach", with "the FA meditation (35 min)" as one example (Colzato et al., 2012). The authors themselves suggested that a lift in positive mood from meditating "has boosted the effect". **A better mood may have done part of the work**, so attention alone cannot take the credit.

One small study

CE

Colzato et al., 2012

- Nineteen healthy adults who already meditated
- Open monitoring promoted divergent thinking
- Focused attention did not sustain convergent thinking

The open sit went with the wide, many-answers task. **The focused sit failed to help the one-answer task**, which is a surprise if you expect narrow attention to help narrow problems. One small study cannot

settle the question either way, and the mood note above is one more reason to hold it loosely.

> **Science Says:**
>
> A much larger study combined many training studies, with "332 effect sizes" in all (Haase et al., 2025). Across all methods, **the average effect size was g = 0.53**. The team found that "Complex training courses, meditation and cultural exposure were most effective (gs = 0.66)" (Haase et al., 2025). **Meditation sat level with the other two** on average.

Effect sizes in the larger study



Imagine a cook who spends a month in a market town abroad. **She comes home with new smells and tastes in her memory**, and her next dishes borrow from them. Her trip is only my picture of cultural exposure.

The same team warned that "Study effect sizes varied considerably across all studies and for many subgroup analyses, suggesting that researchers can plausibly expect to find reversed effects occasionally" (Haase et al., 2025). Reversed effects are **results that go the wrong way**. Meditation did well on average, and single studies swung a long way around that average.



Two cushions on a wooden floor, one facing an open window full of garden light, the other facing a plain white wall.

Put those two studies side by side. **Meditation as a whole did well** in the large study, with big swings between studies. The split between open and focused sits rests on one small study of 19 experienced meditators, so a short sit for a beginner is practice with no promise attached. Treat the starter and the advanced level as practice.

Exercise:

Narrow or wide.

1. Starter. Before a task, ask whether its variables are identified. Write “focus” or “widen” and **check afterwards** how it went.
2. Middle. Before an open ideas task, sit five minutes noticing whatever comes. Before a one-answer puzzle, sit five minutes on your breath. Compare.

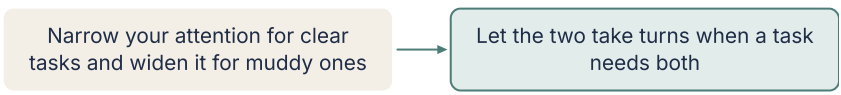
3. Advanced. On a real task, close screens and messages while you search for ideas. Reopen them to check details, and note which part needed which.

Key idea:

Narrow your attention for clear tasks and widen it for muddy ones, and let the two take turns when a task needs both.

Quick check:

In Vartanian's summary, what happens to creative people's attention when a task is ill defined? Answer: it becomes defocused.



2.2.3 Mind Wandering, Breaks and Incubation

Imagine you have been stuck for an hour on the first line of a hard letter to a friend. You give up and go out to hang the washing. **Halfway along the line, a better opening turns up.** In this section I want to look at what attention does when you step away, and which kind of break helps.

Attention never simply switches off. When you leave a task, it goes somewhere, to the washing, to a daydream or to tomorrow's shopping.

Where it goes during the break may shape what you bring back, and the research gives some careful clues.



A woman hanging white sheets on a washing line in a sunny garden, a wooden peg held between her teeth.

Leaving a problem for a while works like letting tea brew. **You add the leaves, then you wait**, and the drink you come back to is stronger than the one you left. A mind is more than a teapot, and nobody can yet see what goes on during its wait.

Like letting tea brew

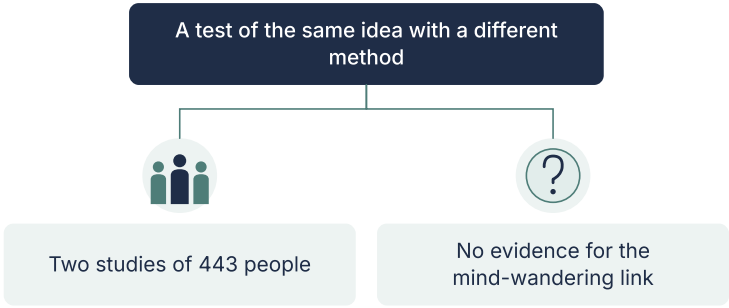


In 1.3.2 you met incubation and the study that combined many incubation experiments (Sio & Ormerod, 2009). There you read of a lab result that linked an easy break to **more mind wandering** (Baird et al., 2012), along with a later test that found no evidence for that link (Murray et al., 2024).

> **Science Says:**
>
> The later test was **a conceptual replication** of a much cited lab experiment, with a new design and two studies of 443 people in all (Murray et al., 2024). The evidence on mind wandering in breaks is mixed, and no one can say it causes the gain.

A conceptual replication is **a test of the same idea with a different method**. If the idea is sound, it should hold up when the details change, so for now the mind-wandering link stays an open question.

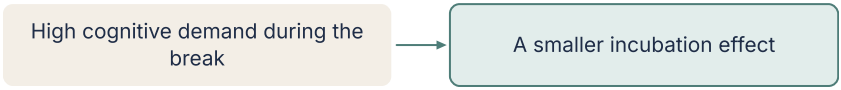
A conceptual replication



Science works this way on purpose. **A result counts for more once others can repeat it**, and a failed repeat is a sign to hold the first finding loosely. One failed repeat does not prove the first result wrong, and it does mean the first result needs more tests.

The combined study held a second lesson about breaks. The authors found that "filling an incubation period with high cognitive demand tasks gave a smaller incubation effect" (Sio & Ormerod, 2009). In plain words, **a hard task during the break shrank the benefit**, so the kind of break counts.

A hard task during the break



They added a warning about using breaks on purpose, writing that "the conditions under which incubation can be used" as a deliberate method for solving problems "must be designed with care" (Sio & Ormerod, 2009). **A break is a tool with conditions attached**, and the light break in the exercise below follows the pattern they found.

> **Key Concept:**
>
> Light and heavy breaks. **A light break** asks little of your mind, such as washing up, folding laundry or a slow walk. A heavy break fills your head with new demands, such as answering hard emails or doing a tricky puzzle. In the combined studies, the heavy kind shrank the benefit of the break.

Light and heavy breaks

A light break	A heavy break
Washing up, folding laundry or a slow walk	Hard emails or a tricky puzzle
Asks little of your mind	Shrank the benefit of the break

Mind wandering has a cost. In one review, mind wandering is when "attention switches from a current task to unrelated thoughts and feelings" (Smallwood & Schooler, 2015). **Its link with errors shows the price**, and the same review noted that "its relationship to creativity and future planning suggest its potential value."

Unrelated thoughts are ones that have **nothing to do with the job in front of you**, such as a holiday plan in the middle of a sum. The review weighed both sides. Errors sat on one side of the scale, and creativity and planning sat on the other. Which side weighs more depends on the job you are doing.

Both sides of the scale

The potential value	The cost
⊕ Creativity	⊖ Errors
⊕ Future planning	

Another review found that "Substantial evidence suggests that mind-wandering typically occurs at a significant cost to performance", including "reading comprehension" and "tests of working memory and intelligence" (Mooneyham & Schooler, 2013). **A wandering mind does worse on focused tasks.** The same authors saw a possible role for it in planning your own life and in creative problem solving.

Wandering is a cost on the clear, focused jobs, the ones where you need every word of a page. **It may be worth more on the open ones**, such as finding a fresh line for a letter. Knowing which kind of job you are doing helps you decide whether to pull your mind back.

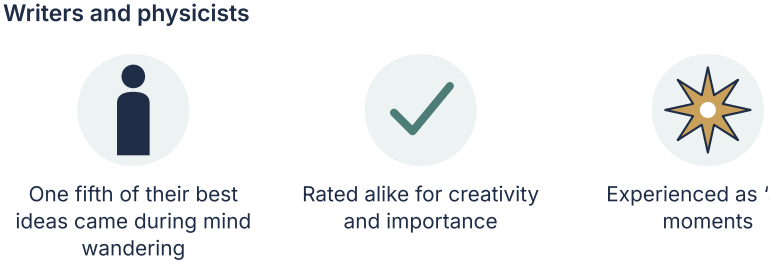
Where wandering costs and where it may be worth more

	Focused jobs	Open jobs
Mind wandering	A cost to performance	May be worth more

> **Science Says:**
>
> One study asked "professional writers and physicists" to report their best ideas each day, with 98 writers and 87 physicists taking part (Gable et al., 2019). They reported "that one fifth of their most significant ideas of the day were formed during spontaneous task-independent mind wandering" (Gable et al., 2019). Task-independent means **while doing something else**, such as cooking or walking.

The team found "no differences between ratings of the creativity or importance of ideas" from mind wandering and from time on task (Gable et al., 2019). **Ideas from both sources were rated alike.** Mind-wandering ideas "were more likely to be associated with overcoming an impasse on a problem and to be experienced as 'aha' moments".

Take a writer stuck on a chapter who stops to peel potatoes. **The missing scene may arrive at the sink**, and if it does, the study suggests it is likely to feel like a sudden flash. Back at the desk, the scene still has to be written.

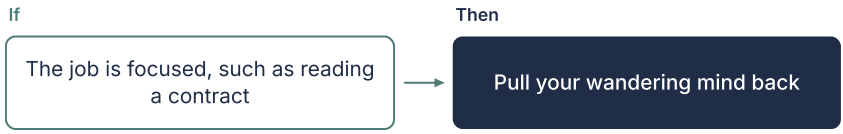


An impasse is **a dead end where you are stuck**. All of these were the people's own reports of their days. Self-reports show what people noticed, and they can miss things.

One fifth is a real share, and it leaves four fifths. **Most of the best ideas still came while people were on task**, working at the problem in front of them. A break is one source of ideas among others, and working on the problem stays the main one.

> **Key Concept:**
>
> Two jobs, two answers. On a focused job, such as reading a contract, **pull your wandering mind back**, since wandering costs performance there. On an open job that has stalled, a light break with room to wander is worth trying. The kind of job tells you which answer to use.

Two jobs, two answers



The kind of wandering may count, along with the amount. In "a sample of 77 undergraduate students", "deliberate MW positively predicted creative performance, whereas spontaneous MW was negatively associated with such performance" (Agnoli et al., 2018). MW is short for mind wandering. **Deliberate wandering means letting your mind drift on purpose**, and spontaneous wandering just happens.

Two kinds of mind wandering

Deliberate	Spontaneous
Letting your mind drift on purpose	Just happens
Positively predicted creative performance	Negatively associated with it

Imagine sitting on a bus with the letter problem in mind. **You let your thoughts roam around it on purpose**, from the friend to the last time you laughed together. Compare that with a mind that slides off to the shopping list without asking you first.



A man on the top deck of a bus gazing out at passing rooftops, a folded letter resting on his knee.

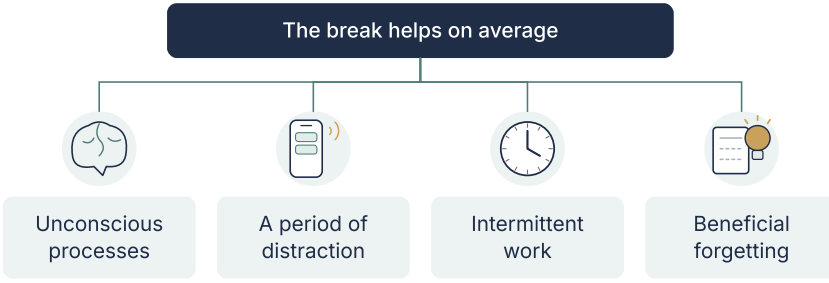
The Agnoli result came from one small study, and it measured links only. It hints that **choosing to let your mind roam** may differ from being pulled away. The Try it below borrows the idea as practice, by leaving the problem on purpose with a question in hand.

> **Exercise:**
> Try it. Before you step away from a problem, write the open question in one line. Let it be the thought you come back to.

Why breaks help is still debated. One pair of authors noted that "most findings do not really speak to whether the effects should be explained by unconscious processes or merely by consequences of a period of distraction" (Ritter & Dijksterhuis, 2014). Unconscious processes are **mental work you are not aware of**, and a period of distraction is simply time spent on something else.

Another researcher listed further explanations. "Other explanations for incubation effects, in terms of Intermittent Work or Beneficial Forgetting are considered" (Gilhooly, 2016). Intermittent work means **coming back to the problem in short bursts** during the break, and beneficial forgetting means losing a wrong idea that was blocking the way.

Why breaks help is still debated

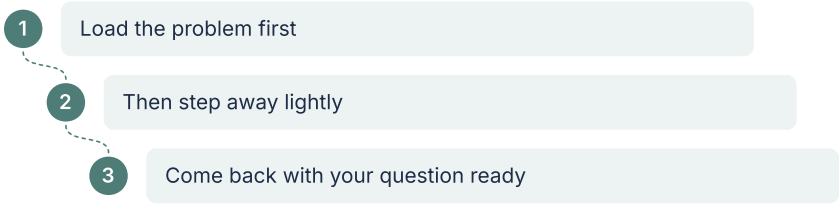


> Science Says:
>
> **The break helps on average, and the reason stays open.** The combined studies found a positive incubation effect (Sio & Ormerod, 2009), and why it helps is still debated (Ritter & Dijksterhuis, 2014; Gilhooly, 2016). This book makes no claim about which explanation is right.

Attention, memory and creativity share this work. **Memory keeps the problem waiting**, attention leaves it for a while, and when you come back you may see it from a fresh side. Beneficial forgetting is one guess at how the fresh side appears, and the others are still in play.

Whatever the reason, the steps stay the same. **Load the problem first, then step away lightly**, and come back with your question ready. The exercise below follows that order.

Load, step away, come back



The light break below rests on the combined studies, with no claim for this routine. The idea log only records where ideas turned up. The drift check is practice, since the evidence on mind wandering in breaks is mixed (Baird et al., 2012; Murray et al., 2024). **Treat all three levels as practice** and see what your week shows.

Exercise:

Breaks and drifts.

1. Starter. After hard work on a problem, take a light break, such as folding laundry, with nothing demanding. Return and add new ideas.
2. Middle. For a week, note where you were and what you were doing when your best daily idea appeared. **Mark it on task or away.**
3. Advanced. On one focused and one open task, mark each drift and whether it cost an error or brought an idea.

Key idea:

Work hard first, then take a light break, since **a demanding break shrank the benefit** and most good ideas still came on task.

Quick check:

In the study of writers and physicists, what share of their best daily ideas came during mind wandering? Answer: one fifth.

Breaks in one line



2.3 Intellect: Analysing, Judging and Combining With Creativity

2.3.1 How Intellect and Creativity Relate: Overlap, Thresholds and Limits

Imagine two friends at a pub quiz. One wins the general knowledge round, and **the other comes alive in the picture round**, where you invent the funniest caption for an odd photo. Could the first friend shine in the picture round? In this section I look at the evidence.

Two rounds at the pub quiz

The general knowledge round	The picture round
Tasks with right answers	The funniest caption for an odd photo

In 1.1.2 you met this book's definition. Intellect is **solving tasks where the variables are identified**, and creativity is solving tasks where the variables are not identified. That definition is about kinds of task, and the studies below are about people's scores on two kinds of test.

Intelligence tests are tasks with right answers, such as finding the next shape in a pattern. Most creativity tests in these studies are open tasks with many possible answers. **The studies ask how the two sets of scores move together**, and none of them tests what a task is.

Each kind of test catches a different job. **A right-answer test asks you to follow one path to one goal**, and an open test asks you to make many paths. In my view, most of daily life mixes the two, often in the same hour.

Each kind of test catches a different job



A right-answer test: one path to one goal



An open test: many paths



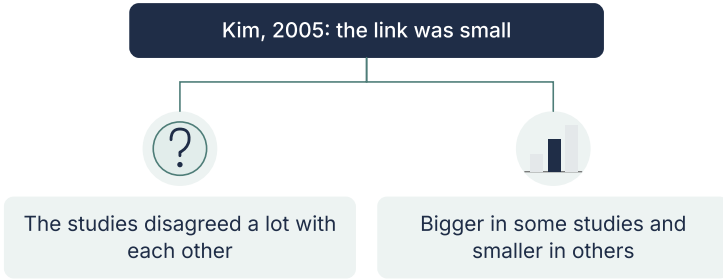
Most of daily life mixes the two

> **Key Concept:**
>
> Scores and tasks. **A test score describes a person** on one day with one test. A task type describes the job itself, whether its variables are identified or not. The research in this section compares scores, and this book's definition sorts tasks. The two sit side by side without clashing.

In 1.1.1 you saw that intelligence and creativity scores **go together a little** (Kim, 2005; Gerwig et al., 2021). Kim's own words add something. The link was "small", "but heterogeneous", and he judged that "the relationship between creativity test scores and IQ scores is negligible" (Kim, 2005).

Heterogeneous means **the studies disagreed a lot with each other**, so the average hides a wide spread. Negligible means small enough to set aside. A link can look tiny on average and still be bigger in some studies and smaller in others. The spread is part of the story.

Small, but heterogeneous



> **Science Says:**
>
> The newer study explained why its link came out higher than Kim's. The rise "could be attributed to the correction of attenuation because a difference between effect sizes prior-Kim vs. post-Kim was non-significant" (Gerwig et al., 2021). Attenuation means **a link shrinking because the tests are not perfectly accurate**. Once that is corrected, the link looks a little larger.

How you test creativity changes the answer. The same study found that "the intelligence-DT relationship can be higher (up to r = .31-.37) when employing test-like assessments coupled with be-creative instructions, and considering DT originality scores" (Gerwig et al., 2021). DT stands for divergent thinking, **the move that spreads out to many possible answers**.

In plain words, **the link grew when people were told to be creative** and when judges scored how original the ideas were. The kind of intelligence measured did not seem to count, since "The facet of intelligence (g vs. gf vs. gc) did not affect the correlation" (Gerwig et al., 2021).

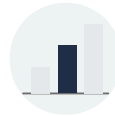
When the link grew



People were told to be creative



Judges scored how original the ideas were



Up to r = .31-.37

A facet is **one side of something**. In that list, g is general intelligence, gf is reasoning through a new problem, and gc is what you have learned, such as words and facts. All three gave much the same link with creativity. Which side of intelligence a test measured counted for less than the way creativity was tested.

Three facets, much the same link



> **Science Says:**
>
> One study tested the instruction effect directly. It found that "asking people to be creative yielded better but fewer responses" (Nusbaum et al., 2014). It added, "When people were told to come up with a lot of ideas and creativity was scored as fluency, intelligence weakly predicted creativity. But when people were told to be creative and creativity was scored as subjective ratings, intelligence more strongly predicted creativity." **It was one study.**

Fluency means **the number of ideas**, and subjective ratings are judges' views of how good the ideas are. Those intelligence scores are only a

stand-in measure for what this book calls intellect. In this book's terms, choosing the best ideas and shaping them is careful work, and careful work calls on intellect.

Two instructions in one study

Told to come up with a lot of ideas	Told to be creative
Come up with a lot of ideas	Be creative
Scored as fluency	Scored as subjective ratings
Intelligence weakly predicted creativity	Intelligence more strongly predicted creativity

Back at the pub quiz, the picture round asks for the funniest caption, which is a quality task. **The friend who reasons well may do better there than you would guess**, because judging which caption lands is part of the job. The link is loose, so plenty of people break the pattern.

> Exercise:
>
> Try it. Take one real problem from your week. List what is known and fixed, and what is not yet identified.

The Try it applies this book's own sort, so **treat it as practice**. The starter level of the closing exercise borrows the two instructions from that one study. You might find the second list shorter, as the study found, and you can judge for yourself whether it is better.

The threshold idea, a certain IQ before creativity can grow, has **mixed evidence** behind it (Kim, 2005; Jauk et al., 2013). Here I look closer at where that line sat in one study, and what changed once people were past it.

Creative potential is what people show **on a creativity test**, and creative achievement is what they have made in real life, such as a song or an invention. Jauk's team, with "297 participants", found that thresholds "varied as a function of criteria" (Jauk et al., 2013), the rules used to score the ideas. It was never one fixed number.

Potential and achievement

Creative potential	Creative achievement
What people show on a creativity test	What they have made in real life

The line sat "around 100 IQ points" for one way of scoring originality and "120 IQ points" for a harder one (Jauk et al., 2013). For the plain count of ideas, it was "around 85 IQ points". **Harder scoring raised the line**, and easier scoring lowered it.

Where the line sat (Jauk et al., 2013)



> **Science Says:**
>
> The same study found that "once the intelligence threshold is met, personality factors become more predictive for creativity" (Jauk et al., 2013). Past the line, **who you are counted for more** in the test scores. Real creative achievement went on benefiting from higher intelligence "even at fairly high levels of intellectual ability" (Jauk et al., 2013).

A third team ran “eight studies (total N = 12,255)” (Karwowski et al., 2016). They wrote that “although evidence concerning the threshold hypothesis on the creativity-intelligence relationship is mixed, the ‘necessary condition hypothesis’ is clearly corroborated”. Corroborated means **backed up**, and the necessary condition is the idea that some intelligence is needed.

The necessary condition hypothesis

- Eight studies (total N = 12,255)
- Evidence on the threshold hypothesis is mixed
- Some intelligence is needed: clearly corroborated

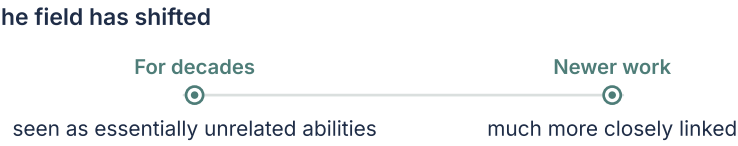
Flour and cake make the idea plain. **You cannot bake a sponge cake without flour**, and a bag of flour on its own never turns into a cake. Intelligence looks like the flour in these studies, needed and never enough, and the picture stops at the kitchen, since people are not recipes.



A bag of flour on a kitchen counter beside eggs, butter and a mixing bowl, a finished sponge cake cooling on a rack behind them.

> **Key Concept:**
>
> Necessary but not sufficient. **Some intelligence seems needed** for creativity, and it is never enough by itself (Karwowski et al., 2016). Necessary means you cannot do without it. Sufficient means it would be enough alone, and the studies found it was not.

The field has shifted over the years. One reviewer wrote, “For decades, intelligence and creativity have been seen as essentially unrelated abilities” (Silvia, 2015). Newer work “revealed that intelligence and creativity are much more closely linked than the field has thought” (Silvia, 2015). **The two abilities look closer than people once believed.**



Silvia argued for “a more fertile conception of both intelligence and creativity, one that emphasizes similarities between solving problems with right answers and thinking flexibly, critically, and playfully” (Silvia, 2015). Fertile means **able to grow new ideas**. His paper is an argument and a review, with no new data of its own.



Two climbing plants on one trellis, their stems winding round each other as they grow towards the light.

Another writer described creativity as a mix of making and judging. He warned that “divergent thinking without convergent thinking can cause a variety of problems including reckless change” (Cropley, 2006). Convergent thinking **narrows many answers to the best one**, and reckless change is change made without checking whether it works.

Reckless change

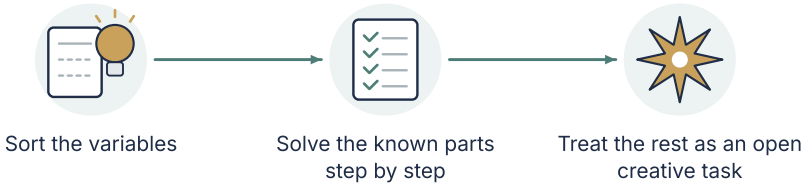
Divergent thinking without convergent thinking	→	Change made without checking whether it works

Imagine a café owner who repaints the whole shop bright orange overnight because the idea felt fresh. **Nobody checked whether the customers would like it**, or whether the paint would last. A little judging before the brush came out could have saved the money.

> **Key Concept:**
>
> Intellect steps inside creative work. In this book's terms, a creative task is one where the variables are not identified. **A creative task usually contains intellect sub-steps**, such as checking, analysing and judging, that work on the parts that are identified. That is my own framing, and the studies above report scores and reviews in their own words.

The advanced level below puts that framing to work. Sorting variables is this book's own tool, and no study has tested it, so **treat it as practice**. Once a problem is sorted, solve the known parts step by step, then treat the rest as an open creative task and check each idea against the known parts.

Sort, solve, then open up

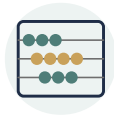


A house move shows how it looks. **For a house move, the date, the budget and the van are fixed**, and you can plan them step by step. How to make a small new room feel like home is open, and that part calls for ideas. You will likely find that most real problems hold both kinds of part.

For a house move



The date



The budget



The van



Make a small new room feel like home

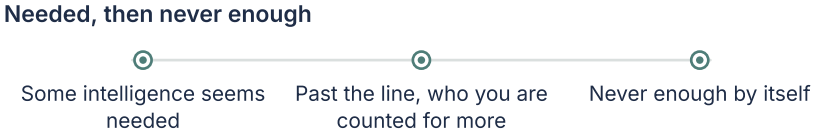
Exercise:

Sort the variables.

1. Starter. List names for a new café for two minutes, then your most creative names for two more. Compare count and quality.
2. Middle. List the knowledge and reasoning a task needs, then what else, such as persistence or a new angle.
3. Advanced. In a project, find a step treated as creative whose variables are identified, and a routine step whose variables are not identified. Handle each the matching way.

Key idea:

Intelligence and creativity test scores go together a little, and some intelligence seems needed and never enough. In this book's terms, **a creative task usually holds intellect steps inside it.**



Quick check:

What did Karwowski's team call the evidence on the threshold hypothesis?

Answer: mixed.

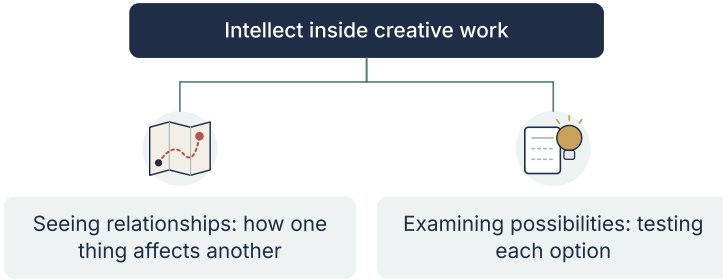
2.3.2 Intellect: Understanding Relationships and Examining Possibilities

Imagine you want to fit a desk into a small flat. The wall by the window has the best light, and a radiator blocks it. **The door swings into the only other gap.** Before any clever idea can work, you have to see how the pieces relate. This section shows how intellect does that job inside creative work.

Seeing relationships is reading how one thing affects another, such as the door and the gap. **Examining possibilities is testing each option** against those relationships before you lift a single chair. Both jobs belong to intellect, and creative work leans on them all the time.

A chess player shows the two jobs at once. **She sees how her pieces guard each other**, and she runs through a few moves in her head before she touches one. A new move can surprise her opponent, and it still has to survive her own careful check.

Two jobs of intellect





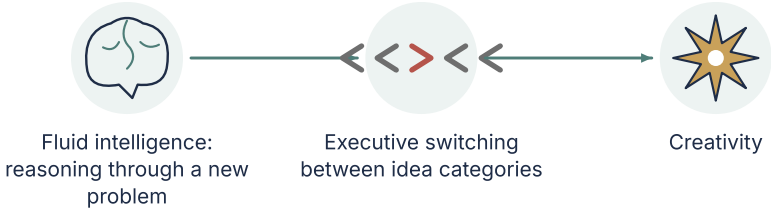
A chessboard mid-game in a café window, one hand hovering over a knight while the other rests on a folded newspaper.

One team looked at how reasoning feeds idea making. They found that "the substantial effect of fluid intelligence (Gf) on creativity was mediated by executive switching, the number of times people switched idea categories during the divergent thinking tasks" (Nusbaum & Silvia, 2011). Fluid intelligence is **reasoning through a new problem**.

Mediated means **it worked through something else**. Reasoning helped creativity partly by helping people switch between kinds of idea,

such as moving from uses as a tool to uses as a toy. Divergent thinking is the move that spreads out to many possible answers.

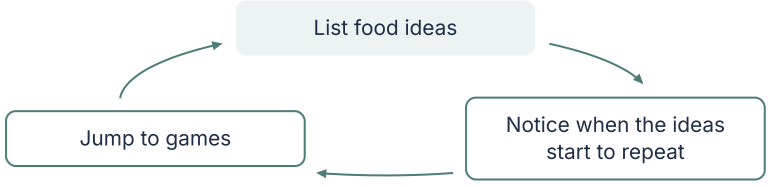
Mediated: it worked through something else



You switch like this when you plan a birthday. **You list food ideas, then jump to games**, then to where it could happen. Each jump opens a fresh set of ideas, and knowing when to jump is a reasoning job.

The switch has a second half. **Noticing when a pile has run dry** is part of the job, and that noticing is a check on your own progress. When the food ideas start to repeat, that is your cue to jump.

Noticing when a pile has run dry



> **Science Says:**
> In the same paper, "half the sample was given an effective strategy for an unusual uses task. The strategy condition interacted with Gf: people high in Gf did better when given the strategy, consistent with their higher ability to maintain access to it and use it despite interference" (Nusbaum & Silvia, 2011). **People who reasoned well used the strategy better.** Interference means distractions and old habits that push the strategy out of mind.

The authors drew a bold conclusion. They wrote that "divergent thinking is more convergent than modern creativity theories presume" (Nusbaum & Silvia, 2011). Convergent thinking **narrows many answers to the best one**, so they saw judging and steering inside the many-answers task.

In this book's terms, that checking and steering are **intellect sub-steps** inside a creative task. The study itself speaks only of switching and strategy.

Judging and steering inside the many-answers task

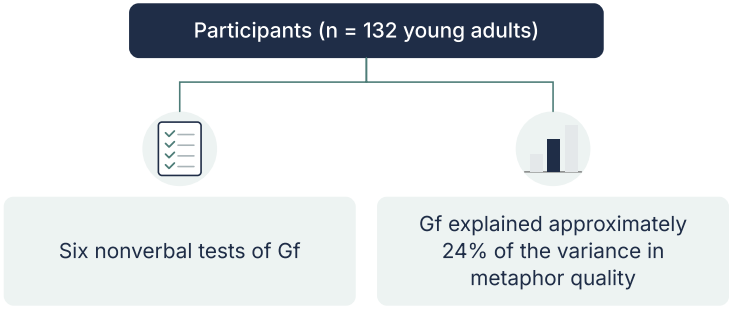
- Divergent thinking is more convergent than modern creativity theories presume
- In this book's terms, intellect sub-steps inside a creative task

> **Key Concept:**
> Keep the plan in sight. **Write your approach on a sticky note** before you start, and put it where you can see it. Keep the wording to five words or fewer, as short as a shopping note. Read it again each time you finish an idea.

Metaphors show intellect at work in a small space, as when you call your inbox a swamp. **Making a good one takes reasoning**, and one team measured how much reasoning counted (Silvia & Beaty, 2012).

The team tested "Participants (n = 132 young adults)" who "completed six nonverbal tests of Gf (primarily tests of inductive reasoning)" (Silvia & Beaty, 2012). Inductive reasoning is **finding the rule behind a set of examples**. They found that "Gf explained approximately 24% of the variance in metaphor quality (standardized beta = .49)".

The metaphor study



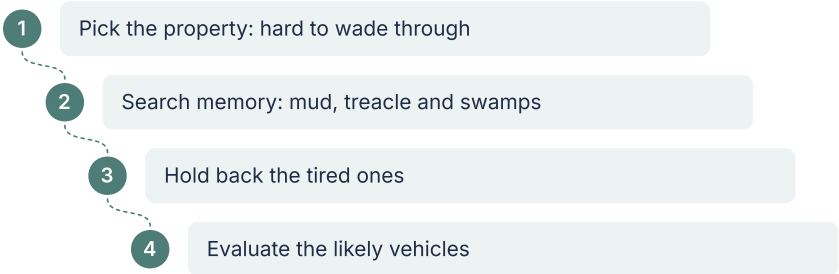
In plain words, reasoning accounted for **about a quarter of the differences** in how good people's metaphors were. "The effect of Gf remained substantial after including personality" (Silvia & Beaty, 2012). Personality did not explain the effect away.

A quarter is a real share, and the other three quarters of the differences came from other things. **Reasoning helps, and it is far from the whole story** of a good metaphor.

> **Science Says:**
>
> The team described the steps. People "must choose a property that they wish to attribute to the topic", then "scan semantic knowledge for suitable vehicles that exemplify the abstract, higher-order attributive category" (Silvia & Beaty, 2012). This "requires maintaining access to the category while inhibiting" irrelevant and "trite possibilities". **The vehicle is the thing you compare to**, such as the swamp.

Run the inbox through those steps. **First you pick the property**, which is being hard to wade through. Then you search memory for things that have it, such as mud, treacle and swamps, and hold back the tired ones. Last, likely vehicles "must be evaluated according to abstract criteria" (Silvia & Beaty, 2012).

Run the inbox through those steps

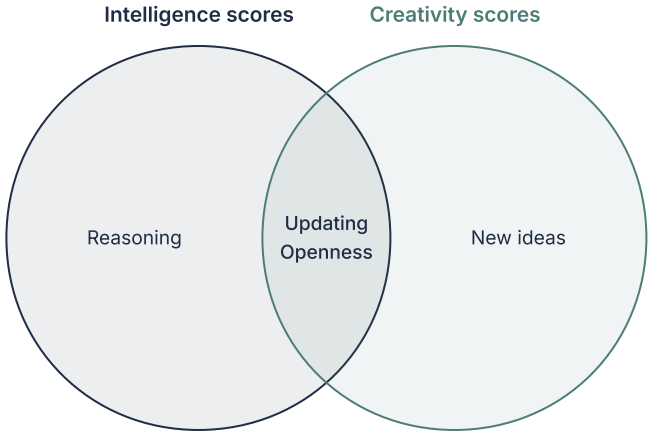


Two control skills help explain this holding back. In 1.1.1 you met a study that tied creativity to updating and inhibition (Benedek, Jauk, Sommer, et al., 2014). **Updating is keeping what is in mind fresh**, and inhibition is holding back an answer that jumps in early.

The same study added a new point, that "updating (and the personality factor openness) was found to explain a relevant part of the shared

variance between intelligence and creativity" (Benedek, Jauk, Sommer, et al., 2014). Shared variance is **the part where the two scores move together**, so updating helps explain why they overlap at all.

The part where the two scores move together



Openness is **a liking for new experiences**, such as strange food or unfamiliar music. In that study it sat beside updating as part of what the two abilities share.

> **Science Says:**
>
> A second team split the jobs more finely. They found that "inhibition may primarily promote the fluency of ideas, whereas intelligence specifically promotes the originality of ideas" (Benedek et al., 2012). Fluency is **the number of ideas**, and originality is how new they are. Holding back helped quantity, and reasoning helped newness.

Imagine naming a new bakery. **Holding back the first tired names**, such as Fresh Bakes, leaves room for more names to come. Reasoning

then helps you spot the one that is new and still fits a bakery, such as a name built from the street's old history.

Inhibition and intelligence

Inhibition	Intelligence
Promotes the fluency of ideas	Promotes the originality of ideas
Holding back the first tired names	Spot the one that is new and still fits

A study of 265 people found that "intelligence significantly influences creative thinking" (Lee & Therriault, 2013). **The influence ran one way in that study**, from intelligence to creative thinking.

Relationships have their own theory. One writer argued that in an analogy, "Relations between objects" are what carry over from one case to another, and the looks of the objects stay behind (Gentner, 1983). An analogy is **a comparison that carries a pattern** from a familiar case to a new one.

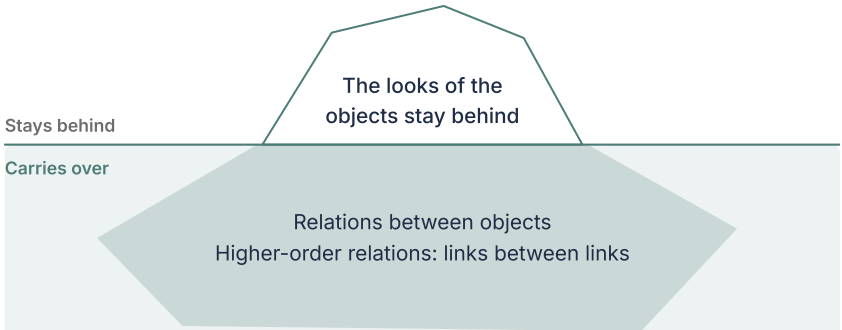


A garden pump pushing water through a green hose, set beside a simple drawing of a heart and its blood vessels.

A heart is like a pump, because **both push liquid through pipes**. The colour and the size of a pump play no part in the comparison. Gentner added that "The particular relations mapped are determined by systematicity, as defined by the existence of higher-order relations" (Gentner, 1983).

Higher-order relations are **links between links**, such as the pushing being the cause of the flow. A good analogy carries a whole joined-up set of relations, and a weak one carries a single loose likeness. Gentner's paper is a theory, built to explain how people use comparisons.

What carries over in an analogy



> 🔑 **Key Concept:**
>
> Spot the warning sign. **An idea that ignores one fixed part is a warning sign**, such as a desk that blocks the door. When you spot one, stop and reread the fixed parts before you build on it. An idea that breaks a fixed part has to be mended or dropped, however clever it looks.

Imagine a school lunch queue that always jams. **First you map how the parts act on each other.** One hatch serves every class, and they all

arrive at once, so the arrival time causes the jam. Then you test each fix against that map, and staggered lunch times pass because they work on the cause.

The lunch queue that always jams



Reasoning shapes timing. In 2.1.1 you saw that later ideas in a long task tend to be more creative (Beaty & Silvia, 2012). The same study found that "as intelligence increased, the serial order effect diminished" (Beaty & Silvia, 2012). **The gap between early and late ideas shrank** for people who reasoned well.

The serial order effect



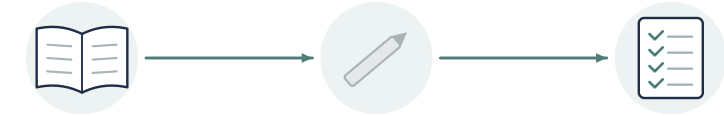
Back at the flat, intellect does its quiet work. **It reads how the door, the radiator and the light affect each other**, and it tests each spot for the desk in your head. A creative answer, such as a fold-down desk on the back of the door, still has to pass that test.

The practice in this section comes from those studies. Updating a note and holding needs in mind rest on the updating results, and keeping

one approach rests on the strategy study, where the benefit was larger for people high in reasoning. **All of it is practice**, with no claim that it carries over to other tasks.

> Exercise:
>
> Try it. Read a problem, such as a friend's message asking for help. After each sentence, update a one-line note of what is needed.

Update a one-line note



> Exercise:
>
> Hold the approach.
>
> 1. Starter. Write two things any idea for a real problem must do. List ideas, and strike any that drops one.
> 2. Middle. Pick one approach, such as starting from the people involved. Use only that for ten minutes, mark each drift and return. Count your marks and **look at the ideas the approach gave you**.

3. Advanced. Meet three needs at once, then add a fourth and check which ideas survive.

Key idea:

Intellect sees how the parts of a task relate and tests each option, so **reasoning works inside creative work**, keeping new ideas tied to what is fixed.

Back at the flat



The door, the radiator and the light



Test each spot for the desk in your head



A fold-down desk on the back of the door

Quick check:

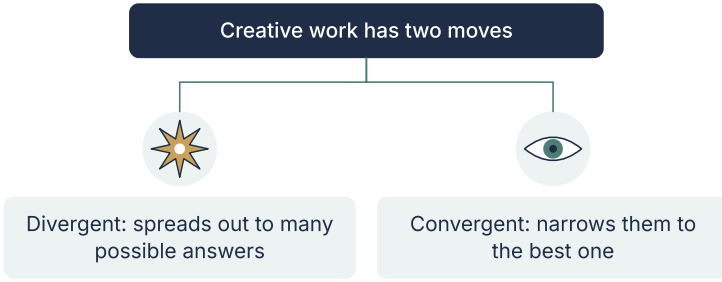
In the metaphor study, about how much of the difference in metaphor quality did reasoning explain? Answer: about 24%.

2.3.3 Generate and Judge: Switching Between Open and Critical Thinking

Imagine you are asked to give a short toast at a friend's wedding. You write one line, frown and cross it out, and then you do the same with the next. **After an hour the page holds one sentence and a lot of ink.** In this section I want to look at making and judging as two separate jobs.

Creative work has two moves. In 1.1.1 you met them as divergent thinking, which **spreads out to many possible answers**, and convergent thinking, which narrows them to the best one. Here the question is how the two take turns, and how intellect does the judging.

Two moves



Cropley described the two moves as partners. He wrote that "The way in which the 2 kinds of thinking work together can be understood in terms of thinking styles or of phases" (Cropley, 2006). **A phase is a stretch of time given to one job**, and a style is a person's usual way of working.

Styles or phases



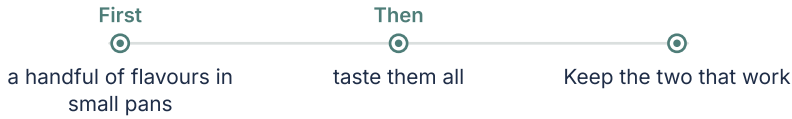
A potter at the wheel works in phases. **First she lets the clay rise and spread under her hands**, trying shapes. Then she stops the wheel, steps back and looks hard at what she has made. Making and looking take turns, and each one has its own time.



A potter at a spinning wheel, wet clay rising between her hands, a row of finished bowls drying on a shelf behind her.

A cook working on a new soup can follow the same pattern. **She tries a handful of flavours in small pans**, ginger in one and smoked paprika in another, without tasting yet. Then she tastes them all, one after another, and keeps the two that work.

A new soup



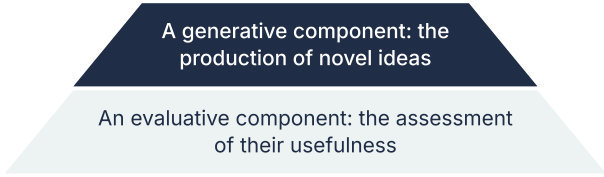
> **Science Says:**
>
> The two phases have a model of their own. A book by three researchers set out "a theoretical model of the creative process" after "a summary of previous approaches to creativity" (Finke et al., 1992). **You met the model as generate, then explore** in 2.1.2, where Finke's later paper gave it its name (Finke, 1996).

One brain study watched the two phases happen. “Participants designed book cover illustrations while alternating between the generation and evaluation of ideas” (Ellamil et al., 2012). Evaluation means **judging how good an idea is**, and an illustration is a picture drawn for a book.

A cover for a book about the sea might start as waves, a lighthouse and a bottle with a note inside. **Then the judging begins**, and the designer asks which one a reader would notice from across a shop.

The team described creativity as “a generative component facilitating the production of novel ideas and an evaluative component enabling the assessment of their usefulness” (Ellamil et al., 2012). **Making brings new ideas, and judging checks whether they are useful.** The two parts are different jobs, and the study asked people to switch between them on cue.

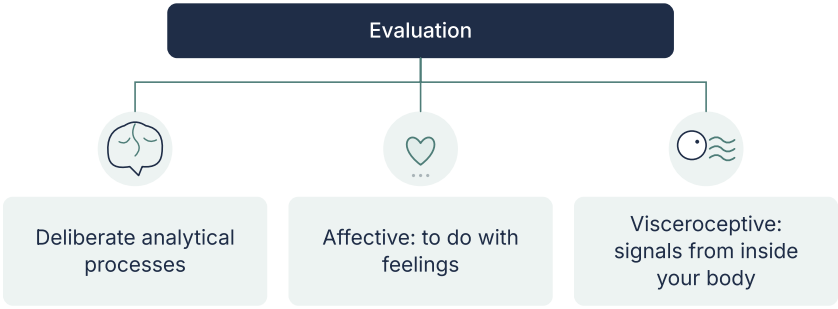
Two parts of creativity



> **Science Says:**
>
> Judging was more than cold reasoning. The team wrote that evaluation “may extend beyond deliberate analytical processes” “to include more spontaneous affective and visceroceptive evaluative processes” (Ellamil et al., 2012). Affective means **to do with feelings**, and visceroceptive means sensing signals from inside your body, such as a gut feeling that a design is wrong.

Your gut may join your head in judging. **When a line in your toast makes you wince**, the wince may be part of the judging. Reasoning can then ask why it felt wrong, and whether a change of word would fix it.

Judging was more than cold reasoning



> **Exercise:**
> Try it. During your next short task, such as a message, mark G each time you make and J each time you judge.

Your marks for a short email might run G, J, G, J, J, J. **A long string of J marks shows that judging has taken over.** When that happens, give yourself a few minutes of only G before you judge again.

A long string of J marks



Original ideas can come by two routes. One review held that creativity "is a function of cognitive flexibility and cognitive persistence" (Nijstad

et al., 2010). Flexibility is **moving across many kinds of idea**, and persistence is staying with one kind and digging deep.

A flexible person planning a garden might jump from flowers to a pond to a bench made from old doors. **A persistent person stays with flowers**, and ends up with a bed that blooms in every month of the year.

Two routes to original ideas

Flexibility	Persistence
Moving across many kinds of idea	Staying with one kind and digging deep
Flowers, a pond, a bench made from old doors	A bed that blooms in every month of the year

The authors found that "cognitive flexibility, operationalised as the number of content categories surveyed, directly relates to idea originality", and that originality can come "by exploring a few content categories in great depth (i.e., persistence)" (Nijstad et al., 2010). **Digging deep is a real route** to original ideas in that review.

> 🗝 **Key Concept:**
>
> Pick your route on purpose. **When a list of ideas stalls, decide whether to go wider or deeper** before you carry on. If you choose deeper, circle the idea you like best on the list and start from that one. The middle level of the closing exercise practises the deep route.

Going deep on gift ideas, such as things to make, might run like this. **A knitted scarf becomes a knitted scarf for the dog**, then a knitted

map of the town where you first met. Each step stays inside one kind of idea and pushes it further than the step before.

Going deep on gift ideas

A knitted scarf → A knitted scarf for the dog → A knitted map of the town where you first met

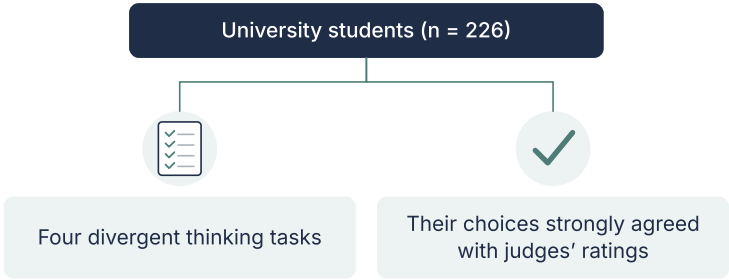


A small dog in a striped knitted scarf, sitting on a doorstep beside a ball of wool.

In this book's terms, the deep route holds intellect sub-steps. **To dig deep you check how far one kind of idea can go**, and you judge each step on the way down. The review sets out the two routes, and the sub-steps are this book's framing.

Can people judge their own ideas with skill? In one study, "University students (n = 226) completed four divergent thinking tasks and then decided which responses were their most creative" (Silvia, 2008). **Their choices "strongly agreed with judges' ratings"**, and "people high in openness to experience, in particular, had stronger agreement".

Picking their own best ideas



Openness is **a liking for new experiences**, such as strange food or unusual music. Silvia concluded, "Creative people are thus doubly skilled: they are better at generating good ideas and at picking their best ideas" (Silvia, 2008). Making and choosing seemed to go together in that sample.

Notice what the students were judging. **They picked from their own answers**, ideas they had just made. The judges then rated the same answers, and the two sets of choices lined up. That agreement is what Silvia meant by picking well.

Doubly skilled

> - Better at generating good ideas
> - Better at picking their best ideas

> **Science Says:**
> Choosing well is not automatic. In a study of groups, "the ideas generated by nominal groups were more original and less feasible than the ideas generated by interactive groups. However, there were no differences among conditions in quality of the selected ideas. Further, idea selection was not significantly better than chance" (Rietzschel et al., 2006). **Their picks were no better than picking at random.**

A nominal group is **people who work alone and then pool their ideas**, and an interactive group works together in one room. Feasible means able to be done. The groups made plenty of ideas, and the picking step let them down. Interactive groups made ideas that were easier to carry out.

Nominal and interactive groups

Nominal groups	Interactive groups
Work alone, then pool their ideas	Work together in one room
More original, less feasible ideas	Ideas easier to carry out

A school council might brainstorm forty ideas for a fundraiser and then pick a few. **In that study, the picking was the weak step**, so a list of good ideas can still end with a poor choice.

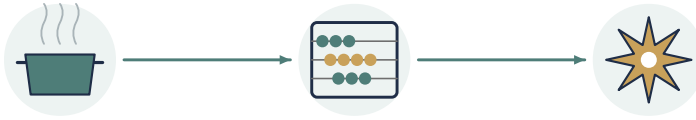
Put the two studies side by side. **Some people pick their own best ideas with skill**, as the students did. The groups choosing among their ideas did no better than chance. Judging is a skill, and in that group study it failed.

Judging is a skill

The students	The groups
⊕ Picked their own best ideas with skill	⊖ Did no better than chance

Some pieces of a creative task have one right answer. **A cake recipe for twelve has to be scaled for thirty before you play with the flavours**, and that sum is either right or wrong. Do the sum on a scrap of paper, then turn to the flavours. The advanced level of the closing exercise practises this.

Do the sum, then the flavours



A cake recipe for twelve → Scaled for thirty: right or wrong → Then turn to the flavours

Back at the wedding toast, try it the other way round. **Write ten opening lines with no crossing out.** Then stop and judge them all at once against three plain tests, short, kind and funny.

Three plain tests

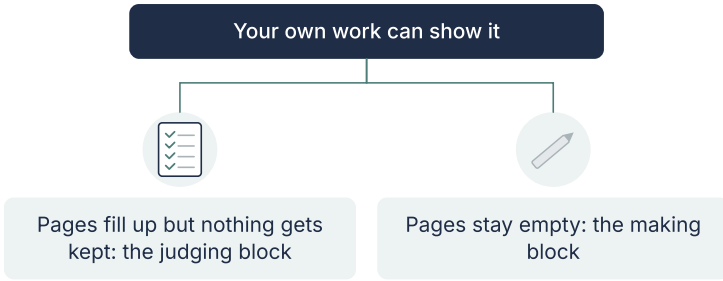
- ☑ Is the line short?
- ☑ Is the line kind?
- ☑ Is the line funny?

> **Key Concept:**
>
> Separate the two jobs. **Give making and judging each its own block of time.** Set the length to suit the job, from a few minutes for a toast to a whole morning for a report. Keep a clock in view, and stop each block when it ends, even in the middle of a sentence.

Which ability leads when? **In the writing block, creativity leads**, since the best line is not yet identified. In this book's terms, the judging block holds the intellect sub-steps of checking, analysing and judging, measured against what is already fixed, such as the time limit and the couple's names.

Your own work can show which block needs more time. **If your pages fill up but nothing gets kept**, give the judging block more care. If they stay empty, give the making block more room.

Which block needs more time



None of the levels below has been tested as a training drill, so **treat them as practice**. Use them on real work, such as a letter, a plan or a drawing.

Exercise:

Switch on a timer.

1. Starter. Take one draft. Make without judging for four minutes, then judge for four and mark what to keep, cut or change. Repeat twice and note **what each block changed**.
2. Middle. Push one kind of gift idea, such as homemade, as far as it goes before trying another.
3. Advanced. Find the piece of a real task with one right answer, such as a measurement. Solve it fully first.

Key idea:

Creative work swings between making and judging, so **give each its own time**, and let intellect lead the judging.

Quick check:

In the study of groups choosing ideas, how well did their selection do compared with chance? Answer: it was not significantly better than chance.

Give each its own time

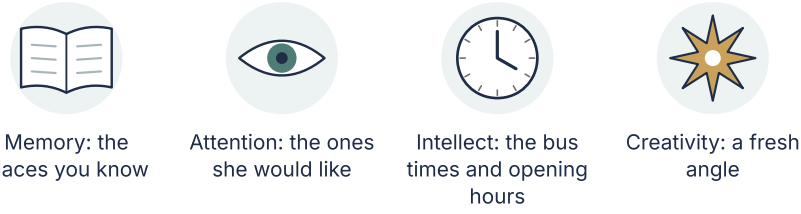
Making and judging	Let intellect lead the judging

2.3.4 When You Need Which: Choosing the Right Ability for Each Step

Imagine your cousin is coming to visit from abroad, and you offer to write her a short guide to your town. You list the places you know, pick the ones she would like, check the bus times and opening hours, and hunt for a fresh angle. **One small task has just asked for four different abilities.**

Memory, attention, intellect and creativity each do a different job. **Here I put the four side by side**, so that when a task stalls you can ask which ability the stuck step needs. This closing section asks how they fit together on a single job, and the town guide is the test case for all four.

Four abilities, one small task



In 1.1.2 you met my definition. **Intellect is solving tasks where the variables are identified.** Creativity is solving tasks where the variables are not identified. I will lean on that line here and leave the full story where it lives.

A car mechanic listens to an engine before she opens her toolbox. **The sound tells her which tool to reach for**, and a good mechanic rarely picks up a hammer for a loose wire. Choosing an ability works the same way, since each step of a task has its own sound. A rattle and a squeal call for different tools.

> 🗝 **Key Concept:**
>
> Check after each step. **After the repair, the mechanic starts the engine and listens again**, and that check tells her whether the step is done. A quiet engine means the job is done, and a new rattle means it is not. A stalled task deserves the same last move, so once a step moves, check it before you go on.



A mechanic leaning over an open car bonnet, one ear turned towards the engine, a tool roll spread open on the wing.

For the town guide, memory and control both play a part. **Memory brings up the market you loved as a child**, and control keeps you on the brief, so the places fit your cousin. Write the first ten places down fast, then let control cut the list to five.

Ten places, then five



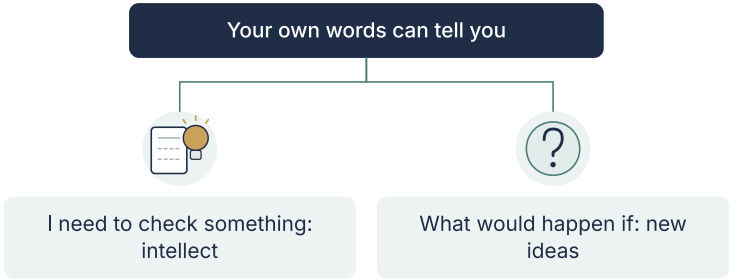
Attention shifts with the kind of task, **wide when a task is ill defined and narrow when it is well defined** (Vartanian, 2009). In this book's terms, an ill defined task is one whose variables are not yet identified, so it is creativity's ground. A well defined task has its variables in place, so it belongs to intellect.

Two kinds of task

Ill defined	Well defined
Attention: wide	Attention: narrow
Variables not yet identified: creativity	Variables in place: intellect

Your own words can tell you when to switch. **If you catch yourself saying you need to check something**, the next step belongs to intellect. If you catch yourself wondering what would happen if, the next step wants new ideas. Listen for both while you work.

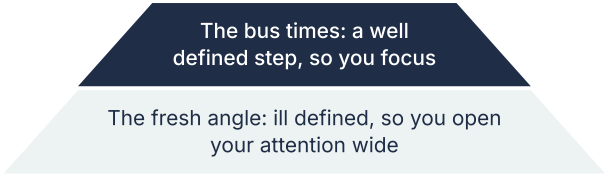
When to switch



Tight focus helps on one kind of problem and can hurt on the other (Wiley & Jarosz, 2012), the wide and narrow choice from 2.2.2. The step you are on should set how wide you look. A torch suits a step where you know what you are looking for, and a floodlight suits a step where you do not.

With the town guide, the bus times are a well defined step. **You know what you need**, so you focus, check and move on. The fresh angle is ill defined, since nobody can tell you in advance what it should be, so you open your attention wide.

The bus times and the fresh angle



On this book's framing, you can run that check on any step in a few seconds. **Ask whether the step in front of you has its variables identified.** If it does, narrow your focus and work through it. If it does not, widen your attention and let more ideas in.

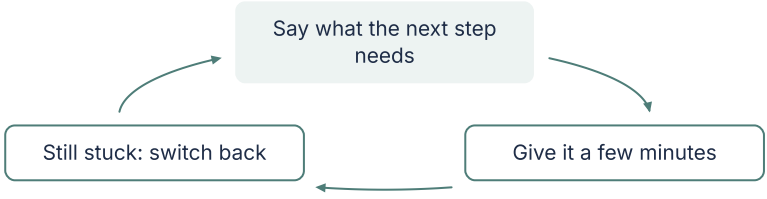
A check in a few seconds

- [x] Has the step its variables identified?
- [x] If it does, narrow your focus
- [x] If it does not, widen your attention

> **Key Concept:**
>
> Choose by the step. **Each step of a task has its own type**, even when the task as a whole is creative. As this book frames it, a creative task usually contains intellect sub-steps, such as checking, analysing and judging. Ask what kind of step you are on, and pick the ability that suits it. A big task can pass through many steps of each type before it is done.

Switching takes a moment of its own. **Before you change ability, say out loud what the next step needs**, such as a fact or a new idea. Then give the new step a few minutes before you judge how it is going. If it still feels stuck, switch back and try a different ability.

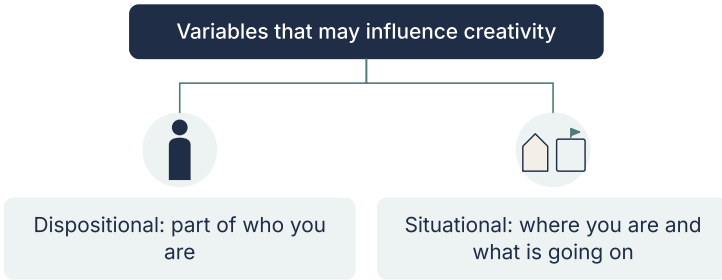
Switching takes a moment



Situations can push creativity along two routes. One review held that “dispositional or situational variables may influence creativity either through their effects on flexibility, on persistence, or both” (Nijstad et al., 2010). **Dispositional means part of who you are**, and situational means part of where you are and what is going on.

A dispositional variable might be your openness, and a situational one might be a deadline or a noisy room. **Some of these you can change**, such as leaving a noisy room, and some you carry with you. Moving rooms is easy, and changing who you are is not. Notice which kind it is before you try to change it.

Two kinds of variable



On the town guide, notice where you work and what you write. **If you keep stalling in one place, try a different one** for the next step. Then watch for yourself whether your ideas go wider or deeper. A library or a park bench is an easy place to try.

On this book's reading, **picking one ability to lead a step leaves the others switched on**. No ability goes quiet just because another one leads. Leading only means doing most of the work on that step.

Leading a step

> - Picking one ability to lead leaves the others switched on
> - Leading only means doing most of the work on that step

The leader sets the pace, and the rest keep working in the background. On the town guide, memory still feeds you places while

intellect checks the bus times. As in an orchestra, the leader can change from one piece to the next while the others keep playing. Your cousin never sees which ability led, only the finished guide.



A small orchestra mid-piece, the first violin leaning forward to lead while the cellos and drums play on behind.

Imagine you are writing a short speech for a friend's leaving party. **Halfway through a funny line, you wonder what year she joined the team.** That is a fact question, and it belongs to another step. Put a small question mark in the margin and finish the line first.

When the jokes run out, go back to the margin. **Now check each question mark, one by one**, and fill in the years and names. Then read the speech once more and look for the next stuck step. A speech with every year right and a joke in every line is ready to rehearse.

A leaving-party speech

- Halfway through a funny line: a question mark in the margin
- When the jokes run out: check each question mark
- Then read the speech once more

> **Exercise:**
>
> Try it. Name one task that stalled this month. Write down the step where it stopped, and ask whether its variables are identified.

Try the four questions on the town guide. **Suppose the list of places runs thin** after the café and the park. The stuck step is memory, so you walk the streets in your head, ask a neighbour or look back at old photos for more material.

Say the list is long, and you keep circling the same three cafés. **The stuck step is attention**, since your focus has closed in on one corner of the town. You widen it by asking what your cousin likes away from food, such as music or old buildings.

Memory, then attention



The list runs thin: memory



Walk the streets in your head



The same three cafés: attention

Or the guide sends her to a museum that is shut on Mondays. **The stuck step is intellect**, because a fixed fact has slipped. You check opening days, bus routes and prices, one by one, until every known variable is in place.

Last, every fact is right and the guide still reads like a leaflet from the station. **The stuck step is creativity**, since the variable you need, a fresh angle, is not yet identified. Here you open your attention wide and let distant ideas in, such as a guide told as a treasure hunt.

Intellect, then creativity

> - A museum shut on Mondays: intellect checks the fixed facts
> - Reads like a leaflet: creativity finds a fresh angle

The checklist below is this book's own, and no study has tested it as a drill, so treat it as practice. Training studies in general found that "more successful programs were likely to focus on development of cognitive skills and the heuristics involved in skill application" (Scott et al., 2004).

A heuristic is **a rule of thumb that guides a skill**, such as check what is fixed first. A rule of thumb is quick to use when stuck. That finding covers training in general, and says nothing about this checklist. The four questions and the signal in the advanced level are rules of thumb written for this book.

Rules of thumb for this book



A heuristic: a rule of thumb that guides a skill



Quick to use when stuck



The four questions and the signal

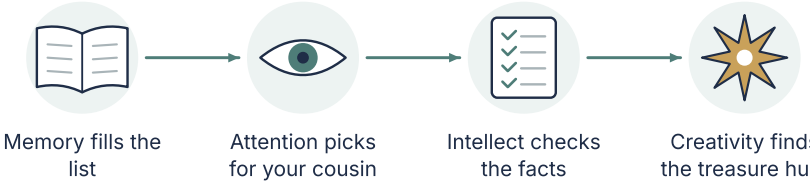
The stage swap in the middle level asks you to break your usual habit on purpose. **Judging while you make, or making while you judge**, can show you how much each habit shapes your work. Keep it small, since the aim is to notice what changes. Afterwards, ask which way gave the better result.

Back at the kitchen table, the guide gets finished one step at a time. **Memory fills the list, attention picks for your cousin**, intellect

checks the facts and creativity finds the treasure hunt. Each ability led once, and none worked alone. Your cousin, with luck, gets a guide worth keeping in her pocket.

> Exercise:
>
> Where am I stuck?
>
> 1. Starter. Ask whether the stalled step lacks material, has the wrong focus, has lost what is fixed or has unidentified variables. Let that ability lead.
> 2. Middle. On a small task, judge while making, then make while judging. **Compare it with your usual way**.
> 3. Advanced. Before a real task, set a signal to change mode, such as three ideas on one theme. Note whether it fired on time.

The guide, one step at a time



Key idea:

Each step of a task has its own type, so **ask which ability the stuck step needs** and let that one lead.

Quick check:

According to Vartanian (2009), what happens to attention when a task is ill defined? Answer: it widens.



Module

3

Developing the Core Skills of Creativity

3.1 Generating and Developing Ideas

3.1.1 Fluency: Producing More Than One Possible Idea

Imagine a friend's birthday is on Saturday, and you need a gift. The first idea arrives at once, a warm scarf, and you go out and buy it. **One idea came, and you stopped there**, so you never found out what the second or the tenth idea might have been.

In the scarf scene, the first idea that seemed good enough ended the search. **Fluency is the skill of keeping going**, of producing more than one possible idea for the same task. In this section I show you what the word means, what training does to it and how to practise it at three levels.

One idea or more

Before	After
The first idea, a warm scarf One idea came, and you stopped there	Fluency is the skill of keeping going More than one possible idea for the same task



A person at a shop counter holding a folded red scarf, with a row of small wrapped gifts on the shelf behind them.

In 1.3.3 you counted uses for a brick, and that count was a fluency score. One review of the Torrance tests gives fluency as “the number of relevant responses” (Alabbasi et al., 2022). The word **relevant** adds a point worth keeping, because an idea that does not fit the task earns nothing.

Other teams use even plainer words. A study that combined many training studies called fluency the “Total number of responses” (Haase et al., 2025), and another team wrote of “fluency (i.e., the answer quantity)” (Weiss & Wilhelm, 2022). **Answer quantity means how many**, and how many is all that fluency counts.

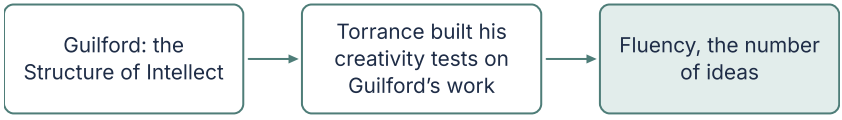
Fluency in plain words

Team	Fluency is
Alabbasi et al., 2022	The number of relevant responses
Haase et al., 2025	Total number of responses
Weiss & Wilhelm, 2022	The answer quantity

> **Key Concept:**
>
> Fluency. Fluency is **how many ideas you produce** for one task. Teams describe the count in slightly different words, and they agree on the core, which is the number of ideas. Only ideas that fit the task are counted, so a song you like earns nothing on a list of uses for a brick.

Fluency comes from a longer line of work. **Guilford set out separate abilities for intelligence and for creativity** in a model he called the Structure of Intellect (Guilford, 1967, as cited in Alabbasi et al., 2022). Torrance then built his creativity tests on Guilford's work (Alabbasi et al., 2022).

A longer line of work



Fluency works like filling a basket at a market. **The more you put in the basket, the more you have to choose from** when you get home. One apple gives you one choice, and ten let you pick the best. Where the picture stops is quality, because a full basket can still hold bruised fruit.



A woven basket on a market stall heaped with apples of many sizes, one hand reaching in to pick.

Choosing from the full basket is a second job, the judging job. **Fluency is the filling, and judging comes after it**. In the scarf scene the judging started after one idea, so the basket never had a chance to fill.

The filling and the judging

1. Fluency is the filling
2. Judging comes after it

> **Exercise:**
>
> Try it. In one minute, list uses for an empty jam jar. Then **cross out ideas that do not fit** and count the rest.

Can fluency be trained at all? One team built a computer course with "9 sessions with 8 divergent thinking tasks each" (Benedek et al., 2006), and divergent thinking is the move that spreads out to many possible

answers. **The trained people came out ahead** on "ideational fluency (d = 0.54)", which means the number of ideas (Benedek et al., 2006).

In 1.2.2 an effect size of about 0.5 was the medium size, so **this gap was medium**, with the trained people a fair way ahead of the people who did not train. A single small study can still give a lucky result, so it is a good start and no more than that.

One course study

BE

Benedek et al., 2006

- 9 sessions with 8 divergent thinking tasks each
- The trained people came out ahead
- Ideational fluency, d = 0.54: a medium gap

> **Science Says:**
>
> The groups in the course study were small, with 11 people in each training group and 14 in the group that did not train (Benedek et al., 2006). The course raised the number of ideas, and the team found "no training effects with respect to the originality of ideas" (Benedek et al., 2006). **More ideas did not bring rarer ideas** in this study.

The same pattern shows up in a much bigger study. A team combined many studies of creativity training for adults and compared what the training did to each idea score. **Training moved the number of ideas and their rareness more** than it moved the number of details or the number of different kinds of ideas (Haase et al., 2025).

Taking all the methods together as one average, 70.09% of the people who trained ended up more creative than **the average person who did**

not train (Haase et al., 2025). Picture a hundred trained people standing in a line beside an untrained group. About seventy of them would stand above the untrained group's average.

Taking all the methods together



> **Science Says:**
>
> The kind of course made a difference. Complex training courses gave an effect of g = 0.66, and brief courses gave g = 0.47 (Haase et al., 2025). Like d, g is **a number for the size of a change**. These results cover creativity in general, so they do not measure fluency alone.

A common way for researchers to check training is a task you already know. Haase's team give an example in which "creativity is assessed with the Alternate Uses Task, which measures divergent thinking" (Haase et al., 2025). **The uses for a brick list is one such task**, and so is the jam jar you tried a moment ago.

Uses tasks make good practice because the rules are simple and the objects are everywhere. You need **an object and a timer**, and the count is easy to keep. A uses task is only one kind of fluency practice, though, and the ideas you want in real life are seldom about bricks.

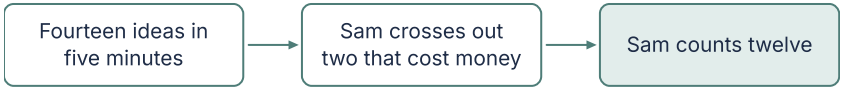
What a uses task needs

- [x] An object
- [x] A timer
- [x] A count that is easy to keep

> **Key Concept:**
> Rounds. The course study spread its practice across **nine sessions** (Benedek et al., 2006), and the rounds in this section copy that shape. Do a round on many separate days, and keep each round brief. Count only the ideas that fit, and write the count down with the date.

Imagine Sam, who wants a cheap Saturday plan for two children. In five minutes Sam writes fourteen ideas, from a picnic to a treasure hunt round the flat. Two of them, a film at the cinema and a theme park, cost money, so **Sam crosses them out and counts twelve**.

Sam's Saturday plan



The twelve are not all good, and they do not need to be. **A long list gives Sam something to choose from**, and the treasure hunt, idea number nine, is the one the children love. The first idea, the picnic, would have been fine, and number nine was better.

> **Science Says:**
> Ideas do not have to be words. In the same big study, figural methods, the ones built on **drawings and shapes**, worked better for creativity (Haase et al., 2025).

> **Key Concept:**
> Drawing rounds. Draw ten small circles on a page. In two minutes, **turn each circle into a different thing**, such as a clock or a face. Count the drawings that have become something, and leave the blank circles out of the count. Next time, try squares or wavy lines.

Every round has a moment when the list dries up. The pen slows, the room goes quiet, and the next idea seems to hide. **Keep the pen moving** and write the next idea that fits, even if it feels weak, because a weak idea that fits still counts.

The jam jar and Sam's Saturday ask for the same move. **You hold back the judging** until the list is long, and only then do you start to choose. The count tells you whether the move is getting easier, week after week.

Hold back the judging



Fluency fits into ordinary days without any extra time. You can **list five ideas before choosing** a dinner, a reply to a hard message, a title for a photo album or a way to sort a messy drawer. Each small list is one more round of practice, and it costs you a minute.

List five ideas before choosing



> **Key Concept:**
> Everyday prompts. List five ways to pack a bag for a day out, five meals with one egg, five ways to say thank you without buying anything or five names for a new plant. **Each prompt takes about a minute**, and each list counts as one round of practice.

Deciding what fits is the one judging step a fluency round allows. **Ask whether the idea answers the task**, and leave how good it is for later. A jam jar used as a pencil pot fits a uses task, and a jam jar you would like to own does not.

Keep the counts in your practice journal with the date and the task. If your one-minute counts rise from four to eight over a month, **your fluency on that kind of task has grown**. Rising counts on jam jars say nothing yet about a gift, so practise on real tasks next to the objects.

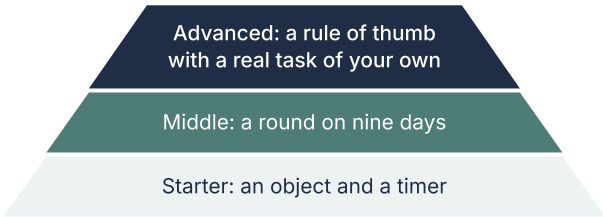
Keep the counts in your practice journal

Day	1	2	3	4	5	6	7
One round	☐	☐	☐	☐	☐	☐	☐
Write the count down with the date	☐	☐	☐	☐	☐	☐	☐

Pick a moment that already exists in your day, such as the bus ride or the kettle boiling, and fix your round to it. **A round tied to**

something you already do needs no extra planning. Three minutes is enough, and the timer keeps the round short and fair.

The three levels



The three levels below follow that order. The starter uses an object and a timer, and the middle level repeats a round on nine days, like the course study's nine sessions (Benedek et al., 2006). The advanced level pairs **a rule of thumb with a real task of your own**, the shape of the better programmes (Scott et al., 2004).

> Exercise:
>
> More than one idea.
>
> 1. Starter. Set a timer for three minutes and list uses for a shoe. Cross out ideas that do not fit, then count the rest.
> 2. Middle. Do one three-minute round with a new object each day for nine days, and **write each count down**.

3. Advanced. Pick a real task from home or work. Follow one rule, ten options before you choose, then pick the best and say why.

Key idea:

Fluency is producing more than one possible idea, and it grows through short rounds of practice where you count only the ideas that fit.

Quick check:

In a fluency count, which ideas earn a point? Answer: only the ideas that fit the task, because fluency is the number of relevant responses.

Fluency in one line

- Producing more than one possible idea
- Short rounds of practice
- Count only the ideas that fit

3.1.2 Flexibility: Moving Between Different Kinds of Ideas

Imagine you have two minutes to list uses for an old newspaper. On your list, you could wrap a fish, wrap a gift, wrap a glass for moving house or wrap your shoes in a suitcase. **Four ideas came quickly, and all four are wrapping**, so the list is long in one direction only.

Two newspaper lists

The first list	The second list
Wrap a fish	Wrap a gift
Wrap a gift	Make a paper hat
Wrap a glass	Start a fire
Wrap your shoes	Line a bird cage

Another person's list says to wrap a gift, make a paper hat, start a fire or line a bird cage. **The second list has the same length and four kinds of idea**. Moving between kinds is the skill in this section, and I show you how it is counted, how it overlaps with other skills and how to train it.

In 1.3.3 you met flexibility as the number of kinds on your brick sheet. The scoring rule is short, saying "Examinees gain one point for each new or different category" (Alabbasi et al., 2022). **A new kind earns a point**, and a second idea of the same kind earns nothing extra.

A category is a kind or group, such as wrapping or burning. The newspaper lists would score **one category for the first person and four for the second**. Both people showed the same fluency, and only one of them moved between kinds.

How flexibility is counted

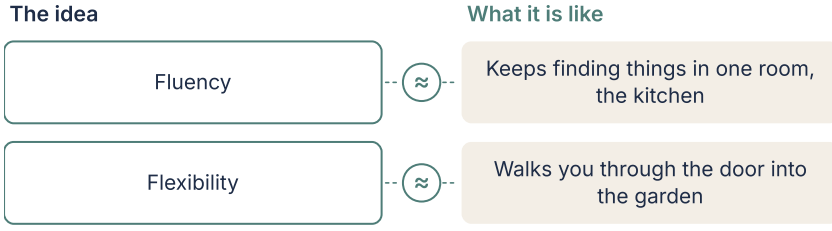
- A new kind earns a point
- A second idea of the same kind earns nothing extra
- One category for the first person and four for the second

> **Key Concept:**
> Flexibility. Flexibility is **the number of different kinds** among your ideas. Other teams describe it as "the number of categorically different ideas" (Weiss & Wilhelm, 2022) and "the number of different categories in which the ideas fall" (Haase et al., 2025). Every version counts kinds, and none counts the ideas inside a kind.

Weiss and Wilhelm describe ideational flexibility, which means flexibility with ideas, as "the use of a variety of ideational categories" (Weiss & Wilhelm, 2022). **They list Guilford's work among the sources** for that idea (Guilford, 1967, as cited in Weiss & Wilhelm, 2022).

Flexibility works like walking through a house. Fluency keeps finding things in one room, the kitchen, with its spoons and pans. **Flexibility walks you through the door** into the garden and up to the attic, where very different things wait. Where the picture stops is the walls, because the kinds of ideas are set by whoever does the scoring.

Walking through a house





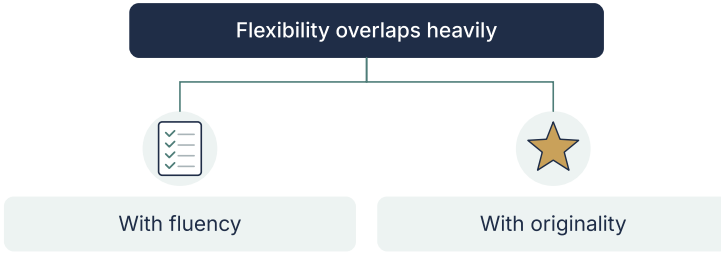
A cutaway drawing of a small house, with a kitchen, an attic full of boxes and an open back door onto a garden shed.

> Exercise:
>
> Try it. List eight uses for a newspaper. Next to each, **write its kind in one word**, then count the kinds.

The Torrance tests have a version with words and one with drawings. Flexibility is "scored only in the Verbal Battery", the one with words, and later versions removed it from the drawing side (Alabbasi et al., 2022). **Word lists are the classic home of flexibility**, so the practice in this section uses words.

Here comes the honest part of the story. One team tested whether flexibility is a separate skill, and found that **flexibility overlaps heavily with fluency and originality** (Weiss & Wilhelm, 2022). In plain words, a person's fluency and originality scores told the team most of what their flexibility score would be.

The honest part of the story



> **Science Says:**
>
> Weiss and Wilhelm wrote that "fluency/originality strongly predicts flexibility and accounts for 61% of its variance" (Weiss & Wilhelm, 2022). Variance means **how much people differ**. Put simply, about 61% of the ups and downs in people's flexibility scores could be guessed from their fluency and originality scores. The part left over "was unrelated to self-reported creative activities" (Weiss & Wilhelm, 2022).

A box of crayons shows the overlap. A person who draws many crayons out of the box will usually pull out **many colours along the way**, because a long grab reaches further into the box. Counting colours mostly repeats the count of crayons, with a small part left over.



A tin of crayons tipped on its side, a child's hand drawing out a long handful in many colours.

The team went further. After they took fluency and originality out, the rest of flexibility "was unrelated to working memory and mental speed" (Weiss & Wilhelm, 2022). Working memory is **the small notepad in your head** for holding a few things at once, and mental speed is how fast you work through simple tasks.

Unrelated to the rest of flexibility

> - Working memory, the small notepad in your head
> - Mental speed, how fast you work through simple tasks

> **Science Says:**
>
> The authors concluded that flexibility, as the tests measure it, "can be deemed primarily a method factor that did not show value over and above fluency/originality" (Weiss & Wilhelm, 2022). **A method factor is a result of how a test is scored**, more than a skill of its own. Their finding is about measuring, and it says nothing against practising a change of kind.

Why keep training flexibility at all? **Changing category on purpose is a habit you can practise**, even when its score overlaps with others. A person stuck on wrapping can tell themselves to try burning or building, and a new kind of idea can appear on the page.

A cook who only fries will make many fried dishes and very few of any other kind. **Naming the habit, frying, is the first step out of it**. Baking and fresh salads are waiting in the same kitchen, and the cook only has to turn round.



> **Key Concept:**
>
> Change the kind. When a list stays in one kind, **stop and name the kind** in one word. Then pick a kind you have not used yet, such as food, sound or games, and write two ideas in it. Each new kind opens a new room, and each room gives you a few more ideas.

The move takes a few seconds once you know it. **Stop, name the kind and switch**, and you can do it in the middle of any list, with or without a timer.

Stop, name the kind and switch



A habit is worth more when practice can move it. **Training studies give a careful yes** for flexibility, with a smaller gain than for fluency and originality (Haase et al., 2025). The smaller gain is the reason the practice below keeps returning to the same move.

> **Science Says:**
> In 3.1.1 you saw that training raised the number of ideas and their rareness more than **the number of different kinds** (Haase et al., 2025). The kinds still went up, with effects of about g = 0.53 to 0.56, depending on how the team grouped the studies (Haase et al., 2025). A smaller gain is still a gain.

Imagine Priya, who is planning a leaving lunch for a colleague. Her first list reads Italian place, curry house, burger bar and sushi. **Every idea on it is a restaurant**, and the team has eaten at all four before.

Priya names the kind, restaurants, and asks what other kinds of lunch exist. She adds **a picnic in the park, a cooking class and a shared meal where everyone brings one dish**. The shared meal wins, because the colleague loves cooking for people and now gets to be cooked for.

Priya's leaving lunch

Kind	Ideas
Restaurants	Italian place, curry house, burger bar and sushi
Other kinds of lunch	A picnic in the park, a cooking class, a shared meal

Priya's move took less than a minute. **Naming the kind made the gap visible**, and the gap pointed to new places to look. Without the name, her next idea would most likely have been a fifth restaurant.

The same move works on ordinary days. Planning a weekend, you can check whether every idea is a trip to a shop, and then **add a kind**, such as something outdoors, something with friends or something made by hand. A dinner menu, a birthday plan and a work report can all be checked in the same way.

Add a kind



> **Key Concept:**
> Kinds you can borrow. When you run dry, borrow a kind from this short list and try it on your task. The list is food, sound, games, building, wearing, giving, growing, moving, hiding and fixing. **Any kind you have not used yet** is fair, and a strange match can be the most fun to try.

Some kinds are hard to name at first. **A one-word label is enough**, even a rough one such as messy ideas or kind ideas. The label only has to help you see that two ideas belong together and a third one does not.

Two kinds that sit far apart give the strongest stretch. **Swapping between two unlike kinds**, such as food and sound, forces your mind to jump each time. One idea about taste and one about noise, then taste again, keeps the list from settling.

> **Key Concept:**
>
> Idea map. Write your task in the middle of a page. Around it, draw a circle for **each kind of idea** you have used and put your ideas inside. Then add one empty circle, give it a new kind, and fill it. The empty circle is where the new direction starts.

Swapping between two unlike kinds



An idea map fits on the back of an envelope. **Keep your old maps** in your practice journal, so a later map of the same task can show you which kinds you now reach for without help.

The advanced level below puts this map to work on a task from your own life. It pairs **one rule of thumb, change the kind on purpose, with a real task**, the shape of the better training programmes (Scott et al., 2004). A real task tends to have kinds nobody has named yet, and finding one is the reward.

Exercise:

Many kinds.

1. Starter. List uses for a towel for two minutes. Name the kinds, then **add one idea from a new kind**.
2. Middle. List ideas for a rainy Sunday, swapping each time between two unlike kinds, such as food and sound.
3. Advanced. Take a real task from home or work. Draw an idea map of its kinds, invent one missing kind and develop the best idea from it.

Key idea:

Flexibility is **moving between different kinds of ideas**, and changing the kind on purpose is a habit you can practise, even though its score overlaps heavily with fluency and originality.

Quick check:

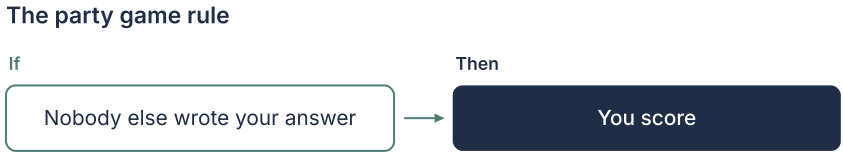
On a list of uses for a newspaper, how many points for flexibility do wrap a fish and wrap a gift earn together? Answer: one, because both ideas are the same kind, wrapping.

Moving between kinds

Different kinds of ideas	Change the kind on purpose

3.1.3 Originality: Finding Unusual Possibilities

IMAGINE A PARTY GAME. Everyone gets a card that asks for something you can find in a kitchen, and each guest writes one answer in secret. **You score only if nobody else wrote your answer**, so a spoon earns nothing, and a forgotten birthday candle in the cutlery drawer wins the round.



An originality score runs on the same rule as the party game. **Originality is finding the unusual possibility**, the idea that few other people would reach. In this section I show you how rarity is counted, what training does to it and how to practise finding the rare idea at three levels.

In 1.3.3 you met originality as the rare ideas on your brick sheet, and you rated your best paperclip ideas. The Torrance scoring gives it as "the number of unusual ideas as determined by statistical infrequency, implying that rare ideas are original" (Alabbasi et al., 2022). **Statistical infrequency means how seldom an answer turns up** across many people.

The scorer works from a list of common answers that many people gave. The rule is plain, saying "If the response is not on the list, it is given a point for originality" (Alabbasi et al., 2022). **An answer that is**

missing from the common list earns a point, just as in the party game.

How the scorer works

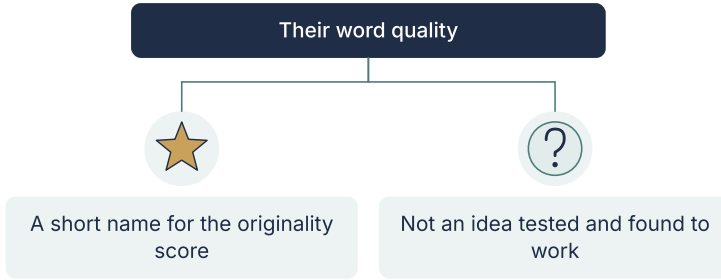


> **Key Concept:**
>
> Originality. Originality is **how rare your ideas are** compared with the answers most people give. A team that combined many training studies calls it "the uncommonness of ideas (originality)" (Haase et al., 2025). Every version asks the same question about each idea, which is how few people would have come up with it. A rare idea on one list can be common on another, so rarity always depends on who else answered.

A different team uses a different word. They write of "originality (i.e., the quality of ideas)" (Weiss & Wilhelm, 2022). **Their word quality is a short name for the originality score**, and it does not mean the idea has been tested and found to work in real life.

The same team write that the way divergent thinking is understood rests on a few scores, and originality is one of them (Weiss & Wilhelm, 2022). **Guilford's work is one of the sources they name** for that view (Guilford, 1956, 1967, as cited in Weiss & Wilhelm, 2022).

A different word

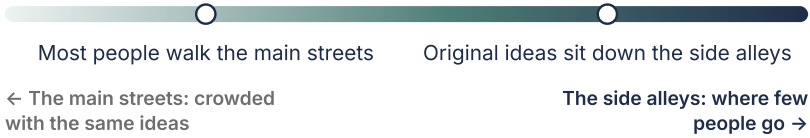




A sunny market street crowded with shoppers, and a quiet narrow lane leading off it towards a small courtyard with a fountain.

The common list works like a map of a busy town. Most people walk the main streets, so the main streets are crowded with the same ideas. **Original ideas sit down the side alleys**, where few people go. Where the picture stops is usefulness, because an alley can lead to a lovely courtyard or to a brick wall.

A map of a busy town

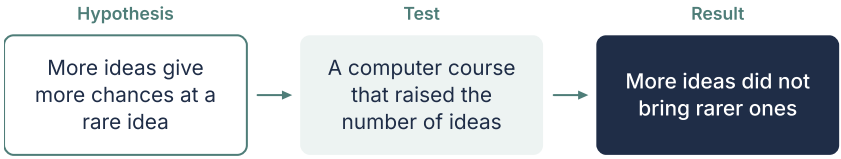


> **Exercise:**
>
> Try it. List uses for a cup for one minute. **Mark each idea you believe few people would write**, then count the marks.

Look back at your cup list and find the ideas you marked. **Check where your marks sit on the list**, near the top or further down. If they came late, walking past the crowded streets was part of how you reached the side alleys.

A longer list might seem the surest road to a rare idea, since more ideas give more chances. **One study put that hope to the test**, and it shows where the two skills part ways.

One study put that hope to the test



> **Science Says:**
>
> In 3.1.1 you met a computer course that raised the number of ideas people produced (Benedek et al., 2006). **More ideas did not bring rarer ones**, and originality stayed where it was.

A plain drill asks you for more ideas. **An originality prompt asks for rarer ones**, and it says so in its instructions, such as list uses nobody else at the table would write. The instruction points you down the side alleys from the start.

Two kinds of prompt

	A plain drill	An originality prompt
Asks for	More ideas	Rarer ones

The big training study that combined many studies gives **a more hopeful picture for originality** (Haase et al., 2025). Across many kinds of training, the people who trained came up with more uncommon ideas than the people in the groups that did not train. The size of that change is in the box below.

> **Science Says:**
>
> Across the studies in that review, originality rose with effects of about g = 0.57 to 0.65, depending on how the team grouped the results (Haase et al., 2025). A g of that size is **about a medium change**. The results come from many different training methods, so they show that originality can move and leave open which method moves it best.

The two findings fit together. **A plain fluency drill may leave originality where it was**, and training in general can raise it. The practice in this section simply asks for the unusual idea by name.

One useful trick follows from the common list. Before you begin, **write down the three answers you expect everyone to give**, then promise

yourself not to use them. Your own guess at the common list closes the main streets, and the side alleys are what remain.

Close the main streets

1. Write down the three answers you expect everyone to give
2. Promise yourself not to use them
3. The side alleys are what remain



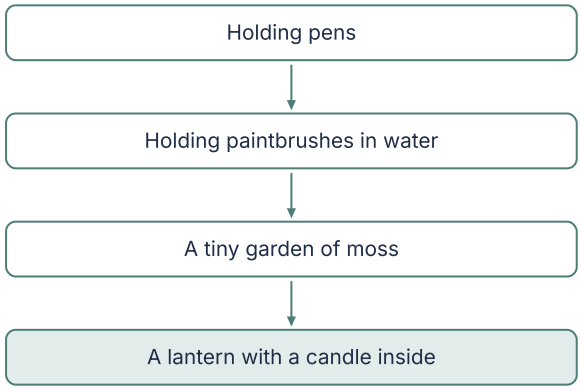
A potter at a wheel shaping a tall, crooked vase, with a neat row of identical round bowls drying on a shelf behind her.

The simplest prompt is a rewrite. You take a common answer, such as holding pens, and **push it one step further from the main street**. Holding pens becomes holding paintbrushes in water, then holding a tiny garden of moss, then a lantern with a candle inside.

Each rewrite asks whether the new idea would still be on the common list. When the answer is probably no, **you have found a side alley**. The

starter level below uses this move, and it needs nothing more than a list you have already written.

Push it one step further

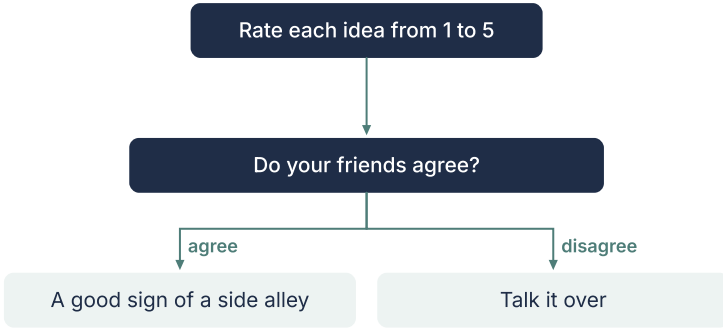


> **Key Concept:**
> Push it further. Pick one common idea from your list. Ask what it would look like **much bigger, upside down or made for someone else**, such as a child or a sailor. Write each new version, then circle the one you believe would surprise most people. The circle marks your most original idea.

You may find it hard to tell how rare your own ideas are. **A friend or two at home can be your raters**, scoring each idea the way judges score ideas in creativity studies (Silvia et al., 2008).

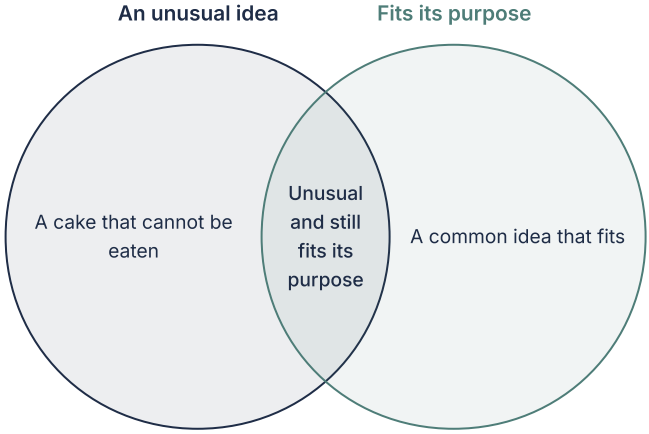
Give them your two circled ideas and ask each person to rate them from 1 to 5. Where your friends agree that an idea is rare, **you have a good sign of a side alley**. Where they disagree, talk it over and ask what they would have written.

Friends as raters



Rarity is only half of what you need in daily life. An unusual idea for a birthday cake that cannot be eaten is rare and no use at all. **The advanced level asks for an idea that is unusual and still fits its purpose**, because a real task has a real person or job waiting at the end.

Rare and fitting



Imagine Tom, who has to give a short talk to his running club. His first ideas are a list of tips, a story about a race and a slideshow of photos. **Tom pushes one idea further** and asks the club to run the talk with him, standing up at each tip to try it.

The idea is rare for a club talk, and it still does the job, because the members still get the tips. **Tom keeps the purpose and changes the form**. The advanced level trains that pairing of rare and fitting. A rare idea that misses goes back on the list, and a common one that fits gets one more push.

Tom's club talk

Before	After
A list of tips	The club runs the talk with him
A story about a race	Standing up at each tip to try it
A slideshow of photos	

> **Key Concept:**
> Rare and fitting. Write the purpose of your task in one line at the top of the page. Then list ideas and **mark each one twice**, once for how rare it is and once for how well it fits the line at the top. The ideas with two good marks are the ones to keep and develop.

The advanced level rests on two things from the research. Training can raise originality on average (Haase et al., 2025), and the better programmes use **a rule of thumb on a realistic task** (Scott et al., 2004). The rule in this case is to push an idea further while keeping its purpose in sight.

Purpose keeps an original idea honest. **Ask who the idea is for and what it must do**, and check the rare idea against both answers before you put time into it.

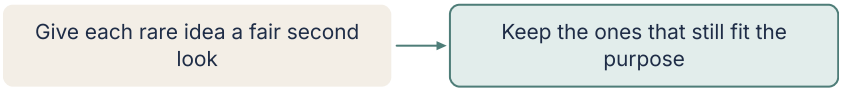
Purpose keeps an original idea honest

- [x] Who is the idea for?
- [x] What must it do?

In ordinary days, originality practice can be small. **Ask for the unusual version once a day**, for a packed lunch, a thank-you note, a route home or the name of a family game. Most days you will go with the usual idea, and that is fine, because the practice is in finding the other one.

Keep a note of the unusual versions you find, and look back over them at the end of each month. Some unusual ideas will feel odd at first, to you and to others. **Give each rare idea a fair second look** before you drop it, and keep the ones that still fit the purpose after that look.

A fair second look



Exercise:

Unusual possibilities.

1. Starter. Take three common uses for a spoon. **Rewrite each one** until you believe it would be missing from a list of common answers.
2. Middle. From any list, circle your two most creative ideas. Ask two people to rate each from 1 to 5.

3. Advanced. Take a real task. Write its purpose, then find one unusual idea that still serves it.

Key idea:

Originality is finding the unusual possibility, the idea few people would reach, and it needs practice of its own that keeps the purpose of the task in view.

Quick check:

How does the Torrance scoring decide whether an answer earns a point for originality? Answer: the answer earns a point if it is not on the list of common responses.

Originality in one line

- The unusual possibility
- The idea few people would reach
- The purpose of the task in view

3.1.4 Elaboration: Turning an Initial Idea Into a Developed Form

IMAGINE A FRIEND SAYS she has an idea for a café. You ask what it is, and she says a café for dog owners. **The idea is one line long**, and you cannot yet see the tables or the sign above the door.

A week later she shows you a page. There is a garden at the back with a fence, a rack for leads by the door and a shelf of dog biscuits baked on

site. **The one line has become a developed form**, and the skill that did the work is elaboration, the subject of this section.

From one line to a developed form

Before	After
A café for dog owners The idea is one line long	→ A garden at the back with a fence A rack for leads by the door A shelf of dog biscuits baked on site

In 1.3.3 you added three details to your best brick idea, and that step was elaboration. The Torrance scoring gives it as "the addition of ideas beyond the minimum necessary for the response" (Alabbasi et al., 2022). **The minimum is what the idea needs to be recognised**, and elaboration is everything you add on top.

Elaboration has the same roots as the other three scores. **Torrance built his tests on Guilford's work** (Guilford, 1967, as cited in Alabbasi et al., 2022), and those tests count elaboration among their scores (Alabbasi et al., 2022).

What elaboration adds

The minimum the idea needs + Everything you add on top = **A developed form**

> **Science Says:**
>
> The same review gives an example. In its words, “the basics of a door are the door and the knob”, and “Any additional elements such as the door design or dimensions are considered as elaborated detail” (Alabbasi et al., 2022). **A door with a knob is the minimum**, and a door with a brass letterbox and a round window is an elaborated door.

Try the door yourself. **A door for a castle** might gain iron studs and a heavy bar across the back, and a door for a cat is a small flap cut into a bigger door. The minimum stays the same, and the details tell you which door you are looking at.

Try the door yourself

	A door for a castle	A door for a cat
The minimum	The door and the knob	The door and the knob
The details	Iron studs and a heavy bar across the back	A small flap cut into a bigger door

A second team describes elaboration as “Specifics and expansion of ideas”, and counts “the number of details provided (elaboration)” (Haase et al., 2025). Specifics are **the small exact facts about a thing**, such as its size or what it is made of. Expansion means making the idea bigger by adding to it.

> **Key Concept:**
>
> Elaboration. Elaboration is **adding detail beyond the minimum** an idea needs. It starts from one idea and fills it in, piece by piece. The more an idea is filled in, the more easily another person can see it and build it. A garden party grows from a date into a guest list and a plan for rain.

A new idea can arrive in a moment, and filling it in can take an afternoon or a month. **That filling in is the slow part of the work**. The bare idea stays the same, and the details give it its shape.

The slow part of the work



Elaboration works like dressing a snowman. The minimum is two balls of snow, one on top of the other, and anyone can see it is a snowman. **Each added thing, a carrot or a scarf, makes it this snowman** and no other. Where the picture stops is purpose, because a real idea gains details that help it work.

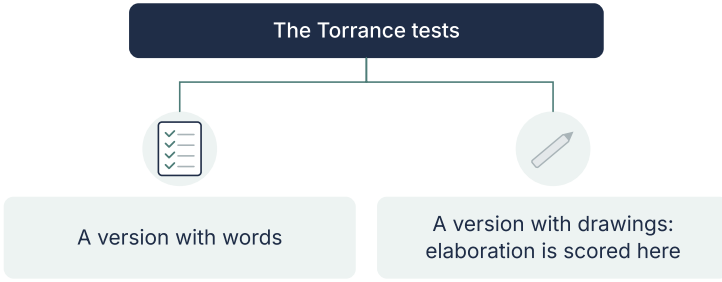


A snowman in a white garden wearing a red scarf and a flat cap, two children pressing stones into its face.

> Exercise:
>
> Try it. Take one bare idea, a park bench. In one minute, **add every detail you can** beyond the seat and the legs.

The Torrance tests have a version with words and one with drawings, and elaboration is scored on the drawing side (Alabbasi et al., 2022). **A sketch is a natural place to practise elaboration**, because every line you add is a detail you can see. You do not need to draw well, since a rough box with labels does the job.

Where elaboration is scored



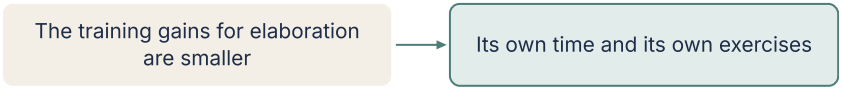
Researchers have given elaboration little attention, as the first box below shows. That leaves **a thinner base of evidence** for how to train it, so the advice in this section rests on less research than the advice for fluency. The two findings below are what we have.

> Science Says:
>
> One team notes that "Elaboration as a further aspect is rarely studied" (Weiss & Wilhelm, 2022). **Rarely studied means few studies**, so any claim about training elaboration rests on a smaller pile of results than claims about fluency or originality.

> **Science Says:**
> In 3.1.1 you saw that training moved the number of ideas and their rareness more than the number of details (Haase et al., 2025). The same team wrote that "Elaboration benefited least from enhancement" (Haase et al., 2025). **The training gains for elaboration are smaller**, and they are still gains, with effects of about g = 0.47 to 0.54.

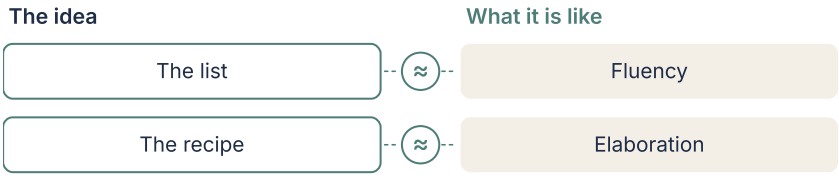
A smaller gain is a reason to give elaboration **its own time and its own exercises**. A long list of ideas, however rare, still leaves each idea one line long. The filling in is a separate job, and practice in this section aims at that job alone.

A smaller gain



A cook with a list of twenty dinner ideas still has no dinner. One idea has to be chosen and **turned into a recipe**, with amounts, an order of steps and a time for the oven. The list is fluency, and the recipe is elaboration.

A cook with a list of twenty dinner ideas



Details come in a few useful kinds. There are **parts**, such as the fence and the lead rack, and there are numbers, such as how many tables there are. There are users, such as who will sit where, and there are steps, such as what happens when a customer walks in.

> **Key Concept:**
>
> Four kinds of detail. When an idea feels thin, name its parts, its numbers, its users and its steps. **Each answer adds a detail beyond the minimum**, and four answers can turn a one-line idea into a page. Start with whichever kind is easiest for you, then move on to the hardest one.

Four kinds of detail



Elaboration needs a minimum to start from. If you begin with a vague wish, such as something nice for the garden, there is **nothing yet to elaborate**. Pick one idea, a bird bath made from an old sink, and the details have something to hold on to. The sink's size and where it will stand come next.

Elaboration needs a minimum

Before	After
A vague wish, something nice for the garden	One idea, a bird bath made from an old sink
Nothing yet to elaborate	The sink's size and where it will stand

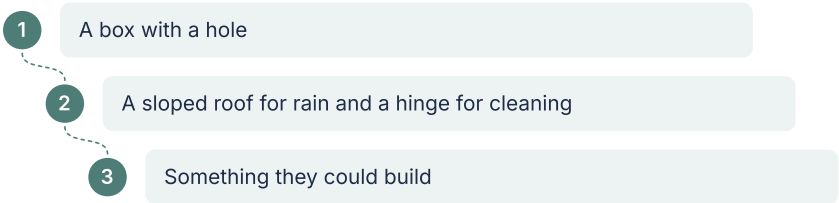
Some details make an idea better, and some only make it longer. A café sign in gold letters adds a detail, and so does a rule that dogs eat for free on Tuesdays. **Check whether each detail helps the idea do its job**, and keep the ones that do.

> **Key Concept:**
>
> Sparse and full. Write one idea twice. The sparse version is a single line, the minimum, and the full version has at least ten details. **Put the two side by side** and mark which details changed what the idea can do, and which only added words. Keep the details that changed something, and cut the rest.

Imagine Leo, who wants to build a bird box with his daughter. His first sketch is a box with a hole. **Leo names the four kinds of detail** and adds a sloped roof for rain, a hinge for cleaning, the height of the hole and a spot on the fence away from the cat.

Each new detail answers a real question about the bird box. **The sketch became something they could build**, with a list of wood to buy and an order of steps. The first sketch was a fine idea, and the second was a plan.

Leo's bird box





A father and daughter in a back garden fixing a small wooden bird box with a sloped roof to a fence post.

The advanced level asks you to do the same with an unfinished piece of your own. It uses a realistic task, the shape of the better training programmes (Scott et al., 2004). **It asks you to decide what the idea still needs** before you add anything.

Deciding comes first because an unfinished piece often has plenty of detail in one place and none in another. A story may have a rich opening and a thin ending, and **a garden plan may list every plant and forget the paths**. Look for the empty places before you fill any of them, and fill the emptiest one first.

Look for the empty places

Plenty of detail	None
⊕ A rich opening	⊖ A thin ending
⊕ Every plant	⊖ The paths

A good test for a finished form is to hand it to someone else. If they can build or follow it without asking you anything, **the idea has enough detail**. Each question they ask points to one more place that needs filling in. A friend who asks where the paths go has found your next detail.

A good test for a finished form



Elaboration fits into many ordinary days. A holiday idea becomes a plan when you add dates and a budget, and **a birthday idea becomes a party** when you add a place and a time. Each time you take one line and fill it in, you are practising this skill.

Because its gains are smaller, elaboration needs practice on purpose. **Set aside time for it** in your week, even a short one, and give it the same care you give to listing ideas. Keep the sparse and full versions in your practice journal so you can compare them later.

Take one line and fill it in

One line	Add	Becomes
A holiday idea	Dates and a budget	A plan
A birthday idea	A place and a time	A party

The three levels below follow the same order as this section. The starter level uses a sketch, the drawing side of elaboration, and the middle level trains the sparse and full comparison. **The advanced level works on your own unfinished piece**, where deciding comes before adding.

Exercise:

Developed forms.

1. Starter. Sketch a lamp in one line. **Add three details** to the sketch, such as a switch, a pattern on the shade or its height.
2. Middle. Write one idea twice, sparse and full. Mark the details that changed what it can do.
3. Advanced. Take an unfinished piece of your own. Decide what it still needs, add those details, then hand it to someone to test.

Three levels in the same order as this section



Starter: a sketch

Middle: sparse and full

Advanced: your own unfinished piece

Key idea:

Elaboration turns **a one-line idea into a developed form** by adding detail beyond the minimum, and because its training gains are smaller, it needs practice on purpose.

Quick check:

In the door example, which parts are the minimum and which are elaboration? Answer: the door and the knob are the minimum, and any extra element, such as the design or the size, is elaboration.

3.2 Seeing and Questioning Differently

3.2.1 Seeing a Problem From Several Angles

Imagine three friends who share a flat, and a kitchen sink that is always full of dirty dishes. One of them says the problem is that nobody washes up fast enough. **The way she puts the problem already points to an answer**, a quicker washing rota, before anyone has looked at the sink from another side.

The second friend says the problem is that the flat owns more plates than three people need. The third says washing up is boring, so everyone puts it off. **Same sink, three different problems**, and each one leads to a different kind of fix.

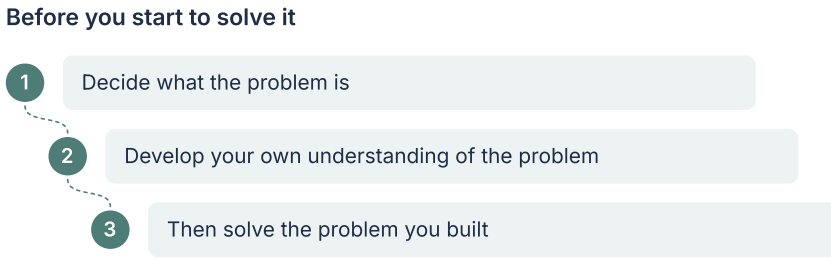
Same sink, three different problems



Seeing a problem from several angles is the skill in this section. I show you what the research calls the first step, why **views that clash can help you**, and how to practise the skill at three levels. You can use it on any task that comes to you without clear edges.

The idea has no single founder, and it comes from research on problem solving. One team wrote that “Problem construction has been determined to be an important process contributing to creative

problem solving" (Reiter-Palmon et al., 1998). **Problem construction is how you decide what the problem is**, before you start to solve it.



> **Key Concept:**
> Problem construction. A newer team wrote, "During problem construction, individuals work to develop their own understanding of the problem at hand" (Reiter-Palmon et al., 2024). **Their own understanding** is the phrase to keep. Three friends at one sink build three problems in their heads, and each friend then solves the problem they built.

The 1998 study looked at "ambiguous, ill-defined problems" (Reiter-Palmon et al., 1998). Ill-defined means **the problem comes without clear edges**, so nobody tells you what counts as the problem or what a good answer looks like. In my words from 1.1.2, these are tasks where the variables are not identified.

Seeing several angles works like walking round a statue in a park. From the front you see a face, from the side a raised arm, and from behind **a detail nobody photographs**. Each view is true, and none of them is the whole statue.

Walking round a statue

From	You see
The front	A face
The side	A raised arm
Behind	A detail nobody photographs

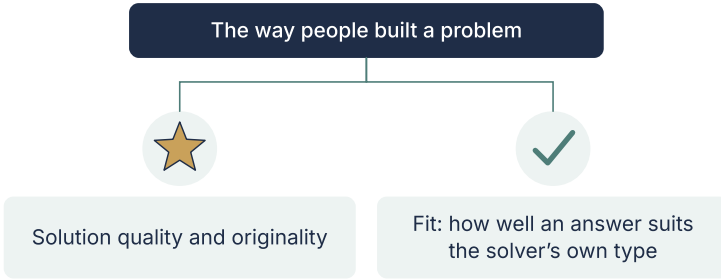


A bronze statue in a city park seen from behind, a child walking round it to look at the side the tourists miss.

Where the statue picture stops is the stone. A statue keeps its shape whichever way you walk round it, while **a problem changes shape with the view you choose**. The sink is one sink, and the three problems built from it are three different jobs.

In a study of 195 students, the way people built a problem went with their answers. The team wrote that “solution quality and originality are related to both problem construction and solution fit” (Reiter-Palmon et al., 1998). **The answers tracked how the problem was built**, and a second thing the team called fit.

A study of 195 students

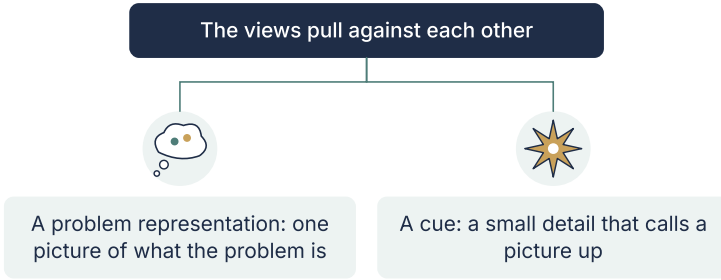


> **Science Says:**
> The team looked at "the degree to which the solution fits the personality of the individual" (Reiter-Palmon et al., 1998). They found that "problem construction ability is positively related to the fit of the solution to the personality type" (Reiter-Palmon et al., 1998). Fit is **how well an answer suits the solver's own type**. The study measured links between scores in one group of students, and it does not test a course.

Fit is easy to picture in the flat. The friend who likes lists builds the problem as a missing rota, and **she finds a fix that suits her own way of working**. In the study, people who were better at building problems gave answers that fitted their own personality type more closely.

A newer study looked at what happens when **the views pull against each other**. People "sort through and combine problem representations activated through cues in the problem" (Reiter-Palmon et al., 2024). A problem representation is one picture of what the problem is, and a cue is a small detail that calls a picture up.

Sort through and combine

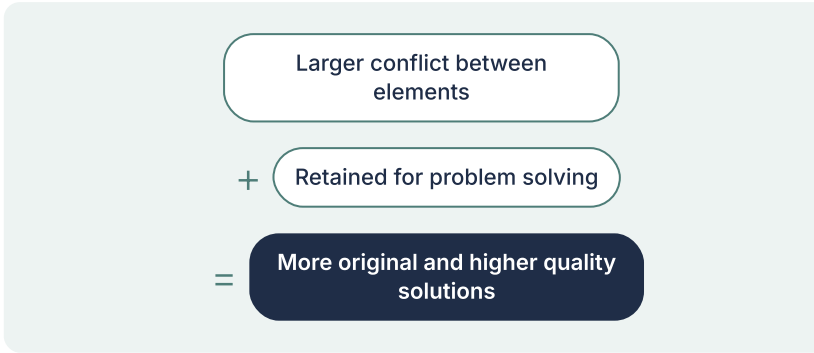


The same team looked closely at the parts of a problem that clash with each other (Reiter-Palmon et al., 2024). Conflicting elements are **parts of a problem that pull in different directions**. Paradoxical ones look as if they cannot both be true.

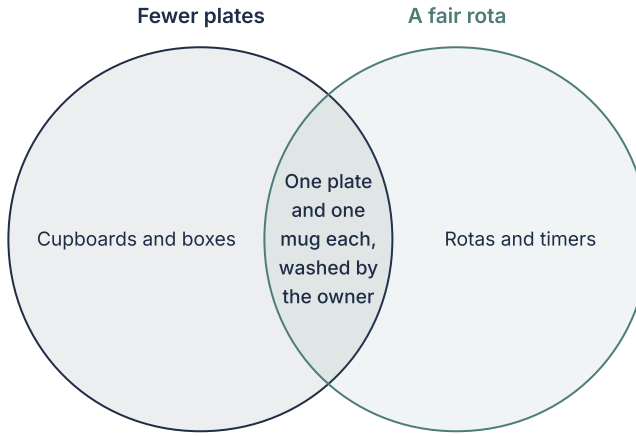
> **Science Says:**
> People "identified more conflicting elements in the problem construction phase, but retained fewer of them in the problem-solving phase" (Reiter-Palmon et al., 2024). The team added, "Larger conflict between elements retained for problem solving resulted in more original and higher quality solutions." **Keeping a real clash alive** while solving went with better answers.

In the flat, the clash is plain. Fewer plates and a fair rota pull apart, because with fewer plates someone has to wash up after every meal. **Holding both views at once** can lead to a fix that neither view finds alone, such as one plate and one mug each, washed by the owner straight after use.

Keeping a real clash alive



Holding both views at once



Climb it in small steps. A child might say **a problem can be seen in more than one way**, and a student adds that your view picks the answers you look for. A scientist cites the links with better answers (Reiter-Palmon et al., 1998; Reiter-Palmon et al., 2024). Your rule is to write two or three views before you solve.

Climb it in small steps



A child: a problem can be seen in more than one way

A student: your view picks the answers you look for

A scientist cites the links with better answers

> Exercise:
>
> Try it. Take one small annoyance from today. **Write it as two different problems**, each in one sentence.

Each view fits in one sentence that begins with How can I or How can we. **Changing the end of the sentence changes the problem**, as with wash faster and use fewer plates. A view that only swaps a word or two, such as wash quicker, is the same view in new clothes.

A real new view brings **a new kind of answer** with it. Washing faster brings rotas and timers, and fewer plates brings cupboards and boxes. When two sentences bring the same kind of answer, keep going until one of them surprises you.

A real new view

	Wash faster	Use fewer plates
Brings	Rotas and timers	Cupboards and boxes

> **Key Concept:**
> Ways to turn the problem. Ask how it looks **to each person involved**, one at a time. Ask how it looks with more or less of something, such as more time or fewer plates. Ask how it will look a year from now. Each question gives you one new sentence for the same problem.

Start with the view that came to you first, and give it a number like any other. **Writing it down shrinks it to one sentence among others**, and a sentence on paper is easy to question. A view kept in your head can pass for the problem itself, unseen.

Ways to turn the problem

- [x] How it looks to each person involved
- [x] How it looks with more or less of something
- [x] How it will look a year from now

Imagine Nell, who runs a small café that is empty every Tuesday. Her first view is how to get more people through the door, and **every idea on her list is an offer**, a cheap coffee or a free slice of cake. The list is long, and all of it comes from one view.

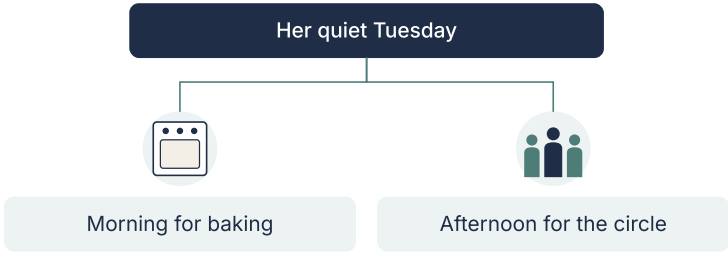


A quiet café on a rainy afternoon, trays of bread cooling on the counter and two regulars knitting by the window.

Nell sits down after work and writes two more views. How can a quiet Tuesday be useful, and how can Tuesday mean something to the people who already come? **The second view turns Tuesday into a baking day** for the busy weekend, and the third starts a Tuesday knitting circle for her regulars. Neither idea costs her anything in offers.

The baking day and the knitting circle clash a little, since one wants a quiet room and the other fills it. **Nell keeps the clash** and gives each half of the day, morning for baking and afternoon for the circle. Neither view alone would have shaped the day that way.

Nell keeps the clash



> **Key Concept:**
> The views table. Draw two columns on a page. In the left column, **write each view as one sentence**. In the right column, write the first answer each view brings. Then look along the right column for answers that pull against each other, and ask whether one idea could keep both.

The table fits on the back of an envelope, and it takes about five minutes to fill. **Keep your old tables** in your practice journal, so you can see over time whether your second and third views come faster and land further from the first.

The views table

Each view as one sentence	The first answer it brings
How to get more people through the door	A cheap coffee or a free slice of cake
How can a quiet Tuesday be useful?	A baking day for the busy weekend
How can Tuesday mean something to the people who already come?	A Tuesday knitting circle

The studies in this section measured links between scores, and none of them tested a course in seeing several angles. **The exercises here are practice**, and I make no promise about how much they raise a score. They train a habit you can watch on paper, writing more than one problem before you start.

The exercises here are practice

The studies in this section	None of them
⊕ Measured links between scores	⊖ Tested a course in seeing several angles

The move fits any open task. Before a holiday plan, a work report or a hard talk with a friend, **write the problem two or three ways** first. Ask which one surprises you most, because the surprising view is the one you have not tried yet.

Before any open task

Try this now

1. Write the problem two or three ways first
2. Ask which one surprises you most

The advanced level below asks you to solve from the hardest view. Practice on a real task with **one plain rule of thumb** follows the pattern of the better training programmes (Scott et al., 2004), and here the rule is to write three views before choosing. The hardest view is the one that clashes most with your first.

> **Exercise:**
>
> Several angles.
>
> 1. Starter. Write one problem from your week in two different sentences. Keep both, and list **what each one lets you see** that the other hides.
> 2. Middle. Add a third view that clashes with the first two, and write one idea that keeps the clash.

3. Advanced. Take a real problem from home or work. Write three views, pick the hardest one and solve the problem from there.

Key idea:

The way you put a problem decides which answers you look for, so write it from several angles and keep the views that clash.

Quick check:

What is problem construction? Answer: deciding what the problem is, by building your own understanding of it, before you start to solve it.

Several angles in one line

- The way you put a problem decides which answers you look for
- Write it from several angles
- Keep the views that clash

3.2.2 Asking Better Questions

IMAGINE YOUR MANAGER STOPS at your desk and asks you to make the staff newsletter better. The first question that comes to mind is how to make it look nicer. **That first question picks your answers for you**, and within an hour you are choosing fonts and photos for the front page.

A different question would send you somewhere else. Who reads the newsletter now, and who never opens it? **You could even ask whether**

it needs to be a newsletter at all, or whether something else would tell people what changed this week.



Asking better questions is the skill in this section. **The question you ask decides where you look for answers**, so a small change in the question can lead to a very different result. I show you what one team learned by combining many studies, how a question can hold a clash and how to practise at three levels.

> **Key Concept:**
> Problem finding. Problem finding is **the work of finding and shaping the question** before you try to answer it. The idea comes from research on how people create. One team wrote, "Problem finding (PF) and divergent thinking (DT) are essential components in most creative cognition models" (Abdulla Alabbasi et al., 2025). This section stays with the first of the two.

In 1.1.2 you saw that creative tasks come with their variables not identified. **A question is how you start to name them**. Who reads the newsletter is one variable, what they want to know is another, and the form it takes is a third.

A question is how you start to name them



A question works like a fishing net. **The size and shape of the net decide what you pull up**, so a net with big holes brings back big fish and lets the small ones go. Cast the same net in the same spot every day and you will keep catching the same kind of fish.



A fishing boat in a small harbour at dawn, a fisher holding up a wide net with an empty middle and a few silver fish caught at the edges.

Where the net picture stops is the water. A fisher cannot change the sea, while **a question can change the problem itself**. The newsletter becomes a different task the moment you ask whether it should be a newsletter. Nothing about the office changed, only the question.

One team combined many studies of problem finding and divergent thinking. A study of that kind tells you more than one study alone,

because **a lucky result in one place is evened out** by the others. For one of their main comparisons, the team gathered 61 results from 10 studies with 1,657 people (Abdulla Alabbasi et al., 2025).

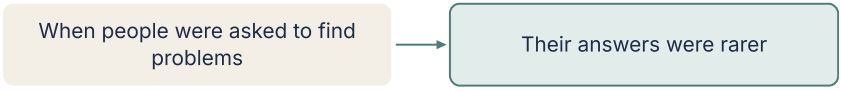
Combining many studies

Comparison	Results	Studies	People
Problem finding and divergent thinking tasks	61	10	1,657
How the two skills go together	138	24	4,207

> **Science Says:**
>
> The team found a large difference in favour of problem finding, with g = .887 (Abdulla Alabbasi et al., 2025). In their words, "PF tasks elicited more original responses compared with DT tasks." **Tasks that ask people to find problems drew rarer answers** than tasks that ask for answers to a set question.

In plain words, a g of nearly 0.9 is a big difference. When people were asked to find problems, **their answers were rarer** than when they were handed a question and asked for many answers to it. The study compared two kinds of task, and it did not test a course in asking questions.

A big difference



The same team looked at how the two skills go together. **Being good at one goes with being a little better at the other**, with plenty of

people who are strong in one and plain in the other. The link is modest, so it is worth practising both, one at a time.

> **Science Says:**
>
> Across 138 results from 24 studies with 4,207 people, problem finding and divergent thinking went together with "r = .290" (Abdulla Alabbasi et al., 2025). An r of about 0.3 is **a modest link**. It tells you the two skills overlap a little, and it tells you nothing about what a course in either one would do.

Climb it in small steps. A child might say **a different question gets a different answer**. A student adds that finding the problem is part of creative work, and a scientist cites the gap in rare answers between the two kinds of task (Abdulla Alabbasi et al., 2025). Your rule is to write several questions before you answer one.

From a child to a scientist

- [x] A child: a different question gets a different answer
- [x] A student: finding the problem is part of creative work
- [x] A scientist cites the gap in rare answers

> **Key Concept:**
>
> Open the question. A question that can be answered yes or no closes the task fast. **Turn it into a how or a why question** and it opens again. Should we print the newsletter becomes how could people hear the news, and the second version leaves room for answers nobody has tried.

> **Exercise:**
>
> Try it. Before you start one task today, **write three different questions** it could be asking. Read them before you choose.

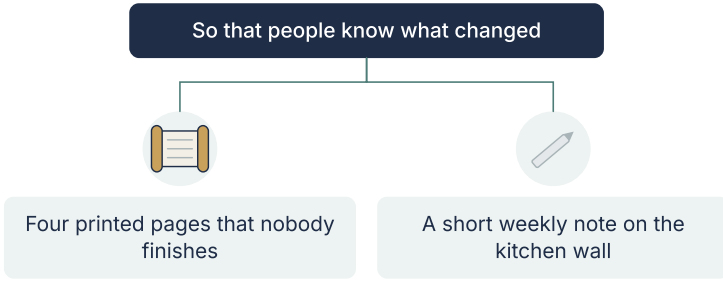
Open the question

Yes or no	How or why
Should we print the newsletter?	How could people hear the news?

Six small words make a good start. **Who, what, where, when, why and how** each open a different door into the same task. A rule of thumb like this, practised on real tasks, is the pattern of the better training programmes (Scott et al., 2004).

Back at the newsletter, the six words give you six questions. The why question asks **why the newsletter exists in the first place**, and the honest answer is so that people know what changed. A short weekly note on the kitchen wall might do that job better than four printed pages that nobody finishes.

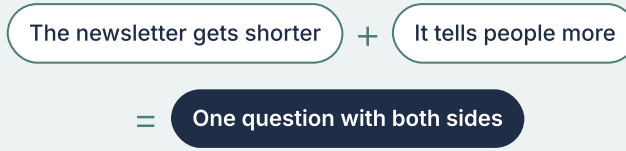
Why the newsletter exists



> **Key Concept:**
> Six question words. Write your task at the top of a page. Under it, **write one question for each word**, who, what, where, when, why and how. Do not answer yet. Then read the six, circle the one that surprises you and answer that one first.

In 3.2.1 you kept two views of a problem alive even when they clashed. **A question can hold a clash inside it**, such as how the newsletter can get shorter and tell people more. The clash stops you from solving one half and forgetting the other.

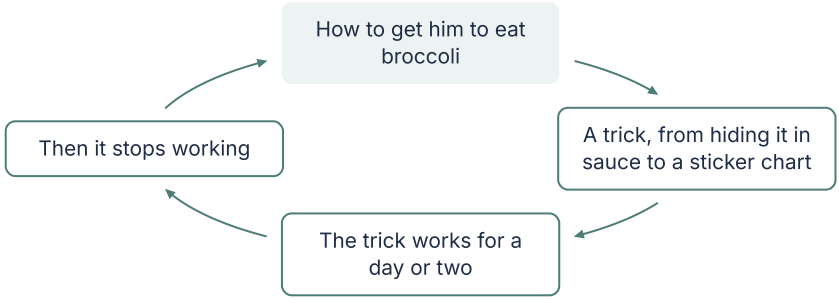
A question can hold a clash



To build a clash question, find two things your task needs that pull against each other, such as cheap and long lasting. **Put both into one question** that starts with how can. The question is harder to answer, and every answer it gets has to keep both sides.

Imagine Ana, a parent whose six-year-old son will not eat vegetables of any kind. Her first question is how to get him to eat broccoli, and **every answer she tries is a trick**, from hiding it in sauce to a sticker chart. The tricks work for a day or two and then stop working altogether.

Every answer she tries is a trick

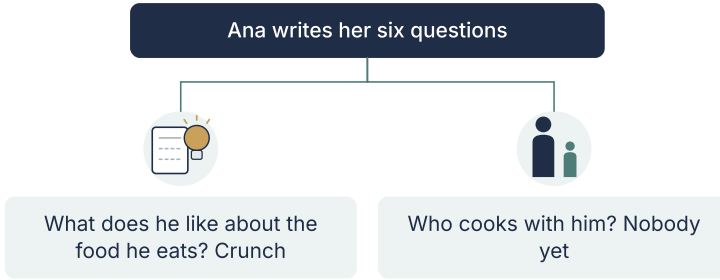


> **Key Concept:**
>
> The first question. Write down the question that comes to mind first, word for word. **Fast is fine for a first draft**. Treat it as one question on the list, give it a number, and write at least two more before you choose which one to answer.

Ana sits down one evening and writes her six questions. The what question asks what her son does like about the food he eats, and the answer is crunch. **The who question asks who cooks with him**, and the answer is nobody yet.

The new questions point to new answers. Raw beans and carrot sticks are crunchy, and **a child who helps to cook may want to taste what he made**. Ana stopped looking for a better trick, because her better question pointed past tricks altogether.

Ana's better questions





A small boy standing on a stool at a kitchen counter, snapping raw green beans into a bowl while his mother chops carrots beside him.

The starter level below asks you to pick the question least like the first. **Distance from the first question is the test**, a habit to practise with no promise attached. It echoes the work above, where tasks that asked people to find problems drew rarer answers than tasks that handed them a set question (Abdulla Alabbasi et al., 2025).

Distance from the first question is the test

- Pick the question least like the first
- A habit to practise, with no promise attached

The research here compared kinds of task and measured links, and none of it tested a course in asking questions. **The exercises here are practice**, and I make no promise about how much they raise a score. They train a habit you can see on paper, which is writing your questions down before any answers.

Ordinary days can use the habit. Before you plan a holiday or settle an argument about chores, **write the question three ways** and see which one changes your plans. Where should we go is one question, and what do we want to feel when we get home is another. The second one can send you somewhere the first never would.

Write the question three ways



The advanced level takes the habit to a real brief from home or work. A brief is **the task as someone else first put it to you**, such as make the newsletter better. You rewrite it three ways and answer the third, because the third version lands furthest from the words you were given.

A real brief

Try this now

1. Take the task as someone else first put it to you
2. Rewrite it three ways
3. Answer the third version

The 1998 study of problem construction ended by pointing to its use "for solving everyday problems" (Reiter-Palmon et al., 1998). **A brief from your own week is one of those**, and it gives the practice a real task to bite on. A real brief comes with people, money and time attached, and those make every question sharper.

For solving everyday problems



Exercise:

Better questions.

1. Starter. Write three questions for one task. Pick the one **least like the first question** you wrote and answer it.
2. Middle. Add one question that keeps a clash in view, such as cheap and long lasting, and answer it.

3. Advanced. Take a real brief. Rewrite its question three ways, then answer the third version.

Key idea:

The question you ask decides where you look for answers, so write several questions before you answer one, and keep a clash inside one of them.

Quick check:

In the study that combined many studies, which kind of task drew more original answers, finding problems or answering a set question? Answer: finding problems.

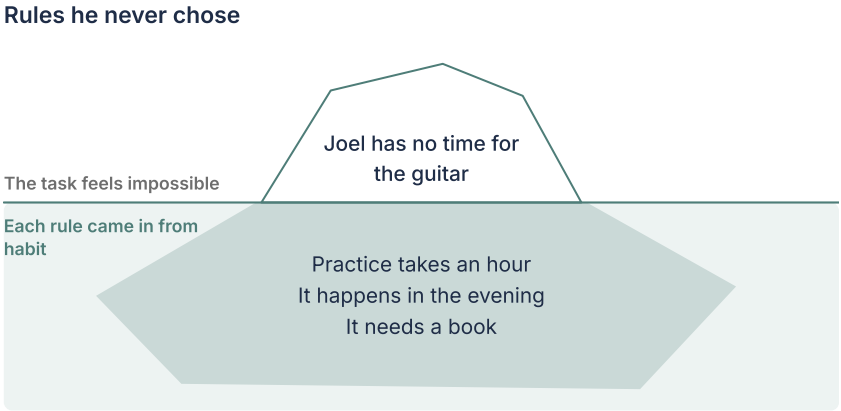
Where you look for answers

The question you ask	Where you look for answers

3.2.3 Spotting Hidden Assumptions

Imagine Joel, who has wanted to learn the guitar for years and says he has no time. When you ask what practice looks like, he says an hour every evening, sitting down with a book of chords. **Joel's problem has rules he never chose**, and he cannot see them, because to him they are simply what practice is.

Nobody told Joel that practice takes an hour, or that it happens in the evening, or that it needs a book. **Each rule came in from habit**, and together they make the task feel impossible. Change one of them and the task looks different at once.

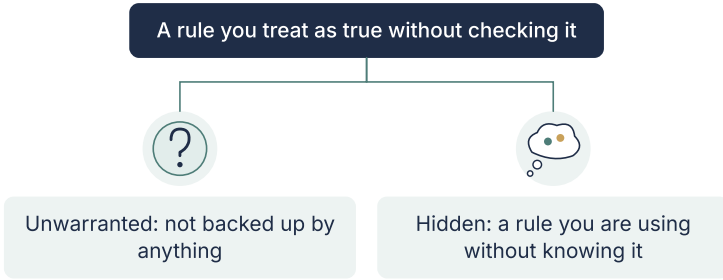


Spotting hidden assumptions is the skill in this section. An assumption is **a rule you treat as true without checking it**. I show you what two research teams found about the pull of past experience, a few ways to drag a hidden rule into the light, and how to practise at three levels.

> 🗝 **Key Concept:**
> Hidden assumptions. One research team writes about problems where "unwarranted assumptions" get in the way (Ritter & Mostert, 2017). Unwarranted means **not backed up by anything**, so an unwarranted assumption is a rule nobody has checked. A hidden one is a rule you are using without knowing it.

A hidden assumption works like a pair of tinted sunglasses you forgot you were wearing. Everything looks a little yellow, and **after a while yellow looks normal**. You blame the weather and the room, and never the glasses. Only when you take them off for some other reason do you see how yellow everything was.

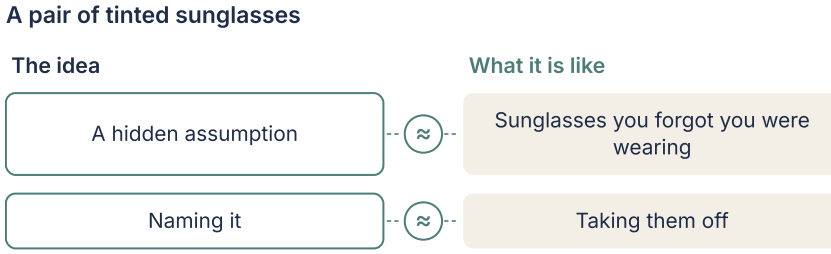
Hidden assumptions





A woman on a park bench in yellow-tinted sunglasses, looking puzzled at a white flower in her hand.

Where the sunglasses picture stops is your hand. You can take glasses off in a second, while **an assumption has to be named before you can remove it**, and naming it is the hard part. Once it is named, it sits on the page as one rule among others, and you can test it.

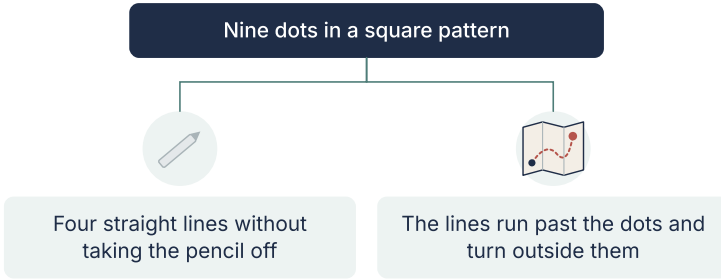


A puzzle you may know, used in research since at least 1930 (Maier, 1930, as cited in Spiridonov et al., 2019), shows the trap. People "are asked to connect the nine dots with four straight lines without taking the pencil off the paper" (Spiridonov et al., 2019). **The dots are arranged in a square pattern** (Ritter & Mostert, 2017).

> **Science Says:**
>
> Among their puzzle tasks, Ritter and Mostert note that on the nine-dot puzzle "people often feel constrained by the assumption that" the lines must stay inside the square the dots seem to draw (Ritter & Mostert, 2017). **The square is not in the rules**. It lives only in the eye of the person solving.

When the square goes, the answer comes quickly, because the lines can run past the dots and turn outside them. **The puzzle never said stay inside**, and the solver added that rule without noticing. The hunt below is a way to look for a square of the same kind in your own tasks.

The nine-dot puzzle



> **Key Concept:**
>
> The invisible square. When a task feels impossible, **look for a rule the task never gave you**. Write down every rule you are following, then put a tick by the ones somebody actually set and a question mark by the rest. The question marks are where the hidden squares are.

Where do hidden rules come from? A team writing in 2026 put it plainly, "Creative problem solving often fails because people rely on heuristic responses reinforced by prior experience" (Yuan et al., 2026). A heuristic response is **an answer that comes from a rule of thumb**, and prior experience means what worked for you before.

Where hidden rules come from

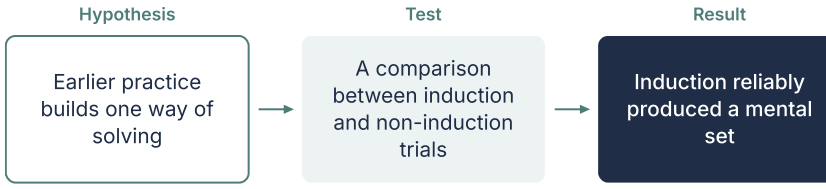
The words	In plain words
A heuristic response	An answer that comes from a rule of thumb
Prior experience	What worked for you before

Experience is a fine teacher most days. **The rule that worked last time is quick and usually right**, which is why you reach for it. The

trouble starts when the task in front of you only looks like the old one, and the old rule leads you away from the answer without a sound.

> **Science Says:**
>
> In the 2026 study, some puzzles came after an induction, a run of earlier practice set up to build one way of solving. The team wrote, "A separate comparison between induction and non-induction trials confirmed that induction reliably produced a mental set" (Yuan et al., 2026). **A run of earlier practice was enough to build a habit** that got in the way.

A run of earlier practice



In 1.1.1 you met a mental set, a habit of seeing a problem one way. Wiley added that when a problem "requires a broad search", experts' knowledge "may confine them to an area of the search space in which the solution does not reside" (Wiley, 1998). **Knowing a field well can keep you searching in the wrong corner** of it.

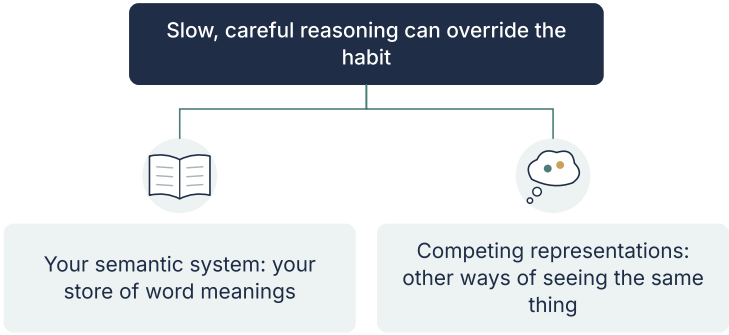


A man searching under a street lamp at night for his keys, while the keys lie in the dark grass a few steps away.

The 2026 team found something hopeful about the way out. They wrote that slow, careful reasoning can override the habit "only when the semantic system provides access to competing representations" (Yuan et al., 2026). Your semantic system is **your store of word meanings**, all the things you know a word or an object can mean.

> **Science Says:**
>
> Competing representations are **other ways of seeing the same thing**. In the 2026 study, people who could reach other meanings easily lost less to the habit the induction had built (Yuan et al., 2026). The study measured a link, so it shows what went together and does not test a course.

Access to competing representations



In plain words, careful reasoning alone did not break the habit in that study. **It worked when another meaning was ready to hand**, so a list of other meanings is a sensible thing to make before you push any harder at the old one. A different reading of the task gives your reasoning somewhere new to go.

Another meaning ready to hand

> - Careful reasoning alone did not break the habit
> - It worked when another meaning was ready to hand
> - Make a list of other meanings

Climb it in small steps. A child might say **we follow rules that nobody gave us**, and a student adds that past success builds habits that can steer us wrong. A scientist cites the study where a run of earlier practice built a mental set (Yuan et al., 2026). Your rule is to write your rules down before you solve.

> **Exercise:**
>
> Try it. Before you start one task today, **write down one rule you are treating as given**. Ask who set it.

Back with Joel, the rules come out on paper. **An hour, every evening, sitting down with a book**, and every one of them gets a question mark, because nobody set them. Joel asks what changes if each rule is false, starting with the hour, because the hour is the rule that keeps the guitar in its case.

> **Key Concept:**
>
> The assumption hunt. Write the task at the top of a page. Below it, **list every rule you are following**, even the ones that feel silly to write. For each rule ask who set it, and what would change if it were false. Pick the rule whose answer surprises you most and try the task without it.

The assumption hunt

- [ ] List every rule you are following
- [ ] Ask who set it
- [ ] Ask what would change if it were false
- [ ] Try the task without it

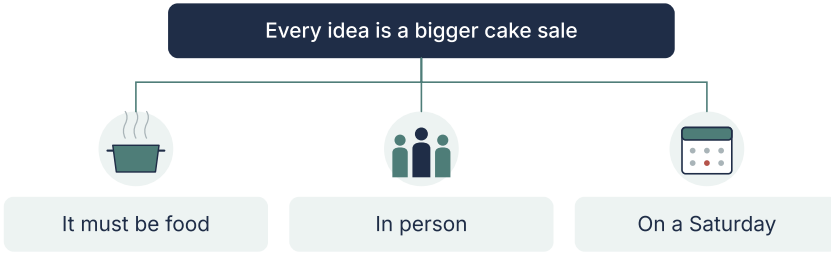
Five minutes a day is still practice, and **a guitar on a stand by the kettle** gets played while the water boils. Joel drops the hour, moves the time to the morning and keeps the guitar out of its case. A month later he can play three songs, and the rule about the hour never comes back.

Joel drops the hour

The old rule	Now
An hour	Five minutes a day
Every evening	The morning
Sitting down with a book	A guitar on a stand by the kettle

Imagine a small charity that holds a cake sale every spring. The volunteers want to raise more money, and **every idea they have is a bigger cake sale**, with more tables and more cakes. Three rules sit under every idea, that it must be food, in person and on a Saturday.

Three rules under every idea



Once the rules are written down, the volunteers can test them one at a time. **Dropping the in-person rule** gives them an online bake-along, where people pay to cook with a local baker on a video call. The cake sale stays, and the new idea brings in people who could never come on a Saturday.

The studies behind this section looked at mental sets and puzzle tasks, and none of them tested a course in spotting assumptions. **The exercises here are practice**, and I make no promise about how much they raise a score. They train a habit you can see on paper, which is writing your rules down before you begin.

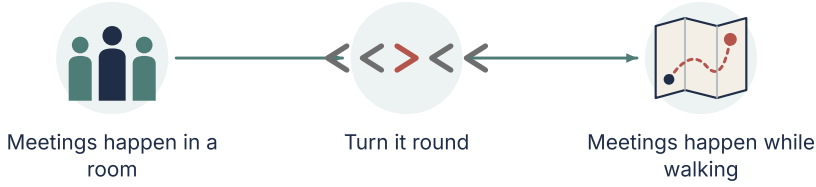
Practice, with no promise

The studies behind this section	None of them
⊕ Looked at mental sets and puzzle tasks	⊖ Tested a course in spotting assumptions

> **Key Concept:**
> Reverse one rule. Pick one rule that everyone in a group shares, such as meetings happen in a room. **Turn it round**, so meetings happen while walking, and redesign the task to fit. Write down what the reversed rule shows you, even when the redesign goes nowhere.

The hunt fits ordinary days. Before you buy a bigger bag or a new phone, **list the rules that make the old one feel small**. Sometimes the rule is the real trouble, and the old thing works fine once the rule is gone.

Reverse one rule



The advanced level below takes this to a real brief. Practice on a real task with **one plain rule of thumb** follows the pattern of the better training programmes (Scott et al., 2004), and here the rule is to list shared assumptions and reverse one. A shared rule is hard to see, because nobody around you questions it.

Exercise:

Hidden rules.

1. Starter. Pick one task and name one assumption in it. Write **what changes if it is false**.
2. Middle. Ask a friend for three small puzzles that share one trick, then one that needs a new trick. Notice the pull of the old trick. This set-up goes back to the water-jar puzzles of Luchins (1942).
3. Advanced. Take a real brief. List the assumptions everyone involved shares, reverse one and redesign the plan.

One plain rule of thumb



Key idea:

A hidden assumption is a rule you follow without knowing it, so write your rules down before you solve and test the ones nobody set.

Quick check:

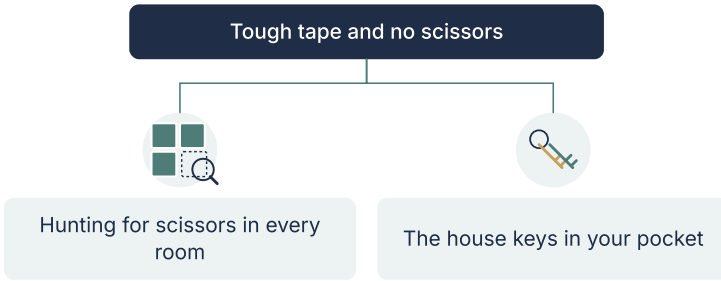
On the nine-dot puzzle, which rule do people often add that the puzzle never gave? Answer: that the lines must stay inside the square the dots seem to make.

3.2.4 Breaking Fixed Patterns and Habits of Thought

Imagine a parcel arrives, wrapped in tough tape, and the scissors are missing from their drawer. You search the kitchen, then the bedroom, then the car. **Ten minutes later you are still hunting for scissors**, while the house keys in your pocket have a perfectly good edge for cutting tape.

The keys were never hidden, and they were never far away. **In your head they were for doors**, so they never showed up as an answer to a parcel. A habit had picked the tool before you looked, and the habit was so fast that you never noticed it choosing.

The keys were never hidden



Breaking fixed patterns is the skill in this section. A fixed pattern is **a way of seeing or doing that runs on its own**, such as keys for doors or the same answer to every money problem. I show you what one small training study found, how a pattern grows and how to practise breaking one at three levels.

In 1.3.2 you met functional fixedness on the candle problem, where a box of thumbtacks hid its second job as a shelf. **Duncker used the**

term in 1945 (Duncker, 1945, as cited in Kroneisen et al., 2021). Here it gets a wider look, as one kind of fixed pattern among many.

> 🗝 **Key Concept:**
>
> Fixed patterns. A fixed pattern is **a groove your mind has worn by use**. Keys are for doors, Sunday lunch is a roast, a slow month means cutting costs. Each pattern runs on its own, without you choosing it. On a new task the same pattern can pick the answer for you before you have looked around.

A groove your mind has worn by use

> - Keys are for doors
> - Sunday lunch is a roast
> - A slow month means cutting costs

One team describes functional fixedness in general words. People "focus on a specific (common) function of an object while overlooking other possible functions that might help to solve a problem" (Kroneisen et al., 2021). **The usual job of a thing hides its other jobs**, and the keys in your pocket are a small, everyday case of it.

A pattern works like a sledge run on a snowy hill. The first ride is slow and wobbly, and every ride after that **follows the groove a little faster**. After twenty rides the sledge goes down the same track by itself, and steering out of it takes a hard push.

A sledge run on a snowy hill

The idea	What it is like
A fixed pattern	The sledge follows the groove a little faster
Steering out of it	Takes a hard push



Two children on a snowy hillside, one sledge racing down a deep shiny groove and the other pushing off into fresh snow beside it.

Where the sledge picture stops is the snow. A groove in snow is only a groove, while **what you know can help you and trap you**, depending on the task. One 2026 study put it this way, "knowledge both constrains and enables insight depending on its interaction with experience-driven heuristics" (Yuan et al., 2026).

A heuristic is a rule of thumb, and experience-driven means **built up from what worked before**. Constrains means holds back, and enables means makes possible. The same groove that speeds you down the hill can keep you from seeing a better slope.

Knowledge both constrains and enables

Constrains	Enables
Holds back	Makes possible

> **Science Says:**
> Ritter and Mostert describe cognitive flexibility as including "the ability to break cognitive patterns, to overcome functional fixedness, and to avoid a reliance on conventional ideas or solutions" (Ritter & Mostert, 2017). Cognitive means to do with the mind. They cite Guilford for it (Guilford, 1967, as cited in Ritter & Mostert, 2017). By this description, **breaking patterns is part of flexibility**.

In 3.1.2 flexibility was the number of different kinds among your ideas. Ritter and Mostert counted it the same way, as **the number of kinds in a list of uses** for an object (Ritter & Mostert, 2017). A list with many kinds is a list that has climbed out of more than one groove.

Can a fixed pattern be loosened by practice? **One small study tried it**, with 32 people and a single training session of an hour and a half (Ritter & Mostert, 2017). The session taught four idea techniques, and the team compared people's scores from before and after it.

A single training session

RM

Ritter & Mostert, 2017

- 32 people
- A single training session of an hour and a half
- Four idea techniques, scores before and after

> **Science Says:**
> In that study, "improvements were observed across a variety of creative performance measures" (Ritter & Mostert, 2017). After the session, **the ideas people gave reached a higher creativity level**. The count of kinds did not rise clearly, and the authors wrote of "a marginal improvement in the number of distinct idea categories generated post-training" (Ritter & Mostert, 2017). Gains in creative problem solving were only marginal (Ritter & Mostert, 2017).

One small study found this, and **one study of 32 people is a start and no more**. It does not show that training of this kind always works. It was one session with one group, measured before and after, and I use it to back the advanced level below and nothing wider.

After the session

Measure	After the session
The creativity level of the ideas	Higher
The number of distinct idea categories	A marginal improvement
Creative problem solving	Only marginal gains

Climb it in small steps. A child might say **we do things the way we did them last time**, and a student adds that habits can hide better answers. A scientist cites one small study of a single session (Ritter & Mostert, 2017). Your rule is to name the pattern, then try one move outside it.

> **Key Concept:**
>
> Signs of a groove. You reach for an answer **before you have finished reading the task**. Every idea on your list is the same kind. The task feels so familiar that it bores you. Any one of these signs is a good moment to stop, name the pattern and look around.

Signs of a groove

- [x] You reach for an answer before you have finished reading the task
- [x] Every idea on your list is the same kind
- [x] The task feels so familiar that it bores you

> **Exercise:**
>
> Try it. Pick up a spoon. **Name its usual use**, then list five uses that have nothing to do with eating.

The spoon shows how a pattern works. **Its usual use comes first and loudly**, and the other uses arrive slowly, once the eating idea has been named and set aside. A pattern you can see is a pattern you can step around.

Ask what the spoon is made of and what shape it has, and **the spoon turns into metal and a curve**. Metal and a curve can prop open a tin, dig a seed hole or reflect a face in a pinch. None of those uses needed a new spoon, only a new way of looking at the old one.

The spoon turns into metal and a curve



Prop open a tin



Dig a seed hole



Reflect a face

> **Key Concept:**
>
> Usual use, other uses. For any object in your way, **say its usual use out loud**. Then ask what it is made of, what shape it has and what it could hold, push, cover or cut. Each question looks at the object as stuff and shape, with its usual job set aside.

Imagine Rosa, who runs a small bike repair shop. Every time money is tight, she cuts costs, a cheaper supplier one year and shorter opening hours the next. **Her pattern is one answer to every slow month**, and each cut leaves the shop a little smaller.

Rosa's pattern



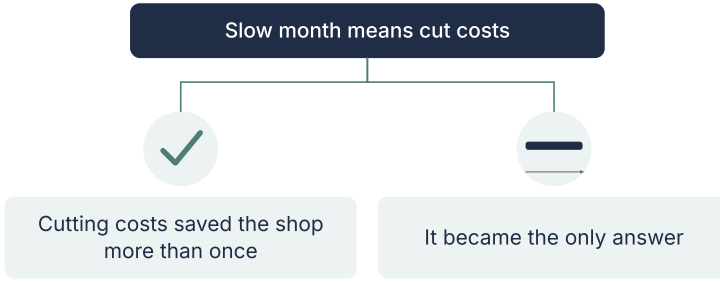
Rosa sits down one evening, names the pattern and writes it down, slow month means cut costs. Then she turns it round and asks what a slow month could add. **The reversed question gives her a Saturday class** where people learn to fix their own punctures, and the class fills the quiet weeks with people and new customers.



A small bike repair shop on a Saturday morning, a woman showing a row of people how to lift a tyre off its wheel.

Rosa's old pattern was no mistake. **Cutting costs saved the shop more than once**, which is why it grew into a groove. The trouble came when it became the only answer, used before she had looked at the month in front of her. A groove is only a problem when it is the only road.

A groove is only a problem when it is the only road



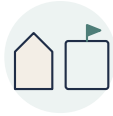
Conversations have patterns of their own. A friend tells you about a bad day, and before they finish **you are already giving advice**, because

advice is your groove. Next time, try one question about how they feel, and see where the talk goes once the usual reply is held back.

> **Key Concept:**
> Reverse the routine. Pick a routine you follow at home or at work, such as the order of a weekly meeting. **Run it backwards once**, or change one feature, such as the place or the time. Watch what the change shows you about why the routine was built that way.

Changing one small feature is a practice step you can try on any task. Work at a different table, use a pencil where you used a keyboard, or start the task at its end. Then write down what the change showed you about the old way.

Change one small feature



Work at a different table



Use a pencil where you used a keyboard



Start the task at its end

The starter and middle levels below are there to show you a pattern at work. **They let you feel a pattern pull**, and they make no promise about scores. The advanced level leans on the small study above, where the ideas grew more creative after one session, and only as far as one study of 32 people allows.

The advanced level puts a real routine to work. Practice on a real task with **one plain rule of thumb** follows the pattern of the better training programmes (Scott et al., 2004), and here the rule is to reverse a

standard routine or change one feature. Keep notes for a week on what the change showed you.

Write the notes in your practice journal, one line a day, with **the old routine on the left and the new one on the right**. At the end of the week, read the two columns side by side. Keep whatever worked, and put the rest back the way it was.

Breaking patterns at three levels



One object you only ever see one way



One word that goes with cottage, Swiss and cake



A routine reversed for a week

> **Exercise:**
>
> Breaking patterns.
>
> 1. Starter. Look round your room. Find **one object you only ever see one way**, and give it a second job.
> 2. Middle. Find one word that goes with cottage, Swiss and cake. It follows the Remote Associates Test (Mednick, 1962). Then write which guesses your first idea blocked.
> 3. Advanced. Take a routine from home or work. Reverse it or change one feature, try it for a week and note what you learn.

Keep notes for a week

Day	1	2	3	4	5	6	7
The old routine	☐	☐	☐	☐	☐	☐	☐
The new one	☐	☐	☐	☐	☐	☐	☐

Key idea:

A fixed pattern picks the answer before you look, so name the pattern first and then try one move outside it.

Quick check:

What is functional fixedness? Answer: seeing an object only by its usual use, so its other possible uses stay hidden.

3.3 Connecting and Shaping Ideas

3.3.1 Combining Distant Ideas

Imagine Maya, who runs a small bakery and wants a new idea for her shop window. Her first thoughts are all from the bakery world, a bigger cake stand, brighter labels and a pile of loaves. **Every idea sits close to bread**, so the window ends up looking much like every other bakery window in town.

Next, Maya joins her bakery to something from a far world, a library. Cakes stand on shelves like books, each with a little card on its spine, and the card names the cake and where its recipe came from. **Two ideas from far apart made a third**, and that third idea belongs to neither world alone.

Two ideas from far apart made a third



Combining distant ideas is the skill in this section, and **Maya's cake shelf is a first example**. The box below sets out what it means, and the bicycle and teapot in the Try it give you a second pair. I show you where the idea began, what two teams found and how to practise joining far ideas at three levels.

Combining distant ideas



The idea has a long root in research. Mednick offered "an associative interpretation of the process of creative thinking" (Mednick, 1962). **The skill in this section grows from that root**, and the box below gives it a name.

> **Key Concept:**
>
> Distant combination. A distant combination **joins two ideas from far-apart areas** into one new idea that keeps a part of each. The bakery and the library are far apart, and the cake shelf keeps the cakes from one and the shelves and cards from the other. A combination of two close ideas, such as bread and butter, is a pair you already know.

Combining far ideas works like building a bridge between two islands. Two islands close together need only a short plank, and everybody has crossed it already. **Two islands far apart need a long bridge**, and fewer people have walked it. Where the picture stops is strength, because a long bridge is only worth building if it can carry weight.

A bridge between two islands

The idea		What it is like
Two close ideas	≈	A short plank everybody has crossed
Two far ideas	≈	A long bridge fewer people have walked
A join that makes sense	≈	A bridge that can carry weight



A long rope bridge stretched between two green islands over calm blue water, a single walker halfway across.

In 2.1.1 you saw two findings that come back here. **Far links and control skills both went with more creative answers** in the same people (Beaty et al., 2014). In a ten-minute task, the later ideas were the more creative ones (Beaty & Silvia, 2012).

Two findings that come back



Far links



Control skills

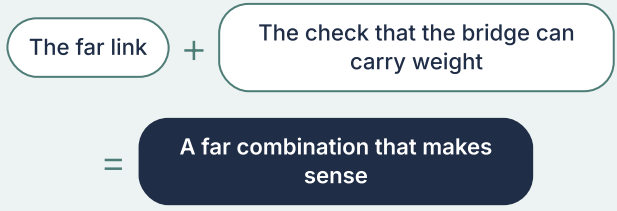


Later ideas were the more creative ones

> **Science Says:**
> That study measured links between scores at one time. It found that both kinds of skill went with idea quality, and **it did not train anyone** (Beaty et al., 2014). The study tells us what goes along with good combinations, and it leaves open whether practice in combining changes anything. A link seen in a group of people can look different in one person.

The two findings fit the bridge picture. **The far link is the long bridge**, and the control skill is the check that the bridge can carry weight. A far combination that makes no sense is a bridge that falls into the sea, so the skill needs both a reach and a check.

A reach and a check



> **Exercise:**
> Try it. Write two things from different worlds, such as a bicycle and a teapot. **Write one way they could join.**

Look at what you wrote. **Ask whether your join keeps a part of both things**, the wheels or the pedals and the spout or the lid. If one of the two has vanished, you have one idea with a new name, and the

combination has not happened yet. Circle the part of each thing that survived the join.

Does the join keep a part of both?

	A teapot on a bike rack	A bike that pumps water for tea as you pedal
What it is	A joke	Keeps a part of each

The bicycle and the teapot are far apart, so the first join may feel silly. A teapot on a bike rack is a joke, while **a bike that pumps water for tea as you pedal** keeps a part of each. Silly joins are fine on the way, because the check comes after the reach.



A sketch on a café napkin of a bicycle with a small kettle fixed behind the seat, a pencil lying across the corner.

> **Key Concept:**
> Reach, then check. **First reach for a far idea** without judging it. Then check the join with two questions. Does it keep a part of each idea? Does it do a job for someone? A join that passes both questions is worth keeping, and a join that fails one goes back for another try.

Reach, then check



Where do far ideas come from when you need them? **Pick them on purpose from a world you do not work in**, such as a garden, a harbour, a circus or a hospital. Write that world at the top of a page and list five things in it before you try to join any of them to your task.

A world list keeps the reach honest. **The far world stays in front of you on the page**, so a cake stand has to meet the ropes, buoys and lighthouses on a harbour list. Each join you write has to use one thing from the list, and the list keeps you from drifting back to bread.

A harbour list

- A cake stand has to meet the ropes
- Buoys and lighthouses on a harbour list
- Each join has to use one thing from the list

> **Key Concept:**
> Far worlds. Keep a short list of far worlds to borrow from, such as **a garden, a harbour, a circus, a kitchen, a hospital and a farm**. **Pick a world you know a little about**, so that you have enough things to list. Cross a world off once it has given you three joins, and swap worlds each week.

Time plays its own part. **When the close ideas run out, go looking on purpose** in a far world, and write down whatever you find there.

Maya's own page that morning had a similar shape. **Her bread ideas came first and fast**, one after another. The library join arrived only after she had run out of bakery ideas and gone looking on purpose.



For practice, **give a combination task at least five minutes**, and keep going after the first easy joins. Mark the joins that came after the third minute. That is the middle level below, and it asks you to look at what your later joins look like on your own page. Write the minute next to each join as you go.

A training study gives you a tool to borrow. In one technique, called Random Connections, "one uses a random stimulus", for example "an object in the room or a picture in a newspaper" (Ritter & Mostert, 2017). **A random stimulus is a prompt you did not choose**, so it comes from outside your usual world.

A random stimulus



An object in the room



A picture in a newspaper



A prompt you did not choose

> **Science Says:**
>
> In Random Connections, a person "tries to generate as many associations related to this stimulus as possible" and then **joins them to the problem** (Ritter & Mostert, 2017). It was one of four techniques taught in one session, and the authors wrote, "It remains unclear whether just one of the training methods would be necessary" (Ritter & Mostert, 2017).

In 3.2.4 you met that small study of 32 people. For the creativity of ideas, "a significant main effect for training was observed" (Ritter & Mostert, 2017). **The result belongs to the whole four-technique session**, so it says nothing about Random Connections on its own, and one small study is a start and no more.

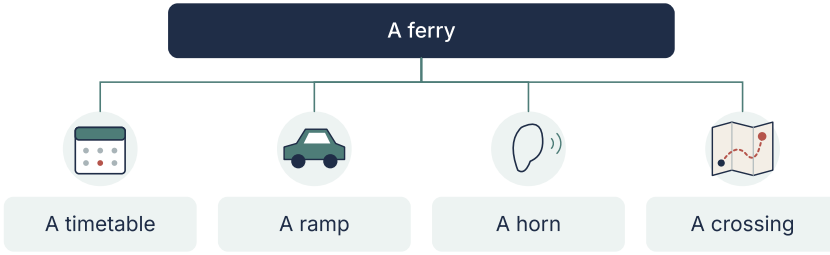
What one small study can say

- The result belongs to the whole four-technique session
- It says nothing about Random Connections on its own
- One small study is a start and no more

Back at the bakery on a quiet Tuesday, Maya opens a newspaper at random and finds a picture of a ferry. **She lists what the ferry brings**

to mind, a timetable, a ramp, a horn and a crossing, and joins each one to the shop. The timetable gives her a board of baking times.

What the ferry brings to mind



The ferry was a random prompt, and the timetable was the join that passed the check. **It kept a part of both worlds and did a job**, since customers could see when the fresh cakes would arrive. The horn gave her nothing useful, and that is fine, because a random prompt only has to give one good join.

One prompt only has to give one good join

The timetable	The horn
⊕ Kept a part of both worlds ⊕ Did a job	⊖ Gave her nothing useful

In ordinary days, **a far world can turn up anywhere**, on a bus advert, in a song or on a cereal box. When you are stuck, take whatever is in front of you and ask what it could lend to the task. The bus advert might give a slogan, and the cereal box might give a shape.

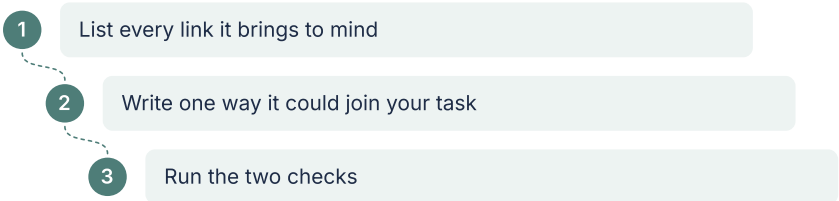
Key Concept:

One prompt, many links. Take one random prompt and **list every link it brings to mind**, at least six. Write them in a column. Next to each, write one way it could join your task. Most rows will stay empty, and one filled row is enough for a round. Then run the two checks on that row.

The starter and middle levels below rest on studies that measured links in groups of people. None of those studies tested these steps as training, so **they are practice, with no promise attached**. Use them to try the skill, and watch what happens on your own page over a few weeks.

The advanced level uses a random prompt on a real task, the pattern of the better training programmes (Scott et al., 2004). **It borrows the Random Connections step** and makes no promise beyond the study above.

One prompt, many links



Exercise:

Far joins.

1. Starter. Pick a far world and list five things in it. Join each to a task of yours, **keeping a part of both** in one sentence.
2. Middle. Stay with one combination task for five minutes. Mark the joins that came after minute three.

3. Advanced. Take a real project. Open a book at random, list associations for the first picture or object, and join them to one project limit.

Far joins at three levels



A far world and five things in it



Five minutes on one task



A real project and a book opened at random

Key idea:

To combine distant ideas, **reach for a far idea and then check the join**, so the new idea keeps a part of each and does a job.

Quick check:

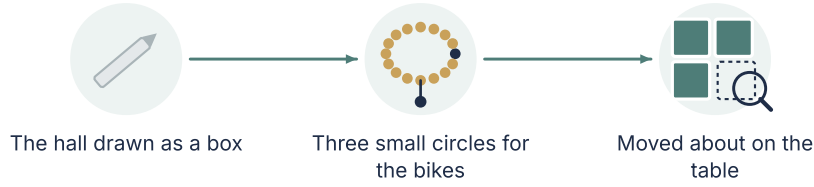
What are the two checks for a distant combination? Answer: whether the join keeps a part of each idea, and whether it does a job for someone who will use it.

3.3.2 Visual Thinking: Working With Sketches, Shapes and Space

Imagine Owen, who shares a small flat with two friends and a tangle of bikes in the hall. Every talk about the hall goes round in circles, because each person describes it in words. **One evening Owen draws the hall as a box**, with three small circles for the bikes and a long thin shape for the coat rack.

Once the hall is on paper, Owen tears the circles out and moves them about on the table. Two bikes go up on the wall, and the third slides behind the door, where it leaves room for the coats. **The answer came from moving shapes**, and nobody had to lift a single bike to find it.

Owen's paper hall

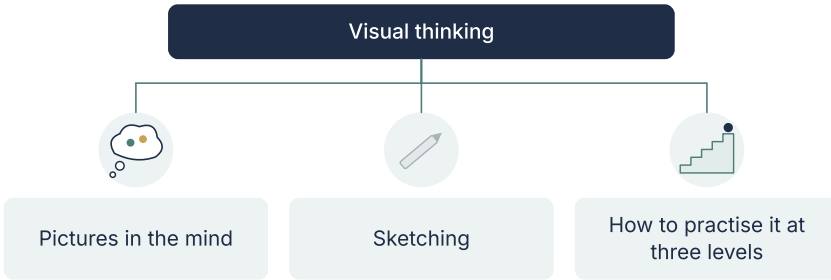




A hand-drawn floor plan of a narrow hallway on squared paper, three paper circles for bikes being moved about by two fingers.

Visual thinking is the skill in this section, and **Owen's paper hall is a small case of it**. He saw the parts of the problem and moved them, which talk alone never allowed. I show you what one team found about pictures in the mind, how sketching fits that finding and how to practise it at three levels.

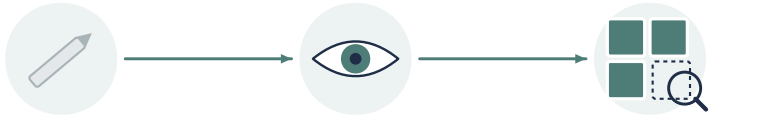
Where visual thinking goes



Research on this skill asks how drawing links to the pictures in your head. One team looked at "the extent to which visual creativity is related to cognitive processes underlying visual mental imagery" (Palmiero et al., 2015). **Visual mental imagery means pictures in your mind**, the inner view you use when you imagine a room before you walk in.

> **Key Concept:**
> Visual thinking. Visual thinking is **working with sketches, shapes and space** on a task. You draw the parts, you look at how they sit together, and you move them on the page. A rough box with three circles is enough, because the drawing only has to show the parts and where they are. Neat lines are optional.

Sketches, shapes and space



Visual thinking works like a road map on a long drive. Spoken directions give you one turn at a time, and **a map shows the whole road at once**, so you can spot a side road nobody mentioned. Where the picture stops is change, because a printed map stays still and a sketch is there to be changed.

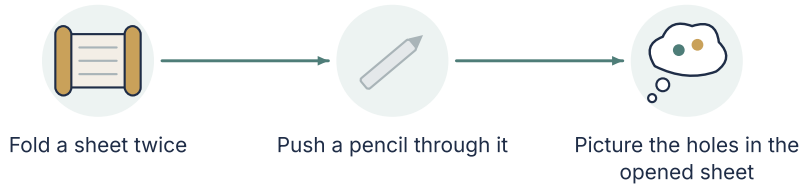
Directions and a map

	Spoken directions	A map
What you get	One turn at a time	The whole road at once

The team found that "all measures of the creativity tasks positively correlated with the image transformation imagery ability" (Palmiero et al., 2015). The team measured image transformation with the Paper Folding Test, which checks how well people can **picture shapes and move them around in their heads** (Palmiero et al., 2015).

A real sheet of paper shows what the test asks. **Fold a sheet twice and push a pencil through it**, and the holes in the opened sheet are what people had to picture in advance. The test asks for that picture in the head, with no sheet to open.

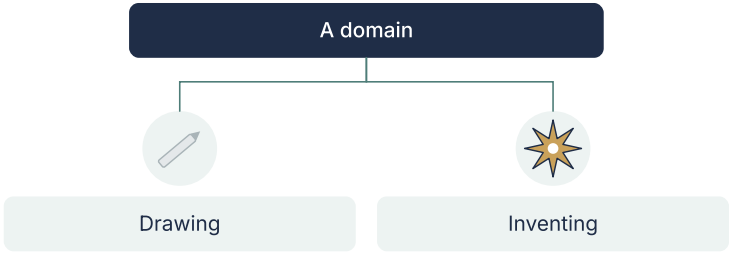
The Paper Folding Test



> **Science Says:**
>
> A closer test showed a narrower picture. The team found "the predictive role of the transformation imagery ability only for the originality score of inventions and for the graphic ability and esthetic scores of artistic drawings" (Palmiero et al., 2015). **The link held for some scores and not others.**

The team's results fit the notion that visual creativity depends on the domain and the task (Palmiero et al., 2015). A domain is **an area of work or life**, such as drawing or inventing. A person strong on one visual task may be ordinary on another, so practise on the kind of visual task you care about.

Visual creativity depends on the domain



In 2.1.2 you met the scribble that you look at and name. **This section works the other way round**, starting from a problem you already

have and drawing its parts so that you can move them. The scribble came before the meaning, and here the meaning comes first. The drawing shows you the parts of a problem you already know.

> Exercise:
>
> Try it. Pick a small problem. For two minutes, **sketch it with shapes only**, using no words at all.

Look at your sketch and name each shape in a word, under the drawing. **The names show which parts you chose to draw**, and the empty space around them shows what you left out. A problem drawn as a box and two circles has two parts in your mind, and a third part may be waiting off the page.

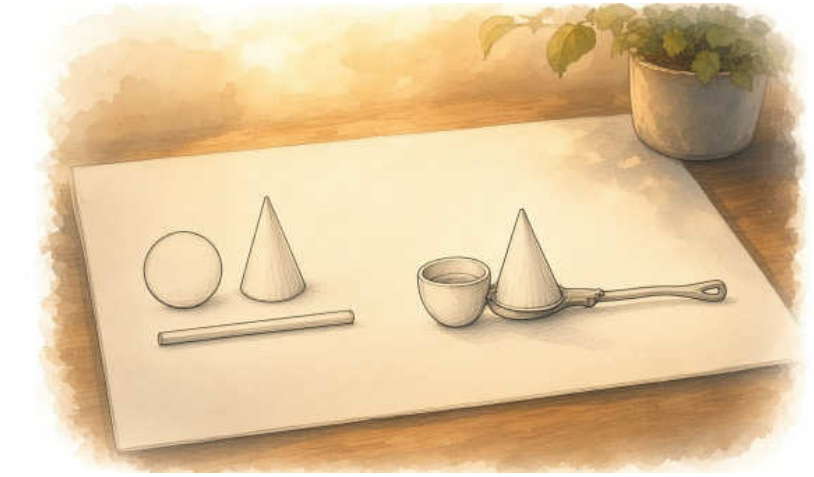
Name each shape

On the page	What it shows
A box and two circles	Two parts in your mind
The empty space around them	What you left out

One lab task in the same study asked people to build things from shapes. The Creative Synthesis Task "measures the ability to produce creative objects belonging to a given category" (Palmiero et al., 2015). **People joined simple shapes into a new object**, and the object had to belong to a group, such as furniture or tools.

The Creative Synthesis Task





A sheet of paper with a circle, a cone and a long bar drawn on it, and beside them the same three shapes joined into a strange new garden tool.

> **Science Says:**
>
> The scores in that task covered the rough form and the finished object. The team computed "originality, synthesis and transformation scores of pre-inventive forms, and originality and practicality scores of inventions" (Palmiero et al., 2015). **A pre-inventive form is the rough shape** before you know what it is for, and an invention is what it becomes.

The starter level below gives you three moves to make on paper. **Turn the sketch round, join two shapes or cut one away**, and then look

at what changed. The moves are this book's practice, and the study measured none of them.

> **Key Concept:**
> Three moves on a sketch. **Rotate** the sketch a quarter turn and ask what the new view suggests. **Merge** two shapes into one and ask what the joined shape could do. **Cut** one shape away and ask what still works without it. After each move, write one line on what changed.

Rotate, merge or cut



Rotate the sketch a quarter turn



Merge two shapes into one



Cut one shape away

Owen's hall shows the three moves. Rotating the plan put the long wall on top and **made the wall look like a shelf**. Merging the coat rack with a bike circle gave a hook that holds a bike and a coat, and cutting the third bike showed that the door could open fully again.

Owen's three moves

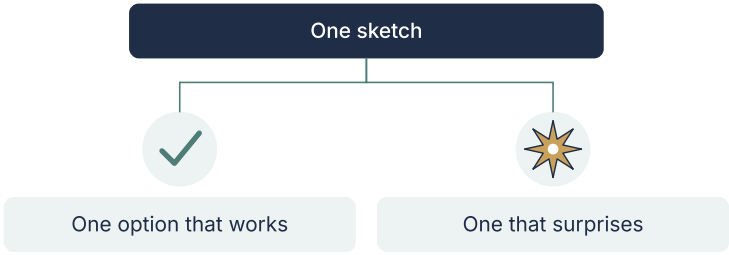
Move	What changed
Rotating the plan	Made the wall look like a shelf
Merging	A hook that holds a bike and a coat
Cutting the third bike	The door could open fully again

Make the moves one at a time. **Finish one move before you start the next**, so that each change stays easy to see. Three moves give three sketches, and you can lay them in a row to compare.

> **Science Says:**
>
> The same study split two kinds of score, finding that "the visualization cognitive style predicted the originality of inventions, whereas the vividness of imagery predicted practicality of inventions" (Palmiero et al., 2015). **A cognitive style is a habit of working.** A habit of working in pictures went with more original inventions, and more vivid inner pictures went with inventions rated as less practical, in a study of 50 students.

The middle level below borrows that split between original and useful. From one sketch, **make one option that works and one that surprises**. The option that works answers the problem as it stands, and the surprising option asks what the shapes could become if the problem changed a little. You do not have to choose between them yet.

From one sketch

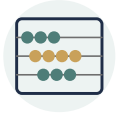


> **Key Concept:**
> Works and surprises. Take one transformed sketch and **draw two options from it**. Label one works, for the option you could build tomorrow. Label the other surprises, for the option that would make a friend laugh or stop. Keep both on the page, since each one shows you something the other leaves out.

The advanced level asks for three sketches of a real task, and then one of them made full. In 3.1.4 you added detail beyond the minimum, and **a chosen sketch needs that step**, with sizes, materials and labels. Practice on a real task with a rule of thumb is the pattern of the better training programmes (Scott et al., 2004).

The flat picked the sketch with the bikes on the wall. **Owen added the height of each hook**, the spot for the screws and a tray for wheels. The finished drawing went on the fridge, and the three of them could point at it, which no amount of talking had allowed. The bikes stayed put until the plan was agreed.

The finished drawing



The height of each hook



The spot for the screws



A tray for wheels

Sketches fit into ordinary days. **Draw a week as seven boxes** before you plan it, draw a hard talk as two circles and the gap between them, or draw a garden as shapes before you buy a single plant. A drawing on the back of an envelope is enough, and a pencil is the only tool you need.

Sketches in ordinary days

- Draw a week as seven boxes
- Draw a hard talk as two circles and the gap between them
- Draw a garden as shapes

Key Concept:

Draw before you talk. Before a talk about a shared problem, **draw the problem on one sheet** that everybody can see. Use boxes for places, circles for people or things and lines for the paths between them. Then let each person move one shape and say why. The talk then happens around the sheet, with every idea in view.

The studies in this section measured links between imagery and visual tasks, and none of them tested sketch practice as training. **The three levels are practice, with no promise attached.** Try them on your own tasks, and keep the sketches in one folder so that you can see how your drawings change over a few weeks. Date each one.

Keep the sketches

Day	1	2	3	4	5	6	7
Keep the sketches in one folder	☐	☐	☐	☐	☐	☐	☐
Date each one	☐	☐	☐	☐	☐	☐	☐

Keep the old sketch next to each new one when you work, so that **the two drawings sit side by side**. The change between them is what you are looking for. A sketch that looks messy is fine, since the moves work on rough shapes and neat ones alike, and nobody else needs to see the page.

Exercise:

Shapes and space.

1. Starter. Take your Try it sketch. **Rotate, merge or cut**, and write one line on what changed after each move.
2. Middle. From the changed sketch, draw one option that works and one that surprises.
3. Advanced. Take a real task. Make three sketches, pick one and add the detail someone would need to build it.

Key idea:

Put a problem on paper as sketches, shapes and space, so you can see its parts and move them about on the page.

Quick check:

Name the three moves you can make on a sketch. Answer: rotate it, merge two shapes, or cut one shape away.

Parts on paper

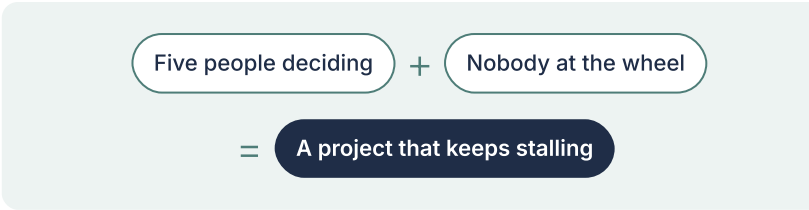
Sketches, shapes and space	See its parts and move them

3.3.3 Thinking in Metaphors

Imagine Hana, who leads a small team at work on a project that keeps stalling. In a meeting she says, almost by accident, **our project is a ship with five captains**. Everybody laughs, and then everybody goes quiet, because the line has named something that a page of notes had missed.

Five captains means five people deciding, and nobody at the wheel. **Hana's line turned a vague problem into a picture** that the whole team could see at once. Then she asked what a better picture would be, and the next one gave her a plan that the team still uses.

Five captains





A small sailing ship on a choppy sea, five people in captain's hats on deck all pointing in different directions.

Making metaphors is the skill in this section. **A metaphor can be a tool for a problem**, and here you learn to make one, check it and stretch it into a next step. I show you where the idea comes from in research, what one study tells us and how to practise at three levels.

Hana's ship came with parts of its own, **the captains, the crew and the course**. Those parts are what you check and stretch in the steps of this section, one part at a time, starting with the line you write in the Try it.

The ship came with parts of its own



The captains



The crew



The course

Science Says:

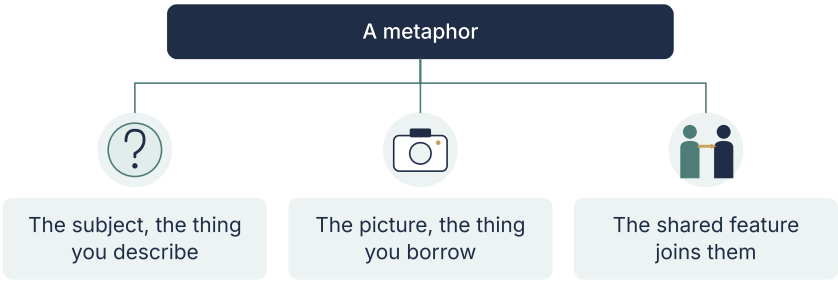
The idea has a root in research on links between ideas. Mednick named **similarity** as one of the ways a creative link can form (Mednick, 1962). Metaphor making draws on that kind of link. A later team studied metaphor making as a creative task in its own right (Silvia & Beaty, 2012).

Key Concept:

Metaphor. A metaphor **borrows a picture from another world** to describe the thing in front of you. The project is the subject, the thing you describe. The ship is the picture, the thing you borrow. The shared feature joins them, here many people deciding at once. Treat the likeness as a guess to test.

A metaphor works like a pair of coloured glasses. Put on the ship glasses, and **the project shows up as captains, crew and a course**. Put on another pair, and the same project shows other parts. Where the picture stops is the glasses themselves, since each pair lets you see some features and hides the rest.

Subject, picture and shared feature



Since each pair shows only some features, **try more than one pair** on any problem. Keep two or three metaphors on the table and swap between them. Each swap can show a part that the last pair hid, and you can keep whatever each one shows you.

> Exercise:
>
> Try it. For a problem of yours, finish this line. **This problem is like ____ because ____.**

Look at the word after because. **The because names the shared feature**, and it is the part that does the work. A metaphor with an empty because is only a picture, and a metaphor with a clear because tells you something about the problem. Underline the because each time you write one.

The because does the work

Part of the line	Hana's line
This problem is like	A ship with five captains
Because	Everybody is giving orders

Write your because as a plain sentence. Hana's would read, **everybody is giving orders**. A because you can say in one breath is easy to check. Once it is written down, the team can check it against the project, and the check is where the picture earns its keep or goes back for another try.

A metaphor needs a reach and a check, and you can practise each one on its own, one at a time. The reach brings the picture, and the check tells you whether the picture fits the problem. A far picture that fits nothing is a joke, and a close one that fits everything says nothing new.

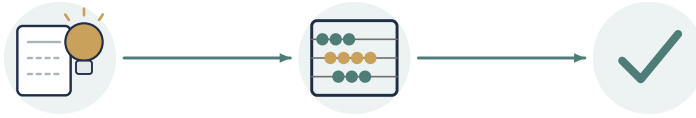
A reach and a check for a metaphor

> - The reach brings the picture
> - The check tells you whether the picture fits the problem

Hana's team used both sides. The ship was a far picture that made them laugh, and the check came when **someone asked what the ship got wrong**. The fit check below turns that question into a routine you can run on any metaphor.

> **Key Concept:**
>
> The fit check. Write three features of your problem. Then **count how many the picture shares**. Write two metaphors and check both. Keep the one that shares more features, and note which feature neither of them caught. That gap is a good place to look for a third metaphor.

Run the fit check



Write three features of your problem

Count how many the picture shares

Keep the one that shares more

Hana ran the fit check on the ship. It caught the many deciders, and it missed the deadline and the handovers between people. **The ship fit one feature in three**, so she tried a relay race. A relay race has a baton, a set order of runners and a finish line, and she checked each of them against the project.

The relay race caught all three features. Deadlines are the finish line, handovers are the baton, and the order of runners is the order of tasks. **The second picture fit better**, and the gap left by the first one had pointed straight at it.

What the relay race caught

The project	The relay race
Deadlines	The finish line
Handovers	The baton
The order of tasks	The order of runners



Four runners on a school track, one handing a red baton to the next as a teacher holds a stopwatch.

A good metaphor can do more than name a problem. **Ask what the picture does next**, and turn the answer into a step. In a relay race, each runner owns one leg of the race, so Hana gave each stage of the project one owner who hands it on when the stage is done.

From picture to step

Each runner owns one leg of the race → Each stage of the project has one owner → The owner hands it on when the stage is done

Stretch only a picture that has passed the fit check. A picture that fits poorly gives a step that fits poorly, since the step comes from the same picture. Check first and stretch second, and keep the order the same each time.

> **Key Concept:**
>
> Stretch it into a step. Take the metaphor that passed the fit check and ask **what happens next in the picture**. A relay passes the baton, a garden needs weeding, and a bridge needs a far bank to land on. Turn that next event into one step for your problem, and write it as a task with a name and a date.

What happens next in the picture



A relay passes the baton



A garden needs weeding

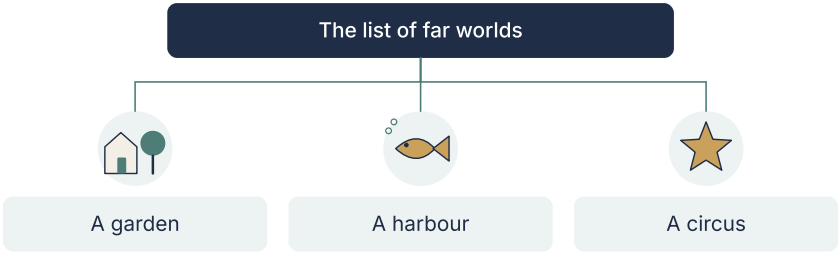


A bridge needs a far bank to land on

The middle level below uses that stretch. It asks for one step that comes from the picture, **written as a real task**. Practice on a real task with one rule of thumb follows the pattern of the better training programmes (Scott et al., 2004), and the rule here is to ask what the picture does next.

In 3.3.1 you kept a list of far worlds to borrow from. **The same list is a store of pictures** for metaphors. A garden, a harbour or a circus can each lend a picture, and the farther the world sits from the problem, the more the fit check has to do.

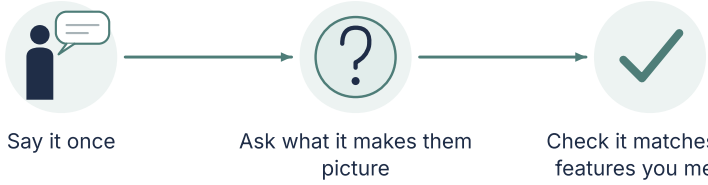
A store of pictures



The advanced level asks for a metaphor that another person would accept. **A metaphor that only you believe stays in your notebook**, while a metaphor that your team or your family accepts can give a whole group shared words for a problem. Hana's team took up the relay race, and the word baton entered their meetings.

To find a metaphor someone else accepts, **test it on them before you lean on it**. Say it once, then ask what it makes them picture. If their picture matches the features you meant, the metaphor works for them, and if it shows something else, you have learned what the problem looks like from their side.

Test it on them first



Science Says:

In 2.3.2 you saw that reasoning ability went with better creative metaphors (Silvia & Beaty, 2012). **That study ran in one direction only.** It predicted metaphor quality from reasoning, and nothing in it shows that metaphor practice raises intelligence. The practice in this section is for making metaphors and nothing wider.

Key Concept:

Fresh and tired. Some metaphors are worn out, such as life is a rollercoaster. **A tired metaphor is one the listener has heard many times**, so it brings no new picture. For a fresh one, pick a picture from a world the listener knows and nobody has used for this problem, then run the fit check on it as you would on any other.

In ordinary days, metaphors turn up whenever you explain something. You can **describe your week as a kind of weather**, a hard choice as a fork in a path, or a messy cupboard as a city with no map. Each one is a small round of practice, and each one can be checked and stretched.

Fresh and tired metaphors

A fresh metaphor	A tired metaphor
⊕ A picture from a world the listener knows	⊖ Heard many times
⊕ Nobody has used it for this problem	⊖ Brings no new picture

Try a metaphor for something you explain to a child, such as why a seed shows nothing for weeks. You might say **a seed is a builder laying**

foundations, since both do hidden work underground first. Check that the child knows builders dig first. Then stretch it into one task, such as drawing the builder's hidden work each week.

A seed is a builder



Hidden work underground first



Builders dig first

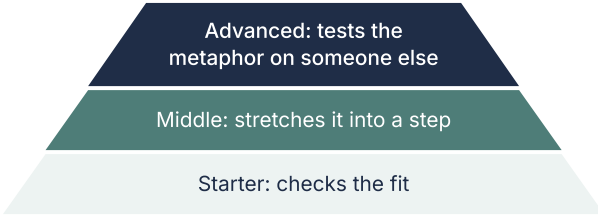


Draw the builder's hidden work each week

The studies behind this section measured links between abilities and metaphors, and none of them tested metaphor practice as training. **The three levels below are practice, with no promise attached.** Use them on your own problems, keep the metaphors you write and look back at them after a few weeks.

Each level adds one move to the last. **The starter checks, the middle stretches and the advanced tests** the metaphor on someone else. Start where you feel ready, and move up a level when the earlier one feels easy.

Each level adds one move



Exercise:

Fitting metaphors.

1. Starter. Write two metaphors for one problem. List three features of the problem, and **keep the metaphor that shares more**.
2. Middle. Ask what happens next in your kept metaphor. Turn it into one step with a name and a date.
3. Advanced. Take a real problem shared with others. Find a metaphor they accept, and test it by asking what they picture.

Fitting metaphors at three levels



Two metaphors and three features



One step with a name and a date



A metaphor others accept

Key idea:

A good metaphor **shares a feature with your problem**, so check the fit and stretch the picture into a next step.

Quick check:

In the line this problem is like ___ because ___, which part does the work?

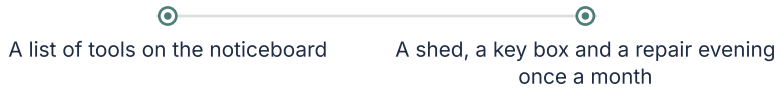
Answer: the because, since it names the shared feature.

3.3.4 Building an Idea Step by Step

Imagine Kofi, a retired carpenter, who wants the people on his street to share their tools. His first idea is one line long, **a list of tools on the noticeboard**. It is a fine start, and it leaves every real question open, such as who keeps the drill and what happens when the ladder comes back broken.

Kofi does not throw the line away, and he does not try to finish it in one go. **He builds it in steps**, one pass at a time, and each pass adds something the last one lacked. A month later the one line has become a shed, a key box and a repair evening once a month.

One line, then a month



Building an idea step by step is the skill in this section. **A pass is one round of work on the idea**, with a single job, such as adding a part or testing a use. I show you where the method comes from in research, how passes stack up and how to practise building at three levels.

One pass, one job

- A pass is one round of work on the idea
- A single job, such as adding a part or testing a use

In 2.1.1 you met the research this section grows from. **People's first answers in an ideas task came from memory**, and later answers came from other moves, such as taking the object apart in their heads

(Gilhooly et al., 2007). In a second study, ideas grew more creative as the minutes went by (Beaty & Silvia, 2012).

The research this section grows from



First answers came from memory



Later answers came from other moves



Ideas grew more creative as the minutes went by

> **Science Says:**
>
> Those two studies watched ideas arrive in one sitting. **Neither of them tested step-by-step building as training** (Gilhooly et al., 2007; Beaty & Silvia, 2012). They show an order that ideas tend to follow in a short task, and the passes in this section borrow that order as a way to practise.

> **Key Concept:**
>
> Three passes. **Pass one is memory**, where you write what you already know or have seen. Pass two is change, where you take the idea apart, swap a part or change a feature. Pass three is use, where you ask who will use the idea, where and when. Each pass has one job, and each one starts from what the last one left.

Memory, change, use



Pass one is memory

Pass two is change

Pass three is use

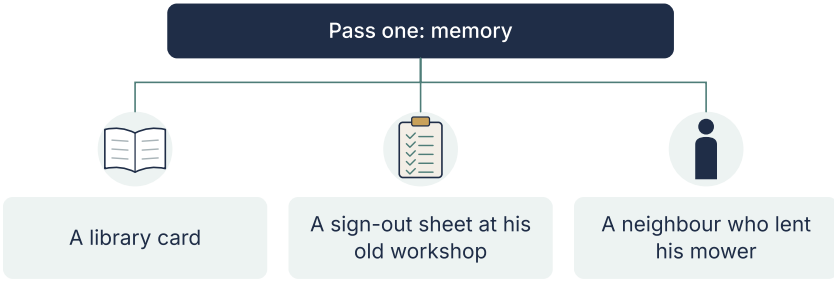
Building an idea works like making a sandcastle on a beach. You pile up the sand, shape the walls and towers, and last you dig the moat and **check where the sea will come in**. Where the picture stops is the tide, since an idea stays put while you work on it and a sandcastle does not.



A child on a sunny beach patting the tower of a sandcastle, a bucket beside her and a narrow moat dug round the walls.

Kofi's first pass was memory. He wrote down what he had seen work, **a library card, a sign-out sheet at his old workshop** and a neighbour who lent his mower to anyone who asked. None of it was new, and all of it was useful, because it gave the second pass something to change.

What Kofi had seen work

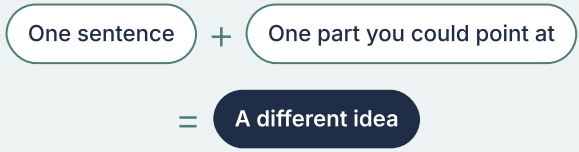


Start with memory, since it needs nothing but what you already have. **Write fast and leave the judging for later**, because the second pass will change most of it anyway. Five or six remembered pieces are plenty for a short idea.

> Exercise:
>
> Try it. Write your idea in one sentence. **Add one concrete next part**, and nothing more.

One sentence and one part is the smallest step there is. **The part should be something you could point at**, such as a place, a person or a time. A list of tools on a noticeboard plus a place, the shed at the end of the street, has already become a different idea.

The smallest step there is



Kofi's second pass was change. He took the idea apart into the list, the tools and the people. **Swapping the noticeboard for a shed** changed where the tools lived, and swapping the sign-out sheet for a key box changed who could open the door.

Pass two: change

Swap	What it changed
The noticeboard for a shed	Where the tools lived
The sign-out sheet for a key box	Who could open the door

> **Key Concept:**
>
> Change moves. In the second pass, try one move at a time. **Take the idea apart** into its pieces and change one piece. Swap a part for another part. Change a feature, such as the size, the place or the time. Write what each move gives you before you try the next.

Change moves



Take the idea apart



Swap a part



Change a feature

Kofi's third pass was use. He asked who would borrow the tools, when and for what. **The answer showed him Saturday mornings**, when most people did their jobs at home, so the shed opened on Saturdays with Kofi there for the first hour to show people the tools.

The three passes had turned one line into a working plan. **Each pass added one kind of thing**, memory gave the pieces, change gave the shape and use gave the timing. No single pass would have got there, and the order kept each pass simple.

What each pass added

Pass	What it gave
Memory	The pieces
Change	The shape
Use	The timing

> **Key Concept:**
>
> Small steps. **Give each pass a time limit**, such as five minutes. Work on one job only during that time, and stop when the timer ends. Then read what you have and decide what the next pass should do. Keep to one job per pass, and leave the other jobs for their own turn.

The next step after the passes is detail. In 3.1.4 you added detail beyond the minimum, and you saw that the training gains for elaboration were smaller and still gains on average (Haase et al., 2025). **Detail gets its own pass here**, with its own time limit, so that the other passes leave room for it.

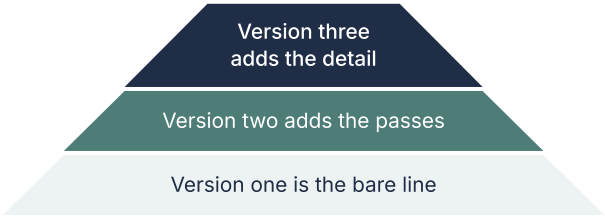
The detail pass asks what the idea needs that nobody has asked for yet. Kofi added **a rule that tools come back clean**, a tag on each tool with its owner's name and a box for broken ones. None of these was in the first line, and each one answered a question a neighbour would have asked.

The detail pass



The advanced level asks for three versions of an idea, each built on the one before. **Version one is the bare line**, version two adds the passes and version three adds the detail. Keep all three on the page, so that you can see what each step added.

Three versions of an idea



Three versions on one page show **where the idea changed most**. Mark the biggest jump between two versions with a star. The star tells you which pass did the most work for that idea, and that pass is worth repeating on the next one.

> **Science Says:**
> Rough forms and finished inventions got separate scores in the Creative Synthesis Task (Palmiero et al., 2015). **The advanced level keeps a similar split** on your page, with the bare line and the finished version side by side.

Practice on a real task with a rule of thumb follows the pattern of the better training programmes (Scott et al., 2004). **The rule here is one pass, one job.** Take a real idea from your home or work, and build it in versions over a week, one version at a time.

A real task brings real questions. **Ask someone who will use the idea** to read your latest version and say what is missing. Their question tells you what the next pass should do, and you can keep going until the questions run out.

Until the questions run out



> **Key Concept:**
> Ask a user. Hand your latest version to **one person who will use the idea**. Ask them two questions, what is missing and what would stop you using it. Write their answers word for word. Each answer is the job for your next pass, and the pass ends when the answer is in the idea.

The latest version went to Pat, the neighbour who borrowed the ladder most. She asked what happened in the rain. **The next pass gave the shed a covered bench**, so people could check the tools before carrying them home. A question from a real user had shaped a part Kofi would never have thought of alone.

Pat's question



What happened in the rain



A covered bench



Check the tools before carrying them home



A covered wooden bench beside a tool shed in light rain, a woman checking the rungs of a folded ladder under the roof.

In ordinary days, step-by-step building fits any plan. **Build a holiday in three passes**, with the places you know first, then one change, such as a new town, and then the use, such as who will want what each day. A birthday, a garden bed or a work project can grow the same way.

A holiday in three passes



When an idea feels stuck, **look at which pass is missing**. A plan full of memory and no change looks like last year. A plan full of change and no use can look clever on paper and fail on the day. Add the missing pass and see what it gives you.

Which pass is missing

A plan full of	Looks like
Memory and no change	Last year
Change and no use	Clever on paper and can fail on the day

> **Key Concept:**
> Version log. On one page, write **version one, two and three** of an idea in a column. Next to each, write which pass made the change, memory, change, use or detail. Look at the column after a week. The log shows you which passes you use most and which ones you skip.

Each level below uses the passes from this section. **The three levels are practice, with no promise attached.** Try them on your own ideas, and keep your version logs so that you can look back over a few weeks.

Start with the starter level on a small idea, such as a weekend plan. **Move up a level when the passes feel easy**, and keep the same idea for all three levels if you like, so that each level builds on the last one.

> Exercise:
>
> Step by step.
>
> 1. Starter. Give one idea three timed passes, memory, then change, then use. **Write one line after each pass.**
> 2. Middle. Add a detail pass, with at least three details nobody asked for.
> 3. Advanced. Take a real idea. Write three versions over a week, each built on the last, and ask a user what is missing.

Step by step at three levels



Three timed passes



A detail pass



Three versions over a week

Key idea:

An idea grows **one pass at a time**, with memory, change, use and detail each given its own step.

Quick check:

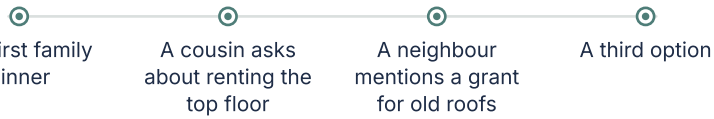
What are the three passes in this section, in order? Answer: memory, then change, then use, with a detail pass after them.

3.3.5 Tolerating Uncertainty and Staying With Open Questions

Imagine Ruth and her two brothers, who have to decide what to do with their late grandmother's house. At the first family dinner, one brother wants to sell it at once, and the other wants to keep it as it is. **Both want the question closed by Sunday**, because an open question feels like a stone in a shoe.

Ruth asks for one month with the question left open. During that month a cousin asks about renting the top floor, and a neighbour mentions a grant for old roofs. **Neither fact existed at the first dinner**, and together they made a third option, to keep the house and let part of it to family.

One month with the question left open





An old brick house with a green door and a tangled front garden, three adults standing at the gate in coats and talking.

Tolerating uncertainty is the skill in this section. **Ruth's month is a small case of it**, a question left open on purpose for a set time while the family kept looking. I show you what one team found, how to keep a question open with an end date and how to practise at three levels.

Research names this skill tolerance of ambiguity. Ambiguity means **a situation that can be read more than one way**, and tolerance of ambiguity means being able to stay with it without rushing to close it. One team found that "Tolerance of ambiguity was significantly and positively related to creativity" (Zenasni et al., 2008).

Tolerance of ambiguity



A situation that can be read more than one way



Staying with it



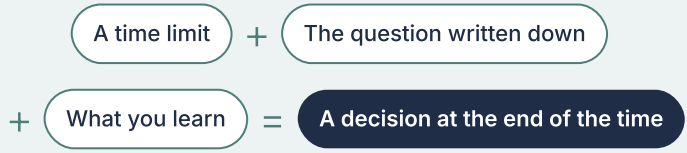
Without rushing to close it

> **Science Says:**
>
> The team measured creativity in three ways, with **divergent thinking tasks**, story writing and people's own ratings of themselves (Zenasni et al., 2008). The study measured a link at one time, in parents and their teenage children, and it did not test whether practice raises either score.

> **Key Concept:**
> An open question. An open question is one where **you do not yet have the facts** or the choice you need. Staying with it means you set a time limit, keep the question written down and gather what you learn. At the end of the time you decide, with whatever the time has brought you.

Writing the question down is the first move. **Put it in one plain sentence**, such as what do we do with the house, and keep the sentence where you will see it. Then you can come back to the same words each time and see whether they still fit.

Staying with an open question



Staying with an open question works like letting dough rise. You mix it, cover the bowl and **leave it alone for an hour**, even though the bread is not ready. Opening the oven early gives you a flat loaf. Where the picture stops is the waiting, because a real open question needs you to keep looking while it sits.



A mixing bowl under a clean tea towel on a sunny kitchen counter, the dough just starting to push the cloth up in the middle.

The family result had a twist. The team wrote, “Creativity of parents was related to their adolescents’ creativity. However, parents’ tolerance of ambiguity was not related to adolescents’ tolerance of ambiguity or creativity” (Zenasni et al., 2008). **The two scores did not pass down in the same way.** Adolescents are teenagers, the children of the parents tested.

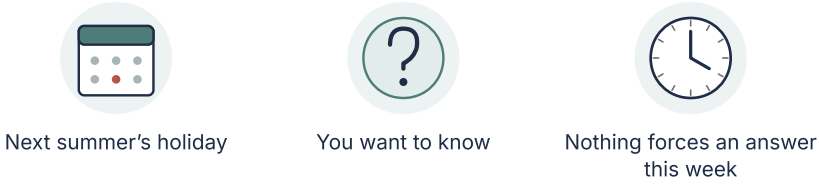
The family result



Pick a question with some pull on it. **Caring about the answer is what makes waiting hard**, and that hard part is the thing you

practise. Next summer's holiday works well, because you want to know but nothing forces an answer this week. A question you do not care about is easy to leave open and teaches you little.

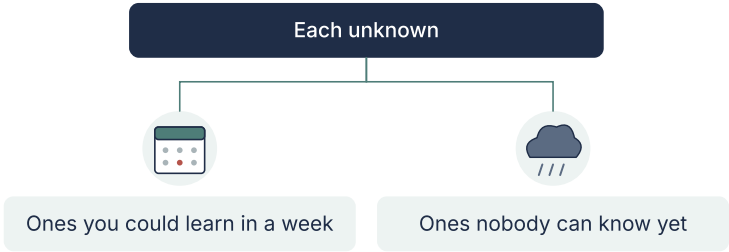
A question with some pull on it



> Exercise:
>
> Try it. Pick a real question you care about that has no deadline this week. **Leave it open for a set time** and list your unknowns.

Look at your list of unknowns. **Each unknown is a reason the question is still open**, and some can be found out. Mark the ones you could learn in a week, such as a price, a rule or a date, and the ones nobody can know yet, such as next year's weather, so you know which are worth chasing.

Your list of unknowns



In 3.2.1 you met a study where a bigger clash among the parts people kept for solving went with more original, higher quality solutions (Reiter-Palmon et al., 2024). **Two answers that pull against each other** are a small open question, and the starter level below asks you to keep both on the page for a while.

> **Key Concept:**
>
> Two answers kept. Write **two answers you are not ready to choose between**, one on each side of a page. Under each, write what would make it the right one. Leave the page for a day. When you come back, add anything you learned under the answer it helps, with the date beside it.

Keep two answers



Keep the two answers in the same words each day. **Change only what sits under them** as you learn things. If an answer itself needs changing, write the new version next to the old one, so the page keeps a record of how your view moved.

Sell and keep

Sell	Keep
Nobody could afford the roof	The house held the family's history

Ruth's family did this at the second dinner. Sell went on one side and keep went on the other. **Under sell they wrote that nobody could afford the roof**, and under keep they wrote that the house held the family's history. Both lines stayed on the page for the month, and the grant later answered the roof line.

> **Science Says:**
>
> In 3.2.2 you met work comparing tasks where people find a problem with tasks where they answer a set question. The problem-finding tasks drew more original answers (Abdulla Alabbasi et al., 2025). **That work compared kinds of task**, and it did not test open-question practice. The middle level borrows its idea of asking one more question.

> **Key Concept:**
>
> The question that would change it. Look at the two answers you kept. Write **one question whose answer would tip you** towards one side. Then find out what you can about it. If the answer arrives, the choice gets easier. If it does not, you have learned where the real gap in your knowledge sits.

One question that would tip you



Some questions can be answered with a phone call, and some need weeks. **Write next to your question how long it might take** to

answer, and fit the end date to that. A question that needs a builder to look at the roof will not be answered by Friday, so give it the weeks it needs.

Ruth's question was what the house could earn. **The cousin's offer answered it**, and the grant answered the roof, so both of the old worries had a reply. The third option, keeping the house and letting the top floor, came from those two answers, and neither answer had been in the room at the first dinner.

Both old worries had a reply

The question	What answered it
What the house could earn	The cousin's offer
The roof	The grant

An open question has to close in the end. **Set the time limit before you start**, such as a week or a month, and write the date down. When the date comes, decide with what you have. Waiting with no end date turns staying open into putting things off, and the date is what keeps the two apart.

> **Key Concept:**
>
> Open with an end. **Write the question, the date and the people** who will decide together. Each week, add one line of what you have learned. On the date, read the lines aloud and choose. If a fact you need is due a few days later, set one new date, and only one.

Open with an end



Write the question, the date and the people

Each week, add one line

On the date, read the lines aloud and choose

Share the date with the people involved. **Everyone then knows when the choice will be made**, and nobody has to push for an answer in the meantime. Ruth's brothers agreed to the month once they could see the end date written on the kitchen calendar.

In ordinary days, small open questions are everywhere. **Leave a weekend plan open until Thursday**, keep two gift ideas until you have seen the shop, or hold the name for a new pet until you have watched it for a day. Each one is a short round of practice with a built-in end.

Small open questions

- Leave a weekend plan open until Thursday
- Keep two gift ideas until you have seen the shop
- Hold the name for a new pet

Some questions cannot wait. A leaking pipe needs a plumber today, a medicine needs taking on time, and a form with a deadline needs sending. **Keep the skill for questions that have room**, such as a move, a big purchase, the plan for a project or the shape of a family event.

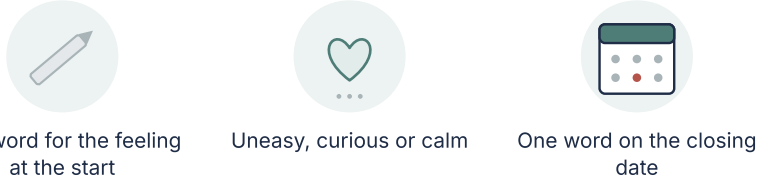
Keep the skill for questions that have room

Questions that have room	Questions that cannot wait
⊕ A move	⊖ A leaking pipe
⊕ A big purchase	⊖ A medicine
⊕ The plan for a project	⊖ A form with a deadline

The advanced level asks you to delay a real decision on purpose and write down what new information appears. Practice on a real task with a rule of thumb is the pattern of the better training programmes (Scott et al., 2004). **The rule here is open with an end**, and the record shows you what the time gave you.

Pay attention to how the open question feels. **Write one word for the feeling** at the start and one word on the closing date, such as uneasy, curious or calm. The two words are your own record, kept for nobody but you, and over a few weeks they can show you how staying open feels to you.

One word for the feeling



Each level below keeps a question open for a set time. **The three levels are practice, with no promise attached.** Try them on questions that have room, and keep your dated pages together so that you can read them back later.

Exercise:

Open questions.

1. Starter. Write two answers you are not ready to choose between. **Keep both for a day**, then add what you learned.
2. Middle. Add one question whose answer would change the choice, and find out what you can.
3. Advanced. Take a real decision with room. Set an end date, delay it on purpose, and log new information weekly.

Key idea:

Leave an open question open on purpose, with an end date, and keep looking for what the time can bring.

Quick check:

What should you set before you leave a question open? Answer: an end date, written down, so that staying open does not turn into putting things off.

Open on purpose

Leave it open on purpose	An end date

3.4 Creative Judgement

3.4.1 Recognising an Interesting Question or a Problem Worth Solving

Imagine Ivy, who runs the library at a small primary school. Her list of problems is long. **The room is cold, the printer jams, the shelves are full** and the children who visit at lunchtime hardly ever take a book home. She has one free afternoon a week, and every problem on the list is asking for it.

Ivy's long list



The room is cold | The printer jams | The shelves are full | Children hardly ever take a book home

Ivy turns the last one into a question about why children who visit do not borrow. **Her question reaches further than the others**, because its answer could change what the library is for. The printer would still jam, and a fixed printer would leave the borrowing where it was.



A small school library at lunchtime, children sitting on beanbags reading, while a row of returned books waits untouched on the desk.

Recognising a problem worth solving is the skill in this section. It is a judging skill, the part of creative work that **picks where to spend your effort** before any ideas arrive. I show you where the skill comes from in research, how to test a question and how to practise at three levels.

A judging skill

> - Picks where to spend your effort
> - Before any ideas arrive

In 3.2.2 you saw that problem finding sits among **the essential parts of most models of creative work** (Abdulla Alabbasi et al., 2025). Finding a problem and judging it are close partners. The research behind this section names no single method for judging which problem is worth solving, so the tools here are practice built on nearby findings.

> **Key Concept:**
> A problem worth solving. In this book, a problem worth solving is one whose answer would **change something you or others care about**, that you can act on, and that leaves room for new ideas. A jammed printer has a known fix. A library where nobody borrows leaves room for many answers, and finding one would change the school.

The list held two kinds of problem. **Some had one known fix**, such as calling someone to look at the heating. Others had many possible answers and nobody yet knew which would work. The second kind is where creative effort pays its way, and judging between the two is the first job.

Two kinds of problem



Choosing a problem works like choosing where to dig in a garden. **You can dig anywhere**, and a hole in the wrong place gives you a sore back. A good gardener looks at the soil and the light first. Where the picture stops is the map, because no map tells you in advance where an answer is buried.



A gardener leaning on a spade in a sunny vegetable plot, looking at several small marked squares of earth before choosing one.

Judging needs something to judge with (Cropley, 2006). **For a question, your yardsticks are the four tests below**, and you can use

them before a single idea exists. Write the tests on a card and keep it with the page of questions, so that every question meets the same four tests.

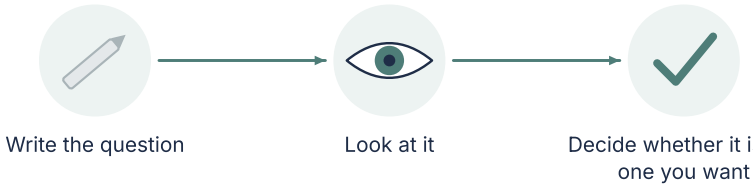
> **Key Concept:**
>
> A question you can judge. **Turn each complaint into a question** that starts with how or why. The printer is useless gives you nothing to test, and why does the printer jam gives you a question with an answer to look for. Judge the questions, and leave the complaints aside.

A complaint and a question

A complaint	A question
The printer is useless	Why does the printer jam?

Shaping a problem well has gone with better solutions (Reiter-Palmon et al., 1998). **Spending a few minutes on the question** costs little, and the practice in this section asks for no more than that. Write the question, look at it and decide whether it is the one you want before you reach for ideas.

A few minutes on the question

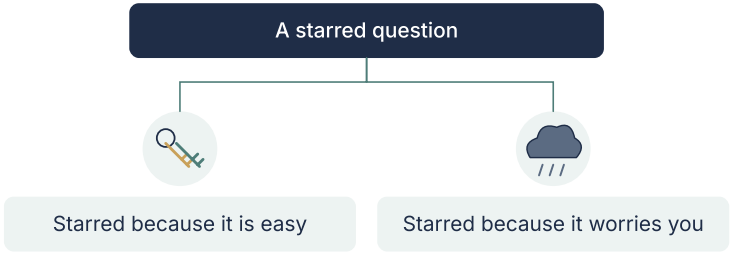


> **Exercise:**
>
> Try it. From one messy situation, write three candidate questions. **Star the one worth a day's work.**

Look at the question you starred. **Ask what made you star it**, and write the reason in a few words next to the star, even if the reason feels small or silly. The reason is your own yardstick, and writing it down lets you test it on the next question you meet.

Some reasons are better than others. A question starred because it is easy may only hide a known fix, and a question starred because it worries you may be the one you care about most. **Both kinds of reason are worth writing down**, so that you can see which kind you reach for.

Why you starred it



> **Key Concept:**
>
> Four questions for a question. Ask **who cares about the answer**. Ask whether the question holds a conflict, two things that pull against each other. Ask whether you could act on an answer within a month. Ask whether it leaves room for more than one answer, which in this book's terms means its variables are not yet identified. A question that passes all four is a strong candidate.

All three of Ivy's questions went through the four tests. Why does the printer jam passed one, since nobody but Ivy cared. Why is the room cold passed two. **Why children do not borrow passed all four**, since teachers and parents cared, and it held a conflict between free time and reading.

Ivy's three questions

Question	Tests passed
Why does the printer jam?	One
Why is the room cold?	Two
Why children do not borrow	All four

The conflict was the part Ivy almost missed. Lunchtime was free time, and borrowing felt like homework. **The question held both at once**, and an answer would have to respect both. A question with no conflict inside often has a plain fix, and a question that holds a conflict leaves room for something new.

The conflict Ivy almost missed



Lunchtime was free time



Borrowing felt like homework



The question held both at once

> **Science Says:**
> In 3.2.1 you met a study of conflicting parts of a problem. **A bigger clash among the parts people kept for solving** went with more original, higher quality solutions (Reiter-Palmon et al., 2024). That study is a link in one task, and here it backs only the conflict test among the four.

Both sides stayed in the question, even though one side made it harder. **Ivy wrote it out in full**, how could borrowing feel like part of free time? The question was harder to answer than the first version, and every idea she wrote under it had to fit lunchtime and reading together.

Both sides stayed in the question



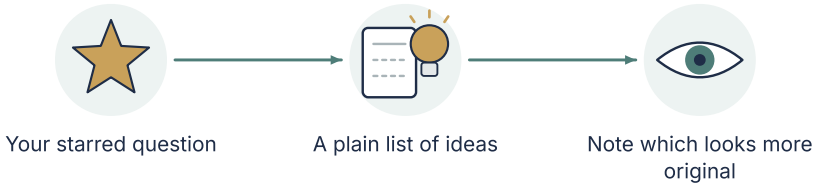
> **Key Concept:**
> Ranking your questions. **Count the ticks each question earns** across the four tests, and write the count next to it. Keep the question with the most ticks, and set the others below it. If two questions tie, keep the one whose answer would change more for the people who care.

The middle level asks you to set your starred question next to a plain list of ideas. **Compare the two**, and note which one looks more original, the question or the ideas. In the review cited above, tasks that asked for

problems drew more original answers than tasks that asked for ideas (Abdulla Alabbasi et al., 2025).

The review compared kinds of task, and it did not test a training method. **The middle level borrows its shape** and makes no promise about what you will find. Write a short note under each page on what you noticed, and keep both pages together in one folder.

Set the two side by side



The advanced level asks you to make the case for your question to someone who has a say, such as a manager or a head teacher. Real tasks with a rule of thumb mark the better training programmes (Scott et al., 2004). **The rule here is to say why this question and no other** in one minute.

In one minute, Ivy made her case to the head teacher. She said who cared, named the conflict between free time and reading and gave **one thing she would try first**, letting children take a book home with no date to bring it back. The head teacher agreed to a trial for half a term, starting the following Monday.

Ivy's one-minute case



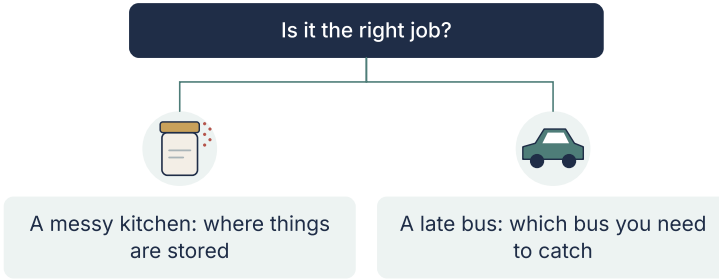
> **Key Concept:**
>
> Questions to drop. Some questions are worth dropping, at least for now. **A question with one known fix** needs a job list, and a question nobody cares about needs no answer. Write dropped questions at the bottom of the page in pencil, so that you can come back if something changes.

The one-minute case is a judging tool in its own right. **Saying the reason out loud** shows you whether you have one. If the minute runs out before you reach the conflict or the person who cares, the question may need more shaping before you put your afternoon into it.

In ordinary days, questions turn up all the time. **Before you start a job at home**, ask whether it is the right job, the way Ivy did. A messy kitchen can become a question about where things are stored, and a late bus can become a question about which bus you need to catch at all.

Not every question needs the four tests. **Keep them for the choices that cost you time**, such as a free afternoon or a family plan. Small questions can be answered on the spot, such as what to cook tonight. The tests are for the ones where a wrong choice would waste a week, or a month of evenings.

Before you start a job at home



The research behind this section measured links and compared kinds of task, and none of it tested these steps as training. **The three levels below are practice, with no promise attached.** Keep your starred questions and your reasons, and look back at them after a few weeks to see which ones you followed.

> Exercise:
>
> Questions worth solving.
>
> 1. Starter. Run your three questions through the four tests. A question with one known fix fails the last test, so **cross it out**, then rank by ticks.
> 2. Middle. Set your starred question beside a quick list of ideas. Note which looks more original.
> 3. Advanced. Make a one-minute case to someone with a say on why this question, who cares and what you would try first.

Questions worth solving at three levels



Run the four tests



Beside a quick list of ideas



A one-minute case

Key idea:

Judge the question before the ideas, and keep the one whose answer would change something, that you can act on and that holds a conflict.

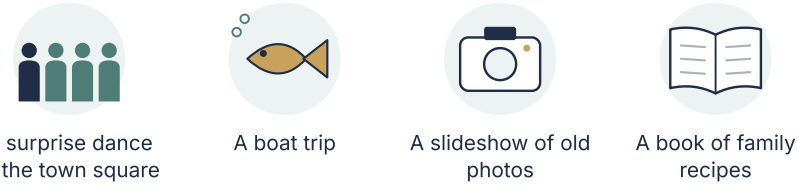
Quick check:

Name the four tests for a question. Answer: who cares about the answer, whether it holds a conflict, whether you could act within a month, and whether it leaves room for more than one answer.

3.4.2 Choosing Ideas According to Their Purpose, Audience and Possibilities

Imagine Ben, whose mum turns seventy in the spring. He sits down with his sister and they fill a page with ideas. **A surprise dance in the town square, a boat trip, a slideshow of old photos** and a book of family recipes, with a note from each grandchild. Every idea on the page has something going for it.

A page of ideas



The surprise dance is the most original by far, and Ben nearly picks it on the spot. His sister asks one question. **Would Mum enjoy being the centre of a crowd?** She is shy, she hates fuss and she once left her own retirement party early. The most original idea on the page would make her miserable.

One question from his sister



Choosing which ideas to take forward is the skill in this section. You have a page of ideas, and **only one or two can go ahead**. I show you where the skill sits in research, how to mark ideas against purpose and audience, how to weigh what an idea could grow into and how to practise at three levels.

Researchers count judging your own ideas as part of creativity. Silvia called it discernment, “the ability to evaluate the creativity of one’s ideas”, and wrote that it “is an important part of theories of creativity”

(Silvia, 2008). **Making ideas is one half of the work**, and choosing among them is the other.

Making and choosing

- Making ideas
- Choosing among them

Some theories go further and look at what happens after the choice. Silvia described theories in which an idea is developed until "the domain's gatekeepers and audience accept it" (Silvia, 2008). **The gatekeepers are the people who decide**, such as an editor or a manager, and the audience is everyone the idea reaches.

After the choice



Key Concept:

Purpose and audience. **The purpose is the job an idea has to do**, such as making Mum feel known and loved. The audience is the people who will meet the idea, such as Mum, her friends and the grandchildren. An idea can be original and still fail its purpose, or serve its purpose and lose its audience.

At the top of the page went the purpose, in one line, make Mum feel known and loved. **The audience went under it**, Mum first and then

everyone else at the lunch. With both lines written down, the page of ideas looked different.

At the top of the page

Purpose	Audience
Make Mum feel known and loved	Mum first and then everyone else at the lunch

Choosing an idea works like choosing a present. **One present can be perfect for one person and wrong for another**, and a clever one must still suit the day. You start with the person and the reason for the gift. Where the picture stops is the receipt, since an idea you put into the world is harder to return.



A person in a gift shop holding two wrapped presents, one bright and loud and one small and plain, weighing them up.

> Science Says:
>
> In 2.3.3 you saw that **people's own picks lined up strongly with judges' ratings** (Silvia, 2008), and that groups in a second study picked no better than chance (Rietzschel et al., 2006). Picking can go well or badly, and the two studies leave open what makes the difference.

> Exercise:
>
> Try it. List five ideas for one task. **Mark each for purpose fit, then audience fit**, in two columns.

Keep the two marks apart. An idea can do the job and still put off the people it reaches, and **a single mark hides which way it fails**. Two columns show you whether to drop the idea or rework it for a different crowd.

Keep the two marks apart



Does the job



Puts off the people it reaches



Which way it fails

Ben marked his four ideas. The surprise dance got a tick for purpose and a cross for audience. The boat trip got two ticks, and the slideshow got a tick for audience and a question mark for purpose. **The recipe book got two ticks**, with a note that it would take weeks to gather.

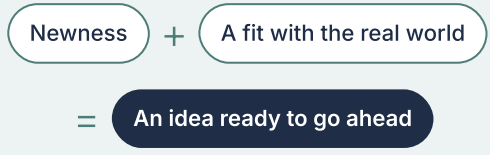
Ben's marks

Idea	Purpose	Audience
The surprise dance	Tick	Cross
The boat trip	Tick	Tick
The slideshow	Question mark	Tick
The recipe book	Tick	Tick

> 🔑 **Key Concept:**
>
> Two marks, two columns. Write each idea in one line. **Give it a purpose mark** and an audience mark in separate columns, using a tick, a cross or a question mark. Read down each column before you choose, and treat a question mark as a reason to find out more.

Judging counts most when ideas are fresh and free. Cropley warned that making ideas with no judging at all carries a risk when the ideas are "not adapted to reality" (Cropley, 2006). **Newness on its own is not enough**, and an idea has to fit the real world, unlike a surprise dance for a shy woman.

Newness on its own is not enough



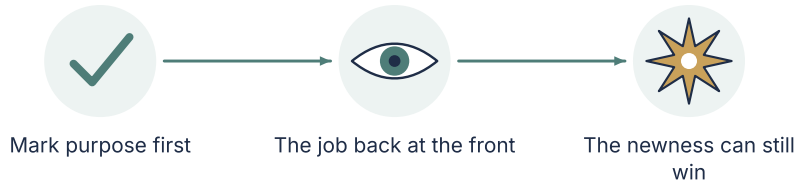
The starter level asks you to drop any idea that fails the purpose mark, **even if it feels original**. Dropping an original idea can sting. A cross

on purpose means the idea does not do the job, and an idea that does not do the job is not ready to go ahead, however fresh it is.

> **Science Says:**
> Judging can fail in either direction (Cropley, 2006). **The starter level asks for one firm cut**, on purpose only, and it leaves the audience marks gentle. A question mark on audience is a reason to ask someone, and it is no reason to drop the idea.

Original ideas often fail on purpose for a plain reason. **They were made to be new**, and the job came second. Marking purpose first puts the job back at the front, and the newness can still win once the job is done.

Mark purpose first



> **Key Concept:**
> The side list. An idea you drop can still go somewhere. **Write dropped ideas on a side list** at the bottom of the page, with the reason they failed. A surprise dance that fails one party may suit a different day, and the side list keeps it from being lost.

The middle level asks you to keep three finalists and write one objection from the audience for each. **An objection is the first worry someone**

would raise, said in their own words. Each finalist has to survive its objection, or be changed until it can.

Ben's three finalists were the boat trip, the slideshow and the recipe book. For the boat trip, his aunt would say Mum cannot manage the steps. For the slideshow, Mum would say she hates seeing herself on a screen. **For the recipe book, the grandchildren would say** they do not know any recipes.

One objection for each finalist

Finalist	Objection
The boat trip	Mum cannot manage the steps
The slideshow	She hates seeing herself on a screen
The recipe book	They do not know any recipes

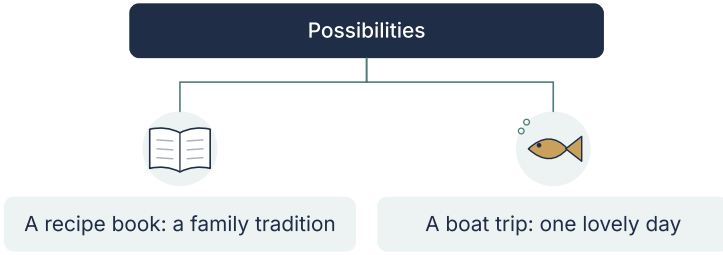
> 🗝 **Key Concept:**
>
> The objection test. For each finalist, **write the objection in the voice of one person** in the audience. Then write one change that would answer it. A finalist with no answer to its objection drops to the side list, and a finalist that can be changed stays in.

The recipe book had an answer. The grandchildren could write about a meal they loved at Gran's house, with no recipe needed. **The boat trip had no good answer**, since the steps were part of the boat. The slideshow survived as a short one shown once, near the end of lunch.

Purpose and audience tell you what an idea must do now. **Possibilities tell you what an idea could grow into later.** A recipe book could become a family tradition, with a new page every birthday, and a boat

trip would be one lovely day. Both are real gains, and weighing them is part of the choice.

What an idea could grow into





An open handmade recipe book on a kitchen table, with photos and handwritten notes from children stuck beside each recipe.

The advanced level asks you to choose one idea and write a short brief. State its purpose, its audience and **one possibility you are giving up** by choosing it. The brief is a rule of thumb written down, so that you can use it again on the next choice.

The short brief



> **Science Says:**
>
> A review of creativity training found that **the better programmes used real tasks** and gave people rules of thumb to work with (Scott et al., 2004). The review looked at training courses, and it did not test a written brief.

Naming what you give up keeps the choice honest. Ben wrote that the recipe book gave up the adventure of the boat trip. **He kept the boat on the side list** for a summer outing with fewer steps. His sister read the brief and agreed in a minute, because every reason was on one page.

What Ben gave up

- The adventure of the boat trip
- The boat kept on the side list for a summer outing

> **Key Concept:**
>
> The short brief. **Write three lines and no more.** The first says what the idea is for, the second says who will meet it and the third says what you are giving up by choosing it. Read the brief to one person who knows the audience before you start work.

In ordinary days, you choose between ideas all the time. **A birthday plan, a way to rearrange a room** or a plan for a team meeting all have a purpose and an audience. Two columns and one objection each take about five minutes, which is a small price for a choice that counts.

Choices in ordinary days



A birthday plan



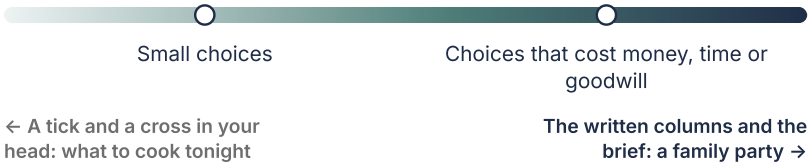
A way to rearrange a room



A plan for a team meeting

Keep the marks light for small choices. **A tick and a cross in your head** is enough for what to cook tonight. Save the written columns and the brief for choices that cost money, time or goodwill, such as a family party or a plan you will present at work.

Keep the marks light for small choices



The research behind this section looked at judging and choosing ideas, and none of it tested these steps as training. **The three levels below are practice, with no promise attached.** Keep your briefs, and look back after the event to see how the choice turned out.

> Exercise:
>
> Choosing by purpose and audience.
>
> 1. Starter. Mark five ideas for purpose and audience. **Drop any idea that fails on purpose**, even an original one.
> 2. Middle. Keep three finalists. Write one audience objection for each and one change that answers it.
> 3. Advanced. Choose one idea and write a brief stating its purpose, its audience and one possibility you are giving up.

Key idea:

Choose an idea by its purpose and its audience first, then weigh what it could grow into, and write down what you are giving up.

Quick check:

Why give an idea two separate marks? Answer: an idea can do the job and still put off the people it reaches, and two marks show which way it fails.

Purpose and audience first

Purpose and audience first	Then what it could grow into

3.4.3 Recognising What an Unfinished Idea Needs

Imagine Jude, a nurse on a busy hospital ward. For two weeks she has been working on a new handover sheet, the page night nurses fill in for the morning team. **The sheet is half made.** It has boxes for each patient, a space for medicines and a line for worries, and something about it still feels wrong.

Jude's half-made sheet



Boxes for each patient



A space for medicines



A line for worries

Each time Jude sits down with it, she starts again from a blank page. **She has five versions now**, and each one looks a lot like the last. She knows the idea is good, and she cannot tell what it is missing, so she keeps rebuilding the whole thing.

Recognising what an unfinished idea needs is the skill in this section. It is a judging skill, and it asks one question of a half-made idea, **what is the one thing it lacks now?** I show you where the skill sits in research, four needs to look for and how to practise at three levels.

Theories of creativity pair making ideas with what Silvia called "evaluating and revising ideas" (Silvia, 2008). **Revising is part of the work**, and it starts with judging what a draft lacks. The research behind this section names no single method for judging an unfinished idea, so the tools here are practice built on nearby findings.

Making, then evaluating and revising



> **Key Concept:**
>
> An unfinished idea. In this book, an unfinished idea is one that **has a shape and is not yet ready to use**. Jude's sheet has boxes and spaces, and it has not yet worked on a real night. An unfinished idea is different from a bad one, since its main parts are there and something is missing.

Judging an unfinished idea works like tasting a soup before you serve it. **A good cook tastes and asks what it needs**, more salt, more time, a new herb or a fresh start. Each answer leads somewhere different. Where the picture stops is the spoon, since an idea has no taste, and you have to ask your questions out loud.



A cook in a small kitchen tasting soup from a wooden spoon, with salt, herbs and a lid within reach on the counter.

Asking the right questions needs yardsticks (Cropley, 2006). **For an unfinished idea, the yardsticks come from its job.** Write the job in one line at the top of the draft, and the four needs below show which part of the job the draft still misses. Jude wrote one line, to help the morning team start the shift.

> **Key Concept:**
>
> Four needs. An unfinished idea may **need facts**, such as how long a handover takes now. It may need detail, when the parts are there and still thin. It may need a new angle, when every version looks like the last. It may need stopping, when it no longer fits the job and more work would not fix it.

Four needs



The fourth need is the hardest to mark. **Stopping can feel like giving up**, after weeks of work. An idea that no longer fits the job still taught you something, and marking it for stopping frees your time for an idea that does fit. If you are unsure, mark another need first and come back to stopping later.

> Exercise:
>
> Try it. For one unfinished idea, **mark the need it has most**, out of facts, detail, a new angle and stopping.

Mark only one need, the one that blocks you most. **An idea can need all four at once**, and trying to fix all four in one go is how Jude ended up with five versions. One mark gives you one next step, and the other needs can wait their turn.

Mark only one need

> - The one that blocks you most
> - One mark gives you one next step

Jude marked her sheet. She did not know how long a handover took now, or which part of it took longest. **The sheet needed facts before it needed anything else.** She spent two nights timing handovers with a watch and a notepad, and found that talking through medicines took half the time.

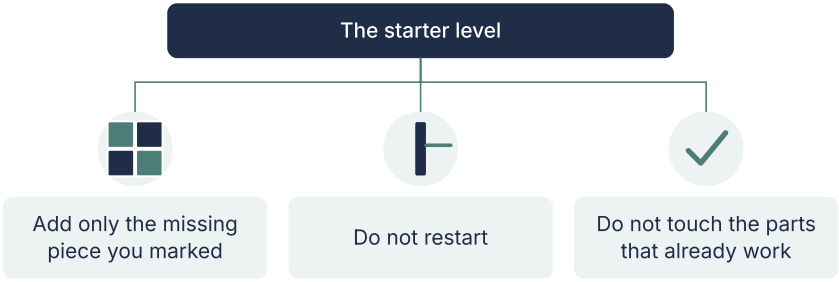
The sheet needed facts first



The starter level asks you to add only the missing piece you marked. **Do not restart**, and do not touch the parts that already work. Jude added a

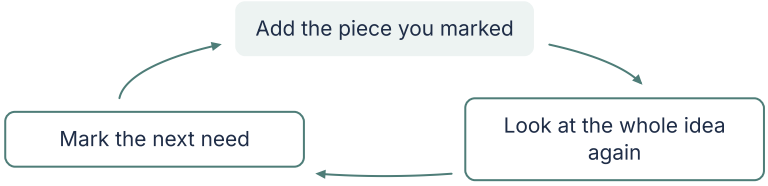
short medicines box with three tick columns and left the rest of the sheet alone, which took ten minutes after two weeks of rebuilding.

Add only the missing piece



In 3.1.4 you met elaboration, detail beyond the minimum, and saw that its training gains were **smaller and still gains on average** (Alabbasi et al., 2022; Haase et al., 2025). Detail is one of the four needs here. When you mark it, add one detail at a time and check the idea after each one.

One piece at a time

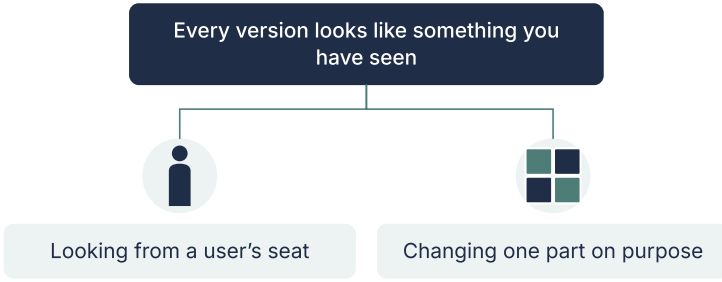


> **Key Concept:**
> One piece at a time. **Add the one piece you marked** and then look at the whole idea again. If the idea now works, stop. If it still lacks something, mark the next need and add that piece. Each round is small, and you can see what each piece changed.

The middle level is for an idea that keeps coming back the same. In 3.3.4 you saw research where **first answers came from memory** and later answers came from other moves (Gilhooly et al., 2007), and where ideas got more creative over time in a task (Beaty & Silvia, 2012). An idea stuck on memory may need a new move.

A sign of being stuck on memory is that **every version looks like something you have seen**. Jude's five sheets all looked like the old forms on the ward. When you spot the sign, pick one new strategy, such as looking from a user's seat or changing one part on purpose, and then judge the idea again.

A sign of being stuck on memory



> **Key Concept:**
> Remembered or new? Hold your latest version next to the last thing you saw that did the same job. **If the two look alike**, the idea may be stuck on memory. Write one new strategy at the top of the page, use it for one version and then mark the four needs again.

An old ward form from a drawer made the test easy. **Jude's latest sheet and the old form looked almost the same**, with the same boxes in the same order. She had been rebuilding the form she already knew, and the

mark she needed was a new angle. The whole check took her less than a minute.

Remembered or new



Jude's latest sheet



The old ward form



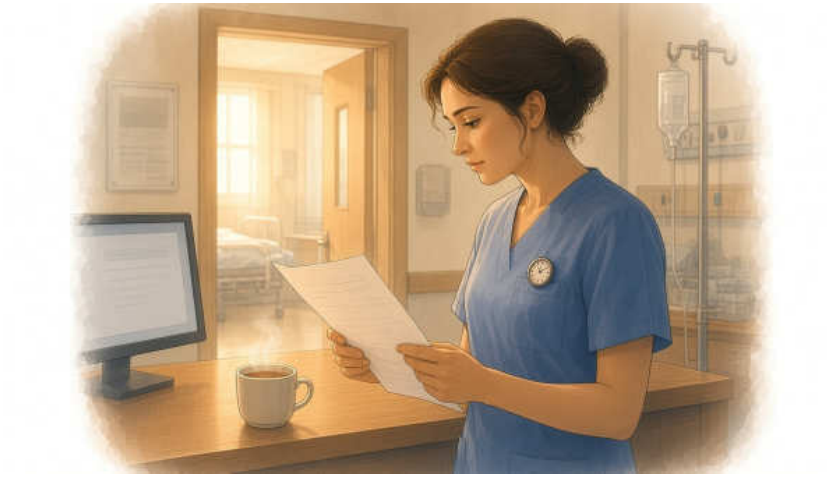
Almost the same

> **Science Says:**
>
> The memory studies watched people make ideas **in a single sitting** (Gilhooly et al., 2007; Beaty & Silvia, 2012). Neither one tested the middle level as training, and the middle level borrows only its order, memory first and other moves after.

Looking from a user's seat came next. Jude wrote the sheet as the nurse arriving at seven in the morning would want to read it, with **the worries at the top** and the routine notes at the bottom. The new version looked nothing like the old forms, and she marked it again.

The new version

At the top	At the bottom
The worries	The routine notes



A morning nurse reading a single sheet at the start of a shift, a cup of tea on the desk beside her.

The advanced level asks you to make a decision about a real draft, to **finish it, revise it or set it aside**, and to write the yardstick you used. Fixed stage models of creative work have been questioned (Lubart, 2001), and **a draft that goes back a step** has not left the path.

> 🗝 **Key Concept:**
>
> Finish, revise or set aside. **Finish when the idea passes your yardstick**, such as a sheet a nurse can read in two minutes. Revise when one need is still marked. Set aside when the idea no longer fits the job. Write the yardstick in one line, so that someone else could check your decision.

Finish, revise or set aside



Finish



Revise



Set aside

Finishing was the choice in the end. Jude's yardstick was **a sheet a morning nurse can read in two minutes** with no questions. She tested it on three mornings, and it passed on all three. She set her old versions aside in a folder, in case a part of one was useful later.

Jude's yardstick

- A sheet a morning nurse can read in two minutes
- Tested on three mornings
- Passed on all three

> **Key Concept:**
> A finished idea is still a start. **Finishing a draft is one step**, and putting it to use in the real world, with real people, is the next. Jude's sheet still had to be printed, shared and used on the ward, and those steps are a different job.

Setting an idea aside is a decision with its own yardstick. **Write why you set it aside** and what would make you pick it up again, such as a new budget or a new team. A note like that turns a dead end into a shelf, and a shelf is easier to come back to.

A dead end into a shelf



In ordinary days, half-made ideas are everywhere. **A garden plan, a letter you have not sent** or a plan for a holiday can sit unfinished for months. Mark one need and add one piece, and you may find the plan moves again after a short session at the kitchen table, with no need to start the whole thing over.

The research behind this section looked at revising, judging, detail, the order of ideas and the stages of creative work, and none of it tested these steps as training. **The three levels below are practice, with no promise attached.** Keep the yardsticks you write, and look back at them when you next start a new idea.

Half-made ideas in ordinary days

- A garden plan
- A letter you have not sent
- A plan for a holiday

Exercise:

What an unfinished idea needs.

1. Starter. Mark one need for an unfinished idea. **Add only that one missing piece**, and do not restart.

2. Middle. If the idea looks like something you have seen, use one new strategy and mark the needs again.
3. Advanced. Decide whether to finish, revise or set aside a real draft, and write the yardstick you used.

Key idea:

Ask what one thing an unfinished idea lacks now, add that piece and judge the whole idea again before you add another.

Quick check:

What are the four needs an unfinished idea may have? Answer: facts, detail, a new angle or stopping.

What it lacks now

Ask what one thing it lacks now

Add that piece and judge again



Module

4

Methods for Developing Creativity

4.1 Organising the Whole Process: Creative Problem Solving

4.1.1 Clarify: Find and Frame the Creative Challenge

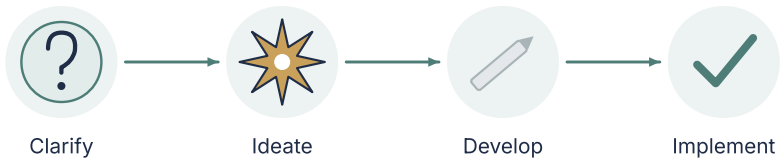
Imagine Ines, who looks after a small shared garden at the end of her street. Hardly anyone uses it, and she decides at once that it needs more benches. **She jumps straight to a fix** before she has asked what the problem really is, and the benches may solve the wrong one.

A fix before the problem

Before	After
She jumps straight to a fix More benches	Ask what the problem really is Find and frame the task first

Ines skipped a step that comes before any idea. **Creative Problem Solving, or CPS, is a method that takes you through a task in stages**. In this book it has four stages, called Clarify, Ideate, Develop and Implement. This section covers the first one, where you find and frame the task before you try to solve it.

Four stages of CPS





A small walled garden at the end of a row of houses, with one empty bench, two raised beds and a half-open gate.

The method is not new. **CPS goes back to work by Osborn in 1953**, and Parnes carried it further in 1967. A later review of training in the method called CPS "one of the more popular creative process models" (Puccio et al., 2006), and the review looked at how CPS has been taught and used at work.

The same review places CPS among other methods. The field has many methods "aimed at deliberately nurturing creative thinking", and CPS is "one of the rare exceptions" where using the method at work goes together with research on it (Puccio et al., 2006). **Deliberately nurturing means growing on purpose**, like watering a plant each day.

Where CPS came from



> **Science Says:**
> The review brought together studies of CPS training "within organizational contexts", which means in companies and other workplaces (Puccio et al., 2006). It is a review of many reports, and **it did not test the Clarify stage on its own**. The support is for CPS as a whole course, so each drill in this section is practice, with no promise of its own. Treat the drills as a way to learn the stage.

What the review covered

- CPS training in companies and other workplaces
- It did not test the Clarify stage on its own
- Each drill in this section is practice

In 3.2.1 you met problem construction, which is deciding what the problem is before you solve it. **The way people built a problem went with the quality and originality of their answers** (Reiter-Palmon et al., 1998). Clarify is the CPS stage where that building happens, and it turns the building into a step you can repeat on any task.

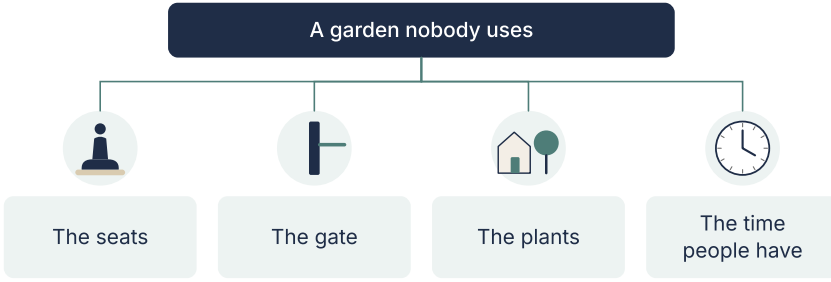
Clarify works like a doctor's first questions. **The doctor asks where it hurts and since when** before writing anything down on a pad, because the same cough can come from different causes. The picture stops at the answer sheet. A doctor checks against known illnesses, and a creative task has no list of right answers.

A doctor's first questions

The idea	What it is like
The doctor	Asks where it hurts and since when
Clarify	Finds and frames the task before you solve it

In this book, creativity is solving tasks where the variables are not identified. **A garden nobody uses is that kind of task.** Nobody has told Ines which parts of the problem count, whether it is the seats, the gate, the plants or the time people have. Clarify is where she starts to find those parts for herself.

Which parts of the problem count



> **Key Concept:**
>
> Clarify. Clarify is **finding and framing the task** before you solve it. You ask what is really wanted, who it is for and what stands in the way. You end with one short statement of the task that still leaves room for many answers. A statement that already names its answer, such as more benches, has nothing left to find, and the next stage starts with its hands tied.

Start with the task the way it first comes to you. Ines writes it down as how to get more benches into the garden. **Then ask why you want that**, and write the answer as a new version of the task. She wants benches so people will sit, and she wants people to sit so the garden feels used.

Each answer to why lifts the task one step higher. **A higher task lets in more kinds of answer**, such as a seed swap or a gate that stays open on Saturdays. A task can climb past the useful point. How to make the whole street happier has no edges, so stop where you can still picture a first move.

Each answer to why lifts the task



> Exercise:
>
> Try it. Write one task from your week as three wishes starting It would be great if. **Keep the wish with the most unknowns.**

Work with the wish that keeps its unknowns. **An unknown is a door left open**, a part of the task you have not decided yet. A wish such as it would be great if neighbours dropped in leaves open who might come and when, and each open part can lead to a different set of ideas.

An unknown is a door left open

- A part of the task you have not decided yet
- Who might come and when
- Each open part can lead to a different set of ideas

Other people see the same task from where they stand. **The neighbour with a pram sees a gate that is hard to open**, a teenager sees nowhere to sit with friends, and the man on the corner sees weeds. Each of them would name a different real task, and Ines cannot see any of them from her own kitchen window.



Three neighbours at a garden gate, one with a pram, one teenager with a phone and one older man holding a bag of weeds.

She asks four neighbours what they would change, and she writes each answer as a task in their words. **Four people give her four different tasks**, from somewhere to sit in the shade to a place for children to dig. None of them asked for more benches, and two of them had never been through the gate.

Four people give her four different tasks



Somewhere to sit in the shade



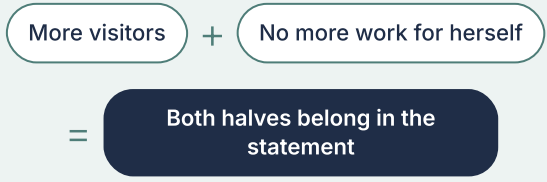
A place for children to dig



None of them asked for more benches

Some tasks hold two wants that pull apart. Ines wants more visitors and no more work for herself, and **both halves belong in the statement**. Keeping a clash in view is a practice step here, and it hands the next stage both halves to work with.

Two wants that pull apart



> **Key Concept:**
> Coming back down. A task that has climbed past the useful point, such as making the whole street happier, needs **a step back down**. Ask how you might do it, and write one answer as a new, smaller task. Stop at the first step where a first move comes to mind. Keep the high version at the top of the page, so you can see where the smaller task came from.

After three steps, Ines has a new statement. It reads, how might more neighbours enjoy the garden each week, with no extra work for me. **The**

benches have gone from the statement, and so has any other answer. Who comes, what they do and when they come are still open, and the clash is still in view.

The new statement

> - How might more neighbours enjoy the garden each week
> - With no extra work for me
> - The benches have gone from the statement

A good statement is short and plain. **It names who the task is for and what would count as better**. It keeps any clash that is really there, and it leaves the answer out, so that the next stage has room to look in many directions. A statement of one line is easy to read aloud and easy to test.

A good statement

- [x] Short and plain
- [x] Names who the task is for
- [x] Names what would count as better
- [x] Keeps any clash that is really there
- [x] Leaves the answer out

Three slips are worth watching for. The first is **a statement that hides an answer**, like more benches. The second is a statement so wide that no first move comes to mind, and the third is a statement that drops one half of a clash to make the task look easy. Each slip shrinks the room for ideas.

Three slips worth watching for



Big studies of training give the method a wider frame. In 3.1.1 complex training courses gave g = 0.66 (Haase et al., 2025). **CPS is a course of several stages**, so it is the kind of course that number describes, though the study did not report CPS as a group of its own.

> **Key Concept:**
> Everyday framing. Try one line before you act on a small problem. A crowded fridge, a child who will not read at bedtime or a garden shed full of clutter all work. **Write it, climb once with why, and read both versions.** Choose the version that leaves more open, and keep the other one for later. After a week, look back at which version led you to the better fix.

Clarify fits ordinary problems, such as a messy hallway or a long weekly meeting. **A hallway task might climb from more hooks** to a way for everyone to find their shoes fast. That version invites more ideas than hooks alone, such as a shoe rack by the door or a basket for each person.

A hallway task climbs

Version	Ideas it invites
More hooks	Hooks alone
A way for everyone to find their shoes fast	A shoe rack by the door or a basket for each person

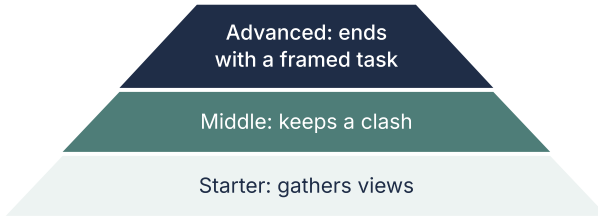
You know Clarify is finished when you can read your statement aloud and **nobody can tell what the answer will be**. If a friend guesses the answer at once, the statement still hides it. Take the answer out of the statement and read the new version aloud. A second reading often takes less than a minute.

Read it aloud



The levels below follow **the order of the stage**. The starter gathers views, the middle level keeps a clash, and the advanced level ends with a framed task. Each level builds on the one before it, so do them in order.

The order of the stage



The advanced level pairs a rule with **a real task of your own**, the shape of the better programmes (Scott et al., 2004). Use a task you care about

and will really act on this month, because a framed statement you will never act on gives the next stage nothing to work with.

Finding the real task at three levels



Everyone it touches



Both wants, then one dropped



One framed statement to carry into Ideate

> **Exercise:**
>
> Finding the real task.
>
> 1. Starter. Pick one task and list everyone it touches. Write **what each person would call the real task**.
> 2. Middle. Write your task with both wants, then with one dropped. **List the ideas the shorter version shuts out.**
> 3. Advanced. Take a real task from home or work. Climb it with why, check it against your starter list and write one framed statement to carry into Ideate.

Key idea:

Clarify is the first stage of CPS, where you **find and frame the task**, and a statement that keeps its unknowns leaves room for many answers.

Quick check:

What should a Clarify statement leave out? Answer: the answer itself, such as more benches, so that the next stage still has plenty of room to look in many different directions.

4.1.2 Ideate: Generate Different Possibilities

Imagine Ines, the woman who looks after a shared garden that hardly anyone uses. She has framed her task as how more neighbours might enjoy the garden each week, with no extra work for her. **Now she needs ideas**, and the first one that comes to her is a sign on the gate.

Now she needs ideas

> - How more neighbours might enjoy the garden each week
> - With no extra work for her
> - The first idea is a sign on the gate

A sign on the gate is a fine idea, and it is only one. **Ideate is the CPS stage where you make many different possibilities** for the task you framed. In this section I show you how the stage works, why the first ideas are seldom the best ones, and how to practise making ideas at three levels.

Like the other stages, Ideate goes back to the CPS work of Osborn and Parnes. It is **the making half of creative work** (Cropley, 2006). Ideate gives that making a stage of its own, so judging can wait. One review backs CPS as a whole course (Puccio et al., 2006), so each drill in this section is practice.

The making half of creative work



Divergent thinking is **the move that spreads out to many possible answers**, and Ideate is where you use it on purpose. In a study that combined many studies of creativity training for adults, the great majority of studies measured divergent thinking to see whether training worked (Haase et al., 2025). Ideate is the kind of work those tests ask for.

Ideate uses divergent thinking



> **Key Concept:**
>
> Ideate. Ideate is **making many different ideas for one framed task**, with the judging held back until later. You write every idea down, even the weak ones, and you keep going after the easy ideas run out. The list you end with is raw material for the next stage, where you will choose and strengthen. A long list with weak ideas in it is a good result.

Ideate works like casting a fishing net. **You haul up everything the net catches**, and the sorting happens later on the deck. Sorting each fish as it came up would leave time for two casts. The picture stops at the sea, because a net catches what is already there, and in Ideate you make some of the fish yourself.

Casting a fishing net

The idea	What it is like
A fishing net	You haul up everything the net catches
Ideate	You write every idea down, even the weak ones

The first ideas come fast, and they come from memory. In 2.1.1 you saw that **first answers are often things you already know**, and that later ideas in a long task tend to be more creative (Gilhooly et al., 2007; Beaty & Silvia, 2012). Ideate uses both findings, and the rule is simple. Keep going after the easy ideas.



A small fishing boat at dawn with a full net being pulled over its side, gulls circling above.

Set a timer before you start. **Five minutes is the length used in this section's drills**, long enough to reach a pause like the one Ines meets below and short enough to fit before breakfast. Write the time at the top of the page with the framed task, so the round has a clear start and end.

Before you start



Ines sets a timer for five minutes and starts. The sign, more benches, a water tap, some flowers and a bird feeder come in the first two minutes. **These are the ideas any garden might have**, and she writes them all down without stopping to judge. The list is still all about things.

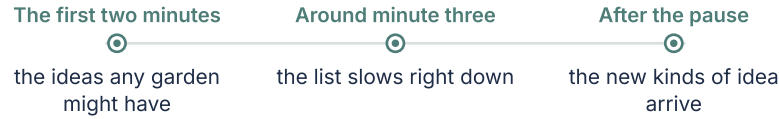
The first two minutes

- [x] The sign
- [x] More benches
- [x] A water tap
- [x] Some flowers
- [x] A bird feeder

> **Exercise:**
>
> Try it. Take one framed task. For five minutes, **list every idea you can** without crossing any out.

Around minute three, the list slows right down. Ines writes nothing for a while, then a book swap box comes, then a Saturday morning tea, then a class from the school planting bulbs. **The new kinds of idea arrive after the pause**, once the easy ones have been used up. By the end of five minutes she has fifteen ideas.

Ines's five minutes





A small wooden book swap box on a post beside a garden gate, a few paperbacks leaning inside it.

The quiet stretch can feel like failure, and it is part of the round. **Stay with the page through the pause**, even if all you do is reread the task or underline one word in it. Rereading the framed task can hand you a new angle, such as who the garden is really for.

Look at where the kinds change on your own list. **A new kind of idea answers the task in a different way**, such as people, events or objects. Ines's first five ideas were all objects, and her later ones were about people and events. A tea or a planting day brings neighbours in, which a bird feeder cannot do.

A new kind of idea

Kind	Ideas
Objects	The sign, a water tap and a bird feeder
People	A class from the school planting bulbs
Events	A Saturday morning tea

> **Key Concept:**
>
> Marking the minutes. Write the minute beside each idea as you go, or draw a line on the page each time the timer passes a minute. **When the list is finished, find the minute where a new kind of idea first appeared.** Over a few rounds you learn how long your own easy ideas last, and you stop giving up before the pause.

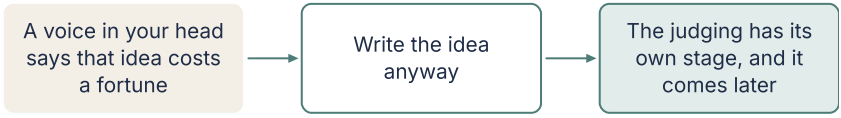
Ideate has a few house rules. **Write every idea, even the silly ones**, because a silly idea can point to a good one. Number the ideas so the list feels like a count you can beat next time. Keep them short, a few words each, so your hand can keep up with your head.

Ideate has a few house rules

- Write every idea, even the silly ones
- Number the ideas
- Keep them short, a few words each

Judging is the hardest rule to keep. A voice in your head says that idea costs a fortune, and the pen stops. **When the voice comes, write the idea anyway** and add a small mark beside it if you want to come back to it. The judging has its own stage, and it comes later.

When the voice comes



Many people make ideas in groups, and the research on groups gives a clear warning. Studies compare groups that talk their ideas out with a nominal group, which is **people who work alone and then pool their ideas**.

> **Science Says:**
>
> A study that combined many studies of brainstorming found that "brainstorming groups are significantly less productive than nominal groups, in terms of both quantity and quality" (Mullen et al., 1991). Quantity means **how many ideas**, and quality means how good they are.

Talking groups and nominal groups

	Brainstorming groups	Nominal groups
Who	Groups that talk their ideas out	People who work alone and then pool their ideas
Quantity and quality	Significantly less productive	More ideas and better ones

In 1.2.2 you met the main reason. **People waste ideas while they wait their turn to speak**, and that waiting caused most of the loss in group brainstorming (Diehl & Stroebe, 1987). An idea you hold back while someone else talks can fade before your turn comes, and the next speaker may pull the group somewhere else.

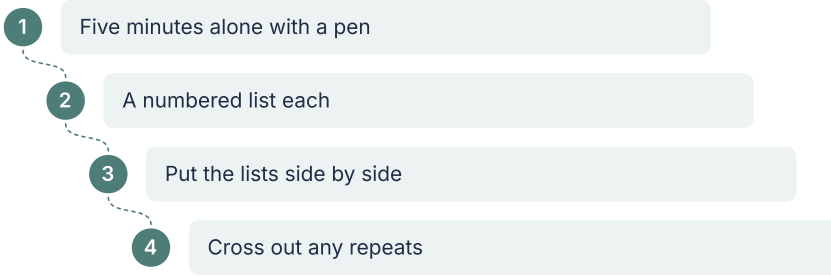
Waiting your turn to speak



For Ideate, the lesson is plain. **Writing alone first saves the ideas that waiting would cost**, even when a group will meet later. Nobody waits for a turn while everyone writes at the same time.

> **Key Concept:**
>
> Alone first. Before any group meeting about ideas, **give everyone five minutes alone with a pen**. Each person writes a numbered list for the same framed task. Then put the lists side by side and cross out any repeats. The pooled list is your nominal group, and it is the list you carry into the next stage. Talk can start once the lists are on the table.

Alone first



Two neighbours join Ines for a try. Each writes alone for five minutes, and then they read out their lists. **The three lists overlap in only a few places**, so between them they have more than thirty different ideas. A tool library and a compost class are new to Ines, and both fit the second half of her task.

Three lists side by side



The end of Ideate is a long list and no decision. **Park the list for a day** if you can, and resist picking a winner on the spot or on the way home. A day away lets you read the list with fresh eyes. Twenty ideas on one framed task is the target for the advanced level below.

The end of Ideate

- A long list and no decision
- Park the list for a day
- Twenty ideas is the target for the advanced level

Ideate fits into ordinary days, wherever a choice comes before a plan. **A meal for guests or a work report starts with a choice**, and a short list made first gives that choice more to work with. The list will be short at first, and it grows with practice.

Small lists count as practice. **A list of five ideas for tonight's dinner** uses the same moves as a list of twenty for the garden. You write them all, keep going past the first and judge only at the end.

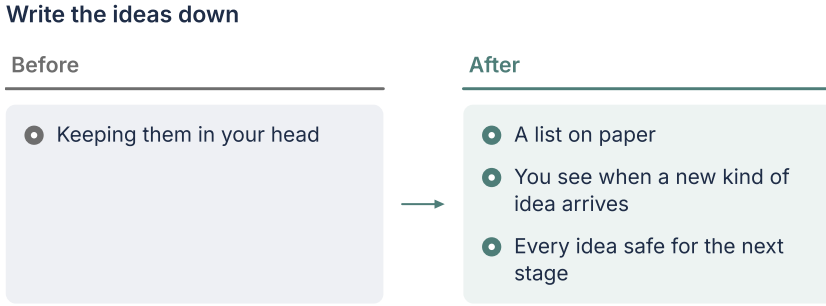
Small lists count as practice



> **Key Concept:**
>
> Everyday Ideate. Three minutes before you choose is enough. **List ideas for a weekend plan, a reply to a hard email or a gift for a neighbour**, then stop and park the list. Come back to it once before you decide. Each list is one round of practice, and the habit is to make before you judge.

The same rules hold when the task is small. **Write the ideas down instead of keeping them in your head**, because a list on paper lets you see when a new kind of idea arrives. Paper keeps every idea safe for the next stage, where you choose.

The levels below build on the stage. The starter pushes past the first ideas, and the middle level keeps the making alone and written. The advanced level pairs a target with **a real task of your own**, the shape of the better programmes (Scott et al., 2004).



> **Exercise:**
>
> Many possibilities.
>
> 1. Starter. List ideas for one framed task for five minutes. **Mark the minute when a new kind of idea first appears**, and keep going past it.

2. Middle. Before a group talk about ideas, write your own list alone. Pool the lists before anyone speaks.
3. Advanced. Take a real framed task. List twenty ideas without judging, then put the list away until tomorrow.

Many possibilities at three levels



Mark the minute a new kind appears



Write your own list alone



Twenty ideas, then put the list away

Key idea:

Ideate is the CPS stage where you **make many different ideas** for one framed task, keep going past the easy ones and hold the judging back until later.

Quick check:

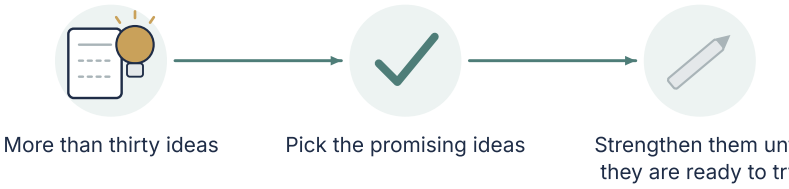
Why make your list alone before a group talks? Answer: because groups that talk their ideas out make fewer and weaker ideas than the same people working alone, mostly because people block each other while waiting to speak.

4.1.3 Develop: Strengthen Promising Ideas

Imagine Ines, who now has a list of more than thirty ideas for her shared garden. The list holds a book swap box, a Saturday tea, a tool library, a sign on the gate and many more. **A long list is not yet a plan**, and she cannot do thirty things at once.

Ines now has to choose and then make the chosen ideas stronger. **Develop is the CPS stage where you pick the promising ideas and strengthen them** until they are ready to try. In this section I show you how to choose with clear tests, how to build up a chosen idea, and how to practise both at three levels.

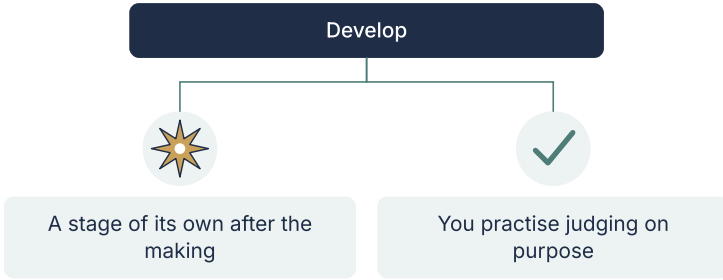
From a long list to a plan



Develop belongs to the same CPS line, which goes back to the work of Osborn and Parnes. **It is where the judging happens** (Cropley, 2006), and it gets a stage of its own after the making. In Develop the judging has a job to do, and the job ends with an idea ready to try.

Develop is the stage where **you practise judging on purpose**, one idea at a time. One review looks at CPS as a whole course (Puccio et al., 2006), so each drill here counts as practice only. Each drill below adds one move to the stage.

Where the judging happens



> **Key Concept:**
>
> Develop. Develop is **choosing the most promising ideas and making them stronger** before you try any of them. You start by writing the tests a good idea must pass. You pick the ideas that pass them best, and then you add what each chosen idea is missing. At the end, each idea is ready for a first real try.

Develop works like a gardener with a young plant. **The gardener cuts the weak shoots and ties the strong one to a stick**, so the plant puts its strength where it counts. Cutting comes first. The picture stops at growth, because a plant grows on its own, and an idea grows only when you add to it.

A gardener with a young plant

The idea		What it is like
The gardener	≈	Cuts the weak shoots and ties the strong one to a stick
Develop	≈	Picks the promising ideas and makes them stronger



A gardener's hands tying a young tomato plant to a cane with soft string, small cut shoots lying on the soil.

In 2.3.3 you saw that **students' choices of their own best ideas closely matched judges' ratings** (Silvia, 2008), and that groups picked no better than chance (Rietzschel et al., 2006). The new point for Develop is about how to choose. A choice made by feel can go either way, so write the tests down before you look at the list.

> **Key Concept:**
>
> A covered list. While you write your tests, **keep the list covered** with a sheet of paper, so no favourite idea in view shapes a test to fit itself. Uncover the list only when every test is written, then read each idea against them. Keep the tests on a card, because the same tests may serve the next list on the same task.

A covered list



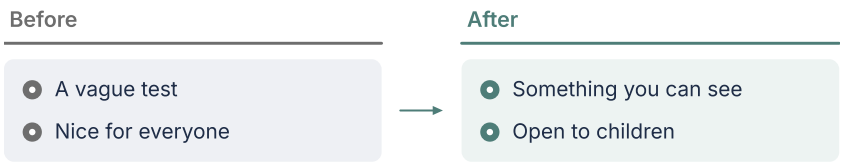
Her three tests come **from her own framed statement**. The idea must bring neighbours in, it must cost her no extra work, and it must start within a month. Each test was already in her statement, so writing them takes her a minute.

Ines's three tests

- [x] It must bring neighbours in
- [x] It must cost her no extra work
- [x] It must start within a month

A test has to be quick to check. A vague test such as nice for everyone **needs turning into something you can see**, such as open to children. Ines checks each of her three tests against one idea before she starts on the list.

A test you can see



> Exercise:
> Try it. Take a list of ideas and write one test from your limits, such as time or money. **Cross out the ideas that fail it.**

Each test cuts the list in a different place. **A bird feeder brings no neighbours in**, so it fails the first test. A summer fair would bring crowds and weeks of work for Ines, so it fails the second. A new hedge fails the third, because it takes a year to grow.

Each test cuts the list

Idea	Fails
A bird feeder	It brings no neighbours in
A summer fair	Weeks of work for Ines
A new hedge	It takes a year to grow

Her whole list of thirty ideas goes through the three tests. The book swap box, the Saturday tea and the tool library pass all three. **Three ideas out of thirty is a fine result**, because the tests are meant to cut. She keeps the others in a folder, since a cut idea can come back when the task changes.

Three ideas out of thirty pass



The book swap box



The Saturday tea



The tool library

> **Key Concept:**
>
> Writing tests. Write each test as a short line that an idea passes or fails. **Take one test from the purpose, one from the people and one from your limits**, such as time or money. Read every idea against every test, and mark the passes. Keep the tests to three or four, because a long row of tests can cut every idea away. Write them above the list, where you can see them as you read.

Writing tests



Choosing is half of Develop. **The other half is making the chosen idea stronger**, by adding what it needs to work in the real world. A bare idea, such as a Saturday tea, leaves out who makes the tea, which Saturday it is and how anyone hears about it.

A bare idea leaves out



> **Science Says:**
> In 3.1.4 you met elaboration, the detail that goes "beyond the minimum" an idea needs (Alabbasi et al., 2022). In a study that combined many training studies, **elaboration gained less from training** than the other idea scores (Haase et al., 2025). The smaller gain is the reason Develop sets time aside for detail, instead of hoping it turns up.

Here the detail has a job, which is to get the idea ready for a try. **Add the details a stranger would need** to make the idea happen without

asking you anything. Who does it, when, where, with what and for how much are the gaps to check.

The gaps to check

- [x] Who does it
- [x] When
- [x] Where
- [x] With what
- [x] For how much

The tea idea gets four additions. **A rota of four neighbours will host**, so no one does it every week. The tea happens on the first Saturday of each month, and everyone brings their own cup. A sign on the gate tells people when, so an early idea comes back in a new job.

The tea idea gets four additions

> - A rota of four neighbours will host
> - The first Saturday of each month
> - Everyone brings their own cup
> - A sign on the gate tells people when

Two chosen ideas can sometimes become one. **The book swap box can sit by the tea table**, so people who come for tea leave with a book and come back to return it. Joining the two costs Ines nothing extra, and each idea now helps the other to bring neighbours in.



A small wooden book box with a glass door standing beside a garden table set with cups and a teapot.

Strength comes from answering the weak spots. **Rain could spoil the tea**, so Ines adds the shed as a dry corner. Nobody might come the first time, so she asks two families by name. Each fix keeps the tea inside its tests.

Answering the weak spots

Weak spot	Fix
Rain could spoil the tea	The shed as a dry corner
Nobody might come the first time	She asks two families by name

> 🗝 **Key Concept:**
>
> Weak spots. Take your chosen idea and list **three ways it could fail** in real life. For each one, write one change that would stop it. Add only the changes that keep the idea passing its tests. If a fix breaks a test, such as costing more than you have, look for a smaller fix that keeps the idea inside its limits.

Adding can go on for ever, so set a stopping point. **Stop when the idea passes its tests and a stranger could carry it out.** Any more detail can wait for the try itself, which will show what the idea still needs better than another hour at the desk.

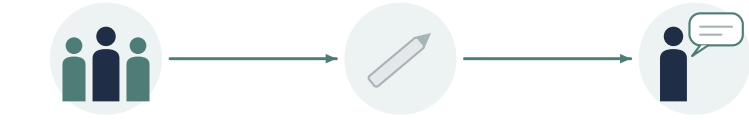
Set a stopping point

> - The idea passes its tests
> - A stranger could carry it out
> - Any more detail can wait for the try itself

A stranger's eye is a useful check against picking by feel. **Ask whether someone who does not know you would pick this idea** from the list. If the only reason to pick it is that you like it, your tests are weaker than the job needs. Add a test, or sharpen one.

The stranger test is a habit to practise, with no promise attached. **Show the list and the tests to a friend**, and ask them to circle the ideas they think pass. Where your circles and theirs differ, talk it through, and look again at the tests you wrote. A friend's circles give you a second view, and they cost nothing.

A friend's circles



Develop fits into ordinary days, such as booking a holiday or changing a weekly routine. **A holiday test might be a budget and a train ride**

under three hours, and two places out of six might pass both. The winner still needs a date and the name of the person who books it.

A holiday test

Test	Two places out of six
A budget	Pass
A train ride under three hours	Pass
Still needs	A date and the name of the person who books it

> **Key Concept:**
> Everyday tests. Before a choice at home, write **one test from your limits and one from the people involved**. A family meal might need to be quick and to suit a child who dislikes onions. Read your options against both, pick one, and add the detail it is missing before you start.

The end of Develop is a small number of strong ideas. **Each one passes its tests and has its weak spots answered**, and each one is ready to try in the world. Carry one or two into the next stage, because trying takes time. Ines carries the tea, with its book box, and nothing else.

The levels below follow the stage. The starter checks one idea's detail by having it read back, the middle level checks a choice against chance, and the advanced level ends with a strong idea ready to try. The advanced level pairs written tests with **a real task of your own**, the shape of the better programmes (Scott et al., 2004).

The end of Develop

- A small number of strong ideas
- Each one passes its tests
- Its weak spots answered

Exercise:

Strong ideas.

1. Starter. Write one idea and its details on a card. **Ask someone to say how they would carry it out**, and fix what they get wrong.
2. Middle. Give your list and tests to someone else. Compare their picks with yours and rewrite one test.
3. Advanced. Take a real task. Write tests, choose one idea, fix three weak spots and make it ready to try.

Strong ideas at three levels



Ask someone how they would carry it out



Compare their picks with yours



Fix three weak spots

Key idea:

Develop is the CPS stage where you **choose with written tests and strengthen what you chose**, so a long list becomes one or two ideas ready to try.

Quick check:

Why write the tests before you choose? Answer: because choices made by feel can go either way, and groups picking from their ideas have done no better than chance.

4.1.4 Implement: Put an Idea Into Practice

IMAGINE INES WITH ONE strong idea for her shared garden. A monthly Saturday tea, hosted by a rota of four neighbours, with a book swap box beside the table. **The plan looks good on paper**, and nobody has drunk a single cup of tea yet.

One strong idea

- A monthly Saturday tea
- Hosted by a rota of four neighbours
- A book swap box beside the table

An idea on paper changes nothing in the garden. **Implement is the CPS stage where you put an idea into practice**, first as a small try and then for real. In this section I show you how to plan the first try, how to learn from it and how to practise putting ideas into the world at three levels.

From paper into practice



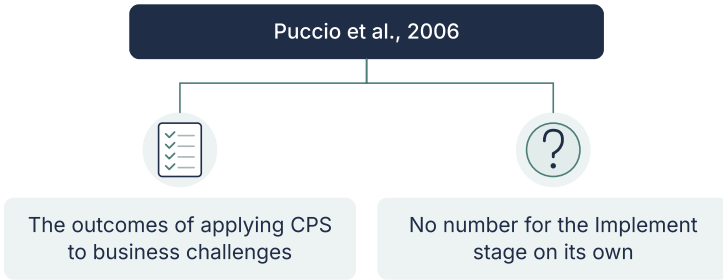


A folding table set up in a small garden with a tea urn, a stack of cups and a wooden book box, the gate open behind it.

Implement is the last of the four stages in the CPS line that goes back to Osborn and Parnes. **The review of CPS training looked at real work**, including "reports that cite the outcomes of applying CPS to business challenges" (Puccio et al., 2006). Outcomes are what happened after people used the method on real tasks.

The same review leans in favour of CPS and warns that the field needs research and practice to keep pace with each other (Puccio et al., 2006). **It does not give a number for the Implement stage on its own.** The drills in this section are practice, and the support behind them is for CPS as a whole course.

What the review of CPS training gives



> **Key Concept:**
>
> Implement. Implement is **putting a chosen idea into the world**, starting with a small try. You plan the first step, say what would count as done, give each job an owner and then run the try. Afterwards you write down what to change, and you change it before the next try. The stage ends when the idea runs well enough to keep going on its own.

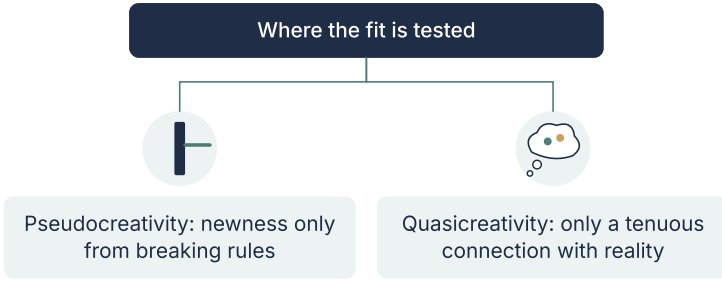
In 1.3.3 you met the gap between potential and achievement (Runco & Acar, 2012). **A list of good ideas is potential, and a tea that really happens is achievement.** Implement is the stage that closes the gap. An idea can feel finished once it is written down, and the feeling is not the same as the tea.

Good ideas and a tea that happens

	Potential	Achievement
In the garden	A list of good ideas	A tea that really happens

Untested ideas can go wrong in two ways. **Pseudocreativity is newness that comes only from breaking rules, lack of discipline, rejecting what exists or simply letting go** (Cattell & Butcher, 1968, as cited in Cropley, 2006). Cropley adds quasicreativity, newness with "only a tenuous connection with reality", such as daydreams (Cropley, 2006). Implement is where the fit is tested.

Untested ideas can go wrong in two ways



Implement works like a dress rehearsal. **The actors run the whole play once before the audience comes**, so the problems show up while the cast can still fix them. The picture stops at the script. A play keeps its script, while a try can change your idea a great deal.

Like a dress rehearsal



Start with the smallest next action. **Make the first step small enough to take this week.** For Ines, the first step is to knock on two doors on Monday and ask two families to come to the first tea. It takes ten minutes, and it turns the plan into something real, with two names and a date.

The smallest next action

- Knock on two doors on Monday
- Ask two families to come to the first tea
- Ten minutes, two names and a date

> Exercise:
>
> Try it. Pick one idea you have written down. **Write the smallest action** that would put it into the world this week.

The smallest action has to be a real move. **Thinking about the idea some more does not count**, and neither does buying a notebook for it. A phone call, a first sketch shown to someone or a date written on a shared calendar all count, because each one puts the idea in front of the world.

A real move

Counts	Does not count
⊕ A phone call	⊖ Thinking about the idea some more
⊕ A first sketch shown to someone	⊖ Buying a notebook for it
⊕ A date written on a shared calendar	

Next, say what would count as done. **A first try needs a finish line** you can see. Ines writes that the first tea is done if six people come, if the rota has four names and if the book box has a few books in it by the end of the day.

The first tea is done if

- ☑ Six people come
- ☑ The rota has four names
- ☑ The book box has a few books in it

> 🔑 **Key Concept:**
>
> Defining done. Before the try, write **two or three signs that the try has happened**. Keep them small enough to reach on the first go. A sign can be a number of people, a thing made or a step finished. When the signs are met, the first try is done, even if the idea still needs work. Huge signs turn a first try into a test you cannot pass.

A small try comes before a full launch. In 3.3.2 you met a lab task that scored the rough form first and the finished invention after it (Palmiero et al., 2015). **The new point for Implement is to treat your first try as the rough form**, a version that shows what the idea can become.

Treat your first try as the rough form



Every job in the try needs an owner. **An owner is the one person who makes sure a job gets done**, with a date beside it. Ines owns the invitations, a neighbour owns the tea urn, and another owns the sign on the gate. If a job has no name next to it, it may not get done.

Every job in the try needs an owner

Job	Owner
The invitations	Ines
The tea urn	A neighbour
The sign on the gate	Another neighbour

Plans made only by talking have a weak spot. Groups that talk their ideas out make fewer and weaker ideas than the same people alone (Mullen et al., 1991), **mostly because people block each other while they wait to speak** (Diehl & Stroebe, 1987). Write each next action down with its owner, so nothing rests on a talk alone.

Write each next action down



Each next action



With its owner



So nothing rests on a talk alone

> **Science Says:**
> The studies behind that warning were about groups making ideas (Mullen et al., 1991; Diehl & Stroebe, 1987). **They did not test groups planning a try**, so for a plan the warning is a caution, with no promise attached.

Choose one person to ask for feedback after the try. **Pick someone who will tell you the truth**, and ask one plain question, what would make it better next time. Ines plans to ask the older man on the corner, who notices most things in the street. She will ask him on the day itself.

Ask for feedback after the try

Try this now

1. Pick someone who will tell you the truth
2. Ask what would make it better next time

Then run the try. The first tea has nine people, and it rains for half an hour, so everyone squeezes into the shed. **The book box stays almost empty**, because nobody knew to bring a book. The older man leaves early, and afterwards he tells her there was nowhere to sit with a back.

The first tea





Neighbours crowded into a garden shed with cups of tea, rain falling on the path outside the open door.

Her notes after the try hold three changes. Ask each guest to bring one book, put one chair with a back near the table, and move the table under the shed roof from the start. **Each change comes from something she saw**, and none of them came from the planning.

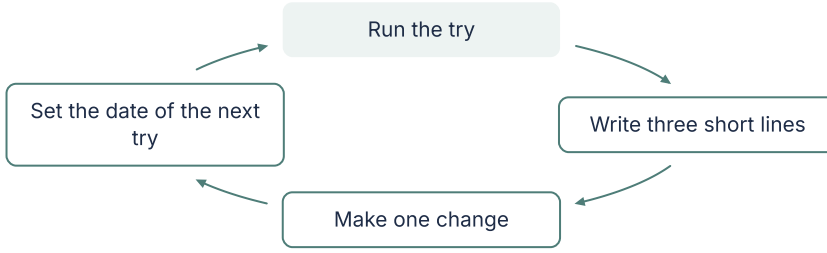
Three changes from something she saw

What she saw	Change
Nobody knew to bring a book	Ask each guest to bring one book
Nowhere to sit with a back	One chair with a back near the table
Everyone squeezes into the shed	Move the table under the shed roof from the start

A try that goes badly is still a try. **The point of a small try is to find the problems while they are small**, so a rainy tea with an empty book box has done its job. Ines would rather learn about the chair and the books from nine neighbours than from forty.

One try is the first of several. **Set the date of the next try** while the first one is fresh, so the changes have a deadline. Then the second try tests a better version of the idea. Ines puts the second tea on the calendar for the first Saturday of next month.

One try is the first of several



> **Key Concept:**
>
> After the try. Write three short lines. **What happened, what surprised you and what you will change.** Keep the lines plain, with no judging of yourself. Then pick one change and make it before the next try. One change at a time shows you which change helped, and small changes are easier to make. Keep every note in one place, so you can read the tries in order.

Implement fits into ordinary days. **A new way to share chores or a weekly family walk** is only an idea until someone tries it once. The first try can be as small as one evening, with one person in charge of it. Write that person's name down before the evening starts.

Only an idea until someone tries it



A new way to share chores



A weekly family walk

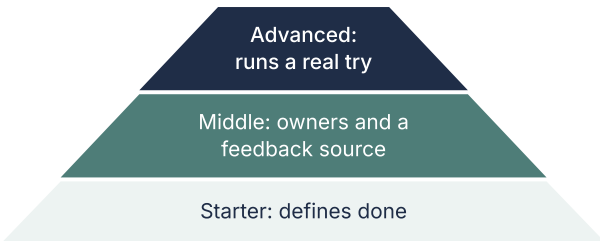


One person in charge of it

> **Key Concept:**
>
> Everyday tries. Pick one small change at home and **try it for one week before you decide** whether to keep it. A new place for keys, a shared shopping list on the fridge or a Sunday plan for the week all work. Name who owns it, write what would count as done, and write your three lines at the end of the week.

The levels below follow the stage. The starter defines done, the middle level gives the try owners and a feedback source, and the advanced level runs a real try. **The practice stays close to everyday tasks**, the kind of problem solving that research on problems points to (Reiter-Palmon et al., 1998).

The levels follow the stage



The advanced level pairs a rule with **a real task of your own**, the shape of the better programmes (Scott et al., 2004). Pick an idea you can try

within two weeks, so the three lines afterwards come while the try is fresh. Start with an idea small enough to try on an ordinary weekday.

> **Exercise:**
>
> Into practice.
>
> 1. Starter. For one idea, **write two or three signs** that would show a first try is done.
> 2. Middle. List every job in the try. Give each an owner and a date, and name one person to ask for feedback.
> 3. Advanced. Take a real idea. Run the try, write three lines afterwards and make one change before the next try.

Key idea:

Implement is the CPS stage where you put a chosen idea into the world through a small try, learn from it and change it before the next try.

Quick check:

What is the first step of Implement? Answer: the smallest next action that puts the idea into the world this week, such as a phone call or a knock on two doors.

Into practice at three levels



Two or three signs



An owner and a date for every job



Three lines afterwards

4.2 Generating Alternatives: Brainstorming and Brainwriting

4.2.1 Brainstorming Alone: Moving Beyond the First Answers

Imagine Hugo, who runs a chess club at his local library on Thursday evenings. Only three people come, and the same three every week. He wants more players, and the first answers in his head are a poster, a post online and free biscuits. **Those three ideas arrive in seconds**, and then his head goes blank.

Hugo's first answers

- [x] A poster
- [x] A post online
- [x] Free biscuits

Hugo's first three ideas are the ones almost anyone would have. **Brainstorming alone is making a long list of ideas on your own**, in writing, with the judging held back until the list is done. In this section I show you why working alone helps, how to move beyond the first answers and how to practise at three levels.

Brainstorming alone



On your own



In writing



The judging held back until the list is done

Brainstorming goes back to Osborn, who **proposed it in a book in the 1950s**. A later study of brainstorming groups named Osborn's book as the place the method came from (Diehl & Stroebe, 1987).

In 4.1.2 you met the warning about groups that talk their ideas out. **People working alone made more and better ideas** once their lists were pooled (Mullen et al., 1991). The new point for this section is how much being alone counts, and how the way you record ideas plays a part.

> Science Says:
>
> The loss in talking groups was larger "in comparison to a nominal group of truly Alone individuals (vs. a nominal group of Together individuals)" (Mullen et al., 1991). **Both kinds of nominal group worked on their own with no talking**, and the Together ones sat in the same room while they did.

Two kinds of nominal group

Kind	How they worked
Truly Alone	On their own with no talking
Together	In the same room, with no talking

In your own practice, the truly alone kind points to **a closed door, a quiet bench or an early hour** when nobody else is up. A busy kitchen with the radio on is a place to cook, and a poor place for a solo list.

A truly alone spot



A closed door



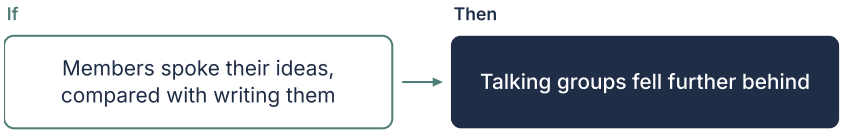
A quiet bench



An early hour when nobody else is up

In the group studies, **talking groups fell further behind** people working alone when their members spoke their ideas, compared with writing them. The loss was larger with "tape-recorded vocalization of contributions (vs. writing of contributions)" (Mullen et al., 1991). Vocalization means saying the ideas out loud, here into a tape recorder.

Saying the ideas out loud





A person alone at a kitchen table early in the morning, writing in a notebook under a lamp, the window still dark.

Writing has another plus for working alone. **A written list lets you see what you already have**, so you can tell when you are going round in circles. The page holds every idea for the day you choose.

A written list

> - Lets you see what you already have
> - Shows when you are going round in circles
> - Holds every idea for the day you choose

Keep each idea to a few words. **Short notes keep your hand moving**, and you can add detail later, on the day you choose. A list of twenty short lines fits on one page.

> Exercise:
>
> Try it. Find a spot where nobody can see your page. **Write ideas for one task until the page is full**, then count them.

Fear of being judged can slow you down even when nobody is there. **Worry about being judged is called evaluation apprehension.** Brainstorming on your own takes away the group, and it does not take away the judge in your head.

Hugo knows that voice well. **He scribbles out ideas soon after he writes them**, in case a member laughs or the library says no. The worry is about people who are not even in the room.

Evaluation apprehension



> **Science Says:**
>
> The same study that named Osborn's book found that "inducing evaluation apprehension reduced productivity in individual brainstorming" (Diehl & Stroebe, 1987). Inducing means **the team caused the worry on purpose**. Individual brainstorming means people working alone, and productivity here means how many ideas they made.

Hugo's scribbled lines are that worry on the page, and each one is an idea he never got to look at twice. Under a thick scribble the words are gone for good, so even a useful idea is lost before anyone can weigh it. That loss is easy to avoid.

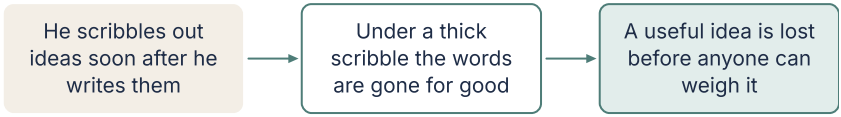
Worry caused on purpose

DS

Diehl & Stroebe, 1987

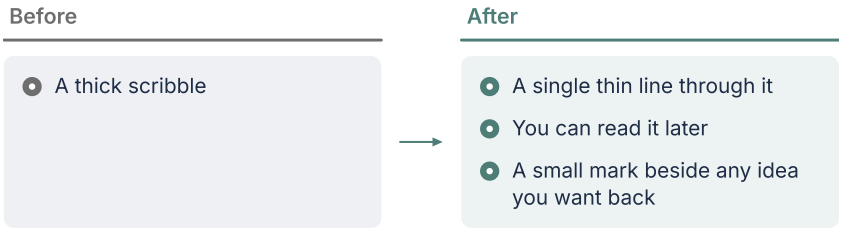
- Individual brainstorming: people working alone
- Inducing evaluation apprehension reduced productivity

Hugo's scribbled lines



A crossed-out idea can still be saved. **Draw a single thin line through it** in place of a scribble, so you can read it later, and add a small mark beside any idea you want back.

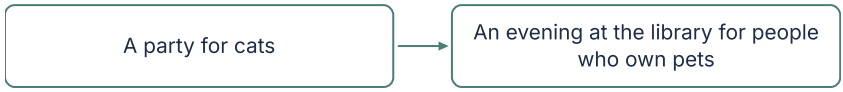
A crossed-out idea can still be saved



> **Key Concept:**
>
> A private list. Write your ideas in a notebook that **nobody else will read** unless you decide to show them. Tell yourself before you start that every idea is allowed, including silly and costly ones. Judging comes later, at a time you choose. A private list takes away an audience you did not need, and it leaves you free to write the strange idea down.

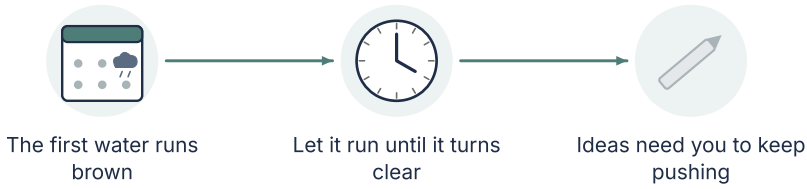
Silly ideas earn their place on the list. **A silly idea can point to a sensible one** that you would never have reached directly. A party for cats sounds like a joke, and it can lead to a sensible idea, such as an evening at the library for people who own pets.

A silly idea can point to a sensible one



A brainstorm alone works like turning on a tap that has been off for months. **The first water runs brown**, and you let it run until it turns clear. Nobody drinks the first cup. Where the picture stops is the waiting, because water clears on its own, and ideas need you to keep pushing.

Like turning on a tap





An old garden tap running into a bucket, the water brown at first and clear further down the stream.

A second try with five minutes and a pen goes further. After the poster, the online post and the biscuits, he writes nothing for almost a minute. **Then the list starts to move**, with a game against the library staff, a

chess table outside the café, a beginners' half hour and a club for parents and children.

Hugo's second try

The first answers	After almost a minute
The poster	A game against the library staff
The online post	A chess table outside the café
The biscuits	A beginners' half hour and a club for parents and children

The late ideas are the ones Hugo had never thought of before. **He circles the ideas that came after minute two**, and four of his six circled ideas are about who might play. His first three were all about how to spread the word, so the kind of idea changed once the easy ones ran out.

The circled late ideas

- He circles the ideas that came after minute two
- Four of his six circled ideas are about who might play
- His first three were all about how to spread the word

> **Science Says:**
> In 2.1.1 you met the order in which ideas come in a long task (Gilhooly et al., 2007; Beaty & Silvia, 2012). **Hugo's list followed that order**, and his late ideas were about new kinds of player. A solo brainstorm has to get past the first answers on purpose, because they arrive first and feel complete.

Give each round enough room for late ideas to arrive. **Keep writing through the first silence**, because stopping there cuts the list off just before the late ideas come. A minute of nothing is part of the round.

When the list dries up, a fresh prompt can restart it. **Hugo asks who else could join**, and the parents waiting for their children at the library come to mind.

A fresh prompt can restart it



> **Key Concept:**
> Pushing past the first answers. When the list dries up, keep the pen on the page and **try a new prompt**. Ask who else, where else, what it would be like for children and what you would do with no money at all. Write whatever comes, even if it seems weak. Keep a short list of your favourite prompts inside the cover of your notebook.

A count helps you see your progress. **Number each idea as you write it**, and write the total at the end with the date. Over a few weeks you can see whether your lists grow, and whether your circled late ideas grow with them.

A count helps you see your progress

Day	1	2	3	4	5	6	7
Number each idea as you write it	☐	☐	☐	☐	☐	☐	☐
Write the total at the end with the date	☐	☐	☐	☐	☐	☐	☐

Every Monday for a month, he runs a round. His first list has nine ideas, and his fourth has fourteen. **The circled late ideas grow from three to six**, and by the fourth week he reaches the new prompts without waiting for the pen to stop.

Every Monday for a month

	His first list	His fourth list
Ideas	Nine	Fourteen
Circled late ideas	Three	Six

The judging comes after the list, at a time you choose. **Read the list once with fresh eyes**, the next day if you can, and mark the ideas worth taking further. Hugo picks the beginners' half hour and the club for parents and children, because both bring in new players and neither costs money.

Hugo's picks

- [x] The beginners' half hour
- [x] The club for parents and children
- [x] Both bring in new players and neither costs money

A solo list is a good start for group work. **Bring your written list to any meeting** about the same task, so your ideas are on paper before the

talk begins. Nobody can block an idea that is already written down, and you can add the group's ideas to your list afterwards.

Bring your written list

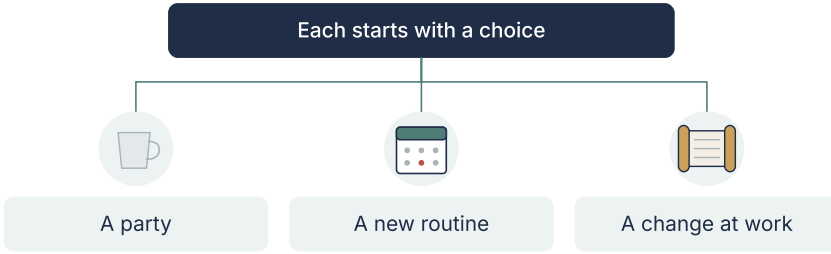


> **Key Concept:**
> Everyday solo rounds. Pick a moment that is already quiet, such as the first coffee of the day. **Write one task at the top of a page and list ideas for five minutes.** Circle the late ones. Keep the pages together, and choose from the list on another day, after the ideas have had time to sit.

Working alone fits into ordinary days. **A party, a new routine or a change at work** each starts with a choice. A private list made first means the first answer is no longer the only one on the table.

The levels below build up the habit. The starter pushes past your first stall, and the middle level keeps your ideas on paper even with others nearby. The advanced level uses **a real task of your own**, the shape of the better programmes (Scott et al., 2004).

A private list made first



Exercise:

Beyond the first answers.

1. Starter. Write ideas alone until you stall. **Then write three more before you stop**, and star the best of the three.
2. Middle. When others are nearby, write your ideas down and say none of them aloud until your list is done.
3. Advanced. Take a real task. Keep a private list for a week, adding ideas whenever they come, and choose only at the end.

Beyond the first answers at three levels



Three more before you stop



Say none of them aloud



A private list for a week

Key idea:

Brainstorming alone means **a written, private list that keeps going past the first answers**, with the choosing held back until the list is done.

Quick check:

Why write your ideas down instead of saying them aloud? Answer: because a written list shows you what you already have, and in the group studies spoken ideas lost more than written ones.

4.2.2 Brainstorming Together: Building on Other People's Ideas

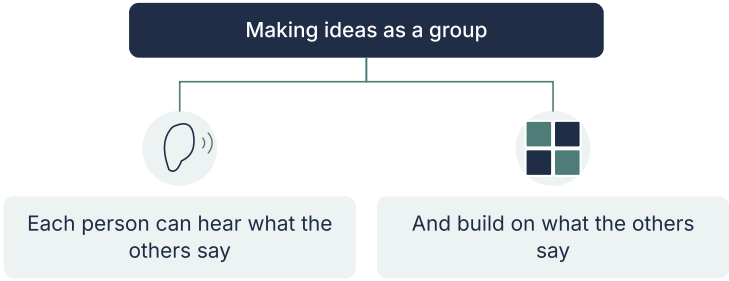
Imagine Bea, who shares a flat with three friends. The heating bill has doubled, and the four of them sit round the kitchen table one evening to find ways to cut it. **The talk is lively and everyone laughs**, and at the end of an hour they have six ideas, most of them from the loudest flatmate.

Bea's first night

- Four of them round the kitchen table
- At the end of an hour, six ideas
- Most of them from the loudest flatmate

An hour of four people talking gave Bea's flat six ideas. **Brainstorming together is making ideas as a group**, where each person can hear and build on what the others say. In this section I show you what the research says about groups, how to run a group round that loses fewer ideas and how to practise at three levels.

Brainstorming together





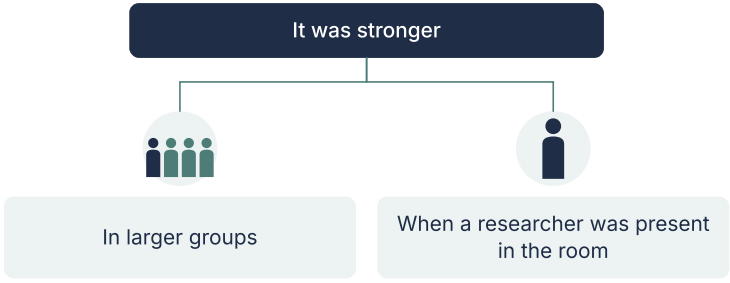
Four young people round a small kitchen table at night, one talking with wide gestures while the others listen, a single sheet of paper in the middle.

Group brainstorming goes back to Osborn in the 1950s. **The picture most people have of it**, a room of people calling out ideas, is the group version this section looks at. In that version, everyone hears every idea as it is said.

In 4.1.2 you met the warning about groups that talk. **Interacting groups produce fewer and weaker ideas** than the same number of people working alone (Mullen et al., 1991). Bea's flat felt that loss on its first night without knowing it.

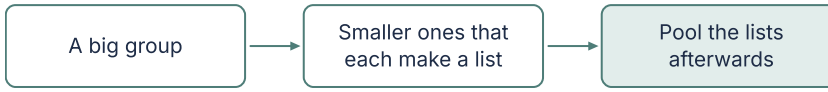
> Science Says:
>
> The loss was not the same in every study. **It was stronger in larger groups** and when a researcher was present in the room (Mullen et al., 1991). That is a pattern across many studies, and it names no best size for a group.

The loss was not the same in every study



Size is one thing a group can change. **A big group can split into smaller ones** that each make a list and then pool the lists afterwards.

A big group can split



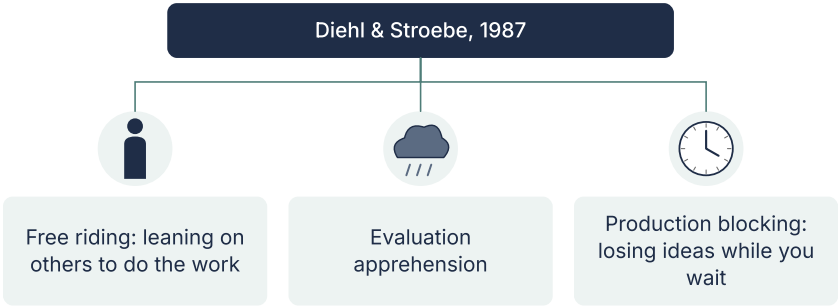
The studies measured a second thing, **a researcher in the room**. They say nothing about a boss, so treat any guess about bosses as a guess. Bea's flat has no researcher and no boss, so neither applies at her kitchen table.



A long meeting table with eight people, two of them talking and the rest waiting with pens raised, a clock on the wall behind.

Three reasons for the loss were tested, free riding, evaluation apprehension and production blocking (Diehl & Stroebe, 1987). **Free riding means leaning on others to do the work.** Production blocking means losing ideas while you wait your turn to speak. Each one names a different way an idea can go missing.

Three reasons for the loss were tested



Production blocking accounted for most of the loss (Diehl & Stroebe, 1987). **Waiting to speak cost the most ideas.** The way the groups talked made the team doubt that evaluation apprehension was the main reason groups lost out.

Waiting to speak cost the most ideas

- Production blocking accounted for most of the loss
- Evaluation apprehension was not the main reason

> **Key Concept:**
> Spotting the queue. Watch a group for one round and **count who speaks and who waits**. Mark a tick for each idea said and a dot each time someone starts to talk and stops. Many dots mean ideas are queuing. Use what you see to choose the fix, a round for the waiting and slips for the ideas that fade.

Waiting to speak works like a queue at a bus with one door. **Only one person can get on at a time.** While you wait, your idea can slip away,

or the bus can turn off. The picture stops at the end of the queue, because everyone gets on a bus in the end, and some ideas never do.

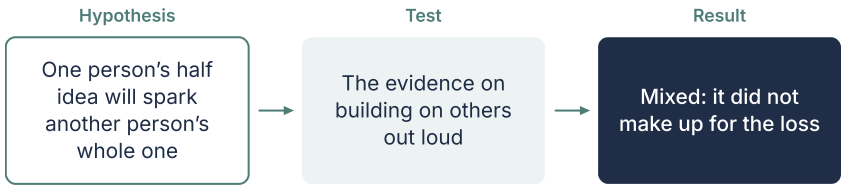
A bus with one door



Groups have a reason to meet all the same. **Building on other people's ideas** is the hope behind group work, the chance that one person's half idea will spark another person's whole one. Bea hopes for that when she calls the flat together.

> **Science Says:**
>
> The evidence on building on others out loud is mixed. The loss in talking groups is a strong finding (Mullen et al., 1991), and **the studies here did not show that building on others makes up for it**. This section treats the gain from building on others as a hope still to be tested.

A hope still to be tested



On the first night, Bea's flat met the queue head on. **The loudest flatmate filled most of the hour**, and two of the others said

afterwards that they had ideas they never got to say. Those lost ideas are the loss the studies measured, seen from inside one kitchen.

The queue in one kitchen



The loudest flatmate filled most of the hour



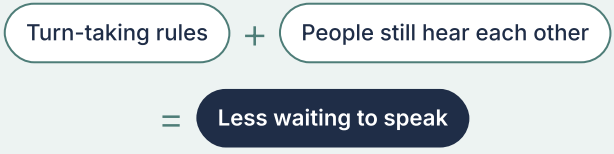
Two of the others had ideas they never got to say



The loss the studies measured

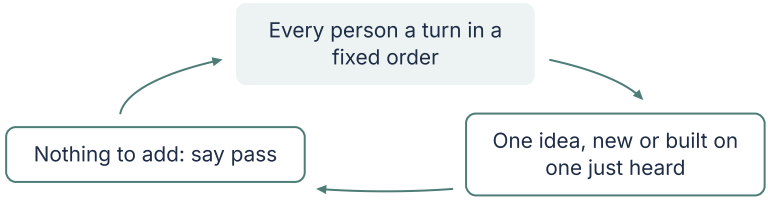
A group can keep the building and lose less to the queue. **Turn-taking rules cut the waiting to speak** without stopping people from hearing each other. The simplest of these rules is a round. It keeps the building and spreads the turns evenly.

Turn-taking rules



> **Key Concept:**
>
> Rounds. A round gives **every person a turn in a fixed order**. Each turn holds one idea, either new or built on one just heard, and nobody interrupts. A person with nothing to add says pass. Keep going round until two rounds in a row are all passes, then stop and count the ideas on the sheet.

A round



The round keeps the hope of building alive. **You hear each idea and can build on it** on your next turn, without shouting over anyone. Bea's flat agrees that a built idea has to name the idea it grows from, so the chain stays easy to follow on the sheet.

A built idea can be small. **Changing one word of the last idea counts**, such as thick curtains becoming thick curtains for the hall door. The chain on the sheet then shows how each idea grew.

A built idea can be small



> Exercise:
>
> Try it. With two or more people, go round in turn. **Each person adds one idea**, with no interrupting. Stop after five rounds.

A round is a practice to cut blocking, with no promise that it erases the loss. **Each person gets a turn without having to fight for it**, so the quiet flatmate's ideas reach the table. Bea's flat tries a round the next

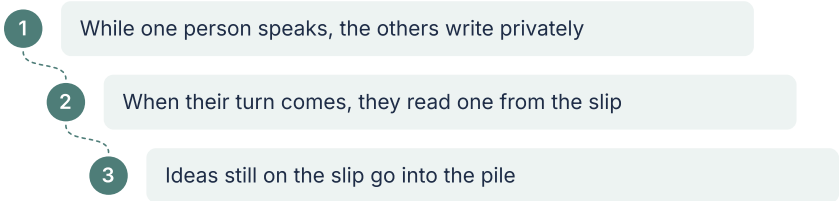
evening, and the quietest flatmate, who said nothing the first night, adds three ideas in ten minutes.

The quietest flatmate

> - Said nothing the first night
> - Adds three ideas in ten minutes the next evening

Writing helps a round lose fewer ideas. **While one person speaks, the others write their own ideas privately** on a slip of paper, so nothing slips away while they wait. When their turn comes, they read one from the slip. Ideas still on the slip at the end go into the pile with the rest.

Slips while you wait



Solo writing can start before the round begins. **The round then starts with every person's best ideas already on paper**, and the building happens on top of them. Nobody arrives with an empty head, and nobody waits with a full one.

Someone has to keep time. **A phone timer for the silent minutes** spares anyone from calling the end, and the round starts when it rings. Bea's flat puts the phone face up in the middle of the table.

Someone has to keep time



A phone timer for the silent minutes



Face up in the middle of the table



The round starts when it rings

> **Key Concept:**
>
> Alone, then together. Start with **five minutes of silent writing**, each person on their own list. Then go round in turn, each person reading one idea from their list or building on one they just heard. Write every idea on a shared sheet as it is said. Finish by adding the unread ideas from each list to the sheet.

Choosing is a separate step, and groups find it hard. In 4.1.3 you met written tests and the reason for them, that **groups choosing from their ideas did no better than chance** (Rietzschel et al., 2006).

The lesson for a group is to choose with written tests, agreed before anyone picks. **Good group tests are ones anyone can check**, such as cost or how soon an idea could start. Cost under ten pounds is a test anyone can read off a price tag.

Good group tests

- [x] Ones anyone can check
- [x] Cost
- [x] How soon an idea could start
- [x] Cost under ten pounds

> **Key Concept:**
> Choosing as a group. Write the tests first, where everyone can see them. **Read each idea against each test** and mark the passes, with no talk about favourites. Keep the ideas that pass every test. If most ideas pass, add one test, and if none pass, look at which test cut everything and ask whether it is fair.

Tests take the heat out of choosing. **Nobody has to argue that their own idea is best**, because the tests do the cutting. Bea's flat finds that the loudest flatmate's favourite, a rule of jumpers indoors, fails the effort test, and nobody has to say so to his face.

The tests do the cutting



Nobody has to argue that their own idea is best



Jumpers indoors fails the effort test



Nobody has to say so to his face

On a Sunday, Bea's flat runs the full pattern. Five silent minutes give them twenty-two ideas between them, and the round adds seven more, built on ones they heard. **Their tests are cost, effort and a start this month**, and three ideas pass, a heating timer, thick curtains for the big window and a weekly check of the meter.

The full pattern on a Sunday

Step	Ideas
Five silent minutes	Twenty-two ideas between them
The round	Seven more, built on ones they heard
Cost, effort and a start this month	Three ideas pass

Group rounds fit into ordinary days. A family deciding on a holiday, a team planning a meeting or friends choosing a gift can all **write alone for a few minutes, then go round in turn**. The whole pattern takes twenty minutes, and the quiet voices get heard.

Group rounds fit into ordinary days



The levels below build the pattern step by step. The starter keeps one speaker at a time, the middle level compares a group list with a pooled solo list, and the advanced level puts solo writing first and choosing last. The advanced level uses **a real task of your own**, the shape of the better programmes (Scott et al., 2004).

Exercise:

Building together.

1. Starter. In a group, let one person speak at a time while **the others write their own ideas** on slips.
2. Middle. After a group list, ask each person to write alone for five minutes. Pool those lists and compare the counts.
3. Advanced. On a real task, write alone first, build in rounds, then choose with written tests.

Building together at three levels



One person speaks at a time



Pool the solo lists and compare the counts



Write alone, build in rounds, then choose

Key idea:

Talking groups make fewer and weaker ideas than the same people alone, so **write alone first, build in turns and choose with written tests.**

Quick check:

What caused most of the loss in brainstorming groups? Answer: production blocking, which means losing ideas while you wait your turn to speak.

4.2.3 Brainwriting: Generating and Exchanging Ideas in Writing

Imagine Dara, who sits on the small committee of a town choir. Five of them meet to plan a summer concert, and the last meeting ended with one idea, the same concert as last year. **Two members talked for most of the hour**, and the other three went home with ideas still in their heads.

The last committee meeting

- Five of them plan a summer concert
- One idea, the same concert as last year
- Two members talked for most of the hour

Dara wants a meeting where every member's ideas reach the table. **Brainwriting is making and swapping ideas in writing**, so a group can build on each other's ideas without anyone waiting to speak. In this section I show you how it works, what the research can and cannot say about it, and how to practise it at three levels.

Brainwriting



Making ideas in writing



Swapping them



Nobody waiting to speak



Five people at a long table in a church hall, each bent over a sheet of paper, a pile of choir folders at one end.

Brainwriting grew out of **the brainstorming that Osborn started**. The written version goes back to Rohrbach, who wrote about it in a German trade journal in 1969. A trade journal is a magazine for people who work in one line of business.

Where brainwriting came from



Brainwriting keeps the group and changes the way ideas move. **Ideas travel on paper**, from one person to the next, and nobody has to speak to add one. Each person reads what the others wrote and adds new ideas or builds on old ones, all in silence. The only sound is pens on paper.

Ideas travel on paper



From one person to the next

Read what the others wrote

Add new ideas or build on old ones

> **Key Concept:**
>
> Brainwriting. Brainwriting is **a group making ideas in writing and passing them round**. Each person writes a few ideas on a sheet of their own, then passes the sheet on to the next person. The next person reads it and adds more, new or built on what is there. Nobody speaks until the writing is over, so nobody waits for a turn. The talk comes at the end, when the sheets are read and the choosing begins.

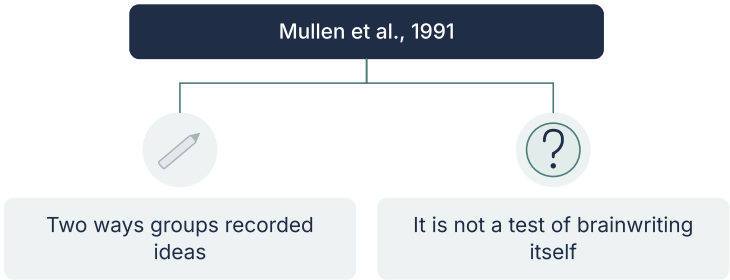
In 4.1.2 you met the warning that talking groups lose ideas, mostly because people block each other while they wait to speak (Diehl & Stroebe, 1987). **Brainwriting aims at that blocking.** On paper there is no queue, because everyone can write at the same time, and an idea goes down the moment it arrives.

No queue on paper

	Talking groups	On paper
Waiting	People block each other while they wait to speak	There is no queue
An idea	Waits for a turn	Goes down the moment it arrives

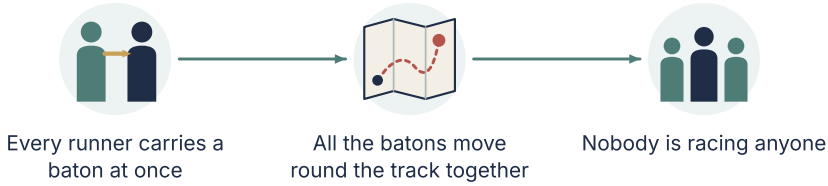
In 4.2.1 you saw that **talking groups fell further behind people working alone** when members spoke their ideas than when they wrote them (Mullen et al., 1991). That finding is the best support for swapping ideas in writing. It compares two ways groups recorded ideas, and it is not a test of brainwriting itself.

What the best support compares



Brainwriting works like a relay race where every runner carries a baton at once. **All the batons move round the track together**, and each one picks up a little more on every lap. The picture stops at the finish, because in a race the fastest team wins, and in brainwriting nobody is racing anyone.

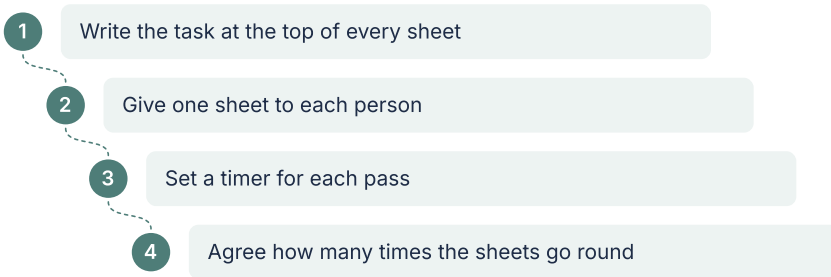
Like a relay race



> Exercise:
>
> Try it. With a few people, **each write three ideas in silence**. Pass your sheet on, and add to the next one.

Set the round up before anyone starts. **Write the task at the top of every sheet**, in the same words, so everyone is answering the same thing. Give one sheet to each person, set a timer for each pass and agree how many times the sheets will go round.

Set the round up



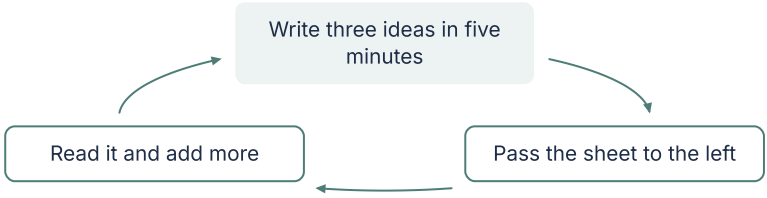
Leave names off the sheets, and agree this before the first pass. **An idea with no name on it is judged on its own**, and nobody has to wonder who wrote the odd one. Dara asks the committee to use the same blue pens, so even the handwriting gives little away.

Leave names off the sheets

> - An idea with no name on it is judged on its own
> - The same blue pens
> - Even the handwriting gives little away

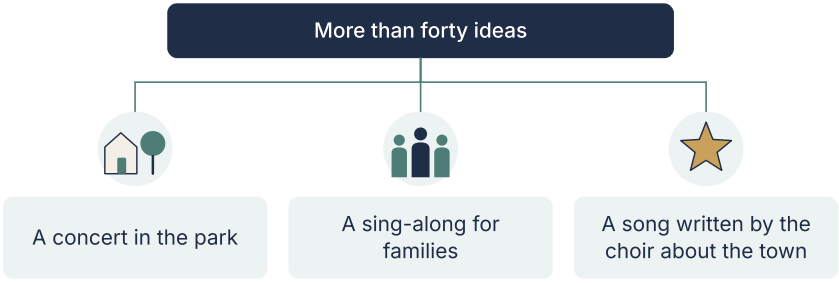
At the next meeting, the committee tries the pattern. Each member writes three ideas for the concert in five minutes, then passes the sheet to the left. **Every sheet goes round the whole table** before anyone says a word, so each member sees every other member's ideas once.

Every sheet goes round the whole table



The sheets come back full. **Five sheets hold more than forty ideas**, from a concert in the park to a sing-along for families and a song written by the choir about the town. The quiet member who said nothing last time added the park idea, and three others built on it.

The sheets come back full



Key Concept:

Building on paper. When a sheet reaches you, **read every idea on it before you write**. Then add either a new idea or one built on an idea already there, and draw a small arrow to the idea it grew from. Arrows let the group see which ideas set off others. Keep each idea to one line, so the next reader can take it in quickly.

People working alone are a strong yardstick, and brainwriting sits halfway between them and a talking group. Each person writes alone and then reads the others' work.

Brainwriting leaves a record behind. **Every idea stays on a sheet** with an arrow to where it came from, so nothing depends on memory after the meeting. The committee can read the whole history of an idea in one glance.

Brainwriting leaves a record



Every idea stays on a sheet



An arrow to where it came from

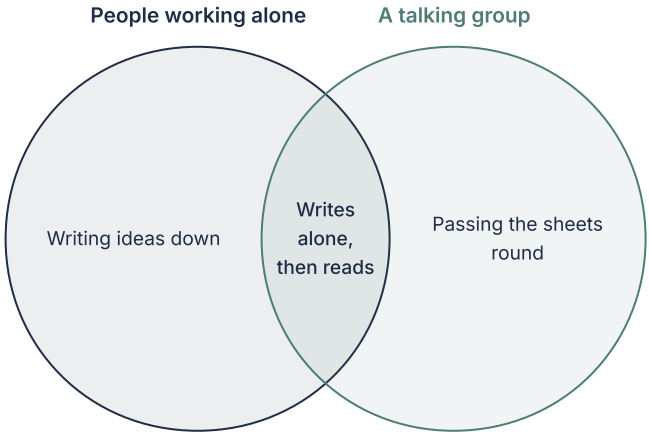


Nothing depends on memory after the meeting

Science Says:

The studies behind the warning compared talking groups with people working alone (Mullen et al., 1991). **Writing ideas down is the part brainwriting shares with the people who worked alone**, and passing the sheets round is the part it shares with a group.

Halfway between



Treat brainwriting as a way to bring a group's ideas together with less blocking, and keep solo lists as your baseline. If a group can meet, brainwriting is one way to use the meeting.

Fear can play a part, along with waiting. **Writing in silence may make the worry about being judged smaller**, since nobody watches you speak. That link is a reason to practise the method, and it stays a guess.

A reason to practise, and still a guess

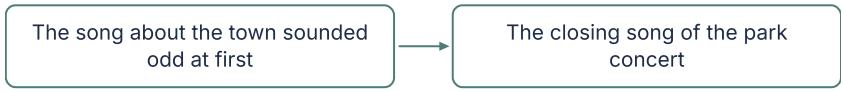
> - Writing in silence may make the worry about being judged smaller
> - Nobody watches you speak

Brainwriting ends with a pile of ideas and no choice made. **Choosing is still a separate step**, and it comes after the last pass. Read the sheets once all the way through before anyone marks a thing.

Odd ideas deserve a second look before the tests cut them. **A strange line on a sheet can hide a good idea** one step away. The song about

the town sounded odd to Dara at first, and it became the closing song of the park concert.

A strange line on a sheet



> **Key Concept:**
> Marking the sheets. Lay all the sheets out where everyone can reach them. **Each member reads every sheet and ticks the ideas** that pass the group's tests. Count the ticks. The ideas with the most ticks go forward, and the rest stay on the sheets for another day. Talk about the ticks only after they are counted.

Once the writing is over, Dara's committee writes three tests, costs little, suits families and can happen by July. **The park concert and the family sing-along pass all three**, and the committee joins them into one afternoon in the park. The whole meeting takes forty minutes, and every member had a hand in the plan.

The committee's three tests

Test	The park concert and the family sing-along
Costs little	Pass
Suits families	Pass
Can happen by July	Pass

A spoken round and a written round can be compared at home. **Try the same task both ways** with the same people, once talking and once

writing, and count the ideas each time. A single comparison proves nothing, and it shows you how your own group works.

Try the same task both ways



Once talking



Once writing



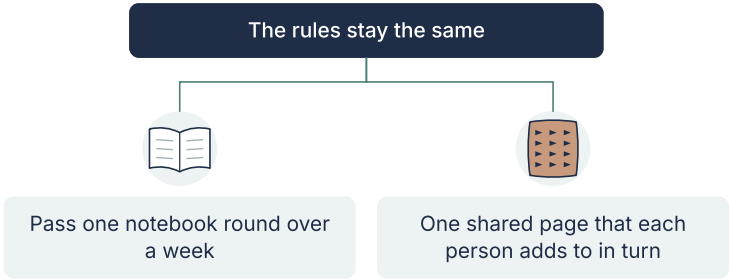
Count the ideas each time



Families on picnic blankets in a sunny park, a small choir singing under a tree with sheet music on stands.

A group that cannot meet can still brainwrite. **Pass one notebook round over a week**, or keep one shared page that each person adds to in turn. The rules stay the same, with the task at the top, one idea per line and no talk until the page is full.

A group that cannot meet



A shared page online works the same way. **Each person adds a line and leaves the rest alone**, so the page grows like a sheet passed round a table. Agree a day when the adding stops and the choosing begins.

Brainwriting fits into ordinary days. **It needs no special kit**, only paper, pens and a few quiet minutes round a table. One spare sheet per person is enough to start.

It needs no special kit

- [x] Paper
- [x] Pens
- [x] A few quiet minutes round a table
- [x] One spare sheet per person

Children can join a round. **A child who cannot write yet can draw an idea** in place of writing it, and someone older can add a label under the drawing.

Children can join a round



> **Key Concept:**
> Everyday brainwriting. Put one task at the top of a sheet and pass it round a family dinner table. **Each person adds one idea and passes it on.** Go round three times. Then read the sheet aloud and pick with two tests. Let the youngest person read the sheet aloud, so every voice is heard once.

The levels below build up the method. The starter adds to other people's sheets without talking, the middle level compares a spoken round with a written one, and the advanced level ends with a choice made by tests. **The advanced level uses a real task of your own**, the shape of the better programmes (Scott et al., 2004).

Keep the full sheets after the choosing. **A sheet holds the ideas that lost this time**, and a different task next month may need one of them. Dara files the five concert sheets in the choir folder, and the sing-along idea is used again for the winter concert.

Keep the full sheets

Day	1	2	3	4	5	6	7
Keep the full sheets after the choosing	☐	☐	☐	☐	☐	☐	☐
File them in the choir folder	☐	☐	☐	☐	☐	☐	☐

Exercise:

Ideas in writing.

1. Starter. In a group, pass sheets round and **add to each one without talking**. Draw an arrow when you build on an idea.
2. Middle. Run one spoken round and one written round on the same task. Count the ideas from each.
3. Advanced. On a real task, run a written swap with names left off, then choose with written tests and keep the sheets.

Ideas in writing at three levels



Add to each sheet without talking



One spoken round and one written round



Names left off, then written tests

Key idea:

Brainwriting is **a group making and swapping ideas in writing**, so nobody waits to speak, and the choosing still needs written tests afterwards.

Quick check:

What problem of talking groups does brainwriting aim at? Answer: production blocking, the ideas lost while people wait their turn to speak. On paper everyone can write at the same time, so no idea waits.

4.2.4 Reverse Brainstorming: Finding Ideas by Asking How to Make It Worse

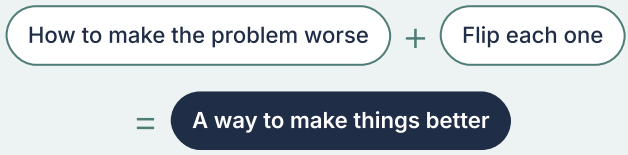
Imagine Omar, who runs a small café near an office block. Every day at lunch the queue stretches out of the door, and some people give up and leave. **He has asked himself how to make the queue faster** for weeks, and the same two ideas keep coming back, a second till and a faster coffee machine.

Omar's question has run dry

- How to make the queue faster
- A second till
- A faster coffee machine

Omar's question has run dry. **Reverse brainstorming turns the task upside down** and asks how to make the problem worse. You list ways to make things fail, then flip each one into a way to make things better. In this section I show you how it works, where its limits are and how to practise it at three levels.

Turn the task upside down



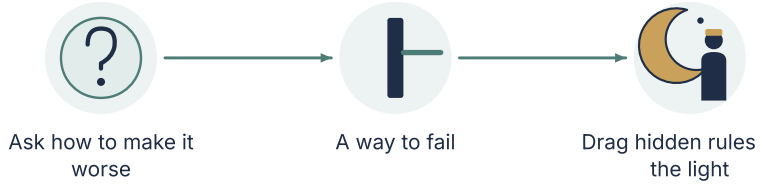


A small café counter at lunchtime with a long queue reaching out of the open door, a single person at the till.

The method borrows its rules from brainstorming, which goes back to Osborn, with one twist, the reversed question. **Its evidence is weak**, so this section treats it as practice only. Use it as one more way to look at a stuck task.

Asking how to make it worse can drag hidden rules into the light, because a way to fail often breaks a rule you had never noticed you were keeping. Omar's café turns out to have two of them. That breaking is the point of the reversed question.

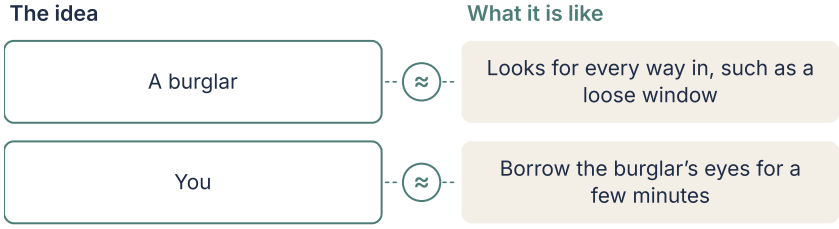
A way to fail breaks a hidden rule



> **Key Concept:**
>
> Reverse brainstorming. Reverse brainstorming is **listing ways to make a problem worse**, then flipping each one into a way to make it better. You write the reversed question first, such as how could I make the queue longer. You list answers without judging. Then you take each answer and turn it round into a fix or a change of design. The judging waits until every answer has been flipped.

Think of a burglar checking a house. **A burglar looks for every way in**, such as a loose window or a key under the mat. With the burglar's list, you know what to lock. The picture stops at the goal, because a burglar wants to get in, and you borrow the burglar's eyes for a few minutes.

A burglar checking a house



Answers to the reversed question can feel like a game. **Omar asks how he could make the queue as long as possible**, and he laughs at the first answer, which is to take every order by hand on paper. A silly answer is still an answer to flip.

The reversed question

> - How could he make the queue as long as possible
> - Take every order by hand on paper
> - A silly answer is still an answer to flip

> Exercise:
>
> Try it. Pick a project. **List ten ways to make it fail.** Write fast and judge none yet.

His list takes five minutes. **Take each order by hand, hide the menu, make people choose milk at the till**, put the cakes where nobody can see them and serve every drink before taking the next order. He stops at twelve ways and reads them back slowly, one at a time. Two of them make him wince.

Twelve ways in five minutes

- [x] Take each order by hand
- [x] Hide the menu
- [x] Make people choose milk at the till
- [x] Put the cakes where nobody can see them

The list holds more than jokes. **Several of the bad ideas are things the café already does every day.** People do choose their milk at the till, which slows every order. The menu sits behind the counter, so people decide only when they reach the front. Omar had stopped seeing both.

Things the café already does every day



> **Key Concept:**
>
> Flipping. Take one answer from the make-it-worse list. **Write its opposite as a change you could make.** Hide the menu becomes put the menu where people queue. Choose milk at the till becomes put milk choices on the menu board. Some answers flip into small fixes, and some into a new design. Flip every answer before you judge any of them, even the silly ones.

Flipping is the second half of the method. **Each bad idea turns into a fix or a redesign**, and a few turn into nothing useful at all. A flipped list still needs judging afterwards, because new ideas need checking against what the task really needs (Cropley, 2006). Omar keeps seven of his twelve flips, the cheap and quick ones.

Flipping each answer

Make it worse	The flip
Hide the menu	Put the menu where people queue
Choose milk at the till	Put milk choices on the menu board

The fixes Omar keeps cost very little. **A menu board by the door lets people choose while they wait**, and a card with milk choices sits on the counter. Cakes move into the glass case at the front, so nobody has to ask what is on offer. None of these fixes appeared on his old list.

Fixes that cost very little



A menu board by the door



A card with milk choices on the counter



Cakes in the glass case at the front

A failure mode is one way a plan can go wrong. In 3.2.1 you met a study where keeping a bigger clash among the parts of a problem went with more original, better solutions (Reiter-Palmon et al., 2024). Some failure modes are clashing parts of that kind, such as speed against care at the till.

A failure mode

> - One way a plan can go wrong
> - Some are clashing parts of a problem
> - Such as speed against care at the till

The study did not test reverse brainstorming, so the link is a reason to practise, with no promise attached. **Treat reverse brainstorming as a drill** for seeing a task from the side of failure, one that can show you what the forward question kept hiding. A round of ten minutes is enough to try it.

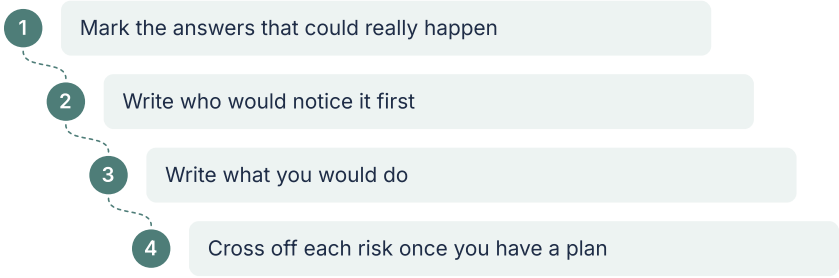
Treat reverse brainstorming as a drill

Try this now

1. See a task from the side of failure
2. A round of ten minutes is enough to try it

> **Key Concept:**
>
> A risk list. After flipping, look back at the make-it-worse list and **mark the answers that could really happen**. Those are your risks. For each one, write who would notice it first and what you would do. Keep the list with the plan, and read it again before you start. Cross off each risk once you have a plan for it.

A risk list



A risk list is short by design. **A handful of real risks is enough to plan for**, and the rest can stay crossed out on the make-it-worse list. Omar's risk list for the new menu has three lines, a missing price, a sold-out cake and a slow first morning.

Omar's risk list for the new menu

- [x] A missing price
- [x] A sold-out cake
- [x] A slow first morning

A group version carries the usual warning. In 4.1.2 you met the warning that interacting groups produce fewer and weaker ideas than the same people working alone (Mullen et al., 1991), **mostly because people block each other while they wait to speak** (Diehl & Stroebe, 1987). The reversed question does not change that.

For a group, write the make-it-worse lists alone first. **Give each person five silent minutes and a sheet**, then pool the lists and flip them together. The laughter can come afterwards, when the lists are read out, and by then nobody's idea has been lost in the queue. Omar's staff like that part best.

For a group, alone first



> **Science Says:**
>
> The warning comes from studies of ordinary brainstorming (Mullen et al., 1991; Diehl & Stroebe, 1987). **A reversed question was not tested in them**, so carrying the warning over to this method is a caution, with no promise attached.

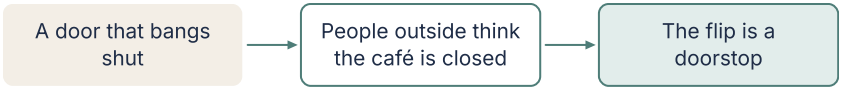
A reversed question can be used at any stage of a plan. **Early on, it shows what to design out**, and just before a launch it shows what to check. Omar uses it twice, once on the queue and once on the night before a new menu goes up. Each use takes him about ten minutes.

Any stage of a plan



With his two staff, he runs a group round. Each writes alone for five minutes, then they pool their lists. **One of the staff adds a way to fail that Omar never saw**, a door that bangs shut and makes people outside think the café is closed. The flip is a doorstop, which costs almost nothing.

A way to fail that Omar never saw





An open café door held by a small wooden wedge, people in the street glancing in at the busy counter.

Some bad ideas will not flip. **Leave those on the list and move on**, because a few dead ends are part of any list. The point is to find the few answers that point at something real. Omar's idea of closing the café entirely flips to open the café, which tells him nothing new.

Some bad ideas will not flip

> - Leave those on the list and move on
> - A few dead ends are part of any list
> - Closing the café entirely flips to open the café

The reversed question fits into ordinary days. **A family trip list might start with forget the tickets** and leave at rush hour, and the flips are a printed copy and an early start. A work talk might start with tiny slides, and the flip is a larger font.

Reversal in ordinary days

Make it worse	The flip
Forget the tickets	A printed copy
Leave at rush hour	An early start
Tiny slides	A larger font

> **Key Concept:**
> Everyday reversal. Pick one plan for this week. Ask how you could **make it go as badly as possible**, and list five answers in two minutes. Flip each answer into one small change. Make the most useful change before the plan starts, and keep the list to compare with what really happened. Over a few weeks, you will see which kinds of failure you tend to miss.

The levels below build the method. The starter flips every answer, the middle level keeps the lists written and solo inside a group, and the advanced level turns a failure list into a risk list and design changes. **The advanced level uses a real task of your own**, the shape of the better programmes (Scott et al., 2004).

Pick the right size of task for the method. **A task with many ways to go wrong suits it best**, such as a queue, an event or a trip. A task with one clear fix, such as a broken hinge on a cupboard door, has little to gain from a list of ways to make it worse.

The right size of task

Suits it best	Little to gain
⊕ A queue	⊖ A broken hinge on a cupboard door
⊕ An event	
⊕ A trip	

> Exercise:
>
> Making it worse.
>
> 1. Starter. Take your Try it list. **Flip each way to fail** into a way to prevent it or a change of design.
> 2. Middle. In a group, have each person write a make-it-worse list alone before any talk. Pool and flip together.
> 3. Advanced. On a real plan, list failure modes, mark the real risks and write one design change for each. Read the risk list again before you start.

Making it worse at three levels



Flip each way to fail



Write alone before any talk



Real risks and one design change each

Key idea:

Reverse brainstorming **asks how to make a problem worse and flips each answer** into a fix, a practice with no tested promise that can show what the forward question kept hiding.

Quick check:

What do you do with each answer on a make-it-worse list? Answer: you flip it into its opposite, a way to prevent the problem or a change of design, and then judge the flipped list against what the task really needs.

4.3 Transforming Existing Ideas: SCAMPER

4.3.1 Substitute, Combine and Adapt: Change What You Start With

Imagine Greta, who packs a lunchbox for her son every school morning. The box leaks, the sandwich gets squashed, and half the food comes home again. **She has tried three new lunchboxes from the shop**, and each one is the same box in a new colour.

Three new lunchboxes, one problem



The box leaks



The sandwich gets squashed



Half the food comes home again

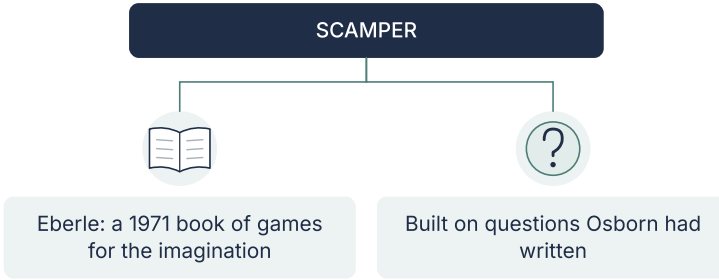
Greta keeps starting from scratch, and each new start ends at the same box. **SCAMPER is a set of prompts for changing something that already exists**, one prompt at a time. In this section I show you the first three prompts, Substitute, Combine and Adapt, and how to practise them at three levels.

SCAMPER

> - A set of prompts for changing something that already exists
> - One prompt at a time

The prompts are older than they look. **SCAMPER comes from Eberle**, who set the prompts out in a 1971 book of games for the imagination. Eberle built them on questions Osborn had written to spark new ideas. The prompts in this book are in plain words of my own, and they do not quote Eberle's wording.

The prompts are older than they look



Each letter of the word SCAMPER names one prompt, and each prompt is one way to change a thing. **S is Substitute, C is Combine and A is Adapt.** The prompts after them are Modify, Put to other uses, Eliminate, and Reverse or Rearrange. This section works with the first three.

Each letter names one prompt

Letter	Prompt
S	Substitute
C	Combine
A	Adapt
M	Modify
P	Put to other uses
E	Eliminate
R	Reverse or Rearrange

> **Key Concept:**
> Start from something real. Each prompt asks you to change the thing in one way and **see what you get**. You start from something real, such as a lunchbox, a plan or a story, and you make a list of changed versions before you judge any of them.

SCAMPER works like a ring of keys. **Each key opens a different door into the same house**, and some doors open onto rooms you never knew were there. The picture stops at the lock, because a key either fits or not, and a SCAMPER prompt always gives you something, even if it is a poor idea.

Like a ring of keys



Each key opens a different door



Into the same house



A prompt always gives you something

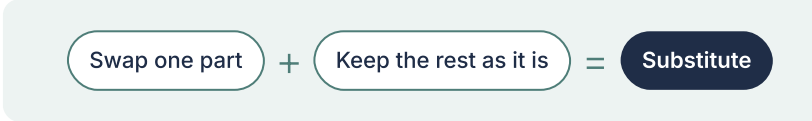
Starting from what exists has a plain advantage. **You never face an empty page**, because the thing in front of you is the first idea. Each prompt points at one small change, and a small change is easier to find than a big answer such as how to make a perfect lunchbox.

Starting from what exists

Before	After
An empty page	The thing in front of you is the first idea
A big answer, such as a perfect lunchbox	One small change

Substitute is the first prompt. **Substitute means swapping one part for something else**, such as a different material, person, place or time. You keep the rest of the thing as it is and change only the one part. Greta asks what she could swap in the lunchbox, and the first answer is the box itself.

Substitute



> Exercise:
>
> Try it. Take something you use every day. **Swap one part for something else**, and write what changes.

Her list of swaps **changes one part at a time**. A tin box takes the place of plastic, a cloth wrap takes the place of foil, a flask replaces the juice carton and a roll replaces sliced bread. The roll is the swap her son likes best, because rolls do not squash flat in a school bag.

Her list of swaps

In place of	The swap
Plastic	A tin box
Foil	A cloth wrap
The juice carton	A flask
Sliced bread	A roll



A small metal tin, a folded cloth wrap and a steel flask lined up on a kitchen table beside a bread roll.

Each swap answers one problem. **The flask stops the leak, and the roll stops the squashing.** Greta notices that she had been looking for one new lunchbox that would solve everything, when two small swaps solve the two problems one at a time.

Each swap answers one problem



Some swaps make things worse, and they still belong on the list. **A paper bag in place of the box** would leak even more, and writing it down shows Greta that the box needs to hold liquid. A poor swap can tell you what the thing has to keep.

A poor swap still belongs on the list

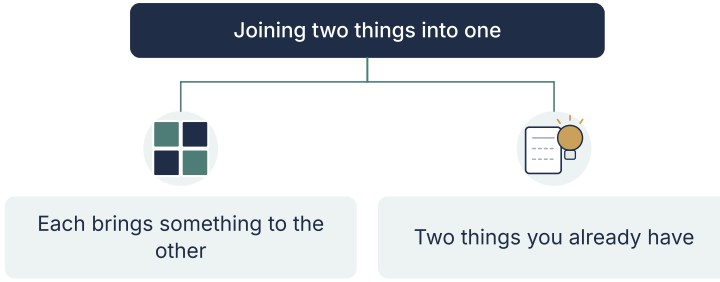
- A paper bag in place of the box
- Would leak even more
- The box needs to hold liquid

Key Concept:

Substitute. Pick one part of the thing and list **four or five things that could take its place**. Try a new material, a new person to do it, a new place or a new time. Keep everything else the same. Write each swap as a short line, and only when the list is done, ask which swap answers the problem you started with.

Combine is the second prompt. **Combine means joining two things into one**, so that each brings something to the other. In 3.3.1 you met combining distant ideas. Here the move is smaller and closer to home, joining two things you already have.

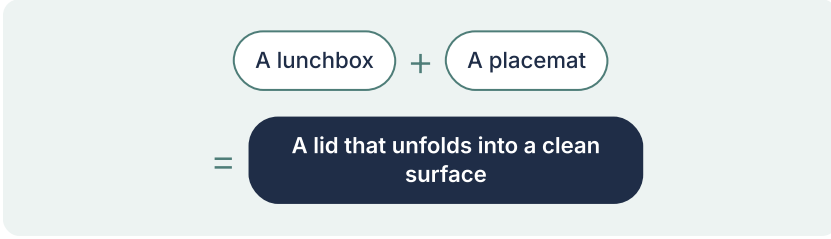
Combine



To combine, pick two things you already use for the same job or close jobs. **Ask what one thing could do both jobs.** A lunchbox and a

placemat could become a box whose lid unfolds into a clean surface, and a water bottle and an ice pack could become one frozen bottle.

What one thing could do both jobs



Her son eats on a crowded table, so Greta combines the lunchbox with a placemat. **The lid opens flat into a small mat**, so the food has a clean place to sit. She tries the flask with an ice pack inside it and drops that idea, because the drink would freeze.

Two things combined

She combines	She drops that idea
⊕ The lid opens flat into a small mat	⊖ The flask with an ice pack inside: the drink would freeze

Adapt is the third prompt. **Adapt means borrowing an idea from somewhere else** and fitting it to your thing. You ask where else a problem like yours has been solved, in another room, another job or another country, and you take the part of the answer that fits.

Adapt



Where else has a problem like yours been solved

Another room, another job or another country

Take the part of the answer that fits



An open toolbox with fold-out trays, each tray holding small tools in neat rows.

Her husband's toolbox gives her an answer, because its trays fold out so every tool has its own place. **She adapts the fold-out trays to the lunchbox**, so the fruit sits apart from the sandwich and nothing gets crushed. The toolbox kept small things apart, and now her lunchbox does the same.

The toolbox and the lunchbox

	The toolbox	The lunchbox
Fold-out trays	Every tool has its own place	The fruit sits apart from the sandwich

> **Key Concept:**
> Adapt. Name the problem in a few plain words, such as keeping small things apart. **Then list three other places where someone has solved it**, such as a toolbox, a sewing kit or an egg box. Take one part of each answer and ask how it would look on your thing. Keep the parts that fit and drop the rest.

The three prompts give Greta a long list. **Every idea on it started from the box she already had.** The prompts do not ask you to invent from nothing. They ask you to change one thing at a time and see where it leads.

Three other places where someone solved it

- [x] A toolbox
- [x] A sewing kit
- [x] An egg box

The evidence for SCAMPER is thin, and you should know it before you lean on the prompts. **The research gives no reason to expect great things from SCAMPER alone**, and it gives no proof that it fails. The two boxes below give what the research for this book found.

> **Science Says:**
> An older study that combined many studies compared 12 kinds of training, and the SCAMPER method "was the least effective" (Ma, 2006, as cited in Haase et al., 2025). The newer review warned that the findings were "based on only four effect sizes" (Haase et al., 2025). **Four results are a very small number to judge by**, so the finding is weak either way.

> **Science Says:**
>
> In 3.2.4 you met one small study (N = 32) with one training session. **SCAMPER was the fourth of the four techniques** taught in that session of an hour and a half (Ritter & Mostert, 2017). The creativity of people's ideas rose after the session, and the gain belongs to the whole package of four. The authors said it was unclear whether one method alone would be enough.

One small study of a package is a start and no more. **This section treats the prompts as practice, with no promise attached.** Use them because they give you a way to start on a thing that is stuck, and judge what they give you by the ideas on the page.

One session, four techniques

RM

Ritter & Mostert, 2017

- N = 32, one session of an hour and a half
- SCAMPER was the fourth of the four techniques
- The gain belongs to the whole package of four

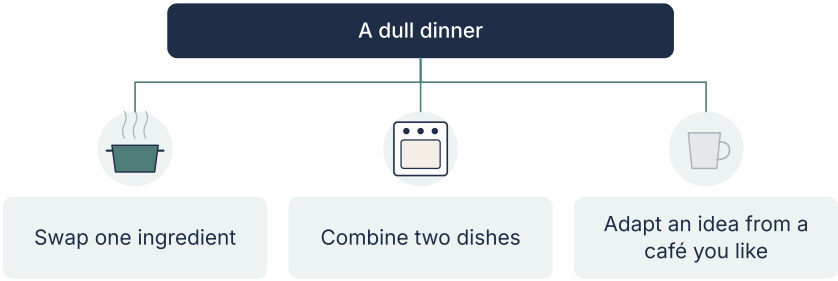
A SCAMPER list still needs choosing. **New ideas need checking against what the task really needs** (Cropley, 2006). Greta writes two tests, no leaks and no squashing, and keeps the ideas that pass. The flask, the roll and the fold-out tray all pass, and the cloth wrap fails because it lets the sandwich get squashed.

Two tests: no leaks and no squashing

Idea	Result
The flask	Pass
The roll	Pass
The fold-out tray	Pass
The cloth wrap	Fails: the sandwich gets squashed

Substitute, Combine and Adapt fit into ordinary days. A dull dinner, a crowded cupboard or a slow bus route can all **go through the three prompts in five minutes**. Swap one ingredient, combine two dishes or adapt an idea from a café you like, and write each version down.

The three prompts in five minutes



> **Key Concept:**
> Everyday SCAMPER. Pick one small thing that annoys you. **Write S, C and A down the side of a page**, and write two changes beside each one. Read the six changes and pick one to try this week. Keep the page, because the other five may suit another day.

Work through the prompts in order the first few times. **The order gives each round a shape**, so you know where you are and what comes

next. Once the prompts feel familiar, start with whichever one suits the thing in front of you.

The order gives each round a shape

> - Work through the prompts in order the first few times
> - Then start with whichever one suits the thing in front of you

The levels below take one prompt each before joining them. The starter combines two options, the middle level adapts an idea from another field, and the advanced level runs all three prompts and chooses with tests. **The advanced level uses a real task of your own**, the shape of the better programmes (Scott et al., 2004).

> Exercise:
>
> Change what you start with.
>
> 1. Starter. Take two things you use for close jobs. **Combine them into one** and write what the new thing does.
> 2. Middle. Name one problem in plain words. Borrow a feature from another field and adapt it to your thing.
> 3. Advanced. On a real task, run Substitute, Combine and Adapt in turn, then choose with two written tests.

Change what you start with at three levels



Combine two things into one



Borrow a feature from another field



Run all three, then two written tests

Key idea:

Substitute, Combine and Adapt **change something that already exists, one part at a time**, and the list they give you still needs choosing with tests.

Quick check:

What does the Substitute prompt ask you to do? Answer: swap one part of a thing for something else, and keep the rest as it is.

4.3.2 Modify and Put to Other Uses: Change Features or Purpose

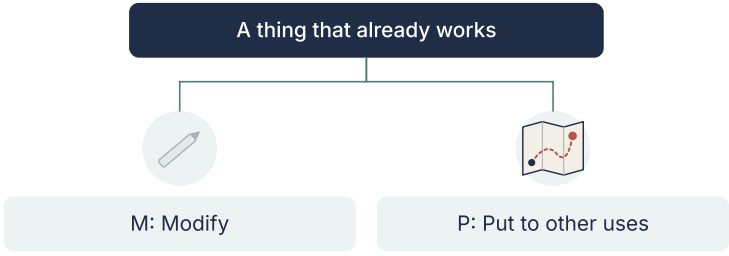
Imagine Ravi, who runs a small bicycle repair stall at a Saturday market. He sells a puncture repair kit in a tin, and hardly anyone buys it. **He thinks the kit is good**, and he cannot see what to change about a thing that already works.

Ravi's kit

- A puncture repair kit in a tin
- Hardly anyone buys it
- He thinks the kit is good

Ravi's kit works, and it still sits on the shelf. **Modify and Put to other uses are the next two SCAMPER prompts**, M and P. Both start from a thing that already works. In this section I show you both prompts and how to practise them on a thing of your own.

The next two SCAMPER prompts





A market stall with bicycle wheels hanging from a rail, a stack of small round tins on the counter and a man in an apron fixing a tyre.

Both prompts come from the same source as the rest of SCAMPER. **Eberle set out the prompts in 1971**, building on questions Osborn had written to spark ideas. The wording in this section is my own, in plain words, and it does not quote Eberle. Use them on your own things, such as a product, a plan or a story.

Each prompt is a way into a thing that is stuck, such as a kit that nobody buys. **The versions they give you still need choosing** afterwards against what the task needs (Cropley, 2006). Start with a thing you can see and touch, so every version is easy to picture, and move on to plans and stories once the prompts feel easy.

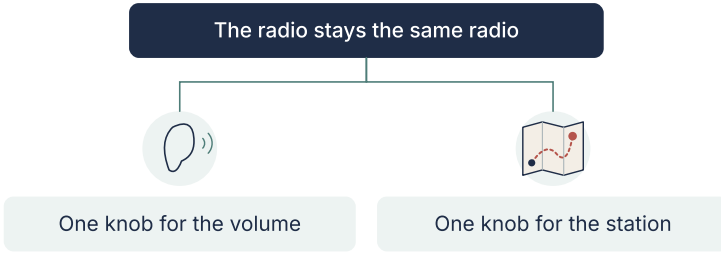
Start with a thing you can see



> **Key Concept:**
>
> Modify. Modify is **changing one feature of a thing**, such as its size, shape, colour, strength, speed or sound. You can make the feature bigger, smaller, stronger or weaker. Each change gives a new version of the same thing. Write each version down before you judge it, because a change that seems silly can point to a useful one. A list of features is the place to start.

Modify works like the knobs on an old radio. **Each knob changes one thing**, such as the volume or the station, and the radio stays the same radio. The picture stops at the dial, because a radio has a few knobs, and a thing you want to change has as many features as you can name.

Like the knobs on an old radio



Start by listing the features. **A feature is any part or quality you can name**, such as the size of the tin, the number of patches, the colour or the instructions inside. Ravi lists eight features of his kit in two minutes. The list itself surprises him, because he had always seen the kit as one thing.

Features Ravi can name

- [x] The size of the tin
- [x] The number of patches
- [x] The colour
- [x] The instructions inside

> **Exercise:**
> Try it. Pick one thing you own. **Make one feature bigger, smaller or stronger**, and write what you get.

Size comes first. **A bigger kit becomes a family kit** with patches for four bikes and a pump. A smaller kit becomes a pocket kit, two patches and a tiny tube of glue, small enough for a keyring. A stronger kit becomes one for mountain bikes, with thick patches that grip rough tyres.

Size comes first

Change	Version
Bigger	A family kit with patches for four bikes and a pump
Smaller	A pocket kit, small enough for a keyring
Stronger	Thick patches for mountain bikes

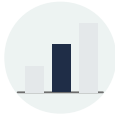
He moves on to the instructions. **Bigger instructions become a short video** on a card with a code to scan, and smaller ones become three pictures on the lid. Ravi notices that many people who look at the kit pick it up, read the back and put it down, and he wonders whether the instructions scare them off.

The instructions

	Bigger	Smaller
Version	A short video on a card with a code to scan	Three pictures on the lid

Change one feature at a time, in two directions. **Bigger and smaller, or stronger and weaker**, give two versions for every feature on your list. Changing one feature at a time shows you which change made the difference, and a version that changes five things at once is hard to learn from.

One feature at a time, in two directions



Bigger and smaller



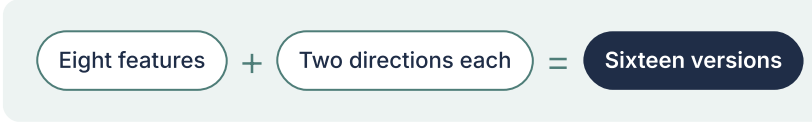
Stronger and weaker



Two versions for every feature

All eight features go through the same two-way change. **Sixteen versions come out of one tin** in about ten minutes, from a glow-in-the-dark tin for night riders to a plain paper packet that costs less. Most are no good, and three of them make Ravi want to try something new.

Sixteen versions out of one tin



> **Science Says:**
> The research for this book gives no test of Modify or Put to other uses on their own. **SCAMPER as a whole has thin evidence**, resting on very few results (Ma, 2006, as cited in Haase et al., 2025). Treat the drills in this section as practice, and judge each version by what it does on the stall.

Put to other uses is the second prompt. **It asks what else the thing could be used for**, by whom and where. The thing stays the same, and its job changes. A tin of puncture patches could fix things that are not bikes, or it could be sold to people who are not cyclists at all.

Put to other uses

- What else the thing could be used for
- By whom and where
- The thing stays the same, and its job changes

In 3.2.4 you met functional fixedness, where the usual job of a thing hides its other jobs (Kroneisen et al., 2021). **Put to other uses is practice in looking past the usual job**, on a thing of your own. It is a prompt to practise, and the research cited here describes fixedness without testing this prompt as training.

Looking past the usual job

Hypothesis	Test	Result
The usual job of a thing hides its other jobs	Put to other uses as practice	Fixedness described, this prompt not tested as training



A small repair patch on a child's inflatable paddling pool in a sunny garden, a tin of glue open on the grass.

Ravi lists new uses for the kit. **Patches could fix paddling pools, air beds, footballs and the tyres on prams and wheelchairs.** A tin of patches could go in a camping kit or a car boot. One idea surprises him most, a stall sign that says it fixes anything that holds air.

New uses for the kit

- Paddling pools, air beds and footballs
- The tyres on prams and wheelchairs
- A camping kit or a car boot

New users come with new uses. **Ask who else has a problem the thing could solve.** Parents with prams, campers and people who play football in the park all have things that go flat. None of them would walk past a bike stall looking for help, and all of them might stop for a sign about things that hold air.

Who else has a problem the thing could solve



Parents with prams



Campers



People who play football in the park

Key Concept:

New uses. Write the thing at the top of a page. **List ten other jobs it could do**, then ten other people who might need it. Join a job to a person, such as patches for campers' air beds. Each join is a possible new use. Circle the joins you had never thought of before you made the list, and pick one to try first.

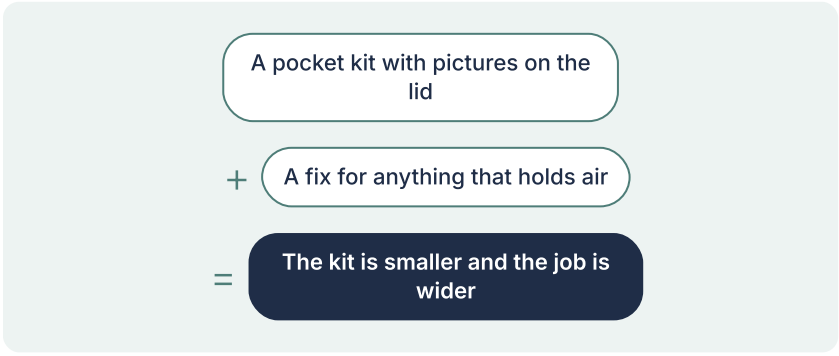
Ideas can be put to other uses, along with objects. **Ravi's repair skill is an idea he already has**, and its usual use is fixing bikes for money. Put to other uses, it becomes a repair class for children, a birthday party where each guest fixes a puncture, or a short talk at the local school.

An idea put to other uses



The two prompts can work on one thing together. **Ravi joins them into one idea**, a pocket kit with pictures on the lid, sold as a fix for anything that holds air. The kit is smaller and the job is wider, and neither prompt alone found it.

Two prompts on one thing



The prompts give a long list that needs choosing. **Write two tests before you choose**, one for what it must do and one for who it is for. His tests are cheap to make and easy for a stranger. The pocket kit passes both, and the video card fails the first because printing codes costs more than the kit.

His two tests: cheap to make and easy for a stranger

Passes both	Fails the first
⊕ The pocket kit	⊖ The video card: printing codes costs more than the kit

Test the choice on the people it is for. **Ravi puts six pocket kits on the stall** with a sign about things that hold air, and he watches what people do with them. By noon two have gone, one to a camper and one to a mother with a pram, where most Saturdays none sell before lunch.

Test the choice on the people it is for

- Six pocket kits with a sign about things that hold air
- By noon two have gone
- One to a camper and one to a mother with a pram

> **Key Concept:**
> Audience test. Show your new version to **three or four people it is meant for**. Watch what they pick up, what they read and what they put down. Ask one plain question, would you use this. Write their answers down without arguing. Their answers are one more test, and they may send you back to the prompts for another round of changes.

Modify and Put to other uses fit into ordinary days. **A dull lunch can be made bigger, smaller or spicier**, and a spare room can be put to other uses as a study, a craft corner or a place for guests. Two minutes with the prompts is enough to find a version worth trying.

Both prompts in ordinary days



A dull lunch made bigger, smaller or spicier



A spare room as a study



A craft corner or a place for guests

The levels below take the prompts in turn. The starter lists new uses, the middle level runs both prompts on one idea, and the advanced level ends with an audience test. **The advanced level uses a real product, plan or service of your own**, the shape of the better programmes (Scott et al., 2004).

Keep a list of what you changed and what happened. **A short note after each try** helps you see which prompt tends to work on your kind of thing. Ravi writes one line each Saturday, the version on the stall and how many sold, and after a month he can see which change paid off.

A short note after each try

Day	1	2	3	4	5	6	7
The version on the stall	☐	☐	☐	☐	☐	☐	☐
How many sold	☐	☐	☐	☐	☐	☐	☐

Come back to the prompts when sales or interest drop. **A thing that worked last year may need a new feature or a new job** this year, and the prompts give you a quick way to look again. Ravi plans to run them on the pocket kit again before the summer camping season.

Exercise:

Change features or purpose.

1. Starter. Take one thing. **List ten new uses for it** and five new people who might need it.
2. Middle. Run Modify and Put to other uses on one idea. Join the best of each and keep the better version.
3. Advanced. On a real product or service, modify one feature, find one new use, then test it on three people.

Change features or purpose at three levels



Ten new uses and five new people



Join the best of each prompt



Test it on three people

Key idea:

Modify changes a feature of a thing, and Put to other uses changes what the thing is for, and both give you versions to choose with tests and try on real people.

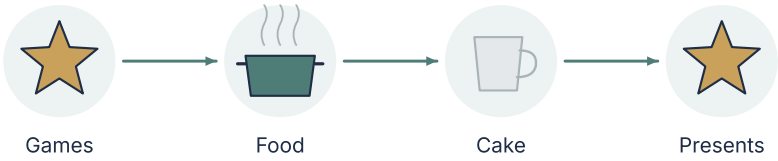
Quick check:

What is the difference between the M and the P in SCAMPER? Answer: Modify changes a feature of the thing, such as its size, and Put to other uses keeps the thing and changes its job.

4.3.3 Eliminate, Reverse and Rearrange: Remove or Reorganise What Is There

Imagine Tess, who is planning a birthday party for her seven-year-old daughter. Every party in the class runs the same way, with games, then food, then cake, then presents. **The parties are loud, tiring and alike**, and Tess wants this one to feel different without costing more.

Every party in the class runs the same way



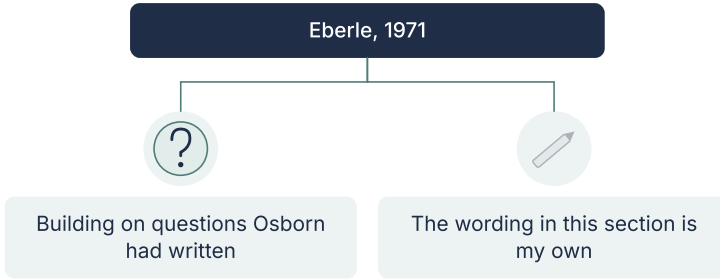
Tess needs a new shape for the old party. **Eliminate, Reverse and Rearrange are the last SCAMPER prompts**, E and the two meanings of R. All three start from a plan you already have. In this section I show you all three and how to practise them at three levels.

The last SCAMPER prompts

- E: Eliminate
- R: Reverse
- R: Rearrange

SCAMPER's last prompts come from the same source as the first ones. **Eberle set the prompts out in 1971**, building on questions Osborn had written to spark ideas. The wording in this section is my own, in plain words, and it does not quote Eberle.

The same source as the first ones



The prompts give you a way to look again at a plan you have stopped seeing. **The versions they give you still need choosing** against what the task needs (Cropley, 2006). Each version takes one line on the page, so a full list fits on one sheet.

> **Key Concept:**
> Keep the old plan. These three prompts **start from the parts already there**, so the old plan stays in view while you change it. Write the old plan on one side of the page and each changed version beside it. If a version breaks the plan, you can see at once which part to put back. A change you can undo is easy to try.

Tidying a crowded room is a good picture. **You take out what you do not need** and move the desk. Nothing new comes in, and the room still feels new. The picture stops at the furniture, because a room has only so many pieces, and a plan can be broken into as many parts as you like.

Tidying a crowded room



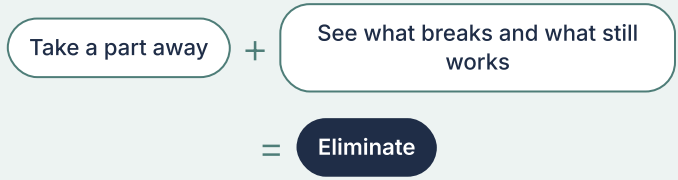
Start by listing the parts of the thing in order. **A part is any step, piece or role you can name.** Tess lists the parts of a usual party on one sheet. Guests arrive, play games, eat, sing to the cake, open presents and leave with a party bag.

The parts of a usual party



Eliminate is the first prompt. **Eliminate means taking a part away**, even a part everyone thinks is needed, and then seeing what breaks and what still works. This is practice, and the idea is to learn what each part is really doing.

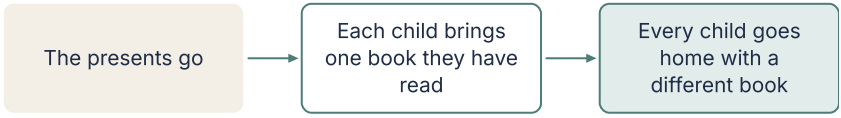
Eliminate



> Exercise:
>
> Try it. List the parts of one plan. **Remove the part that seems most needed** and write what breaks.

The presents go first. **The party still works**, and something new appears in the gap. Each child could bring one book they have read, and every child goes home with a different book. The noise of the present opening goes, and so does the pile of plastic toys.

The presents go first



She tries removing other parts, one at a time. **Without the games, the party has a gap** that something calmer could fill, such as making crowns or decorating biscuits. Without the party bags, nobody misses much. Without the cake, the party stops feeling like a birthday, so the cake stays.

Removing other parts, one at a time



Without the games: a gap to fill



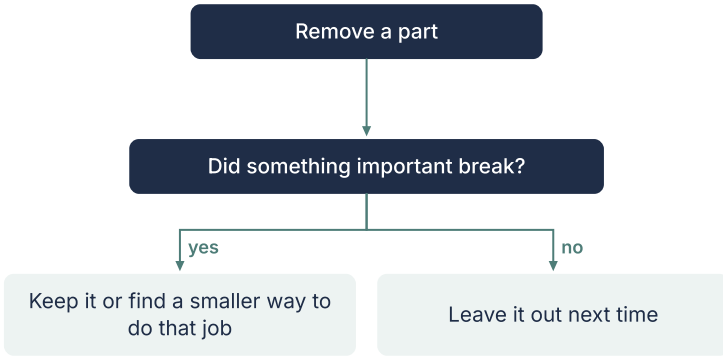
Without the party bags: nobody misses much



Without the cake: the cake stays

> **Key Concept:**
>
> What breaks. When you remove a part, ask **what broke and what still works**. If something important broke, the part was doing a real job, so keep it or find a smaller way to do that job. If nothing broke, the part may have been there out of habit, and you can leave it out next time. Write both answers down, because both teach you something about how the plan works.

What breaks



Reverse is the second prompt. **Reverse means turning something round**, such as the order of the steps, who does what, or the goal itself. You ask what would happen if the opposite were true. Tess asks what would happen if the children hosted the parents.

Reverse



In 4.2.4 you met reverse brainstorming, which asks how to make a problem worse. **SCAMPER's Reverse is a different move.** It does not hunt for ways to fail. It takes the plan itself and turns one part round, such as the order or the roles, to see what the turned version looks like.

Two different moves

Reverse brainstorming	SCAMPER's Reverse
Asks how to make a problem worse	Turns one part of the plan round
Hunts for ways to fail	Such as the order or the roles



Children in paper crowns serving cups of juice to a row of smiling parents sitting on small chairs.

Her page soon holds three reversals. **The children serve the food to the parents**, the party aims to be calm when every party she knows aims to be exciting, and the birthday girl gives a small gift to each guest. The first one makes her laugh out loud, and the third one neatly fits the book swap she already has.

Three reversals



The children serve the food to the parents



A party that aims to be calm



A small gift to each guest

> **Key Concept:**
>
> Swap the roles. Beside each step of the plan, write **who gives and who gets**, and who leads and who follows. Pick one pair and swap them, so the guest becomes the host or the one who watches does the job. Write how the step would run after the swap, even when it sounds silly. A swapped role can show you who has been left out.

> **Science Says:**
>
> The research for this book holds no test of Eliminate, Reverse or Rearrange on their own. **SCAMPER as a whole rests on very few results** (Ma, 2006, as cited in Haase et al., 2025), and one small study (N = 32) taught it inside a package of four techniques (Ritter & Mostert, 2017). The prompts here are practice, with no promise attached.

Rearrange is the third prompt. **Rearrange means changing the order or the layout** of the parts, without taking any away or turning any

round. The parts stay the same, and the plan changes shape. Tess moves the food to the start, because hungry children get cross during games.

Rearrange

- Changing the order or the layout of the parts
- Without taking any away or turning any round
- The food moves to the start

Layout can change, along with order. **Where things happen changes how they feel.** Tess moves the games into the garden and the crown making to the kitchen table, so the loud part and the quiet part have their own places. Nothing new was added, and the house feels bigger on the day.

Where things happen

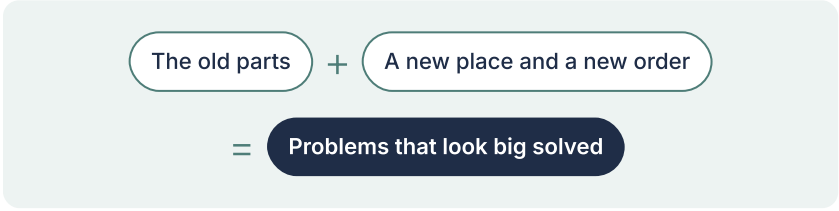
Part	Place
The games	The garden
The crown making	The kitchen table



A kitchen table covered with paper, glue and glitter, three children making crowns while others run past the window in the garden.

Small moves can solve problems that look big. **Food first stops the crossness**, and a quiet table stops the noise from filling the whole house. Tess did not need a new idea for either problem. She needed the old parts in a new place and a new order.

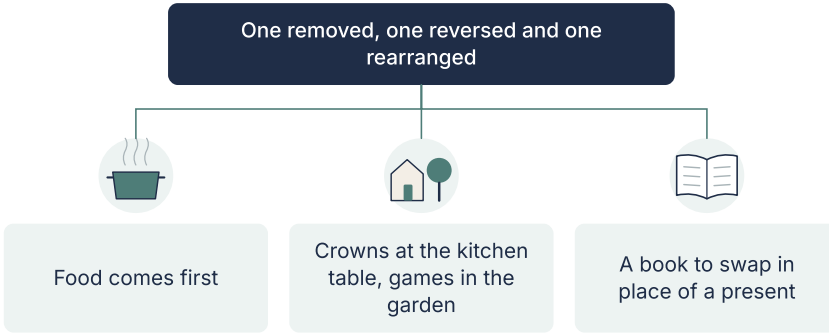
Small moves



> **Key Concept:**
> Moving the parts. Write each part on a small card. **Lay the cards out and move them** into a new order, then into a new layout, such as which room or which time of day. Read each order aloud. Keep the order that solves a problem you had, such as hungry children or one room that gets very loud.

The three prompts give Tess a long list. **Her new party has one part removed, one reversed and one rearranged.** Food comes first, the crowns sit at the kitchen table while games run in the garden, and each child brings a book to swap in place of a present. She has spent no more than for a usual party.

Her new party



A list from the three prompts still needs choosing. **Write two tests before you choose**, one for what the plan must do and one for who it is for. Tess's tests are calm enough for a seven-year-old and no dearer than usual. The children serving the parents fails the first, because seven children carrying juice is not calm at all.

Tess's two tests

- [x] Calm enough for a seven-year-old
- [x] No dearer than usual

Failed changes still teach you something. **A removed part that breaks the plan shows you its job**, as the cake did. A reversal that seems silly can point at a real problem, as the calm party goal pointed at the noise. Keep the failed versions on the list, crossed out, so you can look back at them.

Failed changes still teach you something



A removed part that breaks the plan shows its job



A silly reversal can point at a real problem



Keep the failed versions, crossed out

> **Key Concept:**
>
> Everyday reshaping. Pick one routine, such as the morning rush, the weekly shop or a meeting at work. **Remove one step, reverse one and rearrange the rest.** Write the new version on one line. Try it once this week, and keep a note of what changed, so you can decide whether to keep it.

Eliminate, Reverse and Rearrange fit into ordinary days. **A morning routine can lose one step**, start with the hardest job or swap who makes breakfast. A weekly shop can drop one aisle, go in the reverse order round the shop or be split across two days. Each version costs a minute to write, and you try only the best.

Reshaping ordinary days

Prompt	A morning routine	A weekly shop
Eliminate	Lose one step	Drop one aisle
Reverse	Start with the hardest job	Go in the reverse order round the shop
Rearrange	Swap who makes breakfast	Split across two days

The levels below take the prompts in turn. The starter swaps the roles in one plan, the middle level rearranges the steps or layout, and the advanced level runs all three and chooses with tests. **The advanced**

level uses a real plan of your own, the shape of the better programmes (Scott et al., 2004).

Run the prompts again after the first try. **The party itself will show which change worked**, and the next party can keep it or drop it. Tess writes one line after the day, food first worked and crowns were the best part, and keeps the note with next year's plan.

One line after the day

Day	1	2	3	4	5	6	7
Food first worked	☐	☐	☐	☐	☐	☐	☐
Crowns were the best part	☐	☐	☐	☐	☐	☐	☐

Exercise:

Remove or reorganise.

1. Starter. Take one plan. **Swap who gives and who gets** at one step, and write the new version.
2. Middle. Write the steps of a routine on cards. Rearrange them twice and keep the order that solves a problem.
3. Advanced. On a real plan, remove one part, reverse one and rearrange the rest, then choose with two written tests.

Remove or reorganise at three levels



Swap who gives and who gets



Rearrange the cards twice



Remove, reverse and rearrange, then two tests

Key idea:

Eliminate, Reverse and Rearrange **work on what is already there**, by taking a part away, turning one round or changing the order, and the new versions still need choosing with tests.

Quick check:

How is SCAMPER's Reverse different from reverse brainstorming?
Answer: Reverse turns one part of the plan round, such as its order or roles, while reverse brainstorming lists ways to make a problem worse.

4.3.4 Applying SCAMPER to an Object, a Story and an Everyday Problem

Imagine Felix, a bus driver who keeps a notebook of ideas in his cab. He has learned all seven SCAMPER prompts, and he has never used them on a real job. **Knowing the prompts is a different thing from using them**, and Felix wants to try them on three very different jobs.

Knowing the prompts and using them

- A bus driver with a notebook of ideas in his cab
- He has learned all seven SCAMPER prompts
- He has never used them on a real job

You will run the full set of prompts three times. **The first run is on an object, the second on a story and the third on an everyday problem.** Each run uses the same seven prompts, and each gives a different kind of answer. At the end you compare the three runs to see which prompts paid off where.

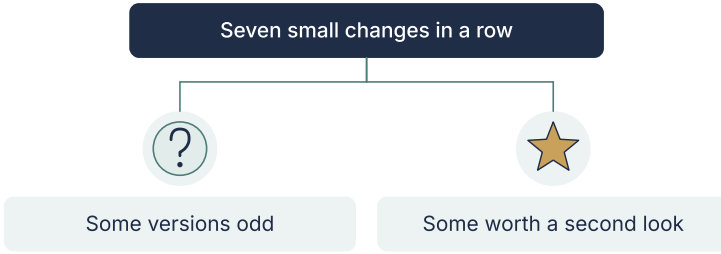
Three runs of the full set



The prompts date from 1971, when Eberle built them on questions Osborn had written to spark ideas. **I give the prompts in my own words**, since Eberle's exact wording is not quoted in this book.

A full run is **seven small changes in a row**, one for each prompt. What it gives you is a long list of versions, some odd and some worth a second look. The work of a run is to fill every line, and the choosing comes after.

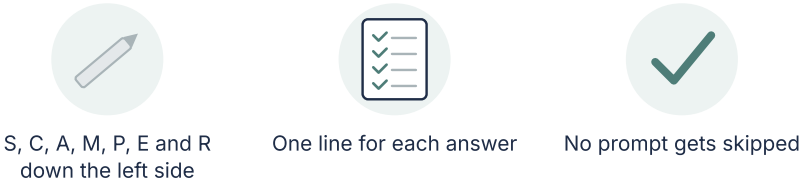
A full run



> **Key Concept:**
>
> Mark the surprises. After a full run, **put a star by any answer that surprised you**. A surprising line is worth a second look before you move on. Read the starred lines first when you choose, and ask what each one tells you about the problem. A run with no stars at all may need a second pass on another day, with fresh eyes.

Start with an object, because an object is easy to hold in mind. **Felix picks his umbrella**, which blows inside out on windy days and drips on the bus floor. He writes S, C, A, M, P, E and R down the left side of a clean page and leaves one line for each answer, so no prompt gets skipped.

A clean page



The first pass goes fast, with **one quick answer for each prompt**. Substitute gives a strong fabric that bends. Combine joins the umbrella

with a bag that catches the drips. Adapt borrows the vents in a kite so the wind passes through.



A black umbrella turned inside out by the wind at a bus stop, its owner holding the bent handle with both hands.

Modify gives a smaller canopy for the bus stop. Put to other uses turns an old umbrella into a sun shade for his cab window. Eliminate takes away the handle and gives a hat with a brim. Reverse gives **an umbrella that folds upwards**, so the wet side ends up inside.

The umbrella run

Prompt	Answer
Substitute	A strong fabric that bends
Combine	A bag that catches the drips
Adapt	The vents in a kite
Modify	A smaller canopy for the bus stop
Put to other uses	A sun shade for his cab window
Eliminate	A hat with a brim
Reverse	An umbrella that folds upwards

> Exercise:
>
> Try it. Pick one object near you. **Run all seven prompts on it once**, writing one answer for each.

His list is quick to read. **Seven versions came out of one umbrella**, and most of them are odd. The upward folding umbrella and the drip bag look worth a second look, because both of them fix the wet bus floor. The hat with a brim is fun to picture, and it will not keep his whole body dry.

Seven versions out of one umbrella

Worth a second look	Fun to picture
⊕ The upward folding umbrella	⊖ The hat with a brim will not keep his whole body dry
⊕ The drip bag	

The second run is on a story. **A story has parts like an object has parts**, such as the hero, the place, the problem and the ending. Felix

picks a fairy tale he reads to his son, the one about three bears whose porridge is eaten by a girl who wanders into their house.

A story has parts like an object



> **Key Concept:**
>
> The parts of a story. Before you run the prompts on a story, **list its parts on one line** of your page. Name who is in it, where it happens, what goes wrong, how it gets fixed and how it ends. Each prompt then has something to work on. A story with clear parts is easier to reshape than a story you only remember as a whole.

On the story, some prompts work better than others. **Reverse gives Felix the best result**, with the three bears wandering into the girl's flat and eating all her cereal. Substitute swaps the porridge for pizza, which makes his son laugh. Eliminate takes out one bear and leaves a story about two bears who argue.

The story run

Prompt	Answer
Reverse	The three bears wander into the girl's flat and eat all her cereal
Substitute	Pizza in place of porridge
Eliminate	Two bears who argue

Other prompts give less. **Put to other uses is hard to apply to a story**, and Felix writes only that the tale could teach children to knock before entering. Every prompt still gets one line, even the weak ones, because a weak line costs seconds and a skipped prompt might hold the best answer.

Every prompt still gets one line

- Put to other uses is hard to apply to a story
- A weak line costs seconds
- A skipped prompt might hold the best answer

Science Says:

Practice on a real task is **the shape of the better programmes** (Scott et al., 2004). One review of creative problem solving training looked at its use in workplaces (Puccio et al., 2006). Both are about whole programmes, so here they back only the choice of real jobs for practice, such as a real object, a real story and a real problem.

The third run is on an everyday problem. **An everyday problem is the hardest of the three**, because it has people in it who care how the week goes. Felix's problem is the laundry at home, which piles up all week and takes his whole Sunday to sort.

The hardest of the three



The laundry piles up all week



It takes his whole Sunday to sort



People in it who care how the week goes



A tall pile of laundry on a bedroom chair, with odd socks hanging off the edge and a basket half full beside it.

The seven prompts go to work again, **this time on a problem with people in it**. Substitute swaps one big wash for small daily ones. Combine joins folding with a radio show the family likes. Adapt borrows the bus depot's rota, so each person has a day.

Smaller baskets come from Modify, one for each person. Put to other uses turns the folding time into talk time with his son. Eliminate removes ironing for everything except work shirts. Rearrange **sorts the clothes the moment they come off**, into three baskets by the bedroom door.

The laundry run

Prompt	Answer
Substitute	Small daily washes
Combine	Folding with a radio show the family likes
Adapt	The bus depot's rota
Modify	Smaller baskets, one for each person
Put to other uses	Folding time as talk time with his son
Eliminate	No ironing except work shirts
Rearrange	Three baskets by the bedroom door

> **Key Concept:**
> One line each. On an everyday problem, **give every prompt one line**, even when the answer seems silly or small. Silly answers can hold a useful part, as the radio show held the idea of making the job less dull. Write fast and judge later, because stopping to judge each line slows the run and narrows the list.

Seven answers now sit on Felix's page, and he needs to pick. **He writes two tests before he chooses**, one for what the plan must do and one for who it is for. His tests are less of Sunday lost and something his son will help with. Most answers pass one test and fail the other.

Felix's two tests

- [x] Less of Sunday lost
- [x] Something his son will help with

> **Key Concept:**
>
> Choosing two. After a full run, **pick the two answers that pass both tests** and develop those. Write how each would work on the first day and what could go wrong. A long list feels like progress, and the ideas on it still need judging and shaping into something that works (Cropley, 2006). Two is a small enough number to try in one week.

He keeps the rota and the three baskets by the bedroom door. **Both pass his tests**, and they fit together. His son takes the Wednesday wash and likes having his own basket with his name on it. The radio show idea goes onto a list for later, since it passed only one test.

Both pass his tests



The rota



The three baskets by the bedroom door



The radio show goes onto a list for later

The rota came from the bus depot, which shows Adapt at work. **Borrowing from a place you know well is often easiest**, because you have seen how it runs. Felix has watched the depot rota for years, and he knew which parts would fit a family of three.

Borrowing from a place you know well



Lay the three runs side by side. **Different prompts paid off on different jobs.** On the umbrella, Reverse and Combine gave the best answers.

For the story, Reverse and Substitute won, and on the laundry, Adapt and Rearrange did the work. **Reverse helped on two of the three jobs**, and Adapt did best where Felix knew a rota he could borrow. Note which prompts won on each of your own runs.

Different prompts paid off on different jobs

Job	Best prompts
The umbrella	Reverse and Combine
The story	Reverse and Substitute
The laundry	Adapt and Rearrange

> Science Says:
>
> The research for this book holds no test of a full SCAMPER run on an object, a story or a chore. **The evidence for SCAMPER as a whole is thin** (Ma, 2006, as cited in Haase et al., 2025). Treat each run as a practice drill, and judge it by the answers it puts on your page.

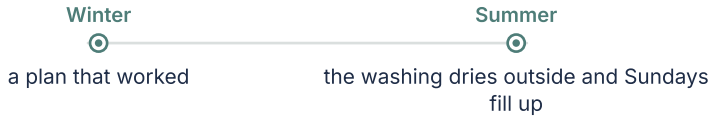
Your own notes show which prompts earn their place. **Keep the circled answers from each run**, and look back after a month to see which ones you used. Felix found that two of his six circled answers made it into real life.

Keep the circled answers from each run

> - Look back after a month
> - Two of his six circled answers made it into real life

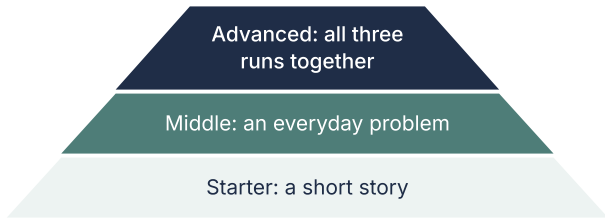
Run the prompts again when a job changes. **A plan that worked in winter may need a new run in summer**, when the washing dries outside and Sundays fill up. Felix puts a note in his cab notebook to run the prompts on the laundry again in June.

Run the prompts again when a job changes



The levels below take the three runs in turn. **The starter uses a short story**, the middle level an everyday problem and the advanced level all three runs together. The advanced level asks you to teach someone the limits of the evidence, so they use the prompts with open eyes.

The three runs in turn



Exercise:

Three runs.

1. Starter. Take a short story you know. **Apply three prompts to it** and write one new version for each.
2. Middle. Run all seven prompts on an everyday problem, then pick two answers and develop them.
3. Advanced. Compare your object, story and problem runs. Note which prompts paid off, and explain to someone why SCAMPER is a practice drill with thin evidence.

Three runs at three levels



Three prompts on a short story



Seven prompts, then pick two



Explain the limits of the evidence

Key idea:

Running all seven SCAMPER prompts on an object, a story and a problem **shows that different prompts pay off on different jobs**, and the lists still need choosing with tests.

Quick check:

Why should you pick answers with written tests after a full SCAMPER run? Answer: A long list still needs judging before any idea works, and two tests show which answers do the job and suit the people.

4.4.1 Finding a Similar Principle in a Different Situation

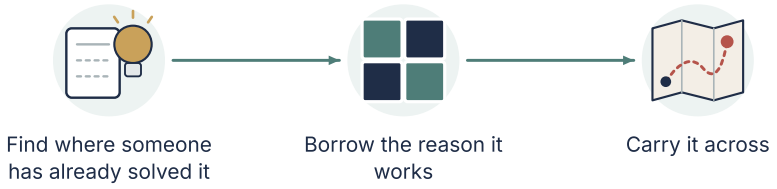
Imagine Lena, who runs a small school library. Every break time, forty children rush to the returns desk at once, and the queue reaches the door. **Lena has tried asking them to walk**, and she has tried a bigger desk, and the queue is still there every day.

The queue is still there

- Forty children rush to the returns desk at once
- Lena has tried asking them to walk
- She has tried a bigger desk

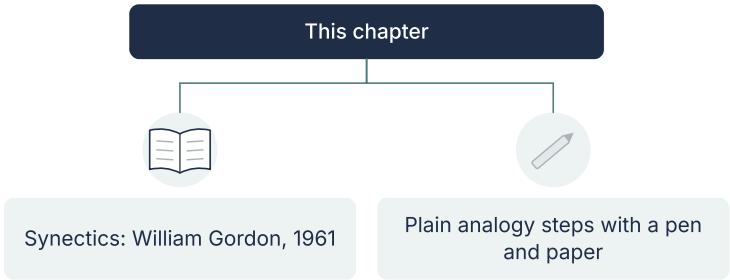
Lena is stuck inside her own problem. **The way out is to find another situation that has the same shape**, where someone has already solved it, and borrow the reason it works. In this section I show you how to find that shared shape, how to carry it across and how to practise at three levels.

Another situation with the same shape



Analogy has a named method beside it in this chapter. **William Gordon described Synectics in a 1961 book.** This section uses plain analogy steps that anyone can try with a pen and a sheet of paper.

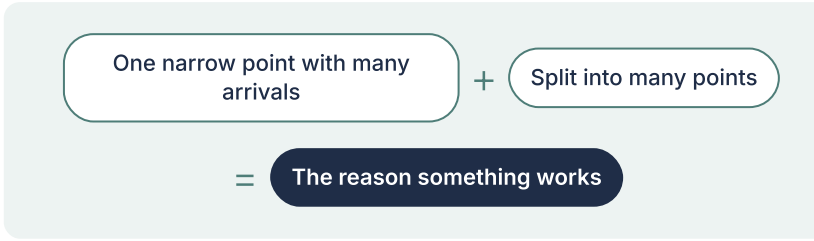
A named method beside analogy



> **Key Concept:**
> A similar principle. **A principle is the reason something works**, said in a way that does not name the thing. A toll road with many booths works because it splits one crowd into several small lines. Said without the road, the principle is that one narrow point with many arrivals can be split into many points. A principle can travel to a new situation, while the road stays where it is.

In 2.3.2 you met Gentner's idea that relations carry over in an analogy and looks stay behind (Gentner, 1983). **This section turns that idea into steps.** The source is the solved situation you know, and the target is the problem you face. A relation is how parts act on each other, such as crowding or splitting.

A principle can travel





A row of toll booths on a wide road, with cars split into short lines in front of each one.

A good analogy keeps the relations and lets the looks go. **The toll road and the library look nothing alike**, with cars in one and children in the other. They share the same relations, with many arrivals, one narrow point and a long wait. Those relations are what Lena can borrow.

Relations carry over and looks stay behind

	The toll road	The library
Looks	Cars	Children
Relations	Many arrivals, one narrow point and a long wait	Many arrivals, one narrow point and a long wait

Relations are easiest to spot as plain verbs. **Write what each part does to the others**, such as crowds, blocks, waits for or splits. Lena writes that children crowd the desk, the desk blocks the door and the queue makes the break shorter. Verbs like these travel to other places easily.

Relations as plain verbs



Children crowd the desk



The desk blocks the door



The queue makes the break shorter

Make a short list of solved situations before you choose one. **Give yourself ten minutes to write five places** where a crowd, a jam or a wait has been sorted out. Look at home and in the shops you use every week. Then pick the one whose verbs sound most like yours, and keep the other four for later.

Five solved situations

Try this now

1. Ten minutes to write five places where a wait has been sorted out
2. Pick the one whose verbs sound most like yours

> Exercise:
>
> Try it. Name one situation where a problem got solved. **List the relations that made it work**, and leave out how it looked.

Start the steps with a solved situation you know well. **Lena picks the school car park at home time**, which used to jam at the gate and now flows. She lists the relations. Cars stop at many bays along the kerb, they move one way round a loop, and a few staff wave them on.

The school car park at home time

- [x] Cars stop at many bays along the kerb
- [x] They move one way round a loop
- [x] A few staff wave them on

Now she carries the relations across, one at a time. **Many bays become a return box in every classroom**, so books stop at many points. The one-way loop becomes one door in and another door out, and the staff become two library monitors from the top year. The two places still look different, and the relations now match.

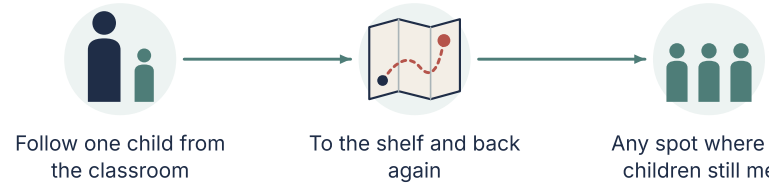
Carrying the relations across

The car park	The library
Many bays	A return box in every classroom
The one-way loop	One door in and another door out
A few staff	Two library monitors from the top year

> **Key Concept:**
> Two columns. Write the source on the left of a page and your problem on the right. **List the relations down each side**, one per line, and draw an arrow when a pair matches. A relation on the left with no partner is one you still have to build. Arrows that join only looks, such as children on both sides, do not count.

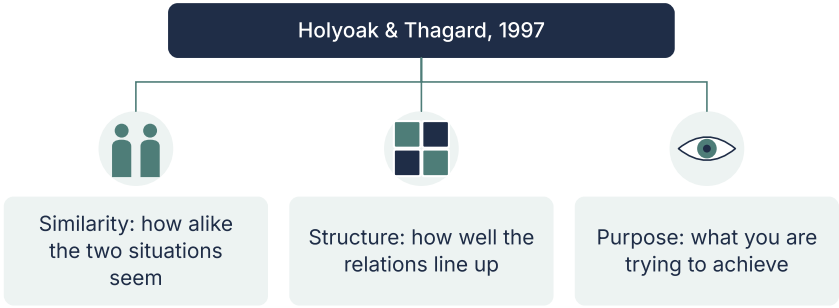
Test the map on paper before you spend anything. **Walk through one break time in your head** with the new plan in place. Follow one child from the classroom to the shelf and back again, step by step. Any spot where two children still meet at one narrow point shows a relation you have not carried across yet.

Walk through one break time



A fuller picture adds two more guides. **Holyoak and Thagard named "3 basic types of constraints: similarity, structure, and purpose"**, seen both in the lab and in everyday settings (Holyoak & Thagard, 1997). Similarity is how alike the two situations seem, structure is how well the relations line up, and purpose is what you are trying to achieve.

Three basic types of constraints



Purpose helps when you are stuck. **Ask what you are really trying to achieve**, and then look for situations that achieved the same thing. Lena's purpose is books back on the shelf without a queue at break. A post office, a doctor's waiting room and a bottle bank all meet a similar purpose.

Lena's purpose

- Books back on the shelf without a queue at break
- A post office, a doctor's waiting room and a bottle bank meet a similar purpose



A bottle bank with several round holes in a car park, a family dropping bottles into different holes at the same time.

Some sources are harder to use than others. **The shared shape is harder to spot when the two situations are far apart**, and Hashemi and Tubau call the task "particularly challenging when the source and target come from semantically distant domains" (Hashemi & Tubau, 2026). A library and a bottle bank are far apart in this sense.

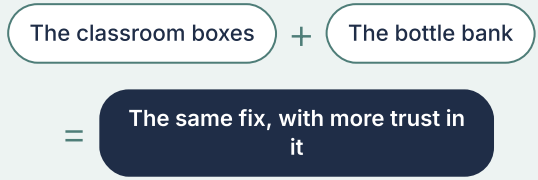
Near and far sources



> **Science Says:**
>
> Analogy research explains how people carry a structure from one situation to another (Gentner, 1983; Holyoak & Thagard, 1997). **It does not test analogy drills as training.** Hashemi and Tubau write that "A critical step in analogical problem solving is recognizing structural similarities between the source ... and the target" (Hashemi & Tubau, 2026). The steps in this section are practice built on that idea.

For a far source, Lena looks outside school. **She picks the bottle bank**, where several holes let a family drop bottles at once. The relation is many drop points side by side, which matches her classroom boxes. Two different sources pointing to the same fix gives her more trust in it.

Two different sources



Say the principle out loud to a friend before you use it. **If they can follow it without hearing about the source**, it is ready to travel. If they ask which road or which car park, cut the names and say it again. Then write the final wording on a card and keep it in your notebook.

Say the principle out loud



> **Key Concept:**
>
> Near and far sources. **A near source comes from a field like yours**, such as another school for Lena. A far source comes from a field that looks nothing like yours, such as a bottle bank or an ant trail. Try one of each on the same problem, and give the far one more time.

In 3.3.3 you practised metaphors, which compare things to make meaning. **Here the aim is narrower**, a working principle you can carry into a real fix. A metaphor can make a library sound like a river. A

principle tells you to add more return points, which you can test next week and keep or drop.

A metaphor and a principle

The idea	What it is like
A metaphor	Can make a library sound like a river
A principle	Tells you to add more return points, which you can test next week

An analogy still gives you only possible answers. **Each borrowed idea needs checking against the real situation** before you use it (Cropley, 2006). Lena checks the classroom boxes with two teachers before she buys any. One says her class will forget them, so Lena adds a weekly reminder on the class board.

Checking a borrowed idea



> **Key Concept:**
>
> Checking the fit. After you carry a principle across, **ask where the two situations differ**. The car park has several staff and the library has one person. Cars come every day and books come back once a week. Drivers want to get home, and children are not always keen to return books. Each difference can break the borrowed idea, so write them down and adjust the idea for each one before you try it.

Where the two situations differ

The car park	The library
Several staff	One person
Cars come every day	Books come back once a week
Drivers want to get home	Children are not always keen to return books

Put the borrowed idea into the library's own words. **Write the plan the way the children will hear it**, such as dropping your book in the box by the door on Friday. Car park words like bays and loops will puzzle a class of eight-year-olds. Read the line aloud to one child and change any word that makes them frown.

The library's own words

The way the children will hear it	Car park words
⊕ Drop your book in the box by the door on Friday	⊖ Bays and loops will puzzle a class of eight-year-olds

The method fits into ordinary days. **When stuck on a home or work problem, name its relations first**, such as one narrow point. Then ask where else those relations show up and how people there fixed them. A

train station, a kitchen at a busy restaurant or an ant trail can all hold a principle.

Where else those relations show up



The levels below follow the steps in order. The starter maps relations onto a new problem, the middle level adds a purpose when you are stuck, and the advanced level takes a source from a far field. **The advanced level uses a real problem of your own**, the shape of the better training programmes (Scott et al., 2004).

Keep a list of principles you have found. **A principle written once can be used again**, on problems you have not met yet. Lena's list starts with split one narrow point into many. She adds a second, send the crowd one way, after the two doors work.

A list of principles you have found

Day	1	2	3	4	5	6	7
Split one narrow point into many	☐	☐	☐	☐	☐	☐	☐
Send the crowd one way	☐	☐	☐	☐	☐	☐	☐

Exercise:

Borrow a principle.

1. Starter. Take the relations from your Try it. **Map them onto a new problem**, and ignore any matches in looks.
2. Middle. If stuck, write what you are trying to achieve, and find a situation that achieved it.
3. Advanced. Pick a source from a far field. Map its relations onto a real problem, and list where the fit breaks.

Borrow a principle at three levels



Map the relations onto a new problem



Write what you are trying to achieve



A source from a far field

Key idea:

Finding a similar principle means **carrying the relations that made something work**, and leaving its looks behind, from a solved situation to the one you are stuck on.

Quick check:

Which counts for more in an analogy, how the two situations look or how their parts act on each other? Answer: How their parts act on each other, because relations are what get carried across.

4.4.2 Borrowing Ideas From Nature, Other Fields and Everyday Experience

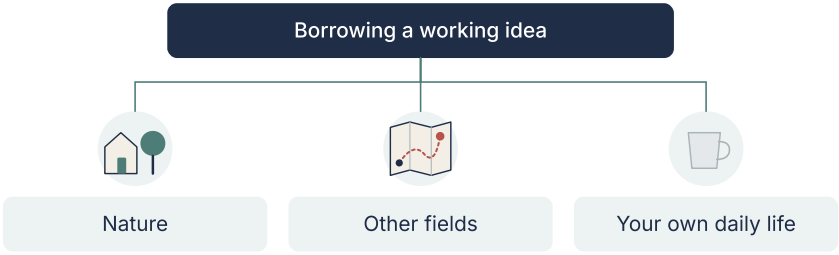
Imagine Arlo, who sells plants from a stall at a weekend market. His stall has a flat cloth roof, and every time it rains the roof fills with water and sags over the plants. **Arlo has tied it tighter and propped it with a broom**, and the water still gathers in the middle.

A sagging roof

- Every time it rains the roof fills with water
- Tied tighter and propped with a broom
- The water still gathers in the middle

Arlo needs an idea from somewhere other than his own stall. **Borrowing means taking a working idea from one place and using it in another.** In this section I show you three places to borrow from, nature, other fields and your own daily life, and how to check that a borrowed idea fits before you use it.

Three places to borrow from



Borrowing from nature has a name of its own. **The word biomimicry goes back to at least 1982**, and Janine Benyus wrote a book about it in 1997. Here, nature is one source among three. This section keeps to the borrowing skill, and the leaf is just one example.

Borrowing from nature has a name

- Biomimicry goes back to at least 1982
- Janine Benyus wrote a book about it in 1997
- Here, nature is one source among three

Key Concept:

Three sources to borrow from. **Nature** gives you ideas from plants, animals and weather. **Other fields** give you ideas from jobs and trades unlike yours, such as road building or cooking. **Everyday experience** gives you ideas from your own home, travel and habits. Each source holds problems that someone or something has already solved. Try all three on the same problem, and write one idea from each before you judge any of them.

In 4.4.1 you met principles and the guides that steer an analogy (Gentner, 1983; Holyoak & Thagard, 1997). Here they meet three kinds of source, one at a time. A leaf and a stall roof look nothing alike. If both have to shed rain, the way a leaf does it may still help the roof.

A leaf and a stall roof

A leaf + A stall roof = Both have to shed rain

Nature comes first for Arlo. **He watches rain on the leaves of his own plants**, and sees that the water runs off because most leaves tilt and few lie flat. Water on a flat leaf sits in a puddle. Water on a tilted leaf rolls to the edge and drops.

Rain on the leaves

Leaf	Water
A flat leaf	Sits in a puddle
A tilted leaf	Rolls to the edge and drops

> Exercise:
>
> Try it. Pick one problem. **Borrow one idea from nature, another field or daily life**, and write how it might help.

Give each source the same amount of time. **Spend five minutes on nature, five on another field and five on daily life**, and stop when the time is up. An even split gives each source a fair turn. Then read all three lists together before you pick.

Give each source the same amount of time



Five minutes on nature



Five on another field



Five on daily life

Then Arlo writes the principle in plain words. **A surface that slopes sheds water**, and a flat one holds it. He writes it on a card and pins it to the stall pole. His stall roof is flat, so the principle points straight at the problem.

The principle in plain words

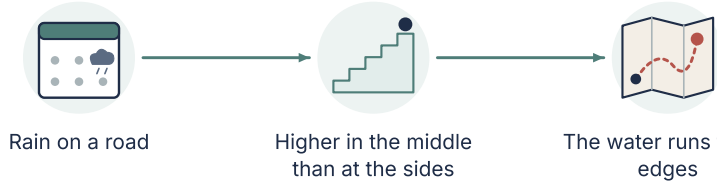
- A surface that slopes sheds water
- A flat one holds it



A large green leaf tilted downwards, a drop of rain rolling towards its pointed tip.

Next he tries another field. **Road builders face the same problem with rain on a road**, and Arlo has noticed that many roads are slightly higher in the middle than at the sides. The water runs to the edges. The relation is the same as the leaf, a slope that moves water away.

Road builders face the same problem



The road and the roof share a purpose, getting rid of rain. **Their structure lines up too**, since in both a slope carries the water away to the edges. Arlo marks the road as a source to keep. A road is far bigger than a stall, and he notes that as a difference to check later.

The road as a source to keep

- [x] They share a purpose, getting rid of rain
- [x] Their structure lines up too
- [x] A road is far bigger than a stall: a difference to check later

> **Key Concept:**
>
> A question for each source. For nature, **ask what living thing meets the same trouble**, such as rain, heat or wind. For other fields, ask which trade handles the same stuff every day, such as water, weight or crowds. For daily life, ask what you already do at home with that stuff. Write the question at the top of the page before you start looking.

The third source is everyday experience. **Your own kitchen, bus ride and weekend chores hold many solved problems** you have stopped noticing. Each one is a source you can borrow from without leaving home. Walk through one ordinary day in your head and note each small job you do out of habit, such as draining, folding or stacking.

A question for each source

Source	Ask
Nature	What living thing meets the same trouble
Other fields	Which trade handles the same stuff every day
Daily life	What you already do at home with that stuff

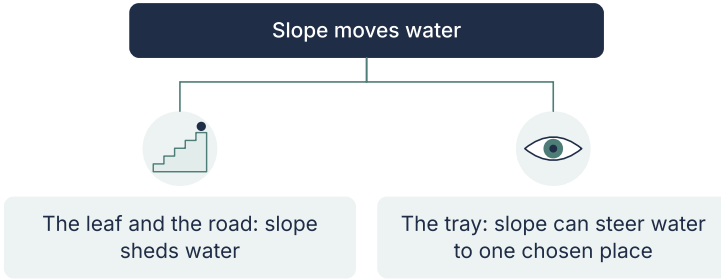
His own kitchen gives the next idea. **When he washes a tray, he tips it to one corner to drain it.** One low corner gathers all the water and lets it out in one place. The principle goes a step further than the leaf, since it says where the water should go.



A hand tipping a wet baking tray over a sink, water running off one corner in a thin stream.

Each source gave a slightly different principle. **The leaf and the road say slope sheds water**, and the tray adds that slope can steer water to one chosen place. Writing each principle on its own line lets Arlo see the small differences between them. The extra step from the tray proves the most useful.

Each source gave a slightly different principle



Three borrowed ideas are now on the page. **The leaf gives a tilted roof**, the road gives a roof that is higher in the middle, and the tray gives a roof with one low corner and a bucket underneath. All three share one principle, slope moves water, and each puts it to work in a different way.

Three borrowed ideas

Source	Roof
The leaf	A tilted roof
The road	A roof that is higher in the middle
The tray	One low corner and a bucket underneath

A borrowed idea still has to fit the stall. **Check it against the real setting before you use it** (Cropley, 2006). A roof idea that needs parts Arlo lacks, or that pours water onto customers, fails however neat it looks. Read each idea slowly and picture it on a wet, windy Saturday.

Picture it on a wet, windy Saturday



Parts Arlo lacks



Water poured onto customers



Check it against the real setting

Each idea needs a few things before it can work. **The road shape needs a stiff middle bar** to hold the roof up, and he has none, so he crosses it out. The tilted roof needs a taller pole, which he has at home. The tray idea needs a bucket, which he has already.

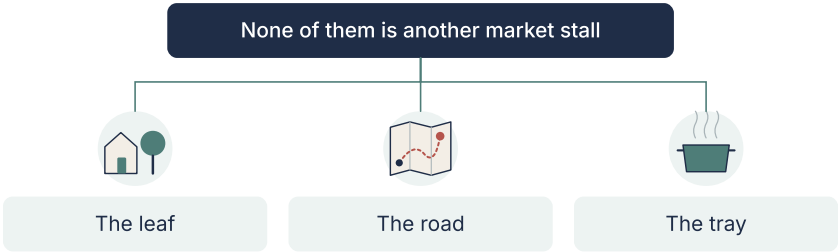
What each idea needs

He has it	He has none
⊕ The tilted roof: a taller pole, which he has at home	⊖ The road shape: a stiff middle bar, and he has none
⊕ The tray idea: a bucket, which he has already	

> 🗝 **Key Concept:**
>
> What must be true. For each borrowed idea, **write the things that must be true** in your setting for it to work, such as parts you need, space, cost or time. Tick each one you can meet today. An idea with every line ticked is ready to try. An idea with an unticked line needs a fix first, or a place on a list for later.

All three of Arlo's sources are far ones, since none of them is another market stall. Each came to him as a principle line, with the leaf, the road and the tray left out. On another day he could also ask the stall next door, which would give him a near source to set beside them.

All three of Arlo's sources are far ones



A principle can travel while some of its conditions stay behind. A leaf is small and light, and a stall roof is large and heavy with rain. A big cloth roof may need a steeper slope than a leaf, so Arlo tests it with a bucket of water first.

Some conditions stay behind

- A leaf is small and light
- A stall roof is large and heavy with rain
- Test it with a bucket of water first

> **Science Says:**
> In 4.4.1 you saw that a shared shape is harder to spot when the source and the problem come from fields far apart in meaning (Hashemi & Tubau, 2026). **A leaf and a stall roof sit far apart in this sense.** The research describes how analogy works, and it does not test borrowing drills, so the steps in this section are practice.

Even a borrowed idea that works can still grow. **Arlo's roof works on the next rainy Saturday**, so he keeps the slope. Then he adds a gutter,

an idea from his own house. He writes the date and the weather on the card, so he can check the roof again after a storm.

Check the roof again after a storm

Day	1	2	3	4	5	6	7
The date	☐	☐	☐	☐	☐	☐	☐
The weather	☐	☐	☐	☐	☐	☐	☐

Sources can also be mixed. **Arlo's final roof takes the slope from the leaf and the low corner from the tray**, and the gutter comes from his house. Each source added one part. He draws the finished roof on the back of the principle card, with each part labelled by its source.

Arlo's final roof



The slope from the leaf



The low corner from the tray



The gutter from his house

> **Key Concept:**
> One part from each source. After borrowing from all three sources, **lay the principle lines side by side** and ask which parts could join. Mark the line that gives the main shape. Then look for a second line that fills a small gap in it. Check the joined plan against what must be true, as you did for each idea alone.

Borrowing fits into ordinary days. **When you are stuck, ask where else this problem has been solved**, in a plant, a trade or your own home. Write one idea from each source, find the principle and check

what must be true. Each round takes a few minutes and uses only a pen and a sheet of paper.

The levels below follow the steps in this section. The starter writes the principle, the middle level tests the fit and the advanced level compares all three kinds of source. **The advanced level uses a real problem from your own field**, the shape of the better training programmes (Scott et al., 2004).

Where else this problem has been solved



Exercise:

Borrow and check.

1. Starter. Take the idea from your Try it. **Write the principle in one line**, without naming the source.
2. Middle. Write what must be true in your setting for the idea to work, and tick what you can meet.
3. Advanced. For a real problem in your field, take one source of each kind. Compare their principles by purpose, fit and reality. Keep the best and say why the rest fail.

Borrow and check at three levels



The principle in one line



What must be true, ticked



One source of each kind compared

Key idea:

You can borrow ideas from nature, other fields and everyday experience by **finding the principle behind a working solution** and checking what must be true for it to work in your own setting.

Quick check:

Before using a borrowed idea, what should you write down? Answer: What must be true in your setting for it to work, such as parts, space, cost or time.

4.4.3 Making the Familiar Strange and the Strange Familiar

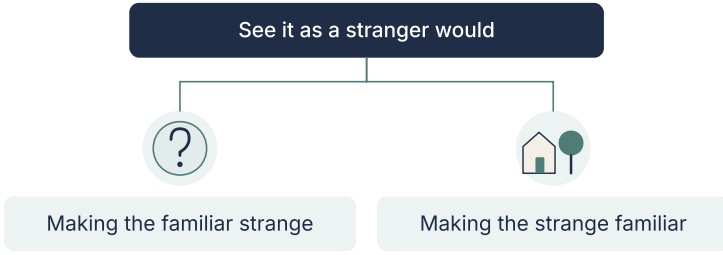
Imagine Nadia, who works on the front desk of a dental clinic. Patients sit in the waiting room looking nervous, and some leave before they are called. **Nadia has walked through that room every day for six years**, and she can no longer see anything in it that might be making people uneasy.

She has stopped seeing the room

- Patients sit in the waiting room looking nervous
- Some leave before they are called
- Six years walking through that room every day

Nadia knows the room so well that she has stopped seeing it. **The cure is to see it as a stranger would.** In this section I show you two moves that work as a pair, making the familiar strange and making the strange familiar, and how to practise each at three levels.

Two moves that work as a pair





A small dental waiting room with chairs in rows facing a wall, a clock above the door and a pile of old magazines.

Making the strange familiar is the framing of Synectics, the method William Gordon described in a 1961 book. This section pairs it with the reverse move, making the familiar strange.

> **Key Concept:**
>
> Familiar strange, strange familiar. **Making the familiar strange** means describing something you know well as if you had never seen it, so its odd parts show. **Making the strange familiar** means taking something new and puzzling and linking it to something you know, so it stops feeling strange. The first helps you notice, and the second helps you understand. Use them in either order, and switch when one stops giving you anything new.

Familiar strange, strange familiar

Move	What it does
Making the familiar strange	Helps you notice
Making the strange familiar	Helps you understand

Start with the familiar made strange. **Describe the thing in plain actions, as a visitor from far away might.** Leave out every name that hides what is going on. Nadia writes that people sit in rows facing a blank wall, hold paper slips and wait for a voice to call one of them through a door.

The waiting room in plain actions



People sit in rows facing a blank wall



They hold paper slips



They wait for a voice to call one of them

> Exercise:
>
> Try it. Pick a place or task you know well. **Describe it as if you had never seen it**, in plain actions.

Pick a quiet moment for the first try. **Stand where you usually stand and write for five minutes without stopping.** Leave every fix for later, because this first pass is only for seeing. If you run dry, look up, find one thing you have not yet written down and describe what it does.

The first try

Try this now

1. Stand where you usually stand
2. Write for five minutes without stopping
3. Leave every fix for later

Read the strange description back. **Parts you stopped seeing years ago now stand out.** Nadia notices three of them. The chairs face a wall, nobody knows how long the wait will be, and the only sound is the drill through the door.

Parts that now stand out

- [x] The chairs face a wall
- [x] Nobody knows how long the wait will be
- [x] The only sound is the drill through the door

The strange move works on tasks and places alike. **Nadia describes booking an appointment in plain actions**, a voice asks for a name, a date and a reason, then the line goes quiet while someone types. The

quiet stretch stands out. A patient on the phone hears nothing and wonders if the call has dropped.

Booking an appointment in plain actions



A voice asks for a name, a date and a reason

The line goes quiet while someone types

The patient wonders if the call has dropped

Each odd part points at a possible change. **Turn every odd part into a question that starts with could.** The chairs could face a window, a board could show who is next, and soft music could cover the drill. None of the ideas is new to the world, and each is new to this room.

Each odd part points at a possible change



The chairs could face a window

A board could show who is next

Soft music could cover the drill

Keep the strange description short. **Six to ten plain lines are enough** for one room or one task. Read it aloud once, slowly, and mark any line that makes you frown. Those marks are where you start looking for a change.

Keep the strange description short

- Six to ten plain lines are enough
- Read it aloud once, slowly
- Mark any line that makes you frown

Key Concept:

Change the seat. Describe the same place again **from a different spot or at a different time**, such as from the patient's chair, or from the door at the busiest hour. Each spot shows parts that your usual place hides. Write one strange description from each spot, then put them side by side and mark the odd parts that show up in both.

The second move runs the other way. **Nadia's manager gives her a task she has never done**, planning the clinic's first open day for children. She has no idea where to start, and the task feels strange and very large. She has two weeks and a small budget.

A task she has never done



The clinic's first open day for children



Two weeks

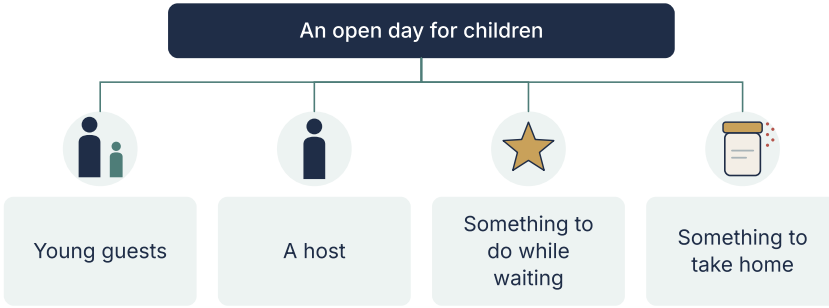


A small budget

To make it familiar, find something you know that shares its relations. **An open day for children is like a birthday party**, with young guests, a host, something to do while waiting and something to take

home. Nadia has planned several birthday parties for her nephews. Suddenly the open day has a shape.

Like a birthday party

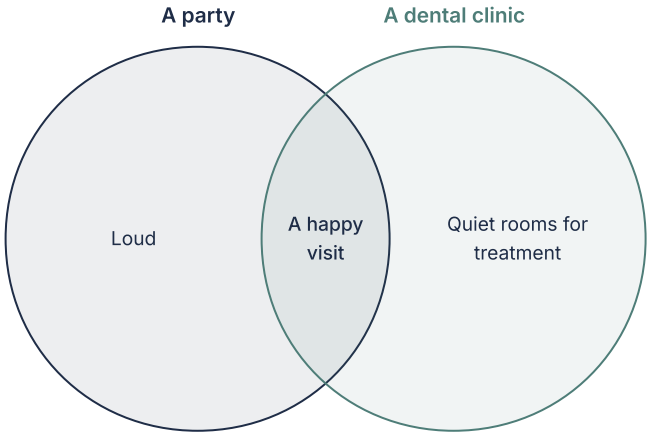




A table at a children's party with paper hats, a stack of small gift bags and a game laid out on a cloth.

A party and a dental clinic look nothing alike, and they share the parts that shape a good visit for a child. Both also share one purpose, a happy visit.

A party and a dental clinic



> **Key Concept:**
> Finding the familiar. To make something strange familiar, **list what it needs to do** in three or four short lines. Then ask where else in your life you have met those same needs, at home, at work or on a trip. A first job, a new town or an odd task at home can each be linked to something you already know how to do. The link gives you a first plan to work from.

Every link has places where it breaks. **Children at a party want to be there**, and children at a dentist may be scared. A party is loud, and a clinic needs quiet rooms for treatment. Nadia writes each difference beside the plan, so the borrowed shape does not hide a real problem.

Every link has places where it breaks

A party	A clinic
Children want to be there	Children may be scared
Loud	Quiet rooms for treatment

The party then carries across. **The host becomes a dentist who says hello at the door**, the games become a chance to hold the small mirror and the take-home bag holds a toothbrush and a sticker. The strange task now has a plan she can explain in a minute.

The party carries across



A dentist who says hello at the door



A chance to hold the small mirror

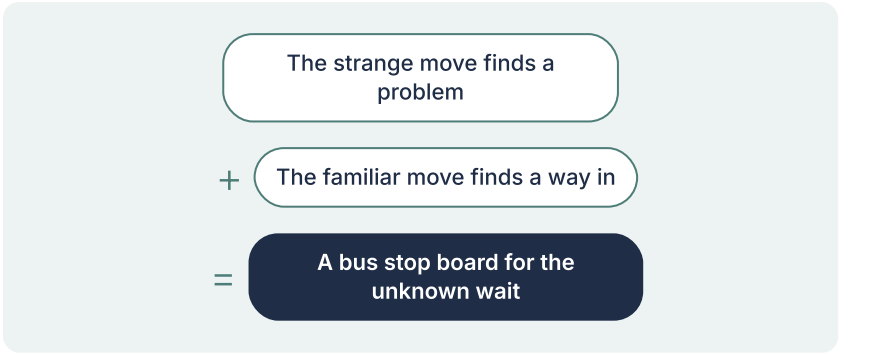


A toothbrush and a sticker to take home

> **Science Says:**
>
> Gentner's theory of analogy "allows analogies to be distinguished cleanly from literal similarity statements" (Gentner, 1983). **A literal statement compares looks**, and an analogy compares how parts act, as the party and the clinic do. Synectics itself rests on weak evidence, so the two moves here are practice, and the ideas they give still need checking.

The two moves can be used on one problem. **The strange move finds a problem, and the familiar move finds a way in.** Nadia uses both on the waiting room. She made it strange to see the unknown wait, then made the wait familiar by linking it to a bus stop board that shows when the next bus comes.

Both moves on one problem



The open day plan can be made strange as well. **Nadia reads it back in plain actions**, as a child might live it. Children arrive, stand in a corridor, wait and go home. The empty wait in the corridor stands out, so she puts a table of drawing paper there.

The open day plan made strange

- Children arrive, stand in a corridor, wait and go home
- The empty wait in the corridor stands out
- A table of drawing paper there

Every idea from these moves still needs testing against the real place (Cropley, 2006). **Some changes will clash with how the clinic runs.** Soft music might bother the dentist. A board showing names might upset patients who want privacy. Nadia changes the board to show numbers only.

Testing against the real place

Nadia changes it	Will clash
⊕ A board that shows numbers only	⊖ Soft music might bother the dentist ⊖ A board showing names might upset patients

> 🔑 **Key Concept:**
>
> Getting a yes. The person who runs a place often knows it best and sees it least. **Show them the strange description first**, and let them spot the odd parts for themselves. Then offer one small change linked to something familiar, such as the bus stop board. A change they helped to see is easier for them to accept.

A simple count shows whether the changes helped. **Nadia counts how many patients leave before being called**, for a month before the changes and a month after. A count like this cannot prove what caused a change. It does tell her whether to keep going or try something else.

A simple count

Day	1	2	3	4	5	6	7
Patients who leave before being called	☐	☐	☐	☐	☐	☐	☐
A month before the changes and a month after	☐	☐	☐	☐	☐	☐	☐

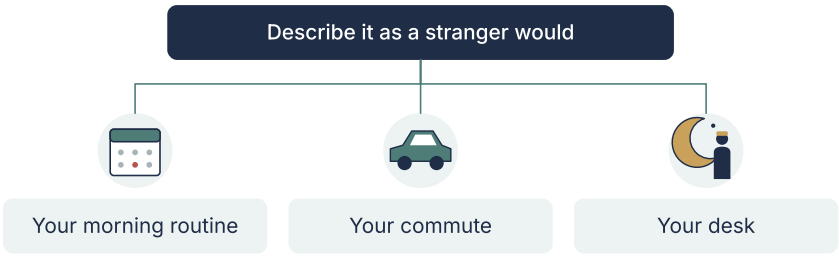
Synectics is a branded method sold through courses and books. **You do not need to buy anything to use these two moves.** A pen, a notebook and a few minutes are enough. The two moves are the part of it this section keeps.

You do not need to buy anything



The moves fit into ordinary days. **Describe your morning routine, your commute or your desk as a stranger would**, and underline the odd parts. When a new task feels huge, list what it needs to do and link it to something you have done before. Each round takes about five minutes.

The moves in ordinary days

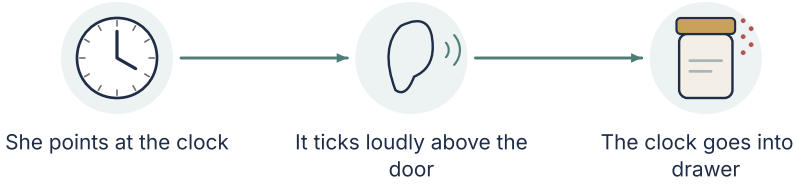


> **Key Concept:**
>
> Fresh eyes. **A person new to a place sees it as strange without trying.** Ask them to list what they notice in plain actions in their first week, before it starts to feel normal to them. Their list is a ready-made strange description. Thank them, and test one small change from it, so they see their eyes were useful.

A new trainee joins the clinic that month. **On her first morning she points at the clock** that ticks loudly above the door. Nadia had

stopped hearing it years ago. The clock goes into a drawer, and the room is quieter by lunch.

Fresh eyes on her first morning



The levels below follow the two moves. The starter makes a strange example familiar, the middle level pairs both moves on one problem and the advanced level asks a real person to accept a change. **The advanced level uses a real setting and a real person**, the shape of the better training programmes (Scott et al., 2004).

> Exercise:
>
> Strange and familiar.
>
> 1. Starter. Pick something strange to you. **Name the relations it shares with something you know** until it feels ordinary.
> 2. Middle. On one problem, make it strange to spot an odd part, then make the fix familiar by linking it to a known solution.
> 3. Advanced. Offer one change from these moves to the person who runs a real place, and get their yes.



Key idea:

Making the familiar strange **helps you notice odd parts you stopped seeing**, and making the strange familiar helps you find a way into a new task by linking it to something you know.

Quick check:

How do you make something familiar strange? Answer: Describe it in plain actions, as a stranger would, leaving out the names that make it feel normal.

4.4.4 Turning a Comparison Into a New Idea

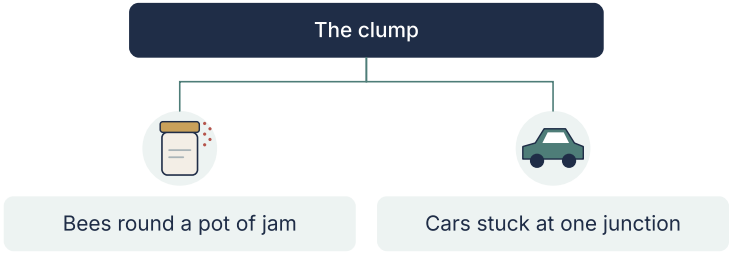
Imagine Mira, who coaches a football team of eight-year-olds on Saturday mornings. Every match looks the same, with all ten children chasing the ball in one tight clump. **Mira has shouted at them to spread out a hundred times**, and the clump forms again within a minute.

One tight clump

- All ten children chasing the ball
- Spread out, shouted a hundred times
- The clump forms again within a minute

Mira already has comparisons in her head. **The clump looks like bees round a pot of jam**, or cars stuck at one junction. A comparison on its own changes nothing on the pitch. In this section I show you how to turn a comparison into a new idea you can try, and how to practise at three levels.

Comparisons already in her head





A crowd of small children in matching shirts all chasing one football across a muddy pitch.

Turning comparisons into plans is the last step of the analogy methods in this chapter. **William Gordon's Synectics, from the 1960s, used comparisons to find new ideas.** This section takes that comparison step on its own and turns it into a written form you can use on your own.

Each comparison starts with the problem. **Say what goes wrong in one plain line**, such as ten children chasing one ball. Then let other places come to mind where the same thing goes wrong at home or in town. Write each one down, however odd it seems at first.

Each comparison starts with the problem



Key Concept:

From comparison to idea. **A comparison says one thing is like another.** An idea says what you could do. The step between them is the reason the two are alike, said as a relation. Write the comparison, write the reason, then write what the reason lets you do. Each line moves you one step from talk towards action. If you cannot write the third line, go back to the second and look for a different reason.

The step has a simple form. **Write** *Like X because of a relation, therefore we could try Y.* The three parts name the source, the shared relation and the action. Mira writes that the clump is like a busy junction, because everyone heads for one point, therefore she could add lanes on the pitch.

The step has a simple form

Part	Mira's line
Like X: the source	A busy junction
Because of a relation	Everyone heads for one point
Therefore we could try Y	Add lanes on the pitch

> **Exercise:**
>
> Try it. Write one comparison for a problem as *Like X because of a relation, therefore we could try Y.*

Write several comparisons before you choose one. **A short list lets you test each in turn.** Mira writes five in three minutes, from a junction and a jam pot to a shop door, a school corridor and a beach on a hot day. She sets a timer so the list stays quick.

Five comparisons in three minutes

- [x] A junction
- [x] A jam pot
- [x] A shop door
- [x] A school corridor
- [x] A beach on a hot day

Lanes become a plan. **Each child gets a lane on the pitch**, marked with cones, and stays in it unless the ball comes into their lane. The clump has nowhere to form, because each lane holds only one or two children. The junction gave her the idea, and the cones cost nothing because the club already owns them.

Lanes become a plan





A row of orange cones dividing a small football pitch into long strips, one child standing in each strip.

In 4.4.1 you met the rule that relations travel and looks stay behind (Gentner, 1983), along with purpose as a guide (Holyoak & Thagard, 1997). A junction and a pitch look nothing alike, and the relation of everyone heading for one point is the same in both. The relation is the part that turns into an action.

The relation turns into an action

> - A junction and a pitch look nothing alike
> - Everyone heading for one point is the same in both

Some comparisons share only looks. **The bees round the jam look like the clump**, small and busy and packed together. When Mira writes

the reason, she finds it is about how they look, and the therefore line stays empty. She crosses it out with a single line, so she can still read it.

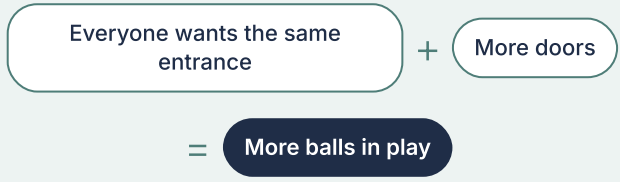
Some comparisons share only looks



> **Key Concept:**
> The because test. Write the because line for each comparison before you write anything else. **If the because line will not come**, set the comparison aside on a separate list. Do not throw that list away. A picture like the bees can still help later, when you explain the plan to the children. Read the list again before the next match.

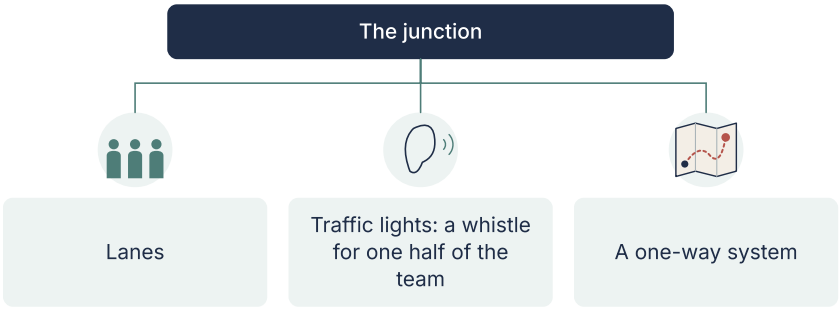
A third comparison goes further. **The clump is like a queue at a shop with one door**, because everyone wants the same entrance. Therefore she could add more doors, which on a pitch means more balls in play. A training game with three balls gives every child more touches at once, and fewer children stand still waiting for a turn.

A queue at a shop with one door



One comparison can give several therefore lines. **Write the because line once and the therefore line three times**, each with a different action. The junction gives lanes, traffic lights and a one-way system. Traffic lights become a whistle that lets one half of the team move at a time.

One because line, three therefore lines



Ideas from a comparison need a purpose to aim at. **Mira's purpose is that every child touches the ball at least ten times in a match.** A tally on her clipboard can show whether it is met. She writes the purpose on the back of the team sheet.

Mira's purpose

> - Every child touches the ball at least ten times in a match
> - A tally on her clipboard
> - Written on the back of the team sheet

Purpose helps you judge each therefore line. **The lanes idea meets the purpose**, since each child gets the ball when it comes into their lane. The three-ball idea meets it in training, and cannot be used in a match. Mira keeps lanes for the match and three balls for practice.

Purpose helps you judge each therefore line

Meets it in a match	Training only
⊕ Lanes: each child gets the ball when it comes into their lane	⊖ Three balls: cannot be used in a match

> **Key Concept:**
>
> Adding a purpose. When a therefore line feels weak, **write what the new idea must achieve** in one short sentence. Then rewrite the therefore line so it meets that purpose. A purpose turns a loose idea into one you can test, because you can see at the end of a match whether it was met. Keep the purpose small enough to check in one go, and write it where you will see it.

In the next match, Mira uses lanes for the first half. **She counts how many times each child touches the ball**, using a tally on her clipboard. Most children reach ten touches, and two do not. A count like this tells her what happened on one morning, and she runs it again the following week.

The next match



Lanes for the first half



A tally of touches on her clipboard



Most children reach ten touches, and two do not

Every new idea still needs checking against the real situation (Cropley, 2006). **Lanes might stop children from learning to move**, since real football asks players to follow the play. Mira decides to use lanes for the

first half only. In the second half, the lanes come off and she watches whether the clump returns.

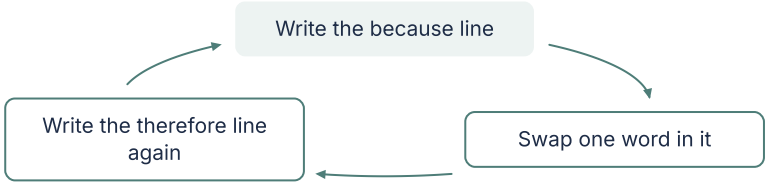
Checking against the real situation

Half	Lanes
First half	Lanes on
Second half	The lanes come off, and she watches whether the clump returns

Choosing among therefore lines takes judgement. **Mira asks herself which line she would bet on**, then checks it against her purpose and the children. Her gut picks lanes, and the checks agree. The whole choice takes her under a minute.

A small change to the because line can give a new action. **Swap one word in it and write the therefore line again.** Everyone heads for one point becomes everyone heads for two points, therefore she could put two small goals at each end. Keep every version on the same page.

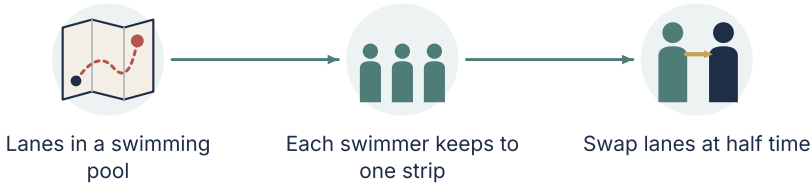
A small change to the because line



> **Science Says:**
>
> In 2.3.3 you saw that students' picks of their own most creative ideas lined up closely with judges' ratings (Silvia, 2008). **Your own pick is a fair first filter** among therefore lines. The form in this section is practice, so test each idea it gives on the real pitch before you use it.

> **Key Concept:**
>
> A second round. Once an idea is in place, **treat the idea itself as a new problem** and write a fresh comparison for it. Lanes that keep children apart are like lanes in a swimming pool, because each swimmer keeps to one strip. Therefore the children could swap lanes at half time, so nobody is stuck on the wing all morning. Write the new pair under the first.

A second round



The method fits ordinary days. **When a problem reminds you of something, write the because line straight away**, then the therefore line. A messy shared fridge might be like a car park, because there are no marked spaces, therefore you could mark shelves. Each round takes a few minutes, and the because line deserves the most time.

Try the form on a small home problem first. **Socks that never pair up after washing** are like shoes kicked off at a door, because each pair

splits on the way in. Therefore you could clip each pair together before it goes in the wash. One clip costs little, and you will know within a week.

The form on home problems

Like	Because	Therefore
A car park	No marked spaces	Mark shelves
Shoes kicked off at a door	Each pair splits on the way in	Clip each pair together

Keep a page of the therefore lines you have tried. **Each line that worked once is a ready idea** for the next problem with the same relation. Mira's page starts with lanes for crowding and a whistle for taking turns. She uses the whistle the next month, when the children crowd round the drinks table.

A page of therefore lines you have tried

Day	1	2	3	4	5	6	7
Lanes for crowding	☐	☐	☐	☐	☐	☐	☐
A whistle for taking turns	☐	☐	☐	☐	☐	☐	☐

The levels below follow the steps in this section. The starter drops comparisons that share only looks, the middle level adds a purpose and the advanced level turns a comparison into a real decision. **The advanced level uses a real decision and real people**, the shape of the better training programmes (Scott et al., 2004).

Exercise:

Compare, then act.

1. Starter. Write five comparisons for one problem. **Drop the ones that share only looks**, and keep the rest.
2. Middle. For each one kept, write what the idea must achieve, and rewrite the therefore line to meet it.
3. Advanced. Use a comparison for a real decision. Choose the therefore line with tests from the people affected.

Compare, then act at three levels



Drop the ones that share only looks



Rewrite the therefore line to meet a purpose



A real decision with tests from the people affected

Key idea:

To turn a comparison into a new idea, **write why the two things are alike as a relation**, then write what that relation lets you do, and check it against a clear purpose.

Quick check:

What makes a comparison useful for a new idea? Answer: It shares a relation, such as everyone heading for one point, which gives you a therefore line with something real to act on, while a comparison of looks gives only a picture.

4.5 Changing Perspective: Lateral Thinking

4.5.1 Challenging Assumptions and Reversing the Usual Approach

Imagine Zara, who runs a homework club at a community centre on Tuesday and Thursday afternoons. **Twelve places are open and only three children come**, though parents keep saying their children need help. She has made posters, offered biscuits and moved the start by half an hour, and the room is still mostly empty.

A club with empty desks



Every fix so far keeps the club the same shape. **Each one pushes a little harder at the usual approach**, where children walk to the centre after school and an adult helps them there. In this section I show you how to name the usual approach, turn it the other way round and see what the reversed version gives you.



A bright community centre room with twelve small desks, three of them taken by children bent over exercise books.

Turning a usual approach round has a named source. **In 1967 de Bono wrote a book called The Use of Lateral Thinking**.

Hidden assumptions had a section of their own in 3.2.3. **Here the target is bigger**, the whole usual approach. It is a bundle of those rules packed so tightly that it feels like the only way to do the job, so nobody at the centre has ever thought to question it.

Here the target is bigger

- Hidden assumptions in 3.2.3
- Here, the whole usual approach
- A bundle of rules packed tightly

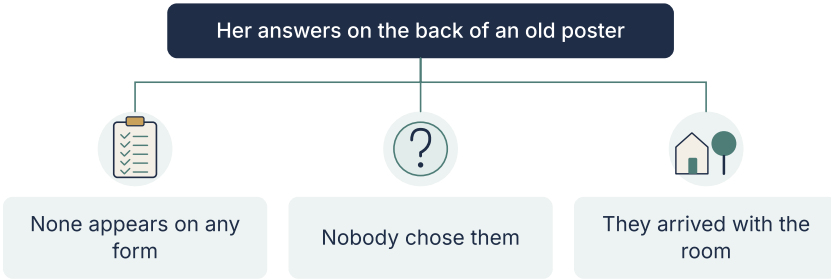
> **Key Concept:**
>
> The usual approach. **The usual approach is the way most people would tackle a problem** without stopping to choose. To find it, write short answers about who does the work, where it happens and when it happens. Then add which way things move, towards you or away from you, and who helps whom. Written as plain rules, those answers show the shape everyone has stopped seeing.

Finding the usual approach



Her answers go on the back of an old poster. **Children come to the centre**, the club runs after school, and adults help children with their work. Three short rules hold the whole club in place, and none of them appears on any form. Nobody chose them, because they arrived with the room.

Three short rules hold the club in place



A reversal **turns one rule into its opposite** and treats the opposite as true for a while. Children coming to the centre becomes the club going to the children. Adults helping children becomes children helping adults. Each reversal sounds odd at first, and the odd feeling is a sign that you have left the usual track.

A rule and its opposite

Usual rule	Reversed
Children come to the centre	The club goes to the children
Adults help children	Children help adults

A usual approach can feel like the only door in a room. **You push on it every time**, and you stop looking for a window. A reversal is like opening the window instead and climbing out that way, so you see the same room from a new side.

The only door in a room



Push on the door every time



Open the window instead



See the room from a new side

> Exercise:
>
> Try it. Name when the usual approach acts, such as after a problem appears. **Write how it would work at the opposite time**, such as before.

The first reversal Zara tries is the place. **If the club goes to the children**, it could meet where children already are after school, by the

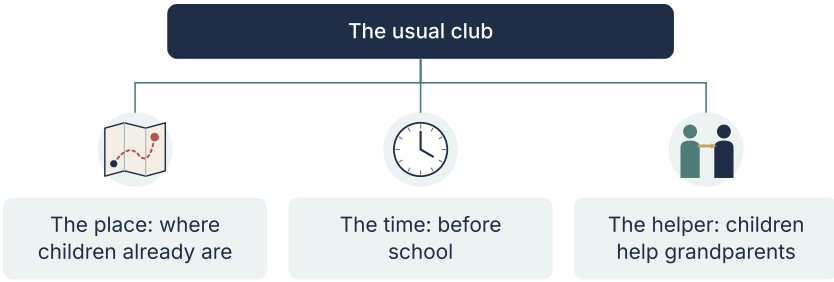
swings, in the park or in the courtyard of the flats. A folding table and a box of pencils would fit in the boot of her car.

If the club goes to the children



The second reversal is the time. **If homework happens before school**, the club becomes a breakfast table at eight, when working parents drop their children off early. The third is the helper. If children help adults, the club could pair children with grandparents who want to learn their phones, and homework gets done side by side afterwards.

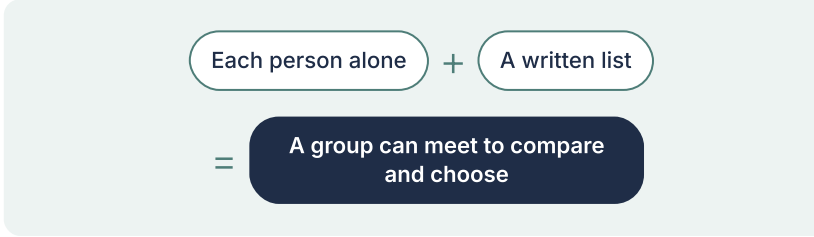
Three reversals of the usual club



> **Science Says:**
> "In the case of visuo-spatial insight problems, giving hints or training people to think in opposites seems to be of some help" (Bianchi & Branchini, 2023). **That finding rests on a small set of studies** and measured success on picture-and-shape insight puzzles.

Do the reversing alone and on paper first. **As 4.1.2 showed, groups that call out ideas together tend to produce fewer of them than the same people working alone** (Mullen et al., 1991; Diehl & Stroebe, 1987). Once each person has a written list, a group can meet to compare and choose.

Do the reversing alone and on paper first



Write the first answers a reversed rule gives you, **even the ones that sound like jokes**, such as children doing sums on the swings. A joke can hold a real part, and the swings joke holds the idea of meeting where children already play.

A joke can hold a real part



> **Key Concept:**
>
> Staying with a reversal. **Write the reversed rule at the top of a page**, and under it list everything that would be easier, cheaper or more fun if it were true. Then list everything that would break. Give each list five minutes. The easier list shows what the reversal offers, and the break list shows what you would need to fix before you try it.

For the breakfast table, the easier list is long. **Parents are already at the door at eight**, children are fresh, and the centre is empty in the mornings. The break list is shorter, with an early start for helpers and a need for toast. Both lists fit on one page, and the page already looks like a plan.

The breakfast table

Easier	Would break
⊕ Parents already at the door at eight	⊖ An early start for helpers
⊕ Children are fresh	⊖ A need for toast
⊕ The centre is empty in the mornings	

The park club gives a different picture. **Its easier list is fun**, with fresh air and children who are already there. Its break list is long, with rain and wind, and no tables or toilets anywhere near. A reversal that breaks in many places is still useful, because one part of it can travel into a better plan.



A folding table set up beside a playground, with two children writing and a box of pencils weighed down by a stone.

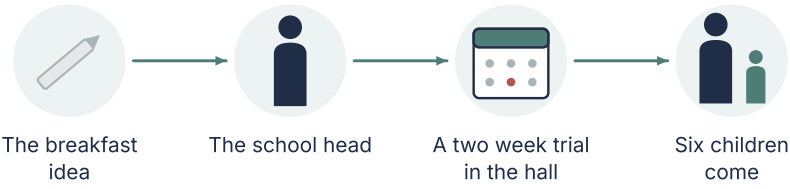
Every reversal gives a possibility, and **a possibility still has to meet the real world**. Before you fall for a reversal, read its break list slowly and mark each item as easy, hard or impossible to fix. One impossible item can sink the whole reversal. Several easy items mean the reversal is closer to a plan than it first looked.

Read the break list slowly

- [ ] Mark each item as easy to fix
- [ ] Hard to fix
- [ ] Impossible to fix

Take the idea to the person who would say yes or no. **Zara takes the breakfast idea to the school head**, who owns the morning drop off and knows which parents arrive early. The head offers the school hall for a two week trial. On the first morning, in this imagined scene, six children come.

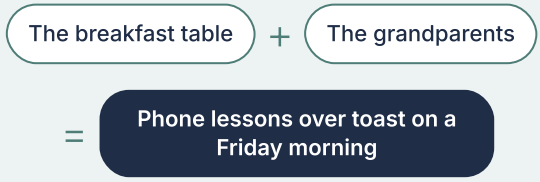
Take the idea to the person who would say yes



> **Key Concept:**
>
> Choosing which rule to reverse. **Reverse the rule that every fix so far has kept.** Zara's posters, biscuits and new start time all kept the club in the same room after school. Start with that rule, because it has sat under every fix you have already tried.

The grandparents idea deserves a second look before it goes in the bin. **It uses the opposite kind of helper**, with children helping adults, and that change gives children a reason to come that has nothing to do with homework. The breakfast table and the grandparents could even join, with phone lessons over toast on a Friday morning.

The two ideas could even join



Keep a small notebook just for reversals. **Write one usual rule and its opposite as a pair**, with a blank line under for the easier list. Date the

page, and reverse only one rule per page, so that when you try it you can tell which change did the work.

A small notebook just for reversals

Day	1	2	3	4	5	6	7
One usual rule and its opposite	☐	☐	☐	☐	☐	☐	☐
A blank line for the easier list	☐	☐	☐	☐	☐	☐	☐
Date the page	☐	☐	☐	☐	☐	☐	☐

> **Key Concept:**
>
> A reversal pair. **A reversal pair is one usual rule written beside its exact opposite**, such as "the club meets after school" beside "the club meets before school". Keeping the pair together means the easier list and the break list both stay about that one rule.

A reversal pair



The club meets after school



The club meets before school



One usual rule beside its exact opposite

Dropping a rule is a different move from reversing it. **A dropped rule leaves a gap**, while turning it round puts something definite in its place. Without the rule about the room, the club could meet anywhere at all. With the rule reversed, the club goes to one named place, where the children already are.

Dropping a rule or reversing it

Dropped rule	Reversed rule
Leaves a gap	Puts something definite in its place
The club could meet anywhere at all	The club goes to one named place

> **Key Concept:**
> When a reversal gives nothing. Some reversals stay jokes however long you sit with them. **Move on to the next rule** on your list and reverse that one instead. If every rule gives nothing, your rules may be very broad. Split a big rule into two smaller ones, such as when the club starts and how long it lasts, and reverse the smaller rules one at a time.

A library that always waits for late books can reverse when it acts. **It writes to readers a week before a book is due**, so the reminder does the work the fine used to do. The usual when was after the due date, and the opposite when is before.

The library reverses when it acts



The usual when: after the due date



The opposite when: a week before

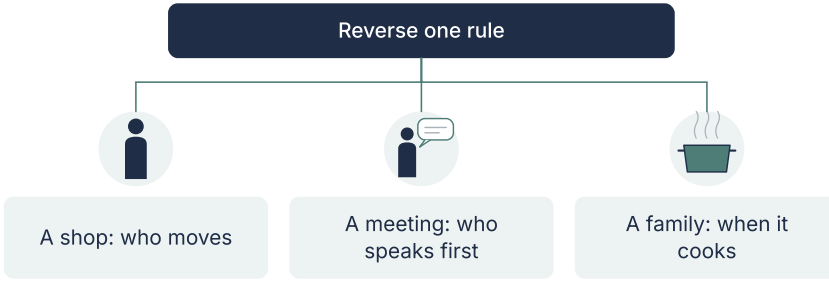


The reminder does the work of the fine

The steps work far beyond homework clubs. **A shop where customers queue at the till** can reverse who moves, with staff taking payment on the shop floor. A meeting where the leader talks first can reverse the

order of who speaks. A family that cooks every evening can reverse when, with one big cooking session on Sunday.

The steps work far beyond homework clubs



On the second morning of the trial, **eight children sit at the hall tables**, and two parents stay to pour juice. The head marks the week as worth continuing.

The second morning of the trial



The levels below take the steps in order. **The starter reverses a direction**, the middle reverses the usual helper alone on paper, and the advanced level applies two reversals to one brief and keeps one for a trial.

Exercise:

Reverse the usual.

1. Starter. Take a task where A usually goes to B. **Write what would happen if B came to A**, and what that would need.
2. Middle. Alone on paper, name the usual helper. Write a version with the opposite kind of helper.
3. Advanced. Apply two different reversals to one real brief. Judge both against stated criteria and keep one for a small trial.

Reverse the usual at three levels



B comes to A



The opposite kind of helper



Two reversals, one kept for a trial

Key idea:

Name the usual approach as plain rules, **turn one rule into its opposite** and stay with it long enough to find the part that could really work.

Quick check:

Which rule is the best one to reverse first? Answer: The rule that every fix so far has kept. Why reverse only one rule on a page? Answer: So you can tell which change did the work. What does the Try it reverse? Answer: When the usual approach acts, by trying the opposite time.

4.5.2 Random Entry: Starting From an Unexpected Word, Image or Object

Imagine Zara with a money problem. **The homework club needs forty new reading books**, and the centre has no budget for them. Her first ideas are a cake sale, a raffle and a sponsored walk, the same three ideas every club in town has already had this year.

The same three ideas

- [x] A cake sale
- [x] A raffle
- [x] A sponsored walk

Her first ideas all come from one corner of her mind. **Random entry starts somewhere else on purpose**, with a thing unrelated to the problem, and follows a link back. In this section I show you how to pick a random start, make links from it and keep the useful ones.

Random entry

> - Starts somewhere else on purpose
> - A thing unrelated to the problem
> - Follows a link back

The method has a named source. **In 1992 de Bono described random entry in a book called Serious Creativity**, as one of his lateral thinking tools. Treat these steps as practice.

A random start has to be really random. **Let chance choose the word.** Open a dictionary anywhere and take the fifth noun, or take the first object your hand finds in a drawer.

Let chance choose the word



Open a dictionary anywhere



Take the fifth noun



Or the first object your hand finds in a drawer

> **Key Concept:**
>
> Three kinds of random start. **A word is the quickest**, because it fits on any page. An image gives you colours, shapes and a scene to borrow from. An object gives you parts you can hold and turn over. Each kind pulls your mind in a different direction, and none of them needs any special kit.

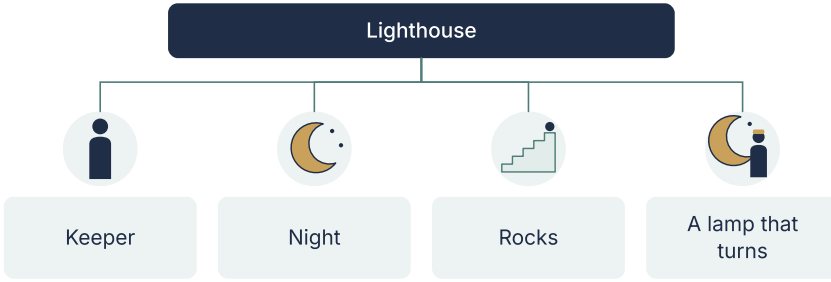
The dictionary falls open at page 312. **The fifth noun on the page is lighthouse**, which seems to have nothing to do with books. Zara writes it in the middle of a sheet and lists what it brings to mind, fast and without judging. Tall, light, keeper, warning, ships, night, rocks, a lamp that turns round and round.

The dictionary falls open

- [x] Write the noun in the middle of a sheet
- [x] List what it brings to mind
- [x] Fast and without judging

Listing comes before linking. **The list turns one random word into many handles**, and each handle can be tried against the problem. A single word gives you one chance to link. A list of eight handles from it gives you eight chances.

One random word, many handles



> **Key Concept:**
>
> List before you look. **Cover the problem while you make the list**, so the handles come from the random word alone. If you keep glancing at the problem, the list can slide towards your usual ideas. Uncover the problem only when the list has eight lines, then start linking. A sticky note over the problem line is enough to keep it out of sight.

List before you look



> Exercise:
>
> Try it. Cover the problem. **Draw one random word or image**, and list eight handles it brings to mind before you link any of them.

Each handle gets held up against the problem of forty books. **Keeper gives a book keeper scheme**, where a local business keeps one shelf stocked and gets its name on it. A lamp that turns gives a book swap that moves round the town, a week in each shop window. Night gives a sleepover readathon, with sponsors paying per page.

Each handle against the problem

Handle	Link
Keeper	A book keeper scheme
A lamp that turns	A book swap that moves round the town
Night	A sleepover readathon

A few links come easily, and others feel forced. **Forced links are part of the method**, because the forcing is what drags the problem into new places. A link does not need to make sense at first. It only needs to give you something to say about the problem that you had not said before.

Forced links are part of the method



The forcing drags the problem into new places



Something to say about the problem you had not said before



A link does not need to make sense at first

Write every link down, even the ones you would never say out loud. **The judging comes later**, as its own step, once the list is finished.

Shaking a snow globe is a good picture of the method. **The flakes settle in a new pattern every time**, and you see the scene inside afresh. The little house inside stays the same, just as your problem does. The picture stops there, since the globe never changes how you see the house and a random word can.



A snow globe held in two hands, flakes swirling round a small painted house.

> 🗝 **Key Concept:**
>
> Forcing three links. **Take three handles from your list and link each one to the problem**, even when the link feels like a stretch. Write each link as one plain sentence about the problem. Then read the three sentences and keep the one that is least obvious, even if it looks the hardest to use.

Forcing three links



Take three handles



One plain sentence each



Keep the least obvious

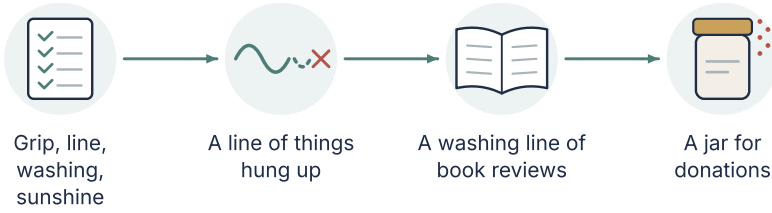
The turning lamp stays on the list. **The moving book swap was the least obvious**, because it turns the whole town into the club's shelf. The book keeper scheme is more ordinary, though it could raise money faster. She keeps both on a short list and drops the sleepover, since she cannot ask children to stay overnight at the centre.

Her short list

Keeps	Drops
⊕ The moving book swap, the least obvious	⊖ The sleepover, since children cannot stay overnight
⊕ The book keeper scheme, could raise money faster	

An object gives a different kind of start. **The first thing in the kitchen drawer is a wooden clothes peg**, with a short list of grip, line, washing and sunshine. A line of things hung up gives a washing line of children's book reviews at the Saturday market, with a jar for donations underneath.

A wooden clothes peg



> **Key Concept:**
>
> Rotating the start. **Use a different kind of random start each time** you run the method. A word works anywhere, an image needs a newspaper or a magazine, and an object needs a drawer or a pocket. Keep a note of which kind gave you the link you kept. After a few weeks the notes show which kind suits the way you work.

The chemist on the high street agrees to hold the first shelf. **A shelf label with the club name sits beside the books**, and three paperbacks from the centre go onto it that Friday. The book swap window at the newsagent is booked for the week after.

The first shelf

- The chemist holds the first shelf
- A shelf label with the club name
- Three paperbacks from the centre

Set a kitchen timer if you want a short run. **Give yourself five minutes for the list and five for the links.** When the timer rings, switch to choosing.

Set a kitchen timer

Day	1	2	3	4	5	6	7
Five minutes for the list	☐	☐	☐	☐	☐	☐	☐
Five for the links	☐	☐	☐	☐	☐	☐	☐
Then switch to choosing	☐	☐	☐	☐	☐	☐	☐

> **Science Says:**
>
> As 3.2.4 showed, **one small study (N = 32) taught a technique of random connections together with three other techniques** (Ritter & Mostert, 2017). Any result from that study belongs to the whole package, so it says nothing about random entry used on its own, as in this section.

Random connections in one study



Random connections



Three other techniques



A result for the whole package

Workshops and decks of prompt cards sell the method. **Cards can be fun to use**, and they are no proof that the method works. A dictionary, a newspaper or a drawer of odds and ends gives you just as random a start for nothing. Pick whichever you have nearby.

Cards or what you have nearby

Prompt cards	What you have nearby
Can be fun to use	A dictionary or a newspaper
No proof that the method works	A drawer of odds and ends, for nothing

> **Key Concept:**
>
> Choosing links. Choosing is a different job from linking. **Check each link against the real world** before anyone acts on it, as you saw in 4.4.2. Cut the links that fail, and keep the rest for a second look on another day, when the fun of the linking has worn off.

Choosing links



Check each link against the real world



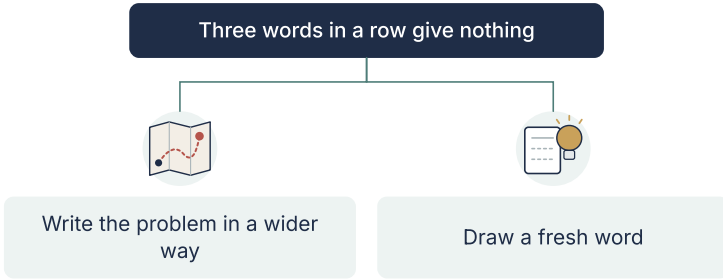
Cut the links that fail



Keep the rest for a second look

Some random words give you no links at all. **Draw a second word and start over**, without going back to change the first. If three words in a row give nothing, write the problem in a wider way, such as getting more children reading, and draw a fresh word.

When words give no links



> **Key Concept:**
>
> Parts and movements. Links come in two kinds. **Some links borrow a part**, such as the keeper, a person who looks after something. Others borrow a movement, such as the lamp that turns or the washing that hangs in a row. If all your links borrow parts, try one that borrows a movement.

Parts and movements



A part: the keeper

A movement: the lamp that turns

A movement: washing in a row

On Saturday the washing line of reviews goes up at the market. **Two jars under it take coins and spare paperbacks**, and by noon one jar is half full. The peg start has earned its place beside the lighthouse links.

Everyday problems suit the method well. **A bored family deciding what to do at the weekend** can draw a random object and plan the Saturday round it. A team stuck on a product name can take the fifth

noun on a random page. A cook with leftovers can open a picture book and borrow its colours for the plate.

Everyday problems suit the method





A family round a kitchen table, a child holding up an old key pulled from a drawer while the others laugh.

Keep each run short and light, so it fits into a tea break. **Ten minutes is enough for one run**, with five for listing and linking and five for choosing. In the scene, after ten minutes Zara's links start drifting back towards cake sales, which is her sign to stop and draw a fresh word another day.

Ten minutes is enough for one run



> **Key Concept:**
>
> Leave one handle. **Circle the one handle you have not linked yet** and leave it for tomorrow with your other club notes. Write the date on the page so you can find that handle when you next have ten free minutes.

Leave one handle



Circle the handle you have not linked yet



Write the date on the page



Find it when you next have ten free minutes

The levels below build up from one start. **The starter forces three links**, the middle adds timing and choosing, and the advanced level starts from a colleague's must-have and then draws random words. A real person who must say yes gives the advanced level a real test, and their must-have shows which links to drop.

> **Exercise:**
>
> Random starts.
>
> 1. Starter. Take three handles from your Try it list. **Force a link from each** to your problem, and keep the least obvious.

2. Middle. Set a timer for five minutes of linking from a new random word, then choose the two links that pass a check.
3. Advanced. For a real task, write a colleague's must-have first. Draw three random words and keep the links that meet it.

Random starts at three levels



Force a link from each of three handles



Five minutes, then two links that pass



A colleague's must-have first

Key idea:

Random entry means **letting chance pick a starting point**, listing what it brings to mind and forcing links from it to your problem, then checking the links like any other ideas.

Quick check:

Why should you let chance pick the random word? Answer: So the word comes from outside the problem. Why cover the problem while you list handles? Answer: So the handles come from the random start alone. What should you do if three random words in a row give nothing? Answer: Write the problem in a wider way and draw a fresh word. Why keep the least obvious link of three? Answer: It has moved the problem furthest from its usual corner.

4.5.3 Provocation: Using an Unusual Proposition to Find a New Direction

Imagine Zara on a sunny Thursday. **Half the children rush through their homework** so they can play football on the field behind the centre, and their answers are full of careless slips. Telling them to slow down works for ten minutes, and then the window and the ball win.

A sunny Thursday

> - Half the children rush through their homework
> - Answers full of careless slips
> - Slow down works for ten minutes

A provocation is **a statement about the problem that you know is false**, said on purpose to move your mind somewhere new. You treat it as true for a few minutes and write what it suggests. In this section I show you how to write one, pull a direction out of it and drop the rest.

A provocation



A false statement about the problem



Treat it as true for a few minutes



Write what it suggests

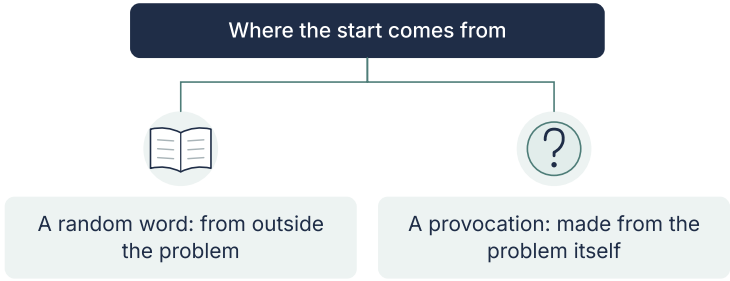


A child at a desk by an open window, pencil in hand, looking out at a football rolling across a sunny field.

Provocation as a method has a named source. **In 1992 de Bono wrote about provocation in Serious Creativity**, with a made up word, po, to mark one. I use plain words here instead. Treat these steps as practice.

Random starts and provocations work differently. **A random word comes from outside the problem**, while a provocation is made from the problem itself, bent into a shape that cannot be true. Zara's first provocation is that the homework is done on the football pitch. It is plainly false, and that is the point of it.

Two different starts



> **Key Concept:**
>
> Four ways to bend a problem. **Exaggerate a part**, such as a club that runs all night. Wish for something impossible, such as homework that marks itself. Swap who does what, such as children who set the homework. Join two things that never meet, such as homework on the pitch. Each way bends the problem in a different direction, so try more than one.

Four ways to bend a problem



Exaggerate a part



Wish for something impossible



Swap who does what



Join two things that never meet

The provocation gets written at the top of a fresh page. **Under it, write everything that would follow if it were true**, without stopping to judge. Homework on the pitch means writing on clipboards, counting passes, measuring the length of a kick and timing a run. Some of these are silly, and some are already half a plan.

Homework on the pitch means

- [x] Writing on clipboards
- [x] Counting passes
- [x] Measuring the length of a kick
- [x] Timing a run

A stepping stone in a river works the same way. **You would never build a house on the stone**, and you stand on it only long enough to

reach the far bank. The provocation is the stone, and the direction you find from it is the far bank.

A stepping stone in a river



The provocation is the stone



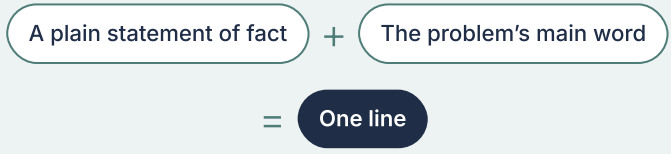
The direction is the far bank



You would never build a house on the stone

> **Key Concept:**
>
> Writing a good provocation. **Write it as a plain statement of fact**, in the present tense, such as the homework is done on the pitch. Leave out soft words like maybe or could, because a soft statement invites you to judge it. Keep it to one line, and keep the problem's main word in it, so the list that follows stays about your problem.

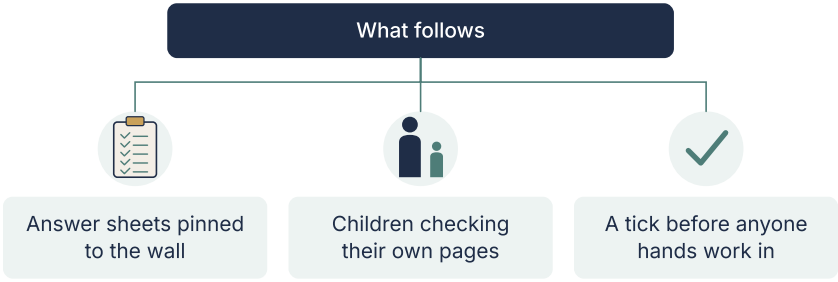
Writing a good provocation



> **Exercise:**
>
> Try it. Write one plainly false statement about a problem. **List five things that would follow** if it were true.

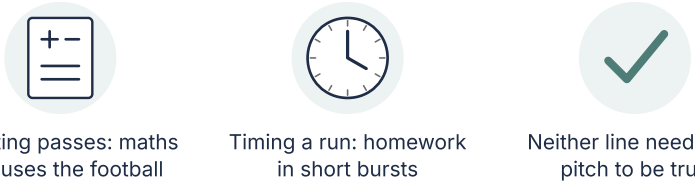
A wishful provocation gives Zara a different list. **She writes that the homework marks itself**, which no homework has ever done. What follows is answer sheets pinned to the wall, children checking their own pages and a tick that appears before anyone hands work in. Each line points at the slips, which is where the problem really hurts.

The homework marks itself



The list is where the provocation pays. **Each line is a possible direction**, a way of moving you had not looked at before. Counting passes points towards maths that uses the football, and timing a run points towards homework in short bursts with movement between them. Neither line needs the pitch to be true.

Each line is a possible direction



> **Key Concept:**
>
> Pulling out a direction. **For each line, write what is good about it** and the principle inside it, said without the provocation. Then write what you would need to make it real. The principle in counting passes is that numbers can come from something the children love. The principle in timed runs is that short bursts with a break between might keep minds fresh.

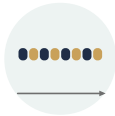
The wishful list gives the strongest direction of all. **Self checking before handing in** moves the job of catching slips to the children themselves, and it costs nothing but a sheet on the wall. It still needs to pass a check, since some children might copy the answers without trying the sums first.

The principle inside each line

Line	Principle
Counting passes	Numbers can come from something the children love
Timed runs	Short bursts with a break might keep minds fresh
Self checking	Moves the job of catching slips to the children

The right strength takes some practice. **A statement that is only a little odd** gives you ideas you could have had anyway, such as homework done a bit faster. A statement so wild that nothing follows from it gives you an empty page. Aim for a statement that is plainly false and still about the problem.

The right strength



Only a little odd: ideas you could have had anyway



Plainly false and still about the problem



So wild that nothing follows

Choosing a direction does not happen by itself. **Picking the best ideas from a long list is a separate step**, and it needs its own time. As you saw in 4.1.3, write your tests before you uncover the list. Zara's tests are fewer slips and children who still want to come.

Zara's tests

- [x] Fewer slips
- [x] Children who still want to come

Each line on the list gets a tick or a cross under each test. A line with two ticks stays for now, and a line with a cross under either test drops out of this round.

Short bursts pass both tests. **Twenty minutes of homework, five minutes of football, then twenty more** keeps the ball in the plan and gives the slips a chance to drop. Maths from the pitch passes the test for wanting to come, and fails the test for fewer slips, because sums on a clipboard in the wind are hard to check.

Two directions against two tests

Direction	Fewer slips	Want to come
Short bursts	Passes	Passes
Maths from the pitch	Fails	Passes

Maths from the pitch does not go in the bin. **A direction that fails one test today** may pass it in another setting, such as a sports day with a teacher to check the sums. Zara keeps a page at the back of her notebook for directions like this one, and she reads it whenever a new problem turns up.

A page at the back of her notebook



A direction that fails one test today



May pass it in another setting



Read it whenever a new problem turns up

> **Key Concept:**
>
> Drop the provocation. **Once you have a direction, let the provocation go.** Nobody will do homework on the pitch, and nobody needs to. The provocation has done its job when it has moved you to a new place. Holding on to it, or trying to make it true, drags you back to arguing with a statement you knew was false from the start.

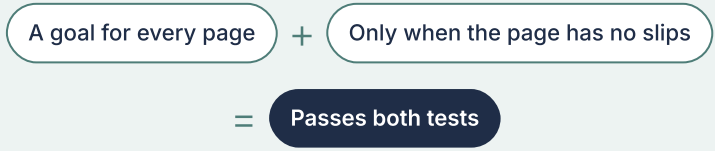
Write a second provocation from the opposite side. **The first one brought homework out to the pitch**, so the second can bring the pitch inside. Zara writes that the football is played at the desks. The list that follows includes a scoreboard on the wall, with a goal for every page done carefully.

A second provocation from the opposite side



The scoreboard passes the test for wanting to come. **It needs care on the second test**, since children chasing goals might rush more. Zara changes the rule so a goal counts only when the page has no slips. The changed rule passes both tests, and the scoreboard goes on the wall next to the short bursts plan.

The changed rule



Write each provocation on paper. **Keep it in view while you list what would follow**, so the false statement stays fixed at the top of the page. Bring the written list to a meeting when you want help choosing.

Write each provocation on paper

Try this now

1. Keep it in view while you list what would follow
2. Bring the written list to a meeting

A trial needs some thought when a direction touches people's time, money or safety. **Before any trial, write what could go wrong** and how you would notice it. A written list of risks is easy to check with a parent or a colleague before anything starts.

Before any trial



Write what could go wrong



How you would notice it



Check with a parent or a colleague

The trial is one Thursday with the short bursts, the scoreboard and the answer sheets. **She counts the slips on each page** and asks the children which part they liked. The slips drop on that one afternoon, and the children vote to keep the scoreboard. One good afternoon is a start, and she plans three more before deciding.

The trial Thursday

Day	1	2	3	4	5	6	7
Count the slips on each page	☐	☐	☐	☐	☐	☐	☐
Ask which part they liked	☐	☐	☐	☐	☐	☐	☐
Plan three more before deciding	☐	☐	☐	☐	☐	☐	☐

The method fits far beyond homework. **A café that wants more morning customers** can say the café opens only at night and see what follows. A team with boring meetings can say the meeting has no chairs. A parent tired of bedtime fights can say the children put the parent to bed.

The method fits far beyond homework



A café that opens only at night



A meeting with no chairs



The children put the parent to bed



A small team standing round a high table in an office, notes spread out and no chairs in sight.

> **Key Concept:**
>
> Your own record. **Write the provocation, the direction you kept and the two tests** on a single card. Add the date and the task at the top, file the card with the club plans, and look back after a month to mark whether the direction is still in use.

On the second trial Thursday, the scoreboard stays and the bursts stay. **A new slip count goes beside the first**, so the two afternoons can be compared on one page. Children who liked the scoreboard get a chance to set the next week's goal rule before the session starts.

The levels below go step by step. **The starter pulls one direction out and drops the rest**, and the middle level adds a second provocation from the opposite side. The advanced level takes a provocation in your field to a safe trial on a real task with real people who will take part in the trial.

The second trial Thursday

- The scoreboard stays
- The bursts stay
- A new slip count beside the first

Exercise:

Bend and pull.

1. Starter. From your Try it list, **pull out one usable direction** and write its principle. Drop the rest.
2. Middle. Write a second provocation that bends the problem the opposite way, and compare the two lists.
3. Advanced. In your own field, choose a direction from a provocation that can be trialled safely. Write the trial, what could go wrong and how you would notice.

Bend and pull at three levels



Pull out one usable direction



A second provocation from the opposite side



A safe trial in your own field

Key idea:

A provocation is **a false statement used as a stepping stone**, so you treat it as true long enough to find a direction and then leave it behind.

Quick check:

What do you do with a provocation once it has given you a direction? Answer: Let it go, because its job was only to move you to a new place. How false should a provocation be? Answer: Plainly false, and still about the problem, so that something useful can follow from it.

4.5.4 Moving From an Unexpected Thought to a Useful Possibility

Imagine a quiet Tuesday at Zara's homework club, when a seven year old looks up from a reading book and says the club should have a dog. **Everyone laughs, and the moment passes.** The centre has no garden, some children are afraid of dogs, and nobody would look after it at night.

A dog at the club



Unexpected thoughts arrive like that all the time. **Write one down before the moment passes.** In this section I show you how to catch an unexpected thought, find the part worth keeping and shape it, one step at a time, into a possibility you could really try.

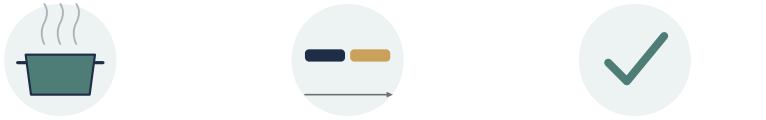


A small boy at a desk holding up a picture book of a dog, while two other children laugh beside him.

Moving from an unexpected thought to a useful one belongs to the lateral thinking that **de Bono wrote about in his 1967 book**. Treat these steps as practice. Judge them by the plans you reach.

An unexpected thought is like a lump of clay on a potter's wheel. **Nobody would sell the first lump**, and nobody would throw it away either. The potter keeps the clay and changes its shape, a little with each turn of the wheel. The clay stays the same stuff, and the shape becomes something people can use.

A lump of clay on a potter's wheel



Nobody would sell the first lump

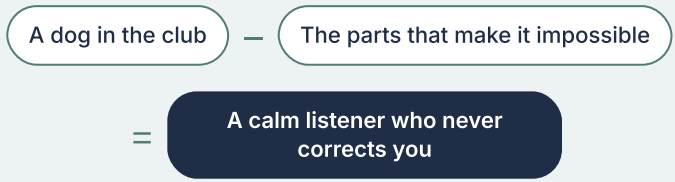
Nobody would throw it away either

The shape becomes something people can use

> **Key Concept:**
>
> Find the core. **The core is the part of the thought that makes it appealing**, said without the parts that make it impossible. A dog in the club is impossible for many reasons. Its core might be a calm listener who never corrects you, or something to look forward to each week. Write the core in one line before you look at any problems.

The child's thought gets written on a card before it can slip away. **Under it, Zara writes the core** as she sees it, a calm listener for children who read aloud. Reading aloud to an adult can feel like a test, because adults notice every slip. A dog notices nothing, which may suit a nervous reader very well.

Find the core



When the thought comes from someone else, **ask them what they like about it**. The seven year old says a dog would listen without laughing, which is the core in a child's words. Asking costs a few seconds, and it turns a laugh into a way in. It shows the child that unexpected thoughts are welcome at the club.

Ask them what they like about it



A dog would listen without laughing



A laugh turns into a way in



Asking costs a few seconds

> Exercise:
>
> Try it. Catch one unexpected thought, yours or someone else's. **Write its core in one line**, and one possibility built on it.

Sometimes the core is hard to see. **Ask what you would miss if the thought vanished**, and write that down. If you would miss nothing, the thought may have no core worth keeping. If you would miss something, even a small thing like a laugh at the start of the week, that small thing is your core.

When the core is hard to see

- Ask what you would miss if the thought vanished
- Miss nothing: no core worth keeping
- Miss something: that is your core

The next step is an honest list of problems. **Write every reason the thought cannot work**, in plain words. For the dog, the list has fear, allergies, cleaning, a room with no garden and no one to care for it at night. A long list is no reason to give up, because each problem can be met in turn.

An honest list of problems

- [x] Fear
- [x] Allergies
- [x] Cleaning
- [x] A room with no garden
- [x] No one to care for it at night

The sentences for the dog come quickly. **A visit of one hour** removes both the night and the garden from the list. A trained volunteer who brings the dog and takes it home removes the care. A second room, or a toy dog, takes care of children who are afraid.

Each problem met in turn

Problem	Change
The night and the garden	A visit of one hour
The care	A trained volunteer who brings the dog
Children who are afraid	A second room, or a toy dog

Key Concept:

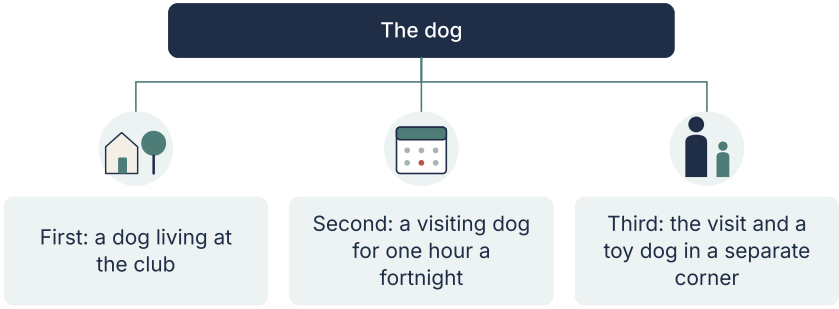
It would work if. **Turn each problem into a sentence that starts with it would work if.** The sentence names the change that would remove the problem. Some changes are easy, such as a shorter visit. Others are hard, such as finding a volunteer. Write them all, then count how many are easy. A thought with mostly easy changes is close to a real possibility.

It would work if



Each round of changes gives a new version. **The first version is a dog living at the club**, which fails almost every test. The second is a visiting dog for one hour a fortnight, brought by a volunteer. The third keeps the visit and adds a toy dog in a separate corner for anyone who is nervous.

Each round of changes gives a new version



The toy dog change is the most surprising one on the list. **It keeps the core for children who are afraid**, since a toy listens without laughing, just like a dog. A change like this is worth noticing, because it shows the core can live in a form far from the first thought.

The toy dog change



A toy listens without laughing



The core can live in a form far from the first thought



It keeps the core for children who are afraid

> **Science Says:**
>
> A strange idea becomes useful only when it is shaped to fit reality, and that shaping is careful, judging work (Cropley, 2006). **Shaping is a separate job from having the idea.** The ladder in this section is one way to do that job in small steps, with a test at each rung, so the judging happens bit by bit.

A version needs tests before it moves on. **Write three things the possibility must do**, such as keep every child safe, help children read aloud and cost nothing. Ask a parent or a colleague to add a test you missed. Each version gets a tick or a cross for each test.

Three things the possibility must do

- [x] Keep every child safe
- [x] Help children read aloud
- [x] Cost nothing

The third version passes two tests at once. **Children read aloud, and nobody pays**, because the volunteer comes free. The safety test needs one more change, a signed note from every parent before the first visit. Zara adds the note, and the third version becomes the fourth, which now passes all three.

The fourth version

The third version + A signed note from every parent = Passes all three

> **Key Concept:**
>
> A ladder of versions. **Write each version on its own line**, from the unexpected thought at the bottom to the plan you could try at the top. Each rung changes only one or two things from the rung below. Keep the core the same all the way up. If the core disappears, you have shaped the thought into an ordinary idea and lost what made it worth keeping.

A ladder of versions



The unexpected thought at the bottom — One or two changes per rung — The plan you could try at the top

Staying with a thought takes patience. **Give each unexpected thought at least three rounds of change** before you decide whether to drop it.

A thought dropped after one round may only have needed one more. If most of its changes are still hard after three rounds, file it and move on.

Staying with a thought

Try this now

1. At least three rounds of change before you decide
2. Still mostly hard after three rounds: file it and move on

Choosing between versions is a separate step. **Read the ladder the next day**, when the thrill of the first idea has faded, and check each rung against the tests. The rung you loved yesterday may fail a test you skipped, and a dull rung may pass them all. Pick the rung that passes most tests.

Read the ladder the next day



The thrill of the first idea has faded



Check each rung against the tests



Pick the rung that passes most tests

Even the best version is still a possibility. **A plan on paper is untested** until it meets the real club. Writing down who will take part and what counts as success makes the first visit easy to judge. Zara plans one visit, with one volunteer, one calm dog and six children who want to take part.

The first visit

Day	1	2	3	4	5	6	7
One volunteer	☐	☐	☐	☐	☐	☐	☐
One calm dog	☐	☐	☐	☐	☐	☐	☐
Six children who want to take part	☐	☐	☐	☐	☐	☐	☐

The method works on any unexpected thought, including your own. **A worker who dreams of sending invoices as postcards** has a core of short, friendly messages that people open. Shaped, it becomes a warm reminder with the amount in large print. The postcard has gone, and the friendliness has stayed.

Invoices as postcards

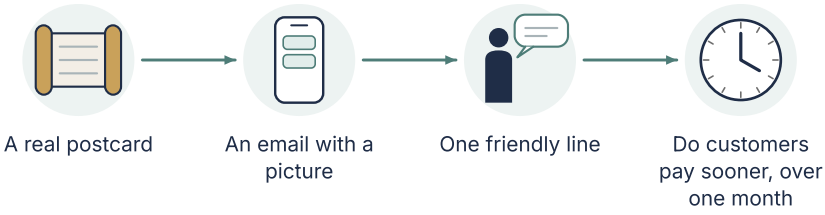
The thought	The core	Shaped
Sending invoices as postcards	Short, friendly messages that people open	A warm reminder with the amount in large print



A calm golden dog lying on a rug while a girl reads aloud from a picture book.

The invoice ladder climbs in small rungs. **The bottom rung is a real postcard**, which costs stamps and gets lost. The next rung is an email with a picture at the top. The next rung up keeps the picture and adds one friendly line, and the top rung tests whether customers pay sooner, over one month.

The invoice ladder



A parent who jokes about a family band on the bus has a core worth keeping. **The core is shared music on long journeys**, and the band itself is impossible. Shaped, it becomes a playlist that each person adds one song to before a trip, so everyone hears something of their own on the way.

A family band on the bus

- The band itself is impossible
- The core: shared music on long journeys
- Shaped: a playlist, one song each

> **Key Concept:**
> Catch the thought. **Write the unexpected thought in the words it came in**, even if it sounds silly. Keep cards or a page of your phone notes ready for them. A thought you have written can be shaped tomorrow.

Catch the thought



Write it in the words it came in



Keep cards or phone notes ready



Shape it tomorrow

Bring a written ladder when you want other people to help with the tests. **Leave one blank line at the top of every ladder page** for the core, in the shortest words you can find. A short core is easier for a parent or a colleague to read at a glance.

The parent notes for the dog visit go home in book bags on Thursday. **All six come back signed before the weekend**, and the volunteer puts the date of the first quiet Tuesday hour in her diary. The rug stays clear of the doorway so readers are not in the way.

Before the first quiet Tuesday hour

- Parent notes go home in book bags
- All six come back signed
- The rug stays clear of the doorway

Exercise:

From unexpected to useful.

1. Starter. For the possibility in your Try it, **list three tests it must meet**.
2. Middle. Revise it, one or two changes at a time, until at least two tests pass. Keep the core the same.
3. Advanced. Take an unexpected thought from your work and climb its ladder. Write a small trial plan for the top rung.

From unexpected to useful, one rung at a time



List three tests



Revise until two tests pass



A trial plan for the top rung

Key idea:

To move from an unexpected thought to a useful possibility, keep its core and change the rest, one rung at a time, until it passes your tests.

Quick check:

What should stay the same as you shape an unexpected thought? Answer: Its core, the part that made it appealing, because losing it leaves only an ordinary idea. What do you do with an unexpected thought that still has mostly hard changes after three rounds? Answer: File it and move on. Why leave a blank line at the top of a ladder page? Answer: For the core, in the shortest words you can find.

4.5.5 Constraints as a Creative Tool: Limits on Time, Materials and Rules

Imagine Zara with three weeks until the centre's open day. **The homework club needs a display** that shows parents what the children do each week. She sits down with a blank sheet and no limits at all, and after an hour the sheet is still blank, because anything is possible and nothing stands out.

Three weeks until the centre's open day

> - The club needs a display
> - A blank sheet and no limits at all
> - Anything is possible and nothing stands out

A limit can give a stuck mind a place to start. **A constraint is a limit on what you can use or do**, such as a deadline or a small budget. In this section I show you how to add a limit on purpose, tell a helpful limit from a harmful one and design a limit that serves your goal.

A constraint



A limit on what you can use or do



A deadline

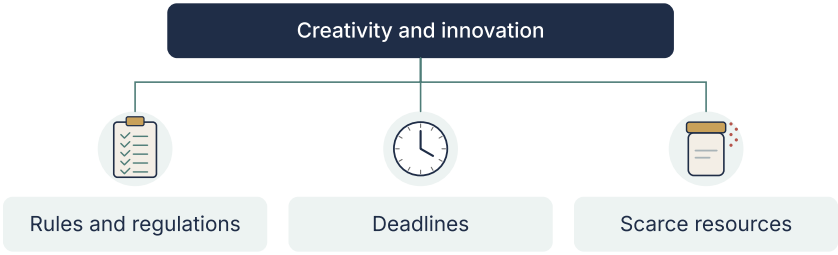


A small budget

The research on limits was brought together in **one review published in 2019** (Acar et al., 2019). The authors wrote that creativity and innovation are "bounded by constraints such as rules and regulations,

deadlines, and scarce resources" (Acar et al., 2019). Scarce resources are things in short supply, such as money or materials.

Bounded by constraints



> **Science Says:**
>
> The review's authors wrote that research on constraints is "fragmented and yields conflicting findings" (Acar et al., 2019). **The findings pull in different directions**, so the evidence is mixed. In response, they set out to "develop a taxonomy of constraints and mediating mechanisms and provide an integrative synthesis that explains how constraints affect creativity and innovation" (Acar et al., 2019). A taxonomy is a sorted list of kinds.

The evidence is mixed



The steps in this section are practice for noticing which kind of limit you have. **Nothing here promises that a limit will make you more**

creative. Use them on your own tasks and keep a note of what each limit removes.

The banks of a river are a good picture of a limit. **Without banks, water spreads into a wide, still puddle.** With banks, the same water gathers and flows. The picture stops where banks squeeze hard, since a river forced through a narrow gap floods its fields, and a very strict limit can swamp a task.



A river running between two grassy banks, with a wide flat puddle on a field beside it.

> **Key Concept:**
>
> Three kinds of limit. **A time limit** sets how long you have, such as one afternoon. A materials limit sets what you can use, such as twenty pounds or only things from the recycling bin. A rules limit sets what you must or must not do, such as a display that fits on one table. Each kind narrows the search in a different way.

Three kinds of limit



Time: one afternoon



Materials: twenty pounds or the recycling bin



Rules: a display that fits on one table

The blank sheet gets one limit. **The display must be made in one afternoon**, from things already at the centre. Within ten minutes Zara has a list, a washing line of homework pages, a tower of exercise books and a photo wall of hands holding pencils. The limit has cut away the shops, the printers and the endless choice.

One afternoon, things already at the centre

- [x] A washing line of homework pages
- [x] A tower of exercise books
- [x] A photo wall of hands holding pencils

> **Exercise:**
>
> Try it. Pick one task. **Add one limit on time, materials or rules**, and list five ideas that fit inside it.

Look at what the time limit leaves in reach. **A long list of possible materials shrinks to what is in the cupboard**, and the cupboard is easy to search. Every idea on the list can be checked by opening one door.

What the time limit leaves in reach



A long list of possible materials



What is in the cupboard



Checked by opening one door

A useful test is to remove the limit. **Write a second list with no limit at all**, and set the two side by side. Zara's open list has a hired screen, printed banners and a video, all ideas from other open days. Her limited list has fewer ideas, and more of them belong to this club.

Remove the limit

Open list	Limited list
A hired screen, printed banners and a video	Fewer ideas
Ideas from other open days	More of them belong to this club

The comparison does not always come out the same way. **Sometimes the open list is the better one**, and the limit has only cut away the good options. Comparing lists on your own tasks shows you which way a limit goes for you.

The comparison does not always come out the same way



Sometimes the open list is the better one



Compare lists on your own tasks



The limit can cut away the good options

> **Key Concept:**
>
> Helpful or harmful. **A helpful limit removes choices you would never miss**, such as shops you were never going to visit. A harmful limit removes something the task needs, such as enough time for children to finish their part. Before you keep a limit, write what it removes. If anything on that list is something the task needs, change or drop the limit.

Helpful or harmful

Helpful	Harmful
⊕ Removes choices you would never miss	⊖ Removes something the task needs
⊕ Shops you were never going to visit	⊖ Enough time for children to finish their part

Some limits hurt in ways that are easy to miss. **As 4.1.2 showed, a group calling out ideas together tends to produce fewer ideas** than the same people working alone (Mullen et al., 1991). A rule that all ideas must be spoken aloud in a meeting is a limit of that harmful kind.

A limit of that harmful kind



All ideas spoken aloud in a meeting



Fewer ideas than the same people working alone

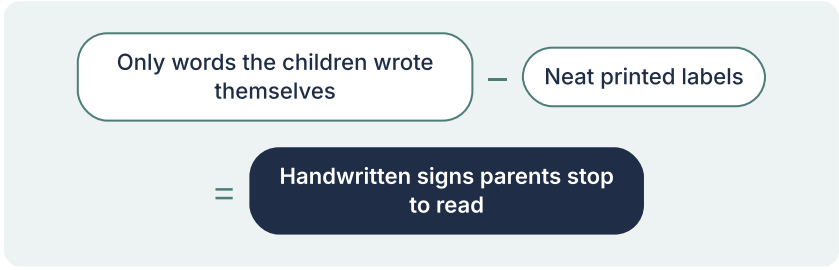


The group calling out ideas together

A rules limit can be a game. **The display must use only words the children wrote themselves**, with no adult writing anywhere. That rule removes the neat printed labels Zara would usually make. In their

place come wobbly handwritten signs, which parents stop to read because they are the children's own.

A rules limit can be a game





A tower of painted cereal boxes on a table, each with a sheet of homework sticking out of the top.

Try a materials limit that points somewhere. **Only things from the recycling bin** points towards cardboard, jars and paper, and the display becomes a tower of cereal boxes, each holding one child's best page. A budget of twenty pounds limits the cost and leaves the search wide open.

Only things from the recycling bin



Cardboard, jars and paper



A tower of cereal boxes



Twenty pounds leaves the search wide open

Key Concept:

Designing a limit. **Start from what the task is for.** The display is for showing parents the children's own work. A limit that serves that purpose, such as only the children's words, pushes ideas towards it. Write the purpose first, then pick the limit that fits it. A limit chosen at random, such as using only blue things, is a different kind of practice.

Designing a limit



Start from what the task is for



Pick the limit that fits it



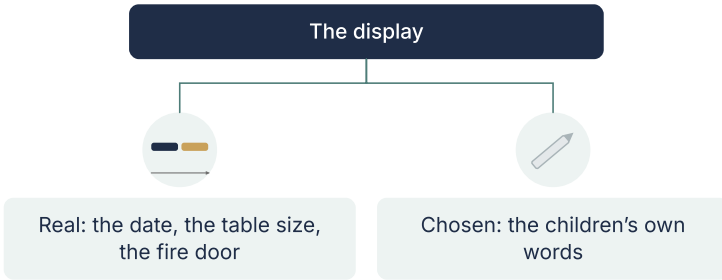
Write the purpose first

Science Says:

Limits set by the real world are a different case. **A budget, a room size or a safety rule** is a limit you did not choose, and every idea must pass it in the end. Checking an idea against limits like these is part of the careful judging that turns a new idea into a workable one (Cropley, 2006).

Chosen limits and real limits can be stacked. **Zara keeps the real ones**, the date, the table size and the rule that nothing can block the fire door. On top she adds one chosen limit, the children's own words. Two layers of limits give her a narrow space to search, and the display comes together in one afternoon.

Two layers of limits



The children get a limit of their own. **Each child has one sheet of paper and one coloured pen** for their part of the display. With so little to choose from, nobody spends the afternoon picking colours, and every page looks different, because the only thing left to vary is what each child puts on it.

A limit of their own



Harmful limits can be loosened in small steps. **One way is to widen a harmful limit a little and run a second session**, and changing its kind is another. When one afternoon proves short for the tower of

boxes, Zara keeps the time limit and swaps the materials limit for a looser one.

Loosen a harmful limit in small steps



Set a deadline you will keep. **Give yourself twenty minutes for the first list.** Set a kitchen timer, write until it rings and then stop writing. A deadline nobody keeps is no limit at all.

Set a deadline you will keep

Day	1	2	3	4	5	6	7
Twenty minutes for the first list	☐	☐	☐	☐	☐	☐	☐
A kitchen timer	☐	☐	☐	☐	☐	☐	☐
Stop writing when it rings	☐	☐	☐	☐	☐	☐	☐

> **Key Concept:**
>
> A limits log. **Keep a short note each time you add a limit**, with its kind, what it removed and whether the ideas got better or worse. After a few weeks the log shows which kinds of limit suit you on which kinds of task.

A limits log



Its kind



What it removed



Better or worse ideas

After open day, the log gets one more line. **Rules limit, removed adult labels, parents stayed longer at the table.** Three parents asked who wrote the signs, and each child pointed to their own page. The cereal box tower stayed up, and the fire door stayed clear.

After open day

- Rules limit, removed adult labels
- Parents stayed longer at the table
- The fire door stayed clear

Limits turn up in ordinary days. **A cook with half an hour and five ingredients** has a time limit and a materials limit. A writer who must tell a story in fifty words has a rules limit. A team with one week to test a product idea has a deadline, and the deadline decides what they skip.

Limits in ordinary days

Who	Limit
A cook with half an hour and five ingredients	Time and materials
A writer with fifty words	Rules
A team with one week	A deadline

Work offers plenty of limits to try. **A report that must fit on one page** forces a writer to choose the one point that counts, and the reader gets it in a minute. A meeting limited to fifteen minutes standing up forces the group to bring decisions, since there is no time for a long talk.

Limits at work



A report that must fit on one page



A meeting of fifteen minutes standing up



The reader gets it in a minute

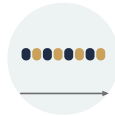
The levels below take the steps in order. **The starter removes the limit and compares**, the middle level sorts helpful from harmful limits, and the advanced level designs a limit for a real task in your field. Write each limit down and date the page before you finish.

> Exercise:
>
> Working with limits.
>
> 1. Starter. Remove the limit from your Try it. **Make a second list** and compare it with the first.
> 2. Middle. For one task, write a limit that would help and one that would harm, and what each removes.
> 3. Advanced. For a real task in your field, write its purpose and design one limit that serves it. Run a short session inside the limit.

Working with limits at three levels



Remove the limit and compare



One limit that helps, one that harms



A limit that serves a real task

Key idea:

A limit on time, materials or rules can **give a stuck search an edge to push against**, so check what each limit removes before you keep it.

Quick check:

How do you tell a helpful limit from a harmful one? Answer: Write what the limit removes. If it removes something the task needs, change it or drop it. What are the three kinds of limit in this section? Answer: Time, materials and rules. What belongs in a limits log line? Answer: The kind of limit, what it removed and whether the ideas got better or worse. What did the 2019 review say about research on constraints? Answer: It was fragmented and gave conflicting findings, so the evidence on limits is mixed.

4.6 Exploring Combinations: Morphological Analysis

4.6.1 Separating a Challenge Into Features and Options

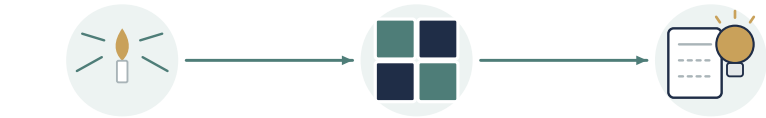
Imagine Bruno, who has to plan a summer week away for his family of four on a tight budget. **Every plan he thinks of is the one they had last year**, a car ride to the same seaside town and the same rented flat. His children want something new this year, and the money will not stretch to anything grand.

A summer week away

> - A family of four on a tight budget
> - Every plan is the one they had last year
> - His children want something new

The holiday sits in his mind as one solid lump. **The way out is to split it into parts**, and then look at each part on its own. In this section I show you how to split a task into features, how to list options for each one and how to tell which features you are free to change.

Split it into parts





A father at a kitchen table with a road map and a calculator, his two children leaning over his shoulder.

A pencil and a blank page are enough to start. **Write the task at the top in one short line**, then leave the rest of the page free for the rows that follow.

The method has a long name and a simple idea. **Morphological analysis is Zwicky's way of splitting a task into features and options**, then listing the ways each feature can go.

Morphological analysis

Features + Options = The ways each feature can go

Science Says:

The method was "Pioneered by Fritz Zwicky at the California Institute of Technology in the 1930s and 40s" (Ritchey, 2006). **He later "wrote a book on the subject"** (Ritchey, 2006), Discovery, Invention, Research Through the Morphological Approach, in 1969. The steps in this section are practice, with no claim that the method makes anyone more creative.

Pioneered by Fritz Zwicky



The California Institute of Technology, the 1930s and 40s



A book on the subject in 1969



Practice, with no claim it makes anyone more creative

Key Concept:

When to split a task. **Try splitting when a task has several separate parts** and every plan you make looks like the last one. A holiday, a shop window or a weekly timetable all have parts you can change one at a time. A task with only one part, such as choosing a colour, gains little from being split.

Last year's holiday was already **one combination of choices**, seaside, car, rented flat, cafés and the beach. Seen that way, each of those choices could have gone another way. The holiday stops being one lump and becomes a set of separate decisions, each with its own list.

Last year: one combination of choices

Choice	Last year
Place	Seaside
Travel	Car
Sleeping	Rented flat
Food	Cafés
Things to do	The beach

> **Key Concept:**
>
> Features and options. As in 4.3.2, **a feature is any part or quality you can name**, written as a short noun, such as place, travel or food. An option is one way that feature could be filled, such as hills, coach or picnic. Write features down the left side of a page and options along each row. For an everyday task at home or at work, try four to six features.

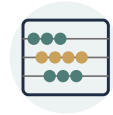
Features and options



A feature: place, travel or food



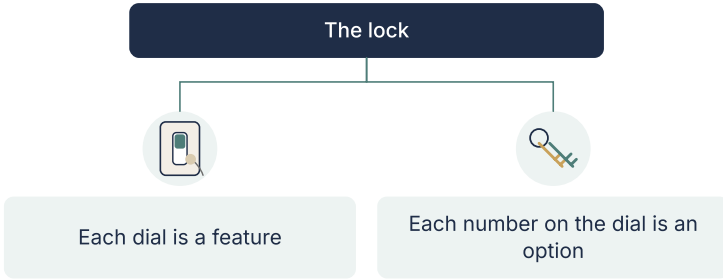
An option: hills, coach or picnic



Four to six features

A combination lock is a good picture of the method. **Each dial is a feature, and each number on the dial is an option.** Turning one dial changes the code without touching the others. The picture stops at the end, because a lock has one right code, while a task can have many good combinations.

A combination lock



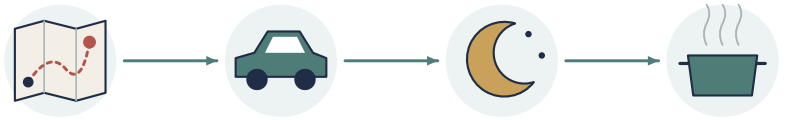
Work tasks split in the same way. **A weekly team meeting** has features like day, place, length, who leads and what form it takes. Writing the features down shows five separate places where the meeting could change, and each one can be changed on its own.

A weekly team meeting



Features are easiest to find if you walk through the task in time order. **Start at the first moment and move forward**, writing each choice you would face. For a holiday, you choose where, then how to get there, where to sleep, what to eat and what to do each day. Each choice you meet is a feature.

Walk through the task in time order



The first step is to name the features. **Bruno writes down every part of a holiday he can think of**, and gets place, travel, sleeping, food and things to do. He nearly adds weather and then crosses it out, because nobody can choose the weather. A feature has to be something you could decide.

Bruno's features

- [x] Place
- [x] Travel
- [x] Sleeping
- [x] Food
- [x] Things to do

> Exercise:
>
> Try it. Pick a task you are stuck on. **List four to six features**, parts that could be done in different ways.

Good features are separate from each other. **Choosing an option for one feature should leave the others free.** Travel and place are close, since some places are hard to reach without a car. Bruno keeps them apart anyway, because a train to the hills is still a real choice, and splitting them shows him routes he would otherwise miss.

Travel and place

> - Close, since some places are hard to reach without a car
> - Bruno keeps them apart anyway
> - A train to the hills is still a real choice

Features that overlap can be merged. **If two features always change together**, they are really one feature with two names. Bruno first writes food and cooking as two rows, then sees that every food option is a kind of cooking. He merges them into one row called meals, and the list gets shorter and clearer.

Features that overlap can be merged



The second step is to fill each row with options. **Place gets four options**, and so does sleeping. For place, Bruno writes seaside, hills, a city and their own town. For sleeping, he writes rented flat, tent, youth hostel and a friend's spare room.

Four options each

Place	Sleeping
Seaside	Rented flat
Hills	Tent
A city	Youth hostel
Their own town	A friend's spare room

Unusual options earn their place on the list. **Staying in your own town** looks like no holiday at all, and yet it removes the whole cost of travel. Bruno writes it down without judging. A table of options is for seeing what is possible, and the judging comes in a later step, once every row is full.

Staying in your own town



Looks like no holiday at all



Removes the whole cost of travel

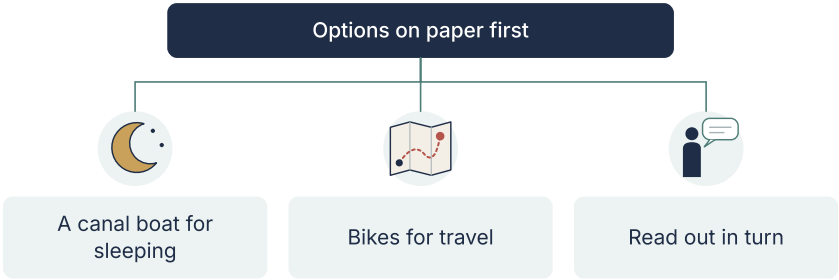


Written down without judging

> **Key Concept:**
>
> Three options or more. **Give every feature at least three options**, so the choice is more than yes or no. Put the usual option first, so you can see it, then add two that differ from it. If a row stays short, ask how someone in another country, another job or another age might fill that feature.

The whole family helps fill the rows. **His daughter adds a canal boat for sleeping**, and his son adds bikes for travel. As 4.1.2 showed, talking groups make fewer and weaker ideas than the same people alone (Mullen et al., 1991; Diehl & Stroebe, 1987). **The family write their options on paper first**, then read them out in turn.

The whole family helps



The third step is to sort the features. **Some features are fixed**, set by limits nobody can change, and others are free. For Bruno, the dates are fixed by school holidays, and the budget is fixed at what is in the savings jar. Place, travel, sleeping, meals and things to do are all free.

Fixed or free

Free	Fixed
⊕ Place	⊖ The dates: school holidays
⊕ Travel	⊖ The budget: the savings jar
⊕ Sleeping	
⊕ Meals	
⊕ Things to do	

Fixed features still shape the free ones. **The budget sets a ceiling on every option**, so a canal boat may suit three nights at most. The budget goes at the top of the page, where every option can be checked against it. A fixed feature belongs on the page as a limit, with no options of its own.

The budget sets a ceiling on every option



At the top of the page



Every option checked against it



A canal boat for three nights at most

> **Key Concept:**
>
> Fixed or free. **Mark each feature Fixed or Free.** A fixed feature is set by a limit you cannot change, such as a date or a law. A free feature has real choices. Before you mark a feature fixed, check whether a real limit sets it or only habit. A habit, such as always going away in August, belongs with the free features.

Knowing the task helps you find features. Knowledge points toward ways into a solution (Cropley, 2006). **Someone who knows holidays well** may spot features a beginner misses, such as when to book or whether to bring a pet. If you are new to the task, ask someone who has done it many times to add one feature you left out.

Ask someone who knows the task



When to book



Whether to bring a pet



One feature you left out

A holiday is only one kind of task. **A shop window** has features like colour, theme, lighting and what goes in the middle of the display. A birthday party has guests, place, food, games and time of day. A weekly

meal plan has the main dish, the side, the cook and the night of the week.

Other tasks, other features

Task	Features
A shop window	Colour, theme, lighting
A birthday party	Guests, place, food, games
A weekly meal plan	The main dish, the side, the cook



A small shop window with a striped awning, a few books on stands and a lamp glowing in the corner.

Splitting a task this way often shows where to spend the next hour. **Write a star beside the thin rows**, and fill those first. For Bruno, place and sleeping are thin, and travel and meals fill quickly. The stars tell him where to put the most thought on the next evening.

Write a star beside the thin rows

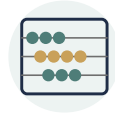
Day	1	2	3	4	5	6	7
Place and sleeping are thin	☐	☐	☐	☐	☐	☐	☐
Travel and meals fill quickly	☐	☐	☐	☐	☐	☐	☐
Fill the thin rows first	☐	☐	☐	☐	☐	☐	☐

The size of the list can grow fast. **Five features with four options each** already give 1,024 possible holidays, because each choice multiplies the others. Keep the features few and the options short. Count the combinations once, then cut a row or an option if the number is past what you can check in an evening.

The size of the list can grow fast



Five features with four options each



1,024 possible holidays



Cut a row or an option

Write each option as one or two words. **Short options keep the page readable**, and a readable page is easier to combine later. Canal boat is better than a long phrase about price. Leave a blank at the end of every row for an option that turns up at dinner or on a walk.

The levels below take the steps in order. **The starter fills every row with three options**, the middle level sorts features into fixed and free, and the advanced level builds a full feature set for a real task in your field. A colleague who knows the task can check your features before you go any further with them on paper.

Write each option as one or two words

- [x] Canal boat is better than a long phrase
- [x] A blank at the end of every row

> **Exercise:**
>
> Features and options.
>
> 1. Starter. For each feature from your Try it, **list at least three options**, including one you would never normally pick.
> 2. Middle. Mark each feature fixed or free, and write the fixed limits at the top of the page.
> 3. Advanced. For a real task at work, list features and options with a colleague, ready to combine in a table.

Features and options at three levels



Three options for each feature



Fixed or free



A full feature set with a colleague

Key idea:

Split a task into **features that can vary and options for each one**, mark which features are fixed and which are free, and keep the list short enough to read.

Quick check:

What makes a good feature? Answer: A part of the task you could decide, which can change without fixing the other features. How many options should each feature have? Answer: At least three, so the choice is more than yes or no. What do you do with a feature you cannot change? Answer: Mark it fixed and write it at the top of the page as a limit.

4.6.2 Building a Combination Table and Exploring New Arrangements

Imagine Bruno on a Sunday evening with his list of holiday features and options. **Five rows of options sit on the page**, and he still cannot see a new holiday in them. The options are all there, but they are only words in rows, and nothing has been put together yet.

A Sunday evening

- Five rows of options sit on the page
- Only words in rows
- Nothing has been put together yet

Options become useful when you start joining them. **A combination table lays them out** so you can pick one from each row and see a whole holiday. In this section I show you how to build the table, how to read a combination from it and four ways to move round it to find arrangements you would never have planned.

A combination table



Lays out the options



Pick one from each row



See a whole holiday

The table is the working heart of Zwicky's morphological analysis (Ritchey, 2006). Treat the table as practice, and judge it by what it shows you on your own tasks.

Rows do not need the same number of boxes. **A row can hold two options or six**, depending on how many real choices that feature has. Bruno's meals row has only three, cooking, picnics and cafés, while his places row grows to five when his son adds a farm. An uneven table works fine.

Rows do not need the same number of boxes

Row	Options
Meals	Cooking, picnics and cafés
Places	Five, when his son adds a farm

> **Key Concept:**
>
> Paper or screen. **A large sheet of paper lets everyone see the whole table at once**, and a pencil mark is easy to draw and rub out. A spreadsheet is handy when the table is big or needs sharing with people far away. Start on paper for a first table, so you look at every box as you draw it.

Paper or screen



A large sheet: everyone can see the whole table



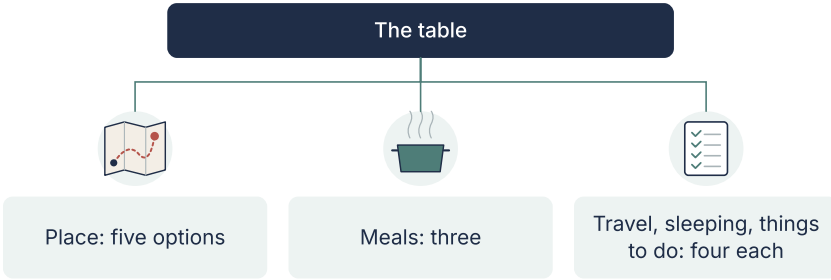
A spreadsheet: big tables, or sharing far away



Start on paper for a first table

Building the table takes a few minutes. **Write one feature per row**, with its options along the row. Bruno's table has five rows, for place, travel, sleeping, meals and things to do. Place holds five options, meals holds three, the other three rows hold four each, and the usual choice goes in the first box of each row.

Bruno's table has five rows



Key Concept:

Reading a combination. **A combination is one box picked from every row**, read across as a single holiday (Ritchey, 2006). Circle one box in each row, or mark them with a number. Every different set of picks is a different combination, even when it changes only one box. Number each combination you read, so you can find it on the page and talk about it by its number.

Reading a combination



The usual combination is the place to start. **Bruno marks last year's holiday**, seaside, car, rented flat, cafés and the beach. Every box in that combination sits in the first column, because the usual choices went there. Seen as one combination among many, the old holiday uses very little of the table.

Last year's holiday

- [x] Seaside
- [x] Car
- [x] Rented flat
- [x] Cafés
- [x] The beach

Habits live in the first column. **Every usual choice sits in it**, so the rest of the table is made of choices the family has never tried. Bruno counts the boxes outside the first column and finds fifteen, each one a choice the old holiday never touched.

Habits live in the first column



Every usual choice sits in it



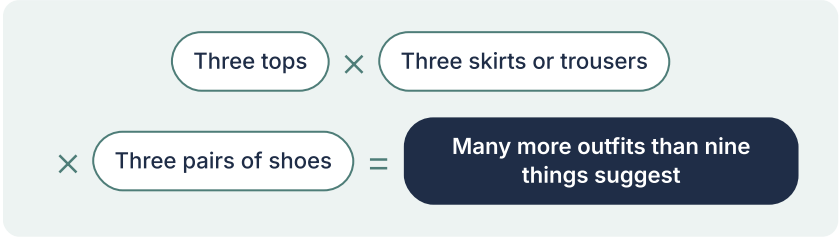
Fifteen boxes outside it



Choices the old holiday never touched

A small wardrobe is a good picture of the table. **Three tops, three skirts or trousers and three pairs of shoes** give many more outfits than nine separate things suggest. Each outfit is one item from each pile. The picture stops at fit, because clothes usually go together, while some options in a table clash with each other.

A small wardrobe



A first table is quicker to build than it sounds. **Ten minutes with a ruler and a pencil** is enough for a small one. Leave each box big enough for two words, and leave one empty box at the end of every row for an option that turns up later.

A first table

Day	1	2	3	4	5	6	7
Ten minutes with a ruler and a pencil	☐	☐	☐	☐	☐	☐	☐
Boxes big enough for two words	☐	☐	☐	☐	☐	☐	☐
One empty box at the end of every row	☐	☐	☐	☐	☐	☐	☐

> Exercise:
>
> Try it. Build a small table for one task. **Write three features with three options each**, and read out one combination.

The first way to move round the table is one row at a time. **Change a single box on the usual combination** and keep the rest the same. Seaside, train, rented flat, cafés and the beach is last year's holiday with a different way to get there. Small moves like this are easy to picture and easy to cost.

One row at a time



The second way is to take the oddest combination. **Pick the strangest option in every row** and read the result. Own town, bikes, canal boat, cooking and doing nothing makes a strange week. Keep any box you like from it, even when the whole combination would never work.

The oddest combination

- Own town, bikes, canal boat
- Cooking and doing nothing
- Keep any box you like from it

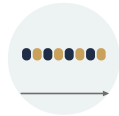
Key Concept:

Which way to move. **Pick the way that suits how stuck you are.** One row at a time is safest when you need a small, cheap change. The odd combination helps when every reading looks the same. Chance helps when you keep picking your favourites. Anchors help when one or two boxes already excite you and the rest is unclear.

Which way to move



One row at a time: a small, cheap change



The odd combination: every reading looks the same



Chance: you keep picking favourites



Anchors: one or two boxes excite you

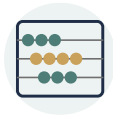
The third way uses chance. **Roll a die for each row**, and if the number is higher than the number of options, roll it a second time. Bruno's rolls give hills, coach, friend's spare room, picnics and swimming. Nobody in the family would have chosen that combination, and his daughter likes it at once.

Bruno's rolls

- [x] Hills
- [x] Coach
- [x] Friend's spare room
- [x] Picnics
- [x] Swimming

Chance is useful because it ignores your habits. **Roll before you pick favourites**, so the die lands on boxes you would skip. If a rolled combination looks impossible, keep the boxes you like from it and roll the rest a second time.

Chance ignores your habits



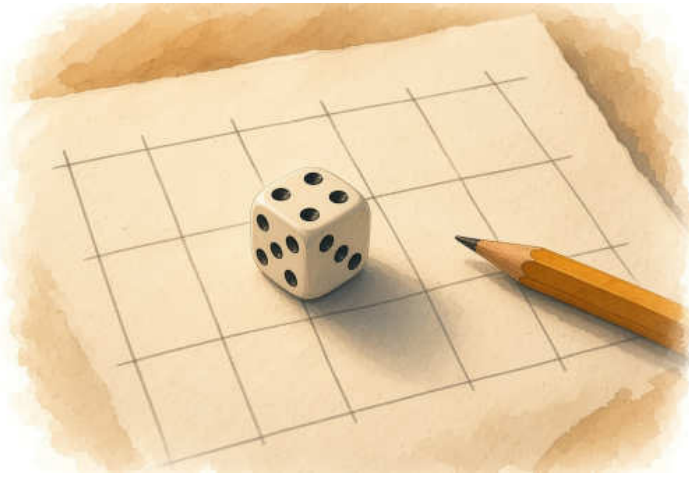
Roll before you pick favourites



Keep the boxes you like



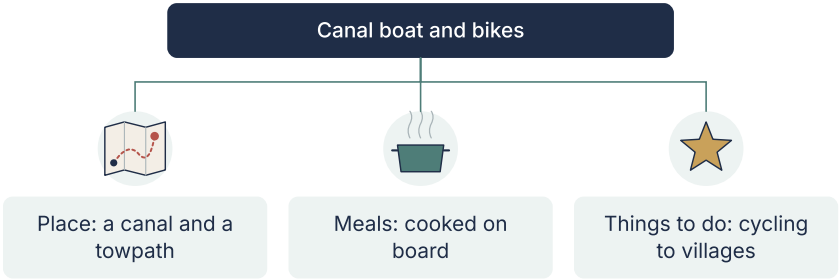
Roll the rest a second time



A single white die resting on a page with a hand drawn grid, beside a pencil.

The fourth way starts from two boxes you like. **Fix two unusual boxes as anchors**, then fill the other rows with whatever suits them. Bruno fixes canal boat and bikes. Place has to be somewhere with a canal and a towpath, meals have to be cooked on board, and things to do become cycling to villages along the water.

Two anchors



Some boxes clash when they meet. **Bikes and a city break with heavy bags** fit badly together, since every move between hotels means carrying everything. A clash rules out that pair, while the rest of the combination can still be saved by swapping one box.

Some boxes clash



> **Key Concept:**
>
> Clash marks. **Put a small cross between two boxes that cannot go together**, and move on (Ritchey, 2006). Clashes show which parts of a holiday depend on each other and which can change freely. If one box clashes with many others, look at it closely. It may be the box that has kept every holiday the same.

Bruno's table has one box that clashes with almost everything. **The car is the clash**, because nearly every new idea, the canal, the bikes and the

hostel, would be easier without it. The car has been the first choice for years. Taking it off the combination opens up half the table at once.

The car is the clash

- The canal, the bikes and the hostel would be easier without it
- The first choice for years
- Off the combination, half the table opens

Writing each combination as a sentence helps you see it. **Turn the boxes into one short sentence**, so the holiday is easier to picture. Three nights on a canal boat, cycling to villages and cooking on deck sounds like a holiday you can imagine. Bruno writes ten combinations as ten short sentences and reads them to the family.

Turn the boxes into one short sentence



Three nights on a canal boat



Cycling to villages



Cooking on deck



A family round a table at dinner, the father reading from a notebook while the children listen.

Tables work for tasks far from holidays. **A village newsletter** has rows for format, who delivers it, how often and where it is left. Paper, children on bikes, monthly and the corner shop is one combination. Email, the vicar, weekly and every front door is another, and each combination is a different kind of newsletter.

A village newsletter

Format	Who delivers it	How often	Where it is left
Paper	Children on bikes	Monthly	The corner shop
Email	The vicar	Weekly	Every front door

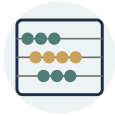
Keep the table small enough to fit on one page. **Three to five rows with three or four options** is plenty for an everyday task.

> Science Says:
>
> One study found that "reducing information in the morphological charts, such as the number of functions, enhances the likelihood for developing higher quality integrated concept solutions" (Smith et al., 2012). **The same study adds that "the largest sized chart failed to show worse results compared with smaller counterparts"** (Smith et al., 2012). Keep your first table small, and judge it by what you can check.

Keep your first table small



Three to five rows



Three or four options



Judge it by what you can check

When others help fill the table, **ask each person to write their boxes alone first**. Talking groups make fewer and weaker ideas than the same people alone (Mullen et al., 1991; Diehl & Stroebe, 1987). Collect the sheets, merge them, then talk. **Every person's options get onto the page**, including the quiet ones.

Ask each person to write their boxes alone first

Try this now

1. Collect the sheets, merge them, then talk
2. Every person's options get onto the page

A table of a hundred combinations is **a list of possibilities**, and every one still needs checking before anyone books. For now, read many combinations and circle the ones that surprise you. Bruno circles the canal boat week, the hills by coach and a week at home with a tent in the garden, and writes a short note beside each.

Bruno circles



The canal boat week



The hills by coach



A week at home with a tent in the garden

The levels below put the table to work. **The starter circles three new combinations**, the middle level fills a table with other people in writing, and the advanced level builds a table for a real task in your field and picks five combinations worth checking.

Exercise:

Combination tables.

1. Starter. In your Try it table, **circle three combinations** you would never have planned.
2. Middle. With two or three others, each fill a table alone in writing, then merge the sheets and read ten combinations aloud.
3. Advanced. Build a table for a real task at work. Read combinations in all four ways and shortlist five, with one note on why each is worth checking.

Combination tables at three levels



Circle three new combinations



Fill tables alone, then merge the sheets



Shortlist five for a real task

Key idea:

A combination table lays out **one row for each feature and a box for each option**, so you can read whole holidays across it and move round it to find arrangements you would never have planned.

Quick check:

What is a combination? Answer: One box picked from every row, read across as a single holiday. What should you do when two boxes clash? Answer: Mark the clash and swap one box, keeping the rest of the combination. Why start with the usual combination? Answer: It shows how little of the table the old holiday uses, and where the untried boxes are.

4.6.3 Choosing Combinations to Develop Further

Imagine Bruno with three circled combinations on his table and one summer to fill. **A canal boat week, the hills by coach and a week at home with a tent in the garden** are all on the page. Each one has a fan in the family, and nobody can agree which to book.

Three circled combinations

- [x] A canal boat week
- [x] The hills by coach
- [x] A week at home with a tent in the garden

A full table is a happy problem to have. **The hard part now is choosing**, since a table on its own does not pick the winner. In this section I show you how to sift the combinations, pick the ones that fit what the task is for and turn one into a holiday you can try.

The hard part now is choosing

> - Sift the combinations
> - Pick the ones that fit what the task is for
> - Turn one into a holiday you can try



A family round a kitchen table, each person pointing at a different combination on a large sheet of paper.

Choosing from Zwicky's table comes after the rows are full (Ritchey, 2006). Treat the choosing steps as practice, and bring the circled combinations and the fixed limits to the same table so everyone can see both. Use the steps when a table has more combinations than you can try.

A kitchen sieve is a good picture of the steps. **A coarse sieve catches the big lumps first**, then a fine one catches the smaller bits. Hard limits are the coarse sieve, and what the task is for is the fine one. The picture stops at shape, because a sieve never changes what passes, while you can reshape a combination.

A kitchen sieve



The coarse sieve: hard limits



The fine one: what the task is for

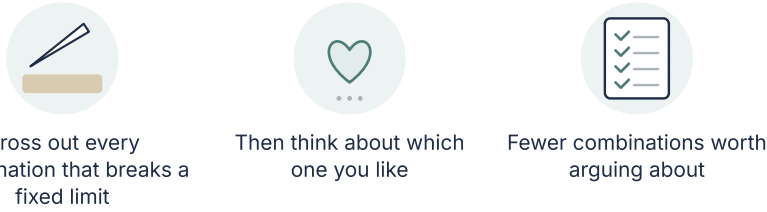


The big lumps first, then the smaller bits

> **Science Says:**
>
> One description of the method weeds out "mutually contradictory conditions" before the remaining combinations are examined (Ritchey, 2006). **Real limits such as a budget or a date** play a similar role here as practice, and research on limits and creativity is mixed (Acar et al., 2019).

> **Key Concept:**
>
> Hard limits first. **Cross out every combination that breaks a fixed limit** before you think about which one you like. Liking a combination that breaks a limit only wastes time. The combinations left after this step are the only ones worth arguing about, so the family argues over fewer of them and keeps the page clear.

Hard limits first



Bruno's savings jar and the school dates come to the table. **The canal boat week fails the budget**, because a full week on the water costs more than the jar holds. Two combinations are left, the hills and the tent at home. One cut, made by the budget, clears the page for the next sieve without a family vote.

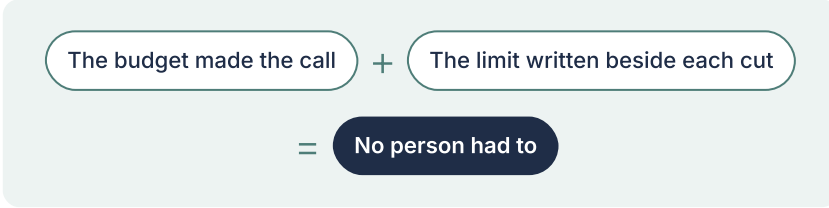
One cut, made by the budget

Combination	Budget
The canal boat week	Fails the budget
The hills	Left
The tent at home	Left

Crossing out feels harsh, and it saves hours. **Every crossed combination is one the family no longer has to discuss**, and the

budget made the call, so no person had to. Nobody's favourite was dropped by someone else's vote. Write the limit that caused each cut beside it, so the reason stays on the page.

Crossing out saves hours



The fine sieve is what the week is for. **For Bruno, the week is for time together**, something new for the children and rest for the two parents. A combination that serves all three parts beats one that serves only one, because a holiday that pleases only one person is a long week for the rest.

The fine sieve



What the task is for comes from the people it serves. **Bruno asks each person for one word** and gets together, new, sleep and chips. Chips is his son's joke, so Bruno counts it under rest with sleep, since good food is part of an easy week. That leaves three parts to score.

One word from each person



Together



New



Sleep



Chips, counted under rest

> **Key Concept:**
>
> What the task is for. As you saw in 3.4.2, **write what the task is for before you look at the combinations**, then mark each one against each part with a tick or a cross. A combination that wins on looks and loses on what the task is for is one to drop, however much someone likes it. Keep that written list in view for the rest of the choosing on this page.

The two combinations meet what the task is for. **The hills by coach tick all three parts.** The tent at home ticks rest and time together, and it loses on something new. The envelope on the table shows the hills with three ticks and the tent with two ticks.

Ticks and crosses

Combination	Together	New	Rest
The hills by coach	Tick	Tick	Tick
The tent at home	Tick	Cross	Tick

Scoring two combinations takes a few minutes. **A grid of ticks and crosses** fits on the back of an envelope, with the combinations down the side and the parts of what the task is for along the top. The envelope makes the scores easy to share with the whole family at once.

A grid on the back of an envelope



The combinations down the side



What the task is for along the top



Easy to share with the whole family

> Exercise:
>
> Try it. Write one line on what your task is for. **Pick the two combinations from your table** that serve it best.

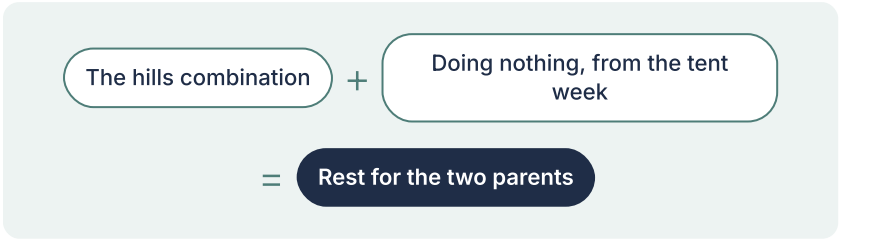
The scores point to the hills, and **ticks are a guide** that do not settle everything. Before dropping the tent, Bruno asks whether changing one box would give it the missing something new. Swapping cooking for cafés only moves the meals down the road, so the tent still loses on new.

Ticks are a guide

- Would changing one box give the tent something new?
- Swapping cooking for cafés only moves the meals
- The tent still loses on new

Combinations can lend each other boxes. **The tent week has one box worth keeping**, doing nothing, which gives the two parents their rest. Bruno moves it onto the hills combination in place of swimming, a box in the same row. The hills combination gets better, and nothing from the tent combination is lost on the page.

Combinations can lend each other boxes



> **Key Concept:**
>
> Borrowing a box. **Before you drop a combination, look for one box in it worth keeping.** Move that box onto the combination you chose, if it fits without breaking a fixed limit. Borrowing keeps the best parts of the combinations you drop. It works only between boxes in the same row or between boxes that do not clash with the chosen combination. Mark each borrowed box on the page so you know where it came from.

Borrowing a box



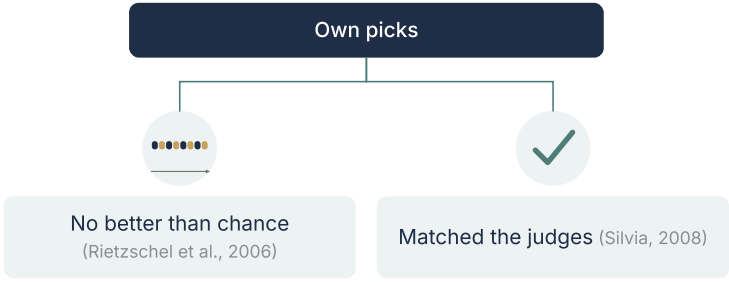
A newness check comes next, and it takes a minute. **A combination can pass every test and still be last year's holiday** with one box changed. Bruno checks the hills combination against last year's. Place, travel and sleeping are all new, so the family will get the something new they asked for this summer.

A newness check

- [x] Place: new
- [x] Travel: new
- [x] Sleeping: new

Choosing by feel can go either way. One study found that people's own picks were no better than chance (Rietzschel et al., 2006), while another found they matched the judges (Silvia, 2008). **Leave the scores overnight.** In the morning Bruno's son still wants the canal boat, and his daughter has come round to the hills.

Choosing by feel can go either way





A boy and a girl at breakfast, one holding a picture of a canal boat and the other a picture of green hills.

A chosen combination needs developing. **A combination is only a sketch of a holiday**, five boxes with no detail. Write the first day, the total cost and what to pack. For the hills, the first day is a coach at eight, a walk to the hostel and a picnic by the path on the way.

A combination is only a sketch



The first day



The total cost



What to pack

Details show what still needs fixing. **The coach arrives at the town at noon**, and the hostel opens at five, which leaves the family with bags and five hours to fill. Bruno adds a left luggage locker at the coach station and a short walk by the river. The page of times makes the gap plain before anyone books.

Details show what still needs fixing

Day	1	2	3	4	5	6	7
The coach arrives at noon	☐	☐	☐	☐	☐	☐	☐
The hostel opens at five	☐	☐	☐	☐	☐	☐	☐
A left luggage locker and a walk by the river	☐	☐	☐	☐	☐	☐	☐

> **Key Concept:**
>
> Explaining the choice. **Write one sentence for every dropped combination** on why it was dropped, such as breaking the budget or losing on rest. Share the sentences with everyone the choice affects, children included. A written reason can be checked afresh when the limits change next year, and it keeps the choice clear for anyone who missed the talk.

Explaining the choice



One sentence for every dropped combination



Share it with everyone, children included



Checked afresh when the limits change next year

Before booking, Bruno takes the family on a Saturday coach trip to the hills. **The coach ride takes longer than the timetable says**, and the children are hungry by eleven. The family plan to pack far more food for the real week. Everything else about the day works, and the booking goes ahead for the last week of August.

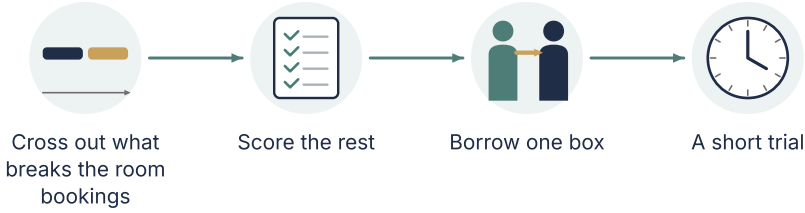
A Saturday coach trip

- Longer than the timetable says
- Pack far more food
- The booking goes ahead for the last week of August

The same steps work at work. **A team choosing a new meeting format** crosses out the combinations that break the room bookings, scores the rest against what meetings are for and borrows one box from

a dropped combination. A short trial shows whether the format holds up, before anyone makes it permanent.

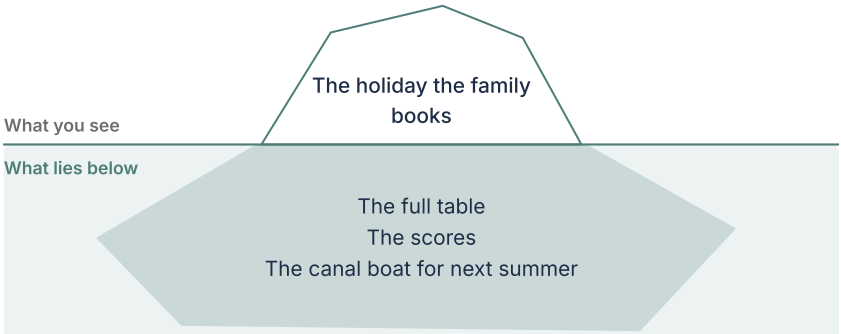
The same steps at work



The combinations you drop still have value. **Keep the full table and the scores** in a folder, so you can come back to them. Next summer the canal boat may fit, once the children are old enough to work the locks. Write the month and the jar total on the cover for next year.

The levels below follow the steps. **The starter crosses out combinations that break a fixed limit**, the middle level develops one combination in detail, and the advanced level takes a chosen combination from a work table to a small trial. Write down who will judge the trial, so the result reaches the person who decides what to keep.

The combinations you drop still have value



Exercise:

Sift and develop.

1. Starter. Cross out every combination on your shortlist that **breaks a fixed limit**, such as a budget or a date.
2. Middle. Develop one surviving combination into a one-page outline with its first step, its total cost and one thing to pack or arrange.
3. Advanced. Take a chosen combination from a real work table to a small trial. Write what counts as a pass, and name who will judge it.

Sift and develop at three levels



Cross out what breaks a fixed limit



A one-page outline



A small trial and who will judge it

Key idea:

To choose from a combination table, **sift out combinations that break fixed limits**, score the rest against what the task is for, borrow good boxes from dropped combinations and develop the winner in detail.

Quick check:

Which comes first, hard limits or what the task is for? Answer: Hard limits, because a combination that breaks one cannot be used however good it looks. Why borrow a box from a dropped combination? Answer: It keeps the best part of that combination without keeping the combination itself. Why write a sentence for every dropped combination? Answer: A written reason keeps the choice clear when someone missed the talk, and it can be checked when the limits change.

4.7.1 Finding the Contradiction: When Improving One Thing Makes Another Worse

Imagine Quinn, who runs a small community bike library from a shed behind the village hall. **Bikes go missing or get damaged overnight**, so she fits heavier locks. Borrowers then wait for ten minutes every morning while she unlocks each one, and some walk away.

A small community bike library

- Bikes go missing or get damaged overnight
- She fits heavier locks
- Borrowers wait for ten minutes every morning

Every stronger lock makes the morning slower. **Improving overnight safety makes daytime borrowing worse.** I show you how to name that contradiction, write it in one sentence and list the ways it shows up.

Every stronger lock



Overnight safety improves



Daytime borrowing gets worse



A slower morning

TRIZ goes back to Genrich Altshuller, who wrote about inventing with R. B. Shapiro in a 1956 article, and it is a way of

inventing around contradictions like Quinn's. Treat every step in this section as practice.

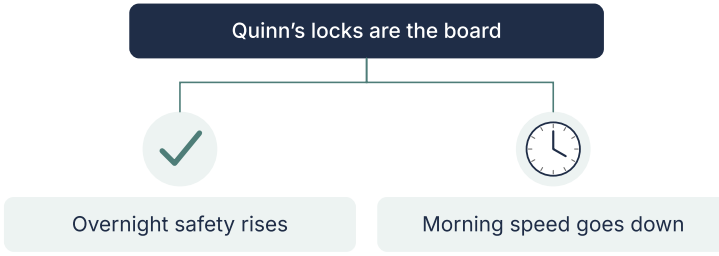
> **Key Concept:**
>
> A contradiction. **A contradiction is where making one half better makes the other half worse.** Write it as two halves joined by "but". Overnight safety gets better, but morning borrowing gets worse. If both halves can improve together with no cost to either, you do not have a contradiction yet.

A contradiction



A see-saw is a good picture of a contradiction. **Push one end down and the other end rises**, every time, on the same board. Quinn's locks are the board, and heavier metal lifts overnight safety and pushes morning speed down. The picture stops at wood, because a real task can hide several contradictions at once.

A see-saw





A playground see-saw with one end on the ground and the other high in the air.

Finding the contradiction is a narrow move. **It names one contradiction between two halves of a task.** Quinn already knows the shed needs safer bikes and happier borrowers. The new step is to write both halves on one line, so inventing has a clear target.

A narrow move

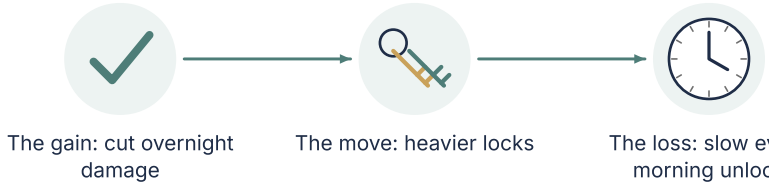
- [x] It names one contradiction
- [x] Between two halves of a task
- [x] Both halves on one line

Wanting safer locks and faster mornings side by side is easy to confuse with a contradiction. **A contradiction appears only when the move that serves one half harms the other.** Write the move in the middle of the sentence, such as fitting a heavier lock, so you can see the harm it causes.

> Exercise:
>
> Try it. Pick a task where a fix made something else worse. **Name what improved and what got worse.**

Quinn writes her first line in a notebook. **Heavier locks cut overnight damage, but they slow every morning unlock.** The move sits in the middle, the gain on the left and the loss on the right. She reads it aloud and checks that both halves name something she could count or time.

Her first line



A home kitchen gives a second example of the same sentence. **Cooking a double batch of chilli on Sunday saves time on weeknights, but it fills the small freezer.** The double batch is the move, so it sits in the middle. Quick weeknight meals are the gain half, and a freezer with no room left is the loss half.

A double batch of chilli

The gain	The move	The loss
Saves time on weeknights	Cooking a double batch on Sunday	Fills the small freezer

> **Science Says:**
>
> In 3.2.1 you met a study where a bigger clash among the parts people kept for solving went with more original, higher quality solutions (Reiter-Palmon et al., 2024). **Naming a contradiction is practice built on that finding**, and it is not a test of TRIZ as training. Evidence on how limits and trade-offs affect creativity is mixed (Acar et al., 2019).

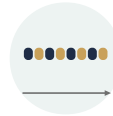
Practice built on that finding



A bigger clash among the parts



More original, higher quality solutions



Evidence on limits and trade-offs is mixed

TRIZ is sold as courses and certificates. **A brand name is no evidence**, and a course that promises big gains is promising more than the research has checked. You can run every step here with a pencil and a sheet of paper, and keep or drop it by what it gives you on the next real task.

Courses and certificates

A pencil and a sheet of paper	A brand name
⊕ Run every step	⊖ No evidence
⊕ Keep or drop it by what it gives you	⊖ Promises more than the research has checked

Some contradictions hide inside a habit. **Quinn used to chain every bike the same way**, with one heavy lock through the frame and the

front wheel. The habit looked like care. Written as a contradiction, it shows that the care for night is the cause of the wait by day.

A contradiction inside a habit



Every bike chained the same way



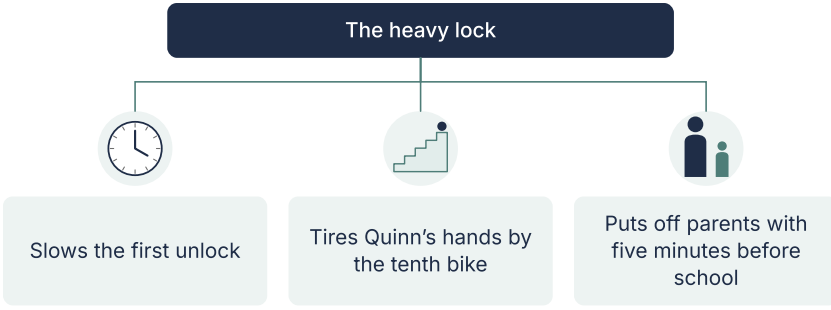
The care for night



The cause of the wait by day

The same heavy lock shows up in more than one place. **It slows the first unlock**, tires Quinn's hands by the tenth bike and puts off parents who have five minutes before school. Listing those three appearances keeps the contradiction concrete.

The same heavy lock in more than one place



Key Concept:

Writing the sentence. **Put the improving move in the middle**, the gain before it and the loss after it. Use plain words a neighbour would follow. Vague loss words hide which half got worse, so name the halves clearly before you invent.

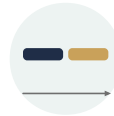
Writing the sentence



The gain before it



The improving move in the middle



The loss after it

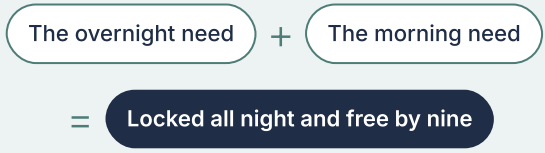
The packed freezer causes trouble in three spots during the week. **Frozen peas slide to the back and get forgotten**, Tuesday's shopping has nowhere to go and the ice trays end up on the counter. Each of those traces back to the Sunday double batch, so the family can list all three under one sentence.

The packed freezer in three spots

- [x] Frozen peas slide to the back
- [x] Tuesday's shopping has nowhere to go
- [x] The ice trays end up on the counter

A second draft can help. **Quinn's first line blamed the lock**, and her second line names the overnight need against the morning need. Bikes need to be locked all night and free by nine in the morning. Said that way, the metal is only one way the contradiction shows up, and other ways become thinkable.

A second draft



Everyday life is full of these contradictions. **A thicker winter coat** keeps you warmer and makes a bike ride clumsier. A brighter shop window pulls in more eyes and heats the glass until the display wilts. Each one is a contradiction once you write the move that links the gain to the loss.

Everyday contradictions

Move	Gain	Loss
A thicker winter coat	Warmer	A clumsier bike ride
A brighter shop window	More eyes	The display wilts

At work the same shape appears. **A longer report** answers every question and nobody finishes reading it. A tighter deadline ships the product and leaves bugs in the first week. Naming both halves stops a meeting from arguing about taste when two parts of the job pull against each other.

At work



A longer report: nobody finishes reading it



A tighter deadline: bugs in the first week



Naming both halves stops arguing about taste

> **Key Concept:**
>
> One contradiction at a time. **Hold one contradiction on the page** before you open a second. Two contradictions mixed into one sentence hide which half you are inventing around. Quinn keeps overnight safety against morning speed on its own line. A later line can hold cost against looks, once the first contradiction has a candidate fix.

Different people can name different halves. **A parent cares about the morning wait**, a neighbour cares about bikes left in the street and Quinn cares about both. Ask each person what got better and what got worse after the last change. Their answers fill out both halves.

Different people can name different halves



A short test keeps the sentence honest. **Cover the gain half and read only the loss**, then cover the loss and read only the gain. Each half should still make sense on its own. A contradiction is ready when a stranger can read the sentence and point to both halves.

A short test



Cover the gain, read only the loss



Cover the loss, read only the gain



A stranger can point to both halves

Some contradictions are false. **A false contradiction looks like both halves must lose**, yet another fix can serve both. A louder bell on the shed door wakes Quinn for late returns and wakes the flat upstairs. A soft light inside the shed can alert her without waking the neighbours, so both halves improve and that contradiction can be dropped.

A false contradiction

- A louder bell wakes Quinn and the flat upstairs
- A soft light inside the shed
- Both halves improve



A soft light glowing inside a shed doorway, with a quiet evening street beyond.

Weather can add another contradiction on its own line. **A cover over the bike rail** keeps rain off the seats and traps damp that rusts the chains. Quinn keeps safety against speed on one line and dryness against rust on another.

A notebook page with only one contradiction is easier to share. **Quinn photocopies the sentence** for the hall committee and asks each person to underline the half they care about most. Shared wording keeps the inventing aimed at the same halves.

Shared wording



Quinn photocopies the sentence

Each person underlines the half they care about

The inventing aimed at the same halves

On Monday she times one full morning unlock with the kitchen clock. **Ten minutes of unlocking** goes beside the morning wait half in the notebook margin. She counts last month's overnight losses from her shed log, writes two bikes lost beside the safety half, and reads both measures aloud before she closes the book.

A measure for each half

Half	Measure
Morning wait	Ten minutes of unlocking
Overnight safety	Two bikes lost last month

A parent who borrows for school runs copies both numbers onto the photocopied sheet, and **Quinn tapes a fresh copy inside the shed door** for a week. She times Tuesday's unlock too, and it takes ten

minutes again. On Wednesday a borrower asks where the two-bike figure came from, and Quinn opens the shed log to show last month's entries.

A fresh copy inside the shed door



Tuesday's unlock: ten minutes again



Where the two-bike figure came from



Last month's entries in the shed log

> **Key Concept:**
>
> Measures beside the sentence. **Write one measure for each half** under the contradiction before you invent. Ten minutes of unlocking and two bikes lost in a month give inventing a clear target.

After inventing, score the new idea against the real shed before you buy a lock (Cropley, 2006). **A clever way round a contradiction can fail on cost, safety or time.** Here the job is only to write the contradiction clearly.

The levels below take the steps in order. **The starter writes the contradiction in one sentence**, the middle level lists three ways it shows up and the advanced level finds a contradiction a stakeholder would recognise. Keep the page short and plain. One clear contradiction on paper is all the starter level needs.

Score the new idea against the real shed

- Cost, before you buy a lock
- Safety
- Time

Exercise:

Name the contradiction.

1. Starter. Write your Try it result as **one sentence** with the move in the middle.
2. Middle. List three ways the contradiction shows up in a normal week, each in one short line.
3. Advanced. For a real task at work, write a contradiction a stakeholder would recognise, and check the wording with them.

Name the contradiction at three levels



One sentence, the move in the middle



Three ways it shows up



Wording a stakeholder would recognise

Key idea:

A contradiction is **where the move that improves one half makes the other half worse**, written as one clear sentence before you try to invent around it.

Quick check:

What makes a contradiction different from two wants written side by side? Answer: The move that serves one half has to harm the other. Where does the improving move go in the sentence? Answer: In the middle, with the gain before it and the loss after it. Why list three ways the contradiction shows up? Answer: Concrete hits are easier to invent around than a vague sense that something feels hard.

4.7.2 Using Selected Inventive Principles in Everyday Examples

Imagine Quinn with her contradiction written in one clear sentence. **Heavier locks cut overnight damage, but they slow every morning unlock**, and she still has no new fix. The next step is to try a few short prompts that suggest ways round a contradiction like hers.

Her contradiction in one sentence

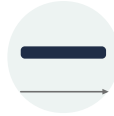
Better	The move	Worse
Cut overnight damage	Heavier locks	Slow every morning unlock

In this section I show you how to pick a small set of inventive prompts, how to apply one prompt at a time to a named contradiction and how to keep the better fits. **Treat these steps as practice** on your own tasks.

In this section



Pick a small set of prompts



One prompt at a time



Keep the better fits

The prompts sit in **Altshuller's TRIZ**, the same line as 4.7.1. The ones used here are written in everyday words for paper practice on named contradictions.

> **Key Concept:**
>
> A prompt. **A prompt is a short instruction that suggests a way round a contradiction**, such as split the job into parts or make the changing part able to move. It is a rule of thumb for inventing, with no proof attached. Write the prompt at the top of a page and list three applications under it before you judge any of them.

A prompt

> - A short instruction
> - A rule of thumb, with no proof attached
> - Three applications before you judge

Write applications alone on paper first. **Talking groups make fewer and weaker ideas than the same people working alone**, mainly from production blocking (Mullen et al., 1991; Diehl & Stroebe, 1987), as 4.1.2 showed. Fill each prompt page alone, then compare the pages. Skip a spoken inventing round until the pages are full.

A toolbox with five labelled drawers is a good picture of the method. **Each drawer holds one kind of move**, and you open one drawer at a time. Opening every drawer at once spills tools across the floor. The picture stops at metal, because a real prompt can give an idea that needs reshaping before it fits the shed.

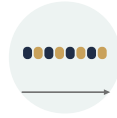
A toolbox with five drawers



Each drawer holds one kind of move



Open one drawer at a time



Every drawer at once spills tools

Five everyday prompts are enough for a first pass. **Split the job into parts**, make the changing part able to move or fold, do the useful step beforehand, use a cheap one-shot version, and put one thing inside another.

Five everyday prompts

- **A first pass**
  - Split the job into parts
  - Make the changing part move or fold
  - Do the useful step beforehand
  - A cheap one-shot version
  - Put one thing inside another

Borrowers can help fill applications without a group call-out. **Leave a blank prompt card** on the desk for a week, with the contradiction written at the top. People add one line when they return a bike. Quinn types the lines onto her page later, so the inventing stays quiet and written.

A blank prompt card on the desk

Day	1	2	3	4	5	6	7
The contradiction at the top	☐	☐	☐	☐	☐	☐	☐
One line when people return a bike	☐	☐	☐	☐	☐	☐	☐
Typed onto her page later	☐	☐	☐	☐	☐	☐	☐

> **Science Says:**
>
> One review of creativity training found that thinking skills and heuristics are among the features of programmes that work well (Scott et al., 2004). **Using a prompt as a short heuristic is practice built on that idea**, and it is not a test of TRIZ on its own. A novel application of a prompt still needs judging against what will work in the real shed (Cropley, 2006).

A short heuristic



The first prompt is split the job into parts. **Overnight security and daytime access become two jobs.** The heavy lock can serve the night, and a lighter daytime system can serve the morning.

Split the job into parts



Three applications go on the page. **A staffed pen by day with a heavy cage by night** is the first. A light cable by day with a heavy lock after closing is the second. A day desk check-in with a night lock cupboard is the third.

Three applications

By day	By night
A staffed pen	A heavy cage
A light cable	A heavy lock after closing
A day desk check-in	A night lock cupboard

> Exercise:
>
> Try it. Pick one prompt. **List three applications** of it to your named contradiction.

The second prompt is make the changing part able to move. **A lock that swings clear of the rail at nine** and swings back at five would serve both halves of Quinn's contradiction. She sketches a hinged hasp and a sliding bar. Both sketches keep overnight strength and cut the morning fiddling with separate padlocks.

Make the changing part able to move



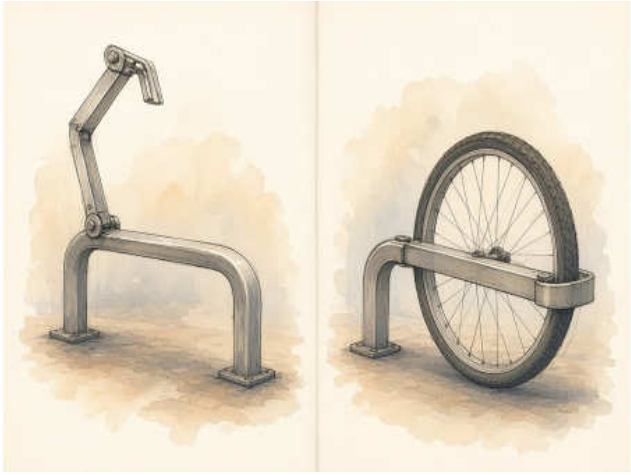
A lock that swings clear of the rail at nine



Swings back at five



A hinged hasp and a sliding bar



A pencil sketch of a bike rail with a hinged bar swung open, and a second sketch with the bar locked down.

Do the useful step beforehand gives a third path. **Unlocking every bike into a ready row before opening** moves the slow unlock work into one burst, before borrowers arrive. Parents then take a bike without waiting for Quinn to kneel at each wheel. The heavy locks still hold through the night.

Do the useful step beforehand

> - A ready row before opening
> - The slow unlock in one burst
> - The heavy locks still hold through the night

A cheap version that does the job once suits daytime only. **A cardboard day pass** handed in at the desk is enough while someone is in the shed. The expensive lock stays for night. Cheap here means light and quick, and the costly tool stays where the risk is high.

A cheap version that does the job once



A cardboard day pass at the desk



The expensive lock stays for night



Light and quick while someone is in the shed

> **Key Concept:**
>
> One prompt at a time. **Apply a single prompt fully before you open the next.** When two prompts give similar ideas, keep the clearer wording and drop the twin.

After each prompt, keep a short fit check. **Ask whether the idea serves both halves of the contradiction.** An idea that speeds the morning and weakens the night fails the check. Quinn crosses out a light daytime chain that a thief could cut in seconds, because overnight safety got worse.

The fit check

Serves both halves	Fails the check
⊕ Speeds the morning and keeps the night safe	⊖ A light daytime chain a thief could cut in seconds

Put one thing inside another suggests nesting. **A lock built into the rail** removes a separate padlock from Quinn's hands each morning. A cable that nests inside a tube in the stand does the same job. She notes the cost of a new rail and parks that idea for a grant year.

Put one thing inside another



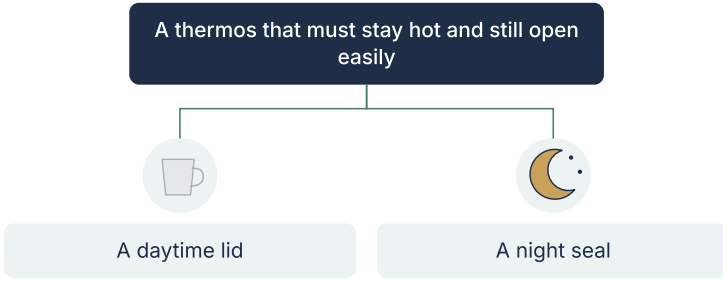
A lock built into the rail

A cable inside a tube in the stand

Parked for a grant year

Transfer helps when a prompt feels stuck. **Try the same prompt on a different everyday object**, then bring the useful part back to the bikes. Split the job on a thermos that must stay hot and still open easily, and you may see a daytime lid and a night seal. That pattern travels back to Quinn's pen-and-cage idea.

Transfer



Any everyday object with a contradiction of its own will do. **A lunchbox that must stay closed in a bag and still open with one hand** is one you can invent around on a bus ride. Split the catch from the seal, or nest a pull-tab inside the lid.

A lunchbox



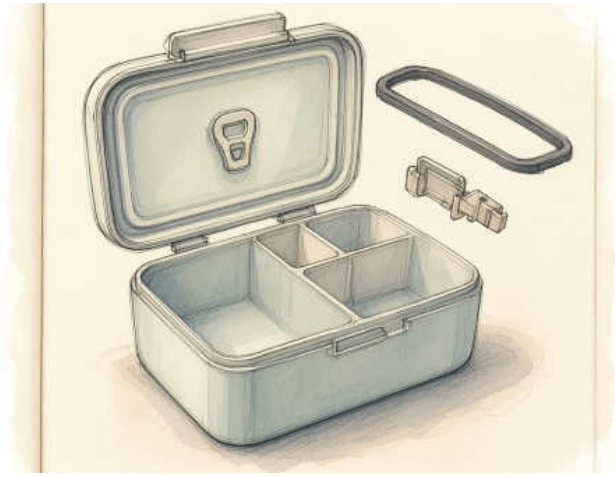
Stays closed in a bag



Opens with one hand



Split the catch from the seal



A lunchbox sketch with the catch drawn apart from the seal, and a pull-tab tucked inside the lid.

A school rucksack shows one prompt worked through away from the shed. **A rucksack big enough for PE kit and library books** is too heavy for a child's walk to school. Split the job gives three uses, a PE bag that stays on a cloakroom shelf, library books kept on the class bookshelf and a small rucksack for the walk.

Split the job for a school rucksack

- [x] A PE bag on a cloakroom shelf
- [x] Library books on the class bookshelf
- [x] A small rucksack for the walk

The fit check sorts the three uses. The cloakroom PE bag and the class bookshelf keep everything the child needs at school all week and leave the walk light, so both pass. The small rucksack alone lightens the walk and leaves the PE kit and books with nowhere to go, so it fails on its own.

Work tasks take the same prompts. **A weekly report that must be thorough and still get read** can use split the job, with a one-page front sheet and a detail pack behind it. A shop display that must be tall and still stable can use a mast that folds in wind.

Work tasks take the same prompts



A one-page front sheet and a detail pack



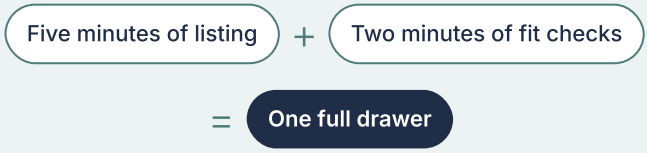
A mast that folds in wind



A weekly report that must be thorough and still get read

Time-box each prompt carefully. **Five minutes of listing and two minutes of fit checks** is enough for one full drawer. A longer sit at the page tends to turn into polishing one favourite idea. Quinn sets a small kitchen timer on the workbench and stops when it rings.

Time-box each prompt



> **Key Concept:**
>
> Keeping the better fit. **After two prompts, keep the applications that serve both halves** and drop the ones that only serve one. Circle at most three for the shortlist. A long list of prompt ideas is raw material. Leave ranking light for now, and keep the circled ones for scoring later.

Keeping the better fit



Keep what serves both halves



Drop what only serves one



Circle at most three

Quinn's shortlist after five prompts is three ideas. **A staffed pen by day with a locked cage by night** heads the list, with a hinged bar and a burst unlock beside it. All three serve both halves on paper.

> **Key Concept:**
>
> Criteria after inventing. **Purpose, cost and safety are written in one line each before you score.** An application that fails safety is out, however clever it looked under the prompt.

Criteria after inventing



Purpose, in one line



Cost, in one line



Safety: fail it and the idea is out

She almost reaches for a medium lock that is only a bit lighter. **She puts that lock back in the drawer** and keeps the shortlist for scoring later.

A prompt page is easier to reuse next month if you date it. **Write the contradiction at the top**, the prompt under it and the date in the corner. Quinn keeps the five pages in a clip on the shed wall. When a new contradiction appears, she can see which prompts already earned their keep.

A prompt page to reuse next month

Day	1	2	3	4	5	6	7
The contradiction at the top	☐	☐	☐	☐	☐	☐	☐
The prompt under it	☐	☐	☐	☐	☐	☐	☐
The date in the corner	☐	☐	☐	☐	☐	☐	☐

On Wednesday she copies the shortlist onto a clean sheet. **Each idea keeps the prompt that produced it** written beside it in the margin. She adds the date at the top, clips the sheet behind the five dated pages and locks the shed.

The levels below take the steps in order. **The starter applies a second prompt and keeps the better fit**, the middle level uses an everyday object then transfers back and the advanced level keeps one application that survives real criteria on a work task. Stay with the everyday prompts from this section.

A clean sheet



Each idea keeps its prompt in the margin



The date at the top



Clipped behind the five dated pages

Exercise:

Prompts on a contradiction.

1. Starter. Apply a second prompt to the same contradiction. **Keep the better fit** from the two prompts.
2. Middle. Apply one prompt to an everyday object, then transfer the useful part back to your task.
3. Advanced. On a real work contradiction, keep one prompt application that survives your purpose, cost and safety checks.

Prompts on a contradiction at three levels



A second prompt, the better fit kept



An everyday object, then back to your task



One application that survives real checks

Key idea:

Inventive prompts are **short heuristics for inventing around a named contradiction**, applied one at a time, with the better fits kept and checked against both halves of the contradiction.

Quick check:

How many prompts should you open at once? Answer: One, applied fully with three applications before the next. What makes an application worth keeping? Answer: It serves both halves of the contradiction, including the half you were ready to sacrifice. Why write alone before talking? Answer: Talking groups make fewer and weaker ideas than the same people working alone, so write alone first, then compare.

4.7.3 Looking for a Different Arrangement Instead of Accepting the First Compromise

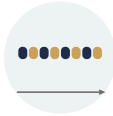
Imagine Quinn with her shortlist of three ideas. **A staffed pen by day with a locked cage by night**, a hinged bar and a burst unlock are on it. She writes beside them the medium lock she almost took in 4.7.2, as the first compromise.

Her shortlist

- [x] A staffed pen by day with a locked cage by night
- [x] A hinged bar
- [x] A burst unlock

A first compromise softens both halves of the contradiction. **It can leave overnight safety and morning speed half served.** In this section I show you how to write that first compromise down, invent a different arrangement and choose between them. **Treat these steps as practice** on your own real tasks.

A first compromise



Softens both halves



Overnight safety half served



Morning speed half served

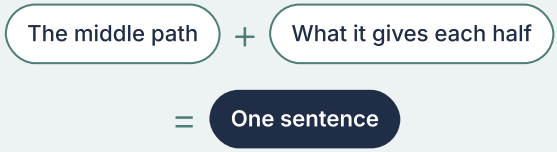


A medium padlock lying between a heavy lock and a light cable on a workbench.

Choosing an arrangement in Altshuller's TRIZ comes after the contradiction and the prompts are on the page. It is a different tool from a multi-feature combination grid.

> **Key Concept:**
>
> The first compromise. **The first compromise is the middle path you reach for** before inventing, such as a lock that is only a bit lighter. Write it in one sentence, with what it gives each half of the contradiction. Seeing it on the page makes it easier to leave behind while you invent something else.

The first compromise in one sentence



A folding map is a good picture of arrangement. **The same sheet of paper can be a wide view or a pocket square**, depending on how you fold it. The paper does not change, the arrangement does, and Quinn's bikes, locks, shed and opening hour are the paper. A new arrangement can serve safety and speed together.

A folding map



A wide view



A pocket square



The same sheet of paper

Quinn writes the first compromise in her notebook. **Use a medium lock on every bike**, strong enough for most nights and quick enough for most mornings. Overnight damage may rise a little and morning waits may fall a little, so both halves stay partly hungry.

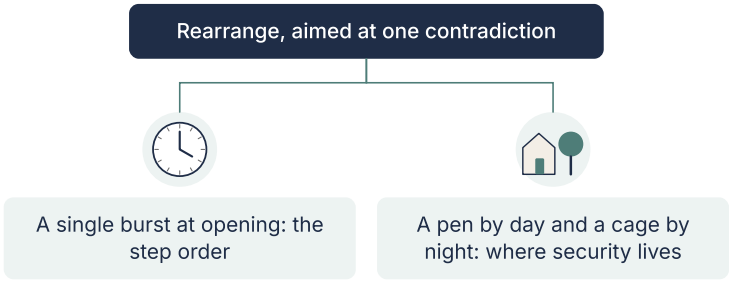
A medium lock on every bike

Half	Medium lock
Overnight damage	May rise a little
Morning waits	May fall a little

> Exercise:
>
> Try it. Write your first compromise in one sentence. **Invent one different arrangement** that aims to serve both halves of your contradiction.

A different arrangement is the Rearrange prompt from 4.3.3, aimed at one named contradiction, and it leaves amounts alone at first. **Moving unlocking into a single burst at opening** changes the step order, and putting bikes in a staffed pen by day and a cage by night changes where security lives. Neither arrangement is a medium lock.

A different arrangement



An allotment shows the same move. **Daily watering keeps the runner beans alive, but carrying cans from the far tap takes the whole evening.** The first compromise, watering every other day, only changes the amount. Running the old hose to the bean rows moves a part the plot already has, so the beans get water daily without heavy cans.

An allotment

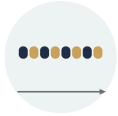
Option	What changes
Watering every other day	Only the amount
The old hose from the far tap	A part the plot already has moves

> **Science Says:**
>
> Do not stop at the first soft option. Evaluate novelty toward what will work in the real world (Cropley, 2006). **Evidence on choosing the best idea is mixed.** In one study, people's own choices closely matched the judges' ratings (Silvia, 2008). In another study, the ideas people picked did no better than chance would (Rietzschel et al., 2006). Score options on written criteria, and treat a first feeling as only one input.

Evidence on choosing the best idea is mixed



Own choices matched the judges' ratings (Silvia, 2008)



Picks no better than chance (Rietzschel et al., 2006)



Score options on written criteria

Score the first compromise and the new arrangement on the same criteria. **Write what the task is for in one line**, then mark each option against that line and against cost and safety.

Quinn's purpose line is bikes ready for neighbours by nine, with no overnight losses. **The medium lock scores middling on both.** The pen-and-cage scores high on both, with a cost in volunteer time at opening.

Quinn scores both options

Option	Score
The medium lock	Middling on both
The pen-and-cage	High on both, with a cost in volunteer time

The plot holder scores both options on one purpose line, beans watered every day before dark. **Every other day scores middling**, with limp leaves after hot afternoons. The hose scores high, with a cost of a few minutes to lay it out and coil it back each evening. The cans stay beside the seedlings for small jobs.

The plot holder scores both



Every other day: middling, limp leaves



The hose: high, a few minutes each evening



The cans stay beside the seedlings

Back at the bike shed, **Quinn pins the pen-and-cage sketch** above the workbench beside her contradiction sentence. Day and night sit side by side on one sheet, so every later step works on that one arrangement.

The hinged bar and the burst unlock stay on the shortlist page beneath the sketch, ready to lend a part.

Quinn pins the pen-and-cage sketch

- Day and night side by side on one sheet
- The hinged bar and the burst unlock stay on the shortlist
- Ready to lend a part



A daylight sketch of an open staffed pen of bikes, and a night sketch of the same rail inside a locked cage.

Borrow one good part from a dropped idea when it fits. **The hinged bar** from the shortlist can sit on the cage gate, so night locking is one motion. Borrowing keeps the useful part of a dropped line without keeping the whole first compromise. Mark each borrowed part so you know where it came from.

Borrow one good part



Before anyone spends money, walk the arrangement through one real morning. **Write the first ten minutes of opening** with names for who unlocks, who staffs the pen and where the heavy locks go at night. A weak spot on paper is cheap to fix. Quinn finds that the pen needs a second volunteer on school-run days.

Walk the arrangement through one real morning



A parent volunteer times a pretend unlock-to-pen handoff at ninety seconds. **Quinn adds that ninety seconds to the opening strip** and keeps the walk-through sheet in the folder with the purpose line. She writes the volunteer’s name beside the ninety-second note so the trial starts from a timed plan.

The opening strip

Day	1	2	3	4	5	6	7
A pretend handoff timed at ninety seconds	☐	☐	☐	☐	☐	☐	☐
The walk-through sheet in the folder	☐	☐	☐	☐	☐	☐	☐
The volunteer's name beside the note	☐	☐	☐	☐	☐	☐	☐

If you invent arrangements with other people, write alone first. **Talking groups make fewer and weaker ideas than the same people working alone**, mainly from production blocking (Mullen et al., 1991; Diehl & Stroebe, 1987). Fill each arrangement on paper alone, then compare.

Write alone first



Fill each arrangement on paper alone



Then compare



Talking groups make fewer and weaker ideas

> **Key Concept:**
>
> When to stop inventing. **Stop when one arrangement beats the first compromise on your purpose line** and passes cost and safety, or when two more inventing passes give only twins of ideas you already have. Write why the first compromise lost, in one sentence, so next month's Quinn can see the reason.

Work tasks use the same move. **A team that always adds more meeting time** to cover every topic is on a first compromise. An

arrangement change might put updates on a written board and keep the live hour for decisions only, so coverage and time both get served.

A team that always adds more meeting time

An arrangement change	The first compromise
⊕ Updates on a written board ⊕ The live hour for decisions only	⊖ More meeting time to cover every topic

The meeting board gets a one-week trial of its own. **Keep the written board if updates stayed clear**, and drop it if the board went unread. The first compromise of longer meetings stays on file as the path you refused.

A one-week trial of its own



Keep the board if updates stayed clear



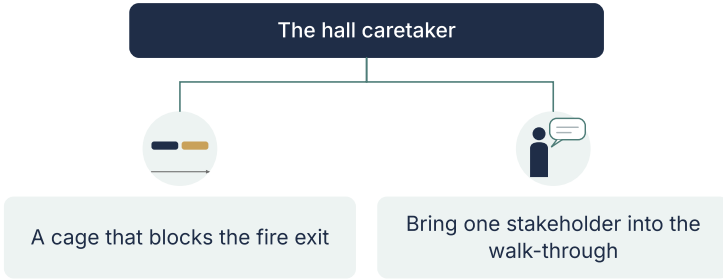
Drop it if the board went unread



Longer meetings stay on file as the path you refused

A stakeholder can break a favourite arrangement. **The hall caretaker** may refuse a cage that blocks the fire exit, even when the purpose scores look perfect. Bring one stakeholder into the paper walk-through before the trial. Keep the contradiction taped on the rail post until the trial ends.

A stakeholder can break a favourite arrangement



Children who borrow bikes notice the change. **A shorter wait at nine** is the half they care about, and zero missing bikes is the half their parents care about. Purpose stays written for the whole trial, with bikes ready by nine and no overnight losses on every daily note she keeps.

Who cares about each half

Half	Who cares
A shorter wait at nine	Children who borrow bikes
Zero missing bikes	Their parents

> **Key Concept:**
> Re-score when the season shifts. **A plan that wins in June can lose in November**, when opening is dark and fewer volunteers come. Use the same purpose line when you re-score. The contradiction may stay the same while the winning arrangement shifts.

Re-score when the season shifts



Wins in June



Can lose in November



The same purpose line

A small cost log helps the trial stay honest. **Note volunteer minutes and any cash spent** each day of the trial. Quinn's log shows twelve extra minutes on school-run mornings and nothing spent on new locks, which is a cost the hall can give without new kit.

After two weeks the trial is over. **The pen-and-cage arrangement** has cut morning waits to under three minutes and recorded zero overnight losses. One volunteer opens with her on school-run days. The medium lock stays in the drawer as a reminder.

After two weeks



Morning waits under three minutes



Zero overnight losses



The medium lock stays in the drawer

A second arrangement is worth keeping as a spare. **The burst unlock at opening** stays on the shortlist page for next season. Quinn files that page behind the pen-and-cage plan, with one line on when she would open the spare, such as a term when the pen loses its second helper.

On the second Friday she brings the cost log to the hall committee. **The committee votes to keep the arrangement for the rest of the term.** After the vote she pins a simple opening rota on the shed wall, with two names on school-run mornings and one name on the quiet days.

A simple opening rota

- [x] Two names on school-run mornings
- [x] One name on the quiet days

A hall notice helps neighbours understand the new arrangement. **One short note on the door** can say bikes are free in the pen by day and locked in the cage by night. Clear words stop people treating the arrangement as a mystery on a busy morning.

One short note on the door



Free in the pen by day



Locked in the cage by night



Clear words on a busy morning

The levels below take the steps in order. **The starter scores both options on purpose criteria**, the middle level changes place or sequence and the advanced level uses the first compromise as a benchmark and stops when one arrangement beats it. Keep the named contradiction in clear view for every score on the page.

> Exercise:
>
> Arrangement over first compromise.
>
> 1. Starter. Score your first compromise and your new arrangement on **what the task is for**, plus cost and safety.
> 2. Middle. Change the place or sequence of a resource or step, and write how that serves both halves.

3. Advanced. On a real work contradiction, use the written first compromise as the benchmark. Strike amount-change disguises, and stop when one arrangement beats it on purpose, cost and safety.

Arrangement over first compromise at three levels



Score both on purpose criteria



Change place or sequence



The first compromise as the benchmark

Key idea:

Leave the first compromise on the page, **invent a different arrangement of places and steps** around the same contradiction, then score both options against purpose, cost and safety.

Quick check:

What is the first compromise? Answer: The middle path you reach for before inventing, which softens both halves. What counts as an arrangement change? Answer: A change of place or sequence, while amounts stay the same at first. Why write alone before a group scores options? Answer: Talking groups make fewer and weaker ideas than the same people working alone, so write alone first, then compare.

4.8 Designing for People: Design Thinking

4.8.1 Understanding the People You Are Creating For

Imagine Pia, who runs a community fridge in a church porch for her street. **Tinned food piles up on the top shelf**, fresh bread goes stale and neighbours still say they cannot find what they need. She has rearranged the shelves twice, and the same complaints come back within a week.

Pia's porch fridge

> - Tinned food piles up on the top shelf
> - Fresh bread goes stale
> - The same complaints come back within a week

The fridge is built for food, and the people who use it are still a blur. **Understanding those people comes before any new shelf plan.** In this section I show you how to watch who arrives, how to copy needs in their words and how to check an assumption against a real cue. Treat these steps as practice.

Three steps before any new shelf plan



Watch who arrives



Copy needs in their words



Check an assumption against a real cue



A wooden porch fridge with tins on the top shelf and a loaf in a paper bag going soft.

Design thinking has a named start in print. **Rowe used the name design thinking in a 1987 book.** The steps in this section need only a pencil, a notebook and a place to stand. Pia starts with the porch she already knows, a few steps from her own front door.

A pencil and a blank page are enough to start. **Stand where the fridge is used**, and save your guesses from home until after the first watch. One line per visit will do, with the time, the weather and who came. A visit that ends with nothing taken still gets its line, since a walk-away is part of the picture.

Enough to start

- [x] A pencil and a blank page
- [x] Stand where the fridge is used
- [x] One line per visit: the time, the weather and who came

Science Says:

A review of design thinking writing listed ten main features and 37 tools and methods (Micheli et al., 2019). **Seven professional designers then sorted cards for all of them.** After the sort, every one of the ten features stayed, and the 37 tools and methods were folded together into eight. One of the ten is "user-centeredness and involvement", which means keeping the users of a thing at the centre of the work.

Ten features, 37 tools and methods



Ten main features listed



Seven professional designers sorted cards



37 tools and methods folded into eight

Key Concept:

Observation. **Observation is watching people in the place where they use the thing**, noting who comes, what they take and what they leave behind. A twenty-minute watch on the church porch is observation.

Where you stand changes what you see. **A watcher in the doorway blocks the way in**, and people act differently when someone stares at the shelf. Pia sits on the bench at the side of the porch with a library book open on her knee. Twenty minutes gives her several visits and still fits into a busy day.

Where you stand changes what you see



A watcher in the doorway blocks the way in



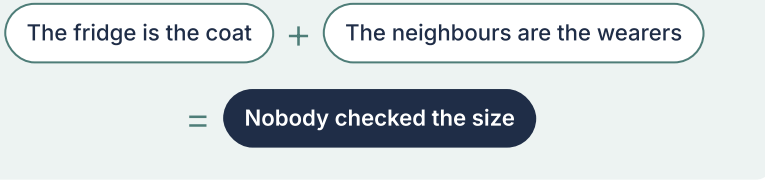
The bench at the side of the porch



A library book open on her knee

A borrowed coat is a good picture of the step. **A coat that fits the giver can leave the wearer cold**, because nobody checked the size on the person who wears it. The fridge is the coat, and the neighbours are the wearers. The picture stops at cloth, because a real street holds many wearers with different sizes at once.

A borrowed coat





A coat held against a person’s shoulders, with the sleeves hanging long past the hands.

Pia watches at three times in one week. Saturday morning brings older neighbours who never bend for the bottom drawer. Weekdays after school bring parents in a hurry, and Wednesday night after choir practice brings people coming home from late shifts. Each watch lasts the same twenty minutes, so no group gets a longer look than the others.

Three watches in one week

When	Who comes
Saturday morning	Older neighbours
Weekdays after school	Parents in a hurry
Wednesday night after choir practice	People coming home from late shifts

Needs sound different in the person's mouth. **"I need the bread where I can reach it"** says more than any tidy phrase about better shelves. Pia copies the words she hears, even when they sound rough, and keeps her own phrasing off the page. One parent says "the bread's always up with the tins", and Pia copies that line exactly.

Needs sound different in the person's mouth



I need the bread where I can reach it



Copy the words she hears

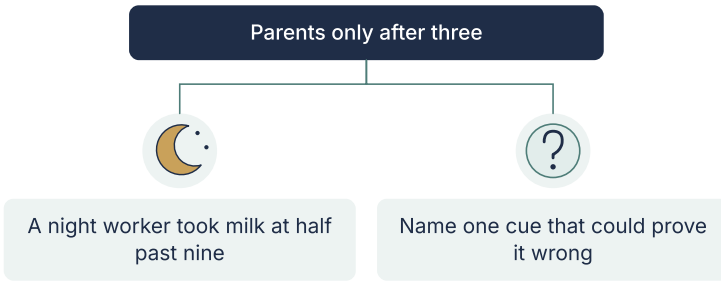


Keep her own phrasing off the page

Assumptions hide inside tidy phrases. **Parents only after three** felt solid until a night worker took milk at half past nine on the Wednesday. A cue is something you can see or hear that settles a guess, such as a

time, a quote or a photo. Before you trust an assumption, name one cue that could prove it wrong.

Check an assumption against a cue



A photo of a shelf is one more kind of cue. **Pia photographs the shelf at closing time on Saturday**, before anyone tidies it. The top shelf is still full of tins, and the bread tray is empty. The photo goes in the folder, so the church team can see the shelf the way the users left it.

A photo is one more kind of cue



> Exercise:
>
> Try it. Pick one thing you are making or fixing. **Do one short watch** and write three notebook lines about who came and what they did.

Church helpers sometimes speak for users, so their words need checking on the porch. **“Nobody wants tins” was helper talk**, and on the

Wednesday night watch three tins went home with night workers. Helper talk is a lead, and the porch is where it holds or breaks. Helpers come at set times, and the watches cover the hours they miss.

Helper talk is a lead

> - Nobody wants tins
> - Three tins went home with night workers
> - The porch is where it holds or breaks

Two needs can pull against each other on one shelf. **A tin pushed in front of the milk on the middle shelf** suits the older neighbour who wants tins at chest height and annoys the night worker who wants cold milk fast. Pia writes both needs in their own words with a star between them, ready for inventing later.

Two needs on one shelf

Who	Wants
The older neighbour	Tins at chest height
The night worker	Cold milk fast

One short question after a visit can fill a gap in the notes. **“What were you hoping to find today?”** leaves room for any answer, and Pia asks it only once the person has finished at the fridge. An older neighbour answers “soup I can open”, and that answer goes into the notebook word for word.

One short question after a visit



What were you hoping to find today?



Ask once the person has finished



Soup I can open

A map of the porch shows what words miss. **Mark where people pause**, where they reach and where they leave food they will not take. Pia sketches the map in pencil on the back of a leaflet during the Saturday watch. Three X marks cluster by the bottom drawer, where older neighbours stop and turn away.

A map of the porch

- [x] Mark where people pause
- [x] Where they reach
- [x] Where they leave food they will not take

What people do shows needs that their words leave out. **A workaround is a sign of a need nobody has spoken.** After school, one parent leaves a pushchair outside and reaches in with one hand, while another holds the door open with a foot. A one-handed reach changes what a shelf has to do.

A workaround is a sign of a need



A pushchair left outside



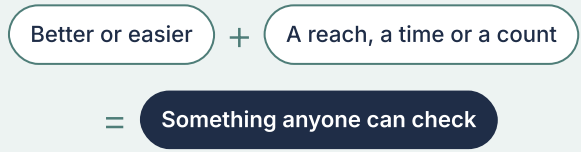
A one-handed reach



The door held open with a foot

Soft words hide weak needs. **Swap “better” and “easier” for a reach, a time or a count.** Bread below shoulder height is something anyone can check with a tape measure. On the next Saturday Pia asks the shortest regular to reach in, and marks that height in pencil on the fridge frame.

Swap soft words



> **Key Concept:**
>
> Need card. **A need card is a short card in a user’s own words that names the person, the need and one limit.** “Parents need bread they can reach after school, on a shelf below shoulder height, with the porch unlocked” is a need card.

The card shares one rule with the framed statement in 4.1.1, since the answer stays off it. What is new here is where its words come from, a watch and a real user. The limit comes from the place, and Pia’s limit is that the porch stays open to anyone, day and night.

The card shares one rule with 4.1.1



The answer stays off it



Words from a watch and a real user



The porch stays open to anyone

Two more cards join the first. **Older neighbours need tins they can lift without bending**, and night workers need milk still cold after nine. The second card came from the Saturday watch and the third from the Wednesday night watch. Each card stays one sentence long, short enough to read aloud in one breath.

Three need cards

Who	Need
Parents	Bread they can reach
Older neighbours	Tins they can lift without bending
Night workers	Milk still cold after nine

Work tasks use the same watch. **A garden centre's phone team that keeps getting the same complaint** can sit beside callers for one hour and write their needs in their words. One caller says "I just want to know it arrived", and that line names a need the order form has no box for.

Work tasks use the same watch



A garden centre's phone team



Sit beside callers for one hour



I just want to know it arrived

A watch can move the need somewhere you did not expect. **A launderette owner watches her customers for an evening**, and two of them read the signs on the machines and leave with their washing still in the bag. The machines work fine, and the need is about knowing which button to press.

A watch can move the need



> **Key Concept:**
>
> Acceptance cue. **An acceptance cue is a sign that a real user agrees with the wording on a need card**, such as a nod or one word they change so it matches how they speak. A customer at a barber's who reads a card about waiting and changes "quick" to "under ten minutes" has given an acceptance cue.

A card is ready with its acceptance cue. **Pia reads the bread card aloud to a parent at the school gate**, and the parent nods. A night worker changes "cold" on the milk card to "still cold". Next Wednesday shows why, as the milk sits at the front of the middle shelf and warms whenever the door opens.

An acceptance cue for each card



Three accepted need cards give the church team a clear start. Inventing comes next, in 4.8.2, with the cards pinned on the porch noticeboard where every helper can read them. Until then, the page for solutions stays blank, and Pia keeps watching on Wednesdays. The starred clash between tins and milk travels with the cards into that evening.

Three accepted need cards

- Pinned on the porch noticeboard
- The page for solutions stays blank
- The starred clash travels with the cards

Exercise:

People and needs.

1. Starter. Note one assumption about the people you watched, and **check it against a real cue** from a short watch or a quote.
2. Middle. Write one user need plus one limit, with no solution named.
3. Advanced. For a real task at work, write a need a stakeholder accepts in their own words.

People and needs, starter to advanced



Check an assumption against a real cue



One user need plus one limit



A need a stakeholder accepts

Key idea:

Before you change the thing, **watch the people and write one need in their words**, then check your assumptions against a real cue.

Quick check:

What goes on a need card? Answer: The person, the need and one limit, in the user's own words. Why watch at more than one time of day? Answer: Different people show up at different times. What is an acceptance cue? Answer: A real user nodding at the wording, or changing one word of it. What is a workaround? Answer: Something a user does to get round a problem, such as a one-handed reach.

4.8.2 Defining the Real Need and Generating Solutions

Imagine Pia with three need cards from the porch watches. **Parents need bread they can reach**, older neighbours need tins they can lift without bending and night workers need milk still cold after nine. The church team now wants ideas, and every first idea names a new fridge she cannot afford. Her budget is twenty pounds.

Before the ideas

- [x] Every first idea names a new fridge
- [x] She cannot afford one
- [x] Her budget is twenty pounds

A pile of need cards still waits for a brief. **One how-might-we question from one need card comes before a list of solutions.** In this section I show you how to write that question from a need card, how to generate many solutions for it and how to keep two to develop. Treat these steps as practice.

From need card to two keepers



Write a how-might-we question from a need card



Generate many solutions for it



Keep two to develop

Rowe's 1987 book gave design thinking its name, and the steps here stay with people and paper. Pia works at her kitchen table on a Monday evening with the three cards, a pencil and a pad. The bread card goes on top, because the empty bread tray in her Saturday photo is the clearest cue she has.

Monday evening at the kitchen table



Three cards, a pencil and a pad



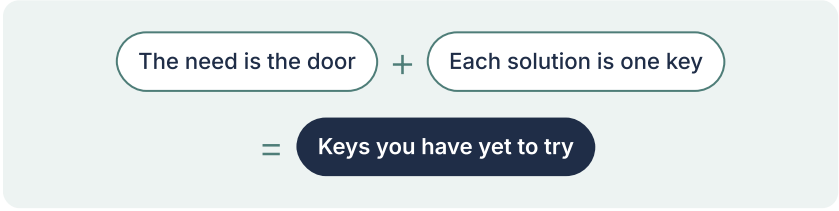
The bread card goes on top



The empty bread tray in her Saturday photo

A locked door with many keys is a good picture of the step. **The need is the door**, and each solution is one key you have yet to try. Cutting a new door is a different job altogether. The picture stops at metal, because a real need can open onto keys from more than one trade.

A locked door with many keys





A wooden door with a lock, and a ring of differently cut keys on the mat.

The bread card comes first. **Pia's first draft reads "how might we fit a new fridge"**, which already holds its answer, the slip you met with framed statements in 4.1.1. She crosses out the fridge and asks what parents wanted it for. The second draft reads "How might we put bread within reach for parents after school, below shoulder height?"

Two drafts

Draft	Question
First	How might we fit a new fridge
Second	How might we put bread within reach for parents after school?

She reads it aloud to one parent at the school gate on Tuesday. **The parent changes “after school” to “after the bell”**, because the rush starts the moment the bell goes and lasts about twenty minutes. Pia copies the new wording to the top of a clean page, and every later line on that page answers it.

Read aloud at the school gate



The parent changes after school to after the bell



The rush lasts about twenty minutes



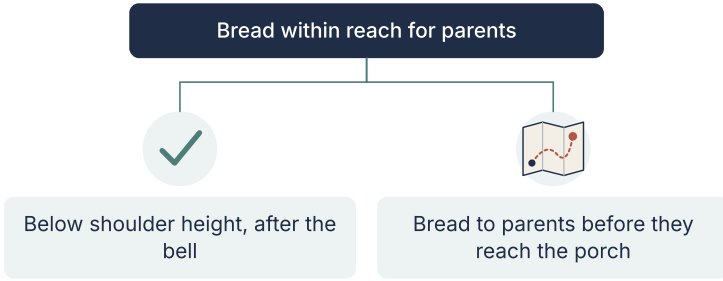
Every later line answers it

> **Key Concept:**
>
> How-might-we question. **A how-might-we question is a question rewritten from one need card that keeps the person and the limit** and leaves every fix off the page. At an outdoor lido, “How might we make sure children who forget their goggles can still swim, at no cost to parents?” is the lido’s question.

One need card can lead to two different questions. **A second angle on the same need opens a different list.** “How might we get bread to parents before they reach the porch?” starts from the same card and

points toward the school run and the walk home. Pia writes both questions down and works on the first one first.

One need card, two questions



> **Science Says:**
>
> In one study, 102 engineering and industrial design students, from high school to graduate level, each got one of two written framings of the same design task before making ideas (Silk et al., 2021). **Students given an innovative framing judged their own ideas as more creative than in their first round.** They felt the wording pushed them toward less familiar ideas.

Two written framings of the same task



The milk and tin cards wait for their own evenings. **One need card per page** keeps each idea tied to the person it serves. The tin card gets its page on Friday, and the milk card waits until Pia has checked the door

shelf on Wednesday night. Three needs on one page would hide whom each line was for.

The limit on the card helps the ideas along. **“Porch unlocked” rules out a locked cabinet** and points toward things that work in an open space, such as a lid, a hook or a crate on wheels. Pia underlines the limit in pencil so it stays in sight while all eight lines go down.

The limit on the card

- [x] Porch unlocked rules out a locked cabinet
- [x] A lid, a hook or a crate on wheels
- [x] Underline the limit in pencil

> Exercise:
>
> Try it. Take one need from a real task. **Rewrite it as a question that starts with how might we**, with no solution named.

Eight short lines go down next. **Each line is a different way to serve that one need**, and one line should be an idea you would normally reject. A lower middle shelf, a bread box by the door and a school-run volunteer each take a line. A bicycle bread round to every house takes the line Pia nearly leaves off.

Eight short lines



A lower middle shelf



A bread box by the door



A bicycle bread round to every house

Write the eight alone on paper first. **Talking groups make fewer and weaker ideas than the same people working alone** (Mullen et al., 1991; Diehl & Stroebe, 1987), so each church helper fills a page alone. Four helpers come on Wednesday, and the four pages are compared only once everyone has eight lines. Pia's own page waits face down.

Write the eight alone on paper first

> - Each church helper fills a page alone
> - Four pages compared only once everyone has eight lines
> - Pia's own page waits face down

Judging waits until the eighth line is down, the habit from 4.1.2. **Fifteen minutes on the timer** is enough for a small task like this. Lines that rename old ones, such as "low shelf" and "shorter shelf", mean the page is full. A novelty that cannot work in the porch meets a later filter (Cropley, 2006).

Judging waits



Fifteen minutes on the timer



Low shelf and shorter shelf: the page is full



A novelty that cannot work meets a later filter

Sorting takes about five quiet minutes. **Pia writes three group headers**, move the food, change who helps and change the porch layout. A helper's offer of a spare fridge goes on a separate scrap, because it skips the question. Each line goes under one header, and the bicycle bread round and the school-run volunteer both land under change who helps.

Three group headers



Pick two to keep after you sort. **One safe idea and one stretch idea** make a useful pair. Pia picks the lower middle shelf from change the porch layout and a school-run bread box filled by a volunteer from change who helps. Two picks from the same header would give her two versions of one idea.

Two keepers

Pick	From
The lower middle shelf: safe	Change the porch layout
A school-run bread box: stretch	Change who helps

The line she nearly rejected still earns its place. **The bicycle bread round is more than one volunteer can manage**, and one part of it travels well, a bread bag that goes to parents on their own route. That part gives the school-run bread box its shape, a box at the gate on the way home from school.

The line she nearly rejected



The bicycle bread round



A bread bag on their own route

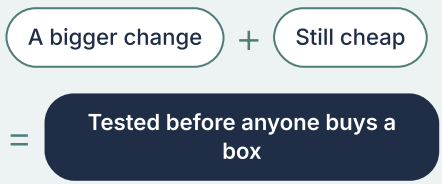


A box at the gate on the way home

> **Key Concept:**
>
> Keeper. **A keeper is one solution chosen from the sorted list to build and test next.** At the lido, a box of spare goggles at the poolside could be the keeper.

A stretch keeper is worth keeping even when it looks shaky. **A stretch keeper tests a bigger change while it is still cheap**, before anyone buys a box or asks a volunteer for a whole term. The lower shelf is a small move, and the school-run box is a big one that changes who helps.

A stretch keeper



Both keepers face one check against the card. **Parents after the bell, below shoulder height and the porch unlocked** make the test. A first sketch of the bread box had a padlock, which breaks the unlocked limit, so Pia redraws it as a box with a lid and no lock. The lower shelf meets all three as it stands.

One check against the card

- [x] Parents after the bell
- [x] Below shoulder height
- [x] The porch unlocked



A bread box sketch with its padlock crossed out and a plain lid drawn beside it.

The other six lines go into the bread folder with the date. **A parked line can come back** if a keeper fails at the porch, so nothing on the page is thrown away. The stretch keeper is the one most likely to need that folder, because it relies on a volunteer and on weather.

A parked line can come back



The other six lines go into the bread folder



With the date



Back if a keeper fails at the porch

The folder gains one more line on Thursday. **Pia gives the second question its own fifteen minutes**, the one about getting bread to parents before they reach the porch. A text to parents when fresh bread comes in turns up on that page and nowhere on the first, so the second angle found a key the first page missed.

The second question gets fifteen minutes

- Bread to parents before they reach the porch
- A text to parents when fresh bread comes in
- A key the first page missed

> **Key Concept:**
> Break line. **A break line is one short fact about the real place that could make a keeper fail**, written under that keeper. Under the lido's goggles box, "the box sits where splashes reach it" is a break line.

Pia writes one break line under each keeper. **Rain on a bread box by the open door** goes under the stretch keeper. The lower shelf gets "the middle shelf already holds the milk", since bread there would need the milk moved. Each one is something Pia can check on a single visit.

One break line under each keeper



Rain on a bread box by the open door



The middle shelf already holds the milk



Checked on a single visit

The bread box gives Pia an idea for the tin card. **A waist-high tin tray fixed beside the bread box** could suit older neighbours. Pia notes the idea in pencil, and on Friday it becomes the first line on the tin page. The tin card still gets its own eight lines.

The tin card

Step	Idea
A pencil note	A waist-high tin tray fixed beside the bread box
Friday	The first line on the tin page
Then	Eight lines of its own

Work tasks follow the same shape. **A support team swamped by tickets** can turn the complaint “I can’t find my order number” into “How might we help customers find their order number in under a minute, from their email?” The team lists eight fixes alone, sorts them and takes one keeper from each of two groups to the stand-up.

Work tasks follow the same shape



A support team swamped by tickets



Help customers find their order number in under a minute



One keeper from each of two groups

> **Exercise:**
>
> Need then solutions.
>
> 1. Starter. For the question from your Try it, **list eight solutions**, including one you would normally reject.

2. Middle. Sort the eight into groups, then keep two that come from different groups.
3. Advanced. For a real user group at work, write a how-might-we question they accept and generate solutions aimed at them.

Need then solutions, starter to advanced



List eight solutions



Keep two from different groups



A how-might-we question they accept

Key idea:

Turn a user need into **a how-might-we question with no solution inside**, generate a wide list alone, then sort into groups and keep two ideas that serve the need in different ways.

Quick check:

What must a how-might-we question leave out? Answer: Any named solution, product or build. Why write the eight solutions alone first? Answer: Talking groups make fewer and weaker ideas than the same people working alone. What do you keep after sorting into groups? Answer: Two ideas from different groups, each still tied to the need card. What is a break line? Answer: One short fact about the real place that could make a keeper fail.

4.8.3 Quick Prototypes, Testing and Learning From Users

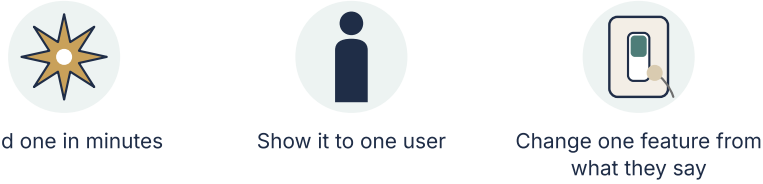
Imagine Pia with two keepers on the bread need. **A lower middle shelf** and a school-run bread box both still fit her how-might-we question. The church team likes the bread box on paper, and nobody has tried either idea at the porch with a real parent. Both keeper cards sit pinned beside the fridge, waiting.

Two keepers on the bread need

- A lower middle shelf
- A school-run bread box
- Nobody has tried either idea at the porch

A favourite on paper can still fail at the porch. **A quick prototype in a user's hands comes next**, before anyone buys wood or books a volunteer. In this section I show you how to build one in minutes, show it to one user and change one feature from what they say. Treat these steps as practice.

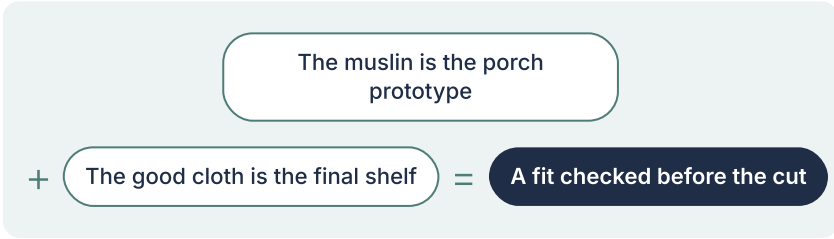
A quick prototype in a user's hands



Rowe's 1987 book gave design thinking its name, and the steps here use scrap card, tape and a crate. Pia sets aside Thursday after school for

the work, because parents arrive at the porch just after the bell. Wood and paint can wait until a scrap version has met a parent, and so can any talk of cost.

A dressmaker's muslin



A dressmaker's muslin is a good picture of the step. **The muslin is cut and pinned** so a fit can be checked before the good cloth is cut. The porch prototype is the muslin, and the final shelf is the good cloth. The picture stops at fabric, because a fridge has cold air, rain and parents in a hurry.



A pinned muslin sleeve on a dress form, with the fine cloth still folded on a chair.

> **Key Concept:**
>
> Quick prototype. **A quick prototype is a rough stand-in for one idea**, cheap enough to throw away and clear enough for a user to react to. A card ledge holding one loaf is a quick prototype of a shelf.

A rough look helps the user speak up. **Crooked tape and pencil marks** tell a parent that the ledge is a draft, so a complaint about it costs nobody anything. Pia leaves her marks showing on purpose and keeps the neat work for the wooden version. Her first ledge still shows a pencil line where she measured it wrong.

A rough look helps the user speak up



Crooked tape and pencil marks

A complaint costs nobody anything

Neat work for the wooden version

Cheap has a size you can set before you start. **Ten minutes and things already in the house** are Pia's limit. The card comes from the recycling, the tape from the kitchen drawer and the crate from the greengrocer next door. A build that needs a shop trip is bigger than a first round needs.

Cheap has a size

- [x] Ten minutes
- [x] Things already in the house
- [x] No shop trip

> **Science Says:**
>
> Jeanne Liedtka, who studies design, argues that design thinking tools such as testing ideas with real users can help catch our own blind spots (Liedtka, 2015). **A short porch round follows that argument.** Prototyping is one of the eight design thinking tools and methods named in one review (Micheli et al., 2019).

Testing ideas with real users



Can help catch our own blind spots



A short porch round follows that argument



Prototyping is one of the eight tools

Pia builds the first prototype in about ten minutes on Thursday. **She makes only the part a parent will touch or see.** A card ledge taped inside the fridge holds one loaf at the middle height, and a labelled crate by the gate stands for the bread box. Neither one would last a week, and neither needs to.

The first prototype

Part	Stands for
A card ledge taped inside the fridge	A shelf at the middle height
A labelled crate by the gate	The bread box

The right person to see it is someone the need card names. **A parent who has just collected a child** fits the bread card, while a church helper or a friend would only guess at what parents do. Pia waits on the

bench for the first parent after the bell, with the notebook open on her knee.

The right person to see it



A parent who has just collected a child



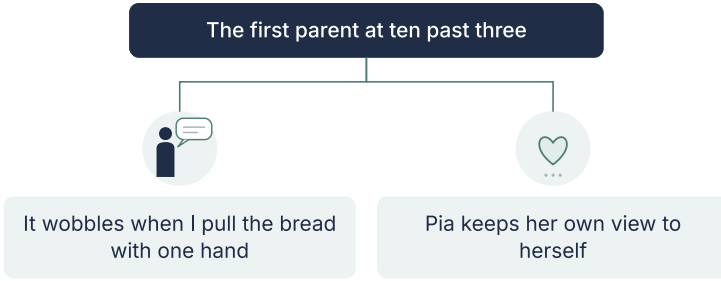
A church helper would only guess



Wait for the first parent after the bell

The first parent arrives at ten past three with a pushchair. **Pia asks what surprised her**, and writes the answer in the parent's own words. "It wobbles when I pull the bread with one hand" goes in the notebook. Pia listens and keeps her own view of the ledge to herself, even when she wants to explain it.

Ask what surprised her



The surprise names the next change. **Pia changes only the part the parent named**, folding the card twice so the ledge is thicker. Twenty minutes later a second parent pulls a loaf out one-handed, the ledge holds, and she asks where the soft rolls went. Nobody expected that question, and Pia writes it down in her words.

Change only the part the parent named



Fold the card twice



A second parent pulls a loaf out one-handed



A question about the soft rolls

> **Key Concept:**
>
> Build, show, change. **Build, show, change is a loop of building a quick prototype, showing it to one user and changing one feature from what surprised them.** One time through the loop is one round, so Pia ran two rounds with the ledge in her first half hour.

One round

- Build a quick prototype
- Show it to one user
- Change one feature

One change per round is the rule you met for first tries in 4.1.4, and prototypes follow it. Pia writes the soft rolls down for a later round and leaves the ledge as it is for the rest of Thursday. The rolls will get a round of their own once the ledge stops changing.

The question you ask shapes the answer you get. **"Do you like it?" invites a polite yes**, and a polite yes gives you nothing to change. "What surprised you?" points the user at the thing in their hands, so Pia asks it every round and then waits quietly for the answer.

The question shapes the answer

Question	Gives you
Do you like it?	A polite yes
What surprised you?	The thing in their hands

> Exercise:
>
> Try it. Pick one keeper idea. **Build a ten-minute prototype** that a user can see or touch.

Reality testing is convergent work, the narrowing that follows a wide list (Cropley, 2006). **The prototype turns that narrowing into something you can see.** Pia keeps the how-might-we question pinned beside the fridge, so every round is checked against it. A steady ledge that sits above shoulder height would fail the card as surely as a wobbly one.

Reality testing is convergent work



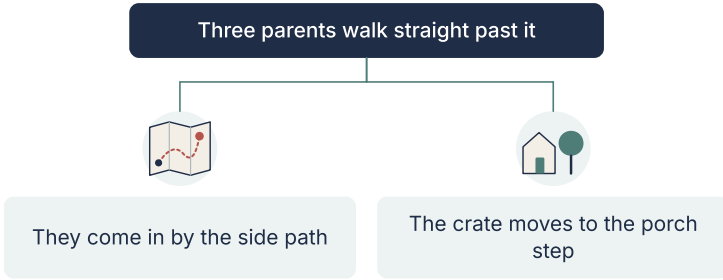
The narrowing that follows a wide list

The question pinned beside the fridge

Every round checked against it

The crate gets its own round that afternoon. **Three parents walk straight past it**, because they come in by the side path and never look at the gate. One says “I’d only see it on the step”, so the crate moves to the porch step for its next round. Every visitor crosses the step, whichever path they take.

The crate gets its own round



Key Concept:

User surprise. **A user surprise is anything a user says or does with a prototype that the builder did not expect.** A hardware shop owner who tapes a card sign above the paint tins and then watches customers ask for paint at the till has found a user surprise.

A user surprise at the hardware shop



A stakeholder can change a build as much as a user can. **The church caretaker stops by at five and asks for no tape on the fridge paint**, even though parents like the ledge. The following Thursday's round uses a freestanding card stand that holds a loaf in front of the fridge, the one change for that round.

A stakeholder can change a build

- [x] The caretaker asks for no tape on the fridge paint
- [x] A freestanding card stand
- [x] The one change for that round

On the second Thursday a child points to the loaf without asking. **Pia writes the child's point down as a surprise**, since she never planned for a reader that small. The child's mother laughs and says he finds the bread before she does. Children come with their parents every day after school, so their surprises belong on the bread card.

Rain falls that afternoon and gives the crate on the step its first real weather. **The break line from the keeper card comes true**, and the top loaf is damp by four. The next round adds one change, a lid cut from a plastic tray, and the loaf under it stays dry the following week.

Rain on the step

Round	The loaf
The crate on the step	The top loaf is damp by four
A lid cut from a plastic tray	The loaf stays dry the following week

Each round happens at the hour its user comes. **The night workers' milk idea needs half past nine on a Wednesday**, the hour on their need card. A late volunteer brings a card bottle rack that keeps the bottles at the back of the middle shelf, and the first night worker says her milk is colder than last week.

Each round at the hour its user comes



Half past nine on a Wednesday



A card bottle rack at the back



Her milk is colder than last week

A prototype answers one question at a time. **The card stand tells Pia whether parents can reach the bread** after the bell. Whether a wooden stand would last a winter is a second question for a later build. Pia writes it on a separate card and keeps it out of the porch rounds, where it would blur the answer.

A prototype answers one question at a time

- Can parents reach the bread after the bell?
- Would a wooden stand last a winter?
- A separate card for the second question

A scout troop planning a jumble sale shows the same limit. **The leaders mark the new table layout on the hut floor with masking tape**, and three children walk through it with empty bags. The tape shows where the queue bunches at the door. Which stall sells the most is a question for the sale day itself.

A scout troop planning a jumble sale



Masking tape on the hut floor



Three children walk through with empty bags



Where the queue bunches at the door



Masking tape squares on a wooden hut floor, with three children walking between them carrying empty bags.

Work tasks use the same cheap loop. **A new signup form can start as a printed sheet on a clipboard** for one afternoon before anyone writes code. One user who cannot find the place to sign is enough for the next round, with that line moved higher. The whole change costs one rubber.

A new signup form

- [x] A printed sheet on a clipboard
- [x] One user who cannot find the place to sign
- [x] That line moved higher

The third Thursday brings one more change to the stand, a lower tier for soft rolls. **Two parents use it, and nothing new surprises either of them.** A round with no new surprise is Pia's sign to stop, so the stand goes to the church team as the shape to build in wood.

The third Thursday

- A lower tier for soft rolls
- Nothing new surprises either parent
- The stand goes to the church team

Exercise:

Prototype, test, learn.

1. Starter. Show your ten-minute prototype to one person and **note one surprise** in their words.
2. Middle. Revise one feature from that surprise, and show the new version to the same person.
3. Advanced. For a real work task, run two build, show, change rounds on the same prototype. Before round two, name the one feature you will change, and stop when a round brings no new surprise.

Prototype, test, learn, starter to advanced



Note one surprise



Revise one feature



Two rounds, stop at no new surprise

Key idea:

Build a **cheap quick prototype**, show it to one user and change one feature from their surprise, round after round, until a round brings no new surprise.

Quick check:

What makes a prototype quick? Answer: It is cheap enough to throw away and clear enough for a user to react to. Who should see a prototype first? Answer: Someone the need card names. When do you stop? Answer: When a round brings no new surprise. What is a user surprise? Answer: Anything a user says or does with the prototype that the builder did not expect.

4.9 Mapping and Imagining: Mind Maps, "What If" and the Worst Idea

4.9.1 Mind Mapping as a Method for Generating Ideas

IMAGINE REMY WITH ONE sheet of paper and a street festival six weeks away. **His list has grown to forty lines**, and the stage, the food and the rain plan sit far apart down the column. He cannot see which lines belong together, and he wants one page that shows the links at a glance.

One page that shows the links



A street festival six weeks away



Forty lines down the column



Which lines belong together

A column puts every idea in a queue. **On a map, distance carries meaning**, because words close in meaning end up close on the page and a link shows as a short line. Here I show you how to grow a map, circle the useful words and turn them into plans you can check. Treat these steps as practice.



A long handwritten list of festival jobs running down one page.

Buzan set out the mind map in a 1974 book called Use your head. **The method needs only paper and a pencil**, so Remy starts at his kitchen table with a big sheet turned sideways. He writes street festival in a small circle in the middle and leaves the rest of the page empty.

Buzan set out the mind map in 1974

- A book called Use your head
- Only paper and a pencil
- Street festival in a small circle in the middle

A tree in winter is a good picture of the map. **The trunk is the festival**, each big branch is one part of it and the twigs are smaller thoughts. You can see which twig hangs from which branch. The picture stops at wood, because two branches on paper can be joined with a pencil line.

A tree in winter

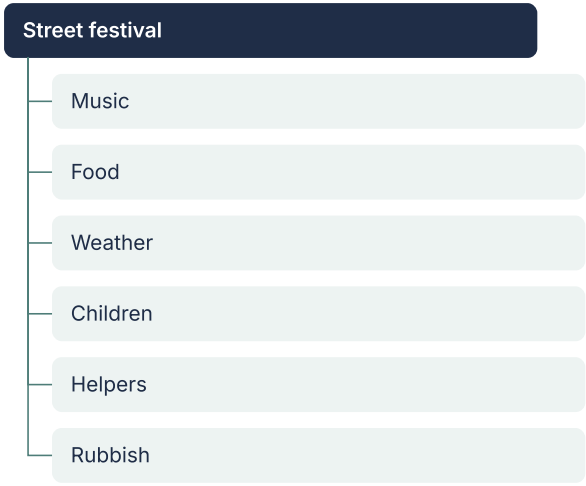
The tree	The map
The trunk	The festival
Each big branch	One part of it
The twigs	Smaller thoughts

Key Concept:

Mind map. **A mind map is a page with one problem written in the middle** and linked words growing out from it. A nurse planning a hospital open day could write open day in the centre, with branches for visitors, tours and parking.

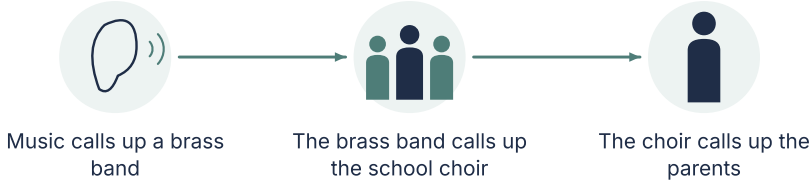
Six branches go down first. **Each branch gets one or two words**, so Remy writes music, food, weather, children, helpers and rubbish around the circle. Longer labels would crowd the page before a single twig is drawn. He spaces the six evenly, like the numbers on a clock face.

Six branches go down first



Twigs grow by association, one word calling up the next. **Music calls up a brass band**, the brass band calls up the school choir and the choir calls up the parents who come to hear it. Mednick offered this link-by-link view of creative thinking, which you met in 3.3.1 (Mednick, 1962).

Twigs grow by association



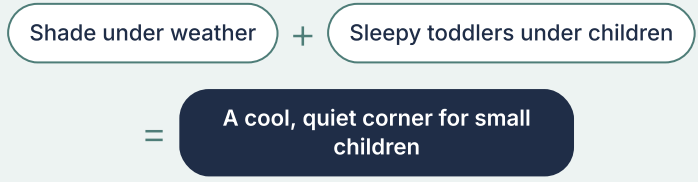
Speed keeps the twigs coming. **Remy gives himself ten minutes** and writes every twig touching the word it came from, so each link stays visible. Under weather he adds shade, wind, puddles and a wet-day stage. Under rubbish he adds bins, a wash station for cups and no glass on the grass.

Under weather and rubbish

- [x] Shade, wind, puddles and a wet-day stage
- [x] Bins and a wash station for cups
- [x] No glass on the grass

The map earns its place when two branches meet. **Shade under weather and sleepy toddlers under children** sit on opposite sides of the page, and Remy joins them with a curved line. Together they make a cool, quiet corner for small children in the afternoon. In the forty-line column, shade and toddlers were thirty lines apart.

When two branches meet



> **Science Says:**
> One review combined 55 studies, with 5,818 people in all, of students who built, changed or looked at node-link diagrams called concept maps (Nesbit & Adesope, 2006). **The review found that "use of concept maps was associated with increased knowledge retention".** Retention means keeping what you learned, and the tests measured remembering and using it. Growing ideas on a map is a different job.

The full-page rule from 4.8.2 tells Remy when to stop. **Tunes turns up next to music**, so he puts the pencil down at twenty-eight twigs. Six

branches with four or five twigs each make a good first map. The whole page took him eleven minutes, one more than he planned.

When to stop



Tunes turns up next to music



Twenty-eight twigs



Eleven minutes, one more than he planned

A thin branch shows a gap in the plan. **Helpers has only two twigs**, stewards and scouts, while music has six. Looking at it, Remy sees that nobody has thought about first aid or a point for lost children. He adds both twigs, and the gap that a long column hid is closed in a minute.

A thin branch shows a gap

Branch	Twigs
Music	Six
Helpers	Two: stewards and scouts
Added to helpers	First aid and a point for lost children

> Exercise:
>
> Try it. Write one problem in the middle of a blank page. **Add six branches of associations**, one or two words each.

Circling comes next. **Remy circles three twigs that someone could actually do on the day**, the silent disco under music, the wet-day stage and the quiet corner. Twigs like fun or nice cannot be circled, because nobody can do fun. He circles in soft pencil, so a circle can be rubbed out if a second look finds the twig vague.

Twigs someone could actually do on the day



The silent disco under music



The wet-day stage



The quiet corner

A circle is a promise to look again. **Three circles are enough for one sitting**, since each one needs work before it becomes a plan. The other twenty-seven twigs stay on the page untouched. Remy writes the date in the top corner so he can find this page later.

A circle is a promise to look again

- Three circles are enough for one sitting
- The other twenty-seven twigs stay untouched
- The date in the top corner

> **Key Concept:**
> Idea seed. **An idea seed is a twig on a mind map that could grow into a plan someone can carry out.** On a library's map for a reading week, the twig pyjamas could be the seed of a bedtime story evening.

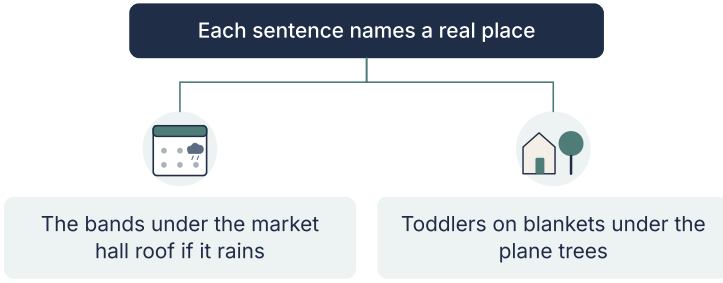
The first sentence takes Remy longer than the whole map, and he tries three versions before one names a real time. Silent disco becomes "Teenagers dance with headphones in the church car park from eight till ten on Saturday." The bare word gave Remy a picture, and the sentence gives him something he can ask the vicar about.

From seed to sentence

Seed	Sentence
Silent disco	Teenagers dance with headphones in the church car park
A real time	From eight till ten on Saturday

The other two seeds get their sentences the same evening. **The wet-day stage becomes the bands playing under the market hall roof if it rains**, and the quiet corner becomes parents and toddlers resting on blankets under the plane trees by the library. Each sentence now names a real place on the street.

The other two seeds get their sentences



> **Key Concept:**
>
> Idea statement. **An idea statement is one sentence that turns an idea seed into a plan by naming who does what, where and when.** At a football club, the seed car share could become "Parents on the Elm Road side take turns driving four players to away games."

A statement still has to meet the real world (Cropley, 2006). **A plan is only as good as its fit with the place**, so Remy walks Bridge Street on

Sunday with the three statements on cards. The market hall caretaker says yes to the bands, until six o'clock, and Remy pencils until six beside that card.

A plan is only as good as its fit with the place



Remy walks Bridge Street on Sunday



The three statements on cards



The caretaker says yes until six

The quiet corner meets its own limit on the walk. **The plane trees shade the library side only after two o'clock**, so the corner works for the afternoon and would sit in full sun all morning. Remy writes after two beside the toddler card. A limit written beside a statement stays with it into the meeting.

A limit written beside each statement

Card	Limit
Bands under the market hall roof	Until six
The quiet corner	After two

Money is the last limit to check. **Remy has £150 for the silent disco**, and headphones cost £4 a set to hire. Forty sets would cost £160, ten pounds over. Remy changes the card to thirty-five sets, which costs £140 and leaves £10 for batteries.

Money is the last limit

Thirty-five sets at £4 + £10 for batteries = £150 for the silent disco

The word in the middle steers every branch. **Remy tries a second map with evening festival in the centre**, and new branches appear at once, lights, noise and getting home in the dark. Lanterns made at the school turn up as a twig that never grew on the daytime page. He keeps both maps side by side.

The word in the middle steers every branch



Evening festival in the centre



Lights, noise and getting home in the dark



Lanterns made at the school

Some problems need no map at all. **A choice between two dates is a yes or no question**, and a branch for each date would add nothing. Maps help when a problem has many parts that touch each other, as a festival does. Remy picks the date with one phone call to the council.

Some problems need no map at all

- A choice between two dates is a yes or no question
- Maps help when many parts touch each other
- One phone call to the council

The twigs you leave are a store for later. **Two weeks before the festival a helper drops out**, and the face painting she offered goes with her. Remy opens the folder, finds the twig scouts under helpers and asks the troop leader. By Friday the scouts have a face painting table.

The twigs you leave are a store for later



Work problems take the same shape. **A shop manager who wants fewer returned shoes** can put returns in the centre, with branches for sizes, photos, packing and staff. The twig size chart under photos becomes “Each product page shows the sole length in centimetres.” That statement can be checked in a week.

A shop manager who wants fewer returned shoes

On the map	Returns map
The centre	Returns
Branches	Sizes, photos, packing and staff
Statement	Each product page shows the sole length in centimetres

A home problem fits on an envelope. **A family with a cluttered hallway** puts hallway in the middle, with branches for shoes, bags, post and a dog lead. The twig low hooks becomes “Each child hangs a school bag on a hook at their own height by the door.” Five minutes gives them one change to try.



School bags hanging on hooks at different heights beside a front door.

Three levels close this section, and each one takes more time than the last. **The starter needs only your Try it page and ten minutes.** The middle level needs a walk or a phone call to check limits, and the advanced level needs a real problem from your work and written criteria agreed before you choose.

Mind map to ideas, at three levels

- [x] The starter: your Try it page and ten minutes
- [x] The middle: a walk or a phone call
- [x] The advanced: a real problem and written criteria

> **Exercise:**
>
> Mind map to ideas.
>
> 1. Starter. Grow two branches from your Try it further and **circle three idea seeds**.

2. Middle. Turn the three seeds into idea statements, then check each one against the real place and write its limit beside it.
3. Advanced. For a real work problem, build a full map, write your criteria first and keep the statements that meet them (Scott et al., 2004).

From the middle to a plan



Key idea:

Put the problem in the middle, **grow branches of associations**, circle idea seeds and turn each one into a statement you can check against real limits.

Quick check:

What goes in the middle of a mind map? Answer: One problem in a few words. What does a thin branch show? Answer: A gap in the plan. What is an idea seed? Answer: A twig that could grow into a plan someone can carry out. What turns a seed into an idea statement? Answer: One sentence naming who does what, where and when.

4.9.2 “What If” Scenarios: Changing One Rule of the World

Imagine Jules behind the counter of his corner cafe at half past two. **The room has been empty since lunch**, and it will stay empty until he locks up at five. A cheaper sandwich and a new lemon cake have not changed that.

The room has been empty since lunch



Half past two at the counter



Empty until he locks up at five



A cheaper sandwich has not changed that

Most fixes keep every world rule of the street in place. **Bending the street itself is the one move Jules has not tried.** In this section I show you how to pick the rule, change it and bring back an idea that works on the real street. Treat these steps as practice.



An empty cafe in the afternoon, with chairs pushed in and a lemon cake under a glass dome.

In 4.5.1 you reversed your approach to a problem. **A what-if leaves your approach alone and changes the world around it**, such as time, money or customers. The move comes from research on counterfactual thinking, where an "additive" mind-set means "adding new antecedent elements to reconstruct reality" (Markman et al., 2007).

Reversed approach or what-if

Move	What changes
Reverse, from 4.5.1	Your approach to a problem
A what-if	The world around it, such as time, money or customers

A board game with one new house rule is a good picture of the move. **Let everyone throw three dice**, and the whole game plays differently, though the board and the pieces stay the same. The picture stops at the box, because a board game prints its rules and a street keeps most of its rules unwritten.

A board game with one new house rule



Let everyone throw three dice



The board and the pieces stay the same



The whole game plays differently

> 🔑 **Key Concept:**
>
> World rule. **A world rule is a fact a situation runs on that nobody in it can change alone**, such as the length of a school day or the hours of daylight. At a country railway station, one train an hour to the city is a world rule.

The world rules of the corner go down first. **Jules writes five in a column**, each one a fact he could never change by himself. Customers pay for each cup, office workers get thirty minutes for lunch and the school bell goes at quarter past three. The bus stops outside every twenty minutes, and the cafe has one room.

Five world rules of the corner

- **Facts he could never change by himself**
  - Customers pay for each cup
  - Thirty minutes for lunch
  - The school bell at quarter past three
  - The bus every twenty minutes
  - The cafe has one room

He picks the rule closest to the empty hours. **The thirty-minute lunch** fills the room at one and empties it by half past, so it sits right beside his problem. The bus and the one room have nothing to do with the empty afternoon. He underlines the lunch rule twice.

He picks the rule closest to the empty hours

> - The thirty-minute lunch fills the room at one
> - It empties it by half past
> - He underlines the lunch rule twice

The what-if goes on a fresh page as a question. **“What if every customer had to stay for exactly one hour?”** changes the lunch rule

and leaves the other four alone. With the bus, the bell and the prices unchanged, every answer still happens on his own corner. That keeps the way back short.

Changes the lunch rule and leaves the other four alone



What if every customer had to stay for exactly one hour?



The bus, the bell and the prices unchanged



Every answer still on his own corner

A rule can be bent too far to come back. **"What if the cafe floated down the river?"** gives fun answers that no street can use. Jules keeps to changes he can picture on a real afternoon, such as longer stays, shorter stays or no money at the till. Those still look like his corner, just tilted.

How far to bend a rule

What-if	Can it come back?
The cafe floated down the river	No street can use it
Longer stays, shorter stays or no money at the till	Still his corner, just tilted

> 🗝 **Key Concept:**
>
> What-if. **A what-if is a question, opening with the words what if, that imagines one world rule as different.** At a dentist's surgery, "What if every visit were free?" is a what-if about the price of a visit, asked by a receptionist who wants to know why people miss check-ups.

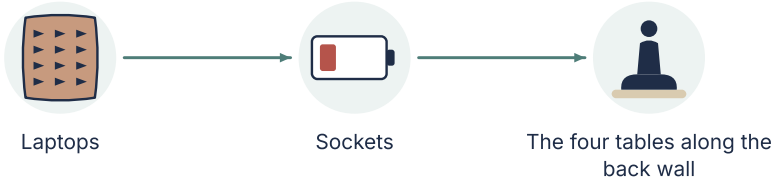
Under the question Jules writes what would happen. **Each answer gets one short line.** People would bring laptops and look for sockets. They would order a second drink after forty minutes. They would want the room quieter than it is at lunch, and some would bring a friend to share the hour.

Each answer gets one short line

- [x] People would bring laptops and look for sockets
- [x] A second drink after forty minutes
- [x] The room quieter than it is at lunch

One answer can lead to the next. **Laptops lead to sockets**, and sockets lead to the four tables along the back wall, where the sockets already are. Two steps along the chain, Jules is looking at furniture he owns. The tables were bought for the lunch crowd and stand half empty every afternoon.

One answer can lead to the next



> **Key Concept:**
>
> Consequence chain. **A consequence chain is a run of short lines in which each line follows from the one before, stopping at something the real place already has.** At a petrol station, "What if fuel were sold only at night?" might run to drivers queuing after dark, then a need for bright light over the pumps, then the floodlights already fixed to the roof.

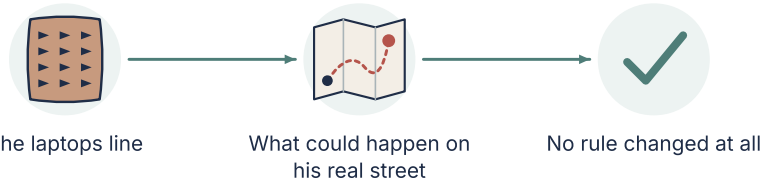
The list also shows Jules a rule he had never checked. **He had assumed customers come only at lunch**, a belief that grew from his habit of turning the coffee machine down at two. It works like the square in the nine-dot puzzle you met in 3.2.3, a limit that lived only in his head.

A rule he had never checked

- He had assumed customers come only at lunch
- It grew from turning the coffee machine down at two
- A limit that lived only in his head

A consequence still has to come home. **Turning a strange idea back toward what works in the real world** is the step that makes it useful (Cropley, 2006). Jules takes the laptops line and asks what part of it could happen on his real street, with no rule changed at all.

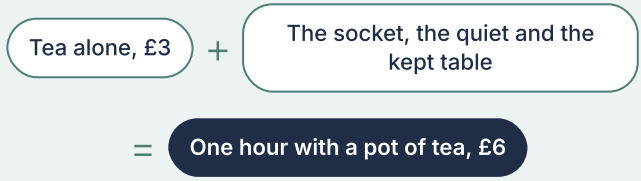
A consequence still has to come home



> Exercise:
>
> Try it. Pick one real situation. **Write five world rules it runs on**, and underline the one closest to the problem.

The answer is a booked work hour. **Any back table can be booked from two until five**, one hour with a pot of tea, for £6. Tea alone costs £3, so the booking pays for the socket, the quiet and the kept table. A small card on each of the four tables says work hour.

A booked work hour



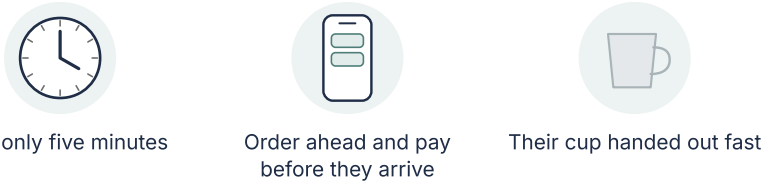
The first week shows how it goes. **Two people book on Tuesday, and all four tables go on Thursday.** Thursday afternoon brings in £24 from bookings alone, in hours that used to earn nothing. Three of the four order a lemon cake as well, which is the second drink line come true in a new form.

The first week

Day	Bookings
Tuesday	Two people
Thursday	All four tables, £24

A second what-if can turn the same rule the other way. **"What if every customer could stay only five minutes?"** gives new consequences. People would order ahead, pay before they arrive and want their cup handed out fast. Jules notices that the five-minute customers walk past at quarter past three, when the bell goes.

A second what-if turns the rule the other way



The opposite rule gives a second idea. **The side window opens as a hatch at quarter past three**, and parents waiting for the bell buy hot chocolate without coming inside. Jules tries it on Friday and sells eleven cups in twenty minutes. Nothing like it appeared on the long-stay page.



A cafe side window open as a hatch, with cups of hot chocolate on the sill near a school gate.

A changed rule works like a limit you choose for yourself. **Research on how limits affect creativity gives mixed results** (Acar et al., 2019), so Jules keeps both ideas as trials and watches the till. The work hour and the hatch each get two more weeks before he decides.

Keep both ideas as trials

- [x] Research on limits gives mixed results
- [x] Watch the till
- [x] Two more weeks before he decides

The two ideas meet at quarter past three. **The hatch queue chatters near the back tables**, and two work-hour guests ask for quiet. Jules ends the last booking at three, so the room is calm while booked and busy after. Ideas from opposite rules can share one room when their hours are kept apart.

Ideas from opposite rules share one room



A class of ten-year-olds can try the move in a lesson. **“What if school started at noon?”** brings consequences like football in the morning and parents at work before lessons begin. One child turns the parents line into a real idea, a toast table in the hall at half past eight for children dropped off early.

What if school started at noon?



Football in the morning



Parents at work before lessons begin



A toast table in the hall at half past eight

Work teams can use the same move. **A team swamped by email asks, “What if messages could only be sent once a day, at four?”** Consequences follow fast. People would walk over to ask, save questions into one list and keep the phone for anything urgent.

A team swamped by email

- Messages sent only once a day, at four
- People would walk over to ask
- Save questions into one list

The team turns one consequence into a trial they can run safely. **A twenty-minute question slot at eleven** lets everyone bring their saved list to one short meeting, while email stays switched on. They write what would count as a good week first and choose against it (Scott et al., 2004; Rietzschel et al., 2006).

A trial they can run safely



A twenty-minute question slot at eleven



Everyone brings their saved list



Email stays switched on

At home, **a family asks, "What if the car were gone for a week?"** The consequences are walking to school, shopping nearer home and sharing lifts. One of those, three children walking together on Wednesdays with a parent at the back, still makes sense once the car is back.

What if the car were gone for a week?



Back at the corner, both trials end after their two extra weeks. **The work hour stays**, now from two until three, with all four tables booked on most days. The hatch stays on school days only, because the bell sets its rush. Neither idea needed a single world rule to change.

Both trials end

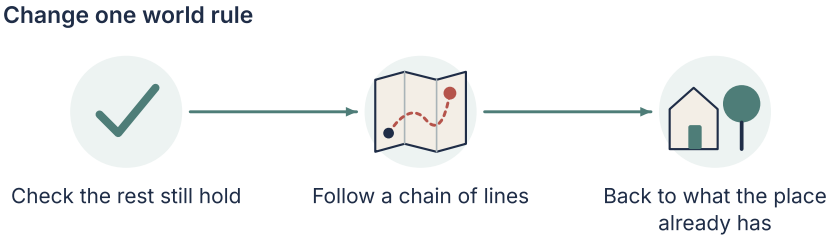
Trial	What stays
The work hour	Now from two until three
The hatch	School days only

Three levels close this section, and each one asks for a bigger step. **The starter checks that one changed rule leaves the others standing.** The middle level follows one chain home to something the place already has, and the advanced level bends three kinds of rule at work and keeps only the ones you can picture.

Bend one rule, at three levels

- [x] The starter: one changed rule, the others standing
- [x] The middle: one chain home
- [x] The advanced: three kinds of rule at work

> Exercise:
>
> Bend one rule.
>
> 1. Starter. Change only your underlined rule. **Tick each other rule that still holds**, and rewrite until all do.
> 2. Middle. From the what-if, chain lines, each following the last, until one names something the place already has.
> 3. Advanced. At work, write a what-if on a time, a money and a who-comes rule. Strike any too far to picture on a real day, then chain each kept one home.



Key idea:

Change one world rule, check the rest still hold, then follow a chain of lines back to something the real place already has.

Quick check:

What is a world rule? Answer: A fact a situation runs on that nobody in it can change alone. Why leave the other world rules alone? Answer: So every consequence still happens in the real place and the way back stays short. What is a consequence chain? Answer: A run of short lines, each following from the one before, that stops at something the real place already has. What do you do with a consequence? Answer: Turn it back toward something that works on the real street.

4.9.3 The Worst Idea Technique: Turning Bad Ideas Into Good Ones

Imagine Orla at a school fair committee meeting, asking for new ideas. **The fair runs from two until five**, and every year families drift home by half past three. Three parents sit round the table with her, and nobody says a word. Orla tears a sheet into four and asks for the worst ideas they can think of.

Nobody says a word



The fair runs from two until five



Families drift home by half past three



Orla tears a sheet into four

Orla reaches for the worst-idea method and asks for bad answers on purpose. A teaching article describes this way of asking for "bad" solutions (Hagen et al., 2016). In this section I show you how to find what makes each answer bad and turn it into a plan. Treat these steps as practice.



Four people sitting silently around a table with blank notepads in front of them.

In 4.2.4 you listed ways to make a problem worse and then flipped them. **Orla writes the committee's real question on a card** in the middle of the table, how to keep families until five. Every answer tonight has to be a plan for the fair, however daft, and each one comes with a shape you can turn round.

The real question on a card

- How to keep families until five
- Every answer a plan for the fair, however daft
- Each one comes with a shape you can turn round

A photo negative is a good picture of a worst idea. **The negative is dark wherever the photo is light**, so it still holds the whole picture in reverse. A worst idea holds the shape of a good one in the same way. The picture stops there, because a negative flips every part and you flip only one.

A photo negative

The negative	A worst idea
Dark wherever the photo is light	Holds the shape of a good one
Flips every part	You flip only one

Key Concept:

Worst idea. **A worst idea is a solution written on purpose to fail at the real problem.** A bus company trying to cut lateness could write “take down every timetable” as a worst idea, since it answers the lateness problem and would make it far worse.

Everyone writes alone on paper first. **Talking groups make fewer and weaker ideas than the same people working alone** (Mullen et al., 1991; Diehl & Stroebe, 1987), so the four lists stay private for five minutes. Orla sets a kitchen timer in the middle of the table. Nobody reads a line out until it rings.

Everyone writes alone on paper first



Four lists stay private for five minutes



A kitchen timer in the middle of the table



Nobody reads a line out until it rings

Orla's own list has five lines. **Lock the gates at three, charge 50p for every chair and give every child a drum** go down first. Then she adds move the cake stall to the car park and hold the raffle draw at two, when the fair opens. Each line is short and plainly terrible.

Orla's own list has five lines

- [x] Lock the gates at three
- [x] Charge 50p for every chair
- [x] Give every child a drum

In 4.2.1 you met the worry about being judged. **A list meant to be bad can ease the fear of looking foolish**, because nobody at the table is trying to impress. When the timer rings, the first parent reads out "a bouncy castle full of custard" and the whole table laughs. Twenty lines are on the table within a minute.

A list meant to be bad



Can ease the fear of looking foolish



A bouncy castle full of custard



Twenty lines within a minute

Two rules keep the list useful. **Each worst idea must answer the real question**, and none may point at a real person. “Make Mr Price run the tombola” would be about one man, so a line like that never goes down. Lock the gates is about the fair, so it stays.

Two rules keep the list useful

Rule	Example
Each worst idea must answer the real question	Lock the gates is about the fair, so it stays
None may point at a real person	Make Mr Price run the tombola never goes down

> Exercise:
>
> Try it. Pick a real problem. **List five deliberately bad solutions**, one short line each.

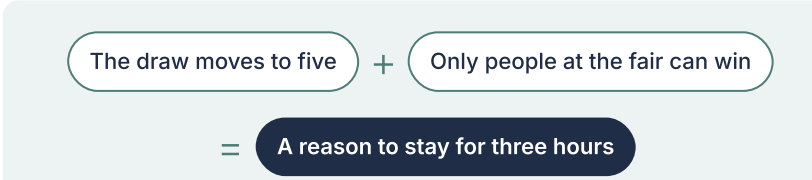
Turning starts by asking why a line is bad. **The raffle draw at two is bad because the prize is won before anyone needs to stay.** Everything else about a raffle is fine, the tickets, the prizes and the excitement. Only one part does the damage, so Orla circles it and writes too early in the margin.

Turning starts by asking why a line is bad



Swap that part for its opposite and the line turns round. **The draw moves to five, and only people at the fair can win.** Families who buy a ticket at two now have a reason to stay for three hours, while the prizes stay the same. The worst idea now works against the drift home.

Swap that part for its opposite



> **Key Concept:**
>
> Bad part. **The bad part of a worst idea is the one feature that makes it fail.** A teacher who wants more homework handed in might write "send it home with no instructions". The missing instructions are the bad part, and swapping only that part gives homework with one worked example at the top.

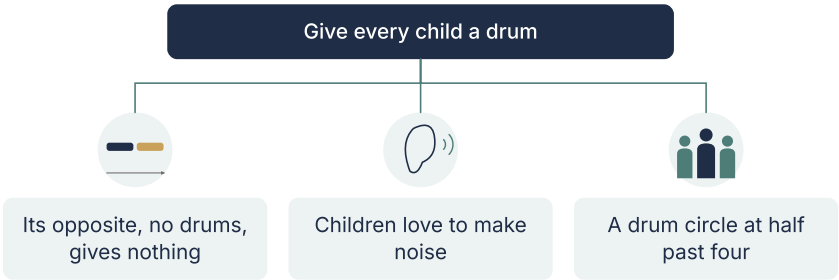
The chair line turns the same way. **Paying to sit is the bad part**, so its opposite is free seats. Orla adds that the free benches go in the shade by the cake stall, where tired parents can sit while children play. A parent who can sit down is a parent who stays.

The chair line turns the same way



Some lines are better mined than turned. **Give every child a drum is terrible as it stands**, and its opposite, no drums, gives nothing. Inside it is something real, that children love to make noise. Orla keeps that piece and drops the rest, and a drum circle at half past four goes on the plan.

Some lines are better mined than turned



> **Key Concept:**
>
> Harvest. **A harvest is a useful piece found inside a worst idea and kept after the rest is thrown away.** A gym's worst idea "play the same song all day" could give the harvest of one short song that tells everyone a class is starting.

Moving the cake stall to the car park looks just as daft at first. **The car park is where families walk when they leave**, and that is the useful piece. A small table by the car park gate sells the last cakes at half price after half past four. Families who were heading out stop for a slice.

The car park is where families walk when they leave

- A small table by the car park gate
- The last cakes at half price after half past four
- Families heading out stop for a slice

Some lines give nothing at all. **Lock the gates at three** traps people, and no turn or harvest makes trapping families safe. Orla crosses it out and moves on. A worst idea earns no place on the plan just because it was written down.

Some lines give nothing at all



Lock the gates at three traps people



No turn or harvest makes it safe



Orla crosses it out and moves on

The four lists now go side by side. **Twenty worst ideas give the committee eleven turned or harvested plans**, more than one fair can use. Some bad parts had two opposites, such as one draw at five or a small draw every hour until five. Choosing by feel from a list this long is a gamble.

Four lists side by side

- Twenty worst ideas
- Eleven turned or harvested plans
- Choosing by feel from a list this long is a gamble

Evidence on how well people pick their own ideas is mixed (Silvia, 2008; Rietzschel et al., 2006). **The committee writes three tests before choosing**, safe for children, run by the helpers they already have and paid from the fair's £40 for new plans. Each plan gets a tick or a cross for every test, and only three ticks go forward.

Three tests before choosing



The tests cut the list to four. **The five o'clock draw, the shaded benches, the drum circle and the half-price cake table** each pass. The drums cost £25 to borrow from the music service, and the benches come free from the church hall. That leaves £15 of the £40, which buys a bigger raffle prize.

The tests cut the list to four



Fair day shows what happens. **At half past four the drum circle is full**, and the car park table sells out by quarter to five. Most of the families who bought raffle tickets are still on the field at five o'clock.

The custard castle never ran, and it still did its job by breaking the silence.

Fair day



At half past four the drum circle is full



The car park table sells out by quarter to five



Families still on the field at five



Children playing drums in a circle on a school field in the late afternoon.

Work problems take the same turn. **A manager whose staff ignore a yearly survey** writes “make the survey two hundred questions long” as a worst idea. The bad part is the length, and its opposite becomes three questions on a card beside the coffee machine. That plan can run for one week with no cost beyond the cards.

A manager whose staff ignore a yearly survey

Step	What it gives
Worst idea	Make the survey two hundred questions long
Bad part	The length
Opposite	Three questions on a card beside the coffee machine

The same tests come first at work. **The manager writes "quick, anonymous and read by someone" as the three tests**, and the coffee card meets all three. The old survey failed the first test. Another worst idea, "ask during the fire drill", gives a harvest, asking while everyone already stands together at the monthly meeting.

The same tests come first at work



Quick, anonymous and read by someone



The coffee card meets all three



Asking at the monthly meeting

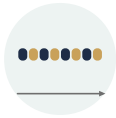
A home problem turns just as well. **A family who are late every school morning** write "hide everyone's shoes" as a worst idea. The bad part is shoes that cannot be found at ten past eight. Its opposite, every pair lined up by the front door the night before, becomes the plan, and it costs nothing.

A family late every school morning

- [x] Hide everyone's shoes
- [x] Shoes that cannot be found at ten past eight
- [x] Every pair lined up by the front door the night before

Lines with one clear bad part turn the most easily. **A fair held at midnight in the rain with no stalls** is bad in three ways at once, so there is no single part to swap. Split it into three lines, or turn a simpler one. The raffle line worked because only its time was wrong.

Lines with one clear bad part turn most easily



Bad in three ways at once



Split it into three lines



Only its time was wrong

Three levels close this section, and each one carries a worst idea further. **The starter turns just one line.** The middle level needs a few people writing alone and a set of tests, and the advanced level needs a real problem at work and criteria that a turned or harvested idea must meet before anyone runs it.

Bad to good, at three levels

- [x] The starter turns just one line
- [x] The middle: a few people writing alone and a set of tests
- [x] The advanced: a real problem at work and criteria

Exercise:

Bad to good.

1. Starter. From your Try it, **turn one bad idea into a possible good idea** by swapping its bad part for the opposite.
2. Middle. With one to three others, each write five worst ideas alone on paper, then compare, turn or harvest them and choose with written tests.

3. Advanced. For a real work problem, turn or harvest one worst idea until it meets your written criteria (Scott et al., 2004).

Deliberately bad solutions



Find the bad part in each → Turn it round or harvest the useful piece → Keep only what passes your tests

Key idea:

Write **deliberately bad solutions**, find the bad part in each, then turn it round or harvest the useful piece and keep only what passes your tests.

Quick check:

What is a worst idea? Answer: A solution written on purpose to fail at the real problem. How do you turn a worst idea round? Answer: Find its bad part and swap that part for its opposite. What is a harvest? Answer: A useful piece kept from a worst idea after the rest is thrown away. Why write worst ideas alone first? Answer: Talking groups make fewer and weaker ideas than the same people working alone.

4.10.1 How Living Things Solve Problems

Imagine Ned on his back step after a walk, picking burrs out of his dog's coat. **Each burr clings with no glue at all**, and some take a hard tug to come free. His shed door blows open in every strong wind, because its latch has broken twice. Ned drops the burrs into a jam jar on the step.

Each burr clings with no glue at all



Burrs in the dog's coat



His shed door blows open in every strong wind



Its latch has broken twice

Plants and animals meet problems such as wind, cold and rain, and each copes in its own way. **Ned wants to borrow one way of coping for his shed door.** In this section I show you how to watch a living thing, name its trick and check famous nature stories before you trust them. Treat these steps as practice.



A dog sitting on a back step with burrs caught in its coat.

In 4.4.2 you met the word biomimicry and Janine Benyus's 1997 book about it, with nature as one of three sources. **This section stays with nature alone**, and with the stories people tell about it. Ned's burrs are a good place to start, because one of the most retold nature stories begins with a burr.

This section stays with nature alone

- Biomimicry, from 4.4.2
- Janine Benyus, 1997
- One of the most retold nature stories begins with a burr

Watching a living thing is like watching the gears of an old bike turn. **The parts show what they do as they move**, even with no manual to explain them. The picture stops at the bike shop, because a bike has a maker you can ask, and a plant leaves you to work it out from what you see.

The gears of an old bike

The bike	A plant
The parts show what they do as they move	The same, seen as you watch
A maker you can ask	Leaves you to work it out from what you see

Key Concept:

Biomimicry. **Biomimicry is design that borrows a working principle from a living thing.** A team making a raincoat who watch how rain behaves on a bird's back, then try the same idea on cloth, are doing biomimicry.

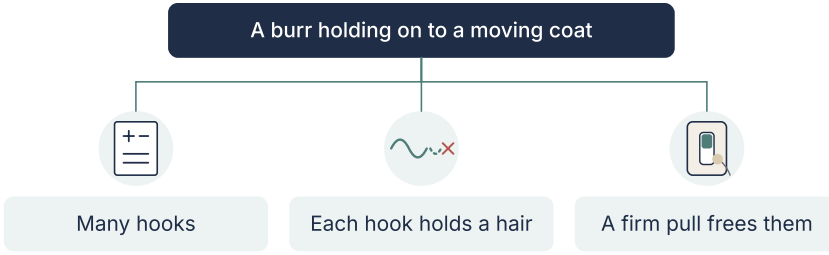
A magnifying glass shows Ned more. **The burr is covered in tiny hooks**, and each hook has caught one or two hairs of the dog's coat. He pulls gently, and several hooks let go while the rest still hold. The burr comes away only when most of the hooks have slipped free.

A magnifying glass shows Ned more



Notes come before any thinking about the door. **The living thing is a burr, and its problem is holding on to a moving coat.** Under that go three notes, many hooks, each hook holds a hair and a firm pull frees them. Why the plant does it can wait, since the how is what a door could use.

Notes come before any thinking about the door



> 🗝 **Key Concept:**
>
> Living system. **A living system is a plant, an animal or a group of them, seen together with one problem it meets.** A holly hedge in a winter gale, a beehive on a cold night and an ant trail crossing a path are three living systems.

The most retold burr story goes back to 1941. **The World Intellectual Property Organization tells how de Mestral was "inspired by burrs sticking to his dog's fur"** (World Intellectual Property Organization, 2026). Under a microscope he saw "hundreds of tiny but strong hooks". Ned's burrs came from the hedge by the canal, and he has no idea which plant grew them.

The most retold burr story

- De Mestral, 1941
- Inspired by burrs sticking to his dog's fur
- Hundreds of tiny but strong hooks

The idea took years to become a product. **A Swiss patent application was filed in 1951 and granted in 1954** (World Intellectual Property Organization, 2026), thirteen years after the burrs. A United States patent for the hook and loop fabric followed in 1955 (de Mestral, 1955). Ned notes the dates, since a close look at a burr is only the first step.

The idea took years to become a product

Year	Step
1941	The burrs
1951	A Swiss patent application filed
1954	The Swiss patent granted
1955	A United States patent

> **Science Says:**
> A letter in the journal Physics World says Velcro **"is not a spin-off from NASA"** (Budde, 1995).

Ned tests the burr before he trusts it. **He presses it onto a wool sock, a cotton shirt and a smooth plastic box.** It grips the sock, holds the shirt weakly and slides straight off the plastic. The hooks need something to catch, so he adds needs hairs or loops to his notes.

Ned tests the burr before he trusts it

Pressed onto	The burr
A wool sock	Grips
A cotton shirt	Holds weakly
A smooth plastic box	Slides straight off

In 4.4.1 you met principles, said without naming the thing they came from. **Many small hooks, each catching a little, together hold firm** is the burr's principle, with the burr left out. The door and the burr share the job of holding on, and that shared job is what can travel (Gentner, 1983; Holyoak & Thagard, 1997).

The burr's principle



> Exercise:
>
> Try it. Name one living system near you. **List how it solves one problem**, in three short notes.

Summer brings Ned a second problem. **The shed gets hot by the afternoon**, and his seed packets curl on the shelf. Online he finds a popular story that the Eastgate Centre, a building in Harare, copies the way termite mounds cool themselves. He starts sketching vents and chimneys before he has read any further.

Summer brings Ned a second problem



The termite research tells a messier story. **Researchers call mound climate control "still only partially understood"** (Ocko et al., 2017), and in the mounds they studied the daily heating from the sun drove the air movement. Later measurements did not fit the older picture of a mound as a steady chimney (Andreen & Soar, 2023).

The termite research tells a messier story

- Mound climate control still only partially understood
- Daily heating from the sun drove the air movement
- Not a steady chimney

The simple story says more than the research shows. **A building copied from a fully understood mound** is a claim the termite work does not back, whatever the building does well. Ned writes contested beside the story and keeps his vent sketches as ideas of his own, to be tested with a thermometer in the shed.

The simple story says more than the research shows



The thermometer gives him his own answer. **Ned reads it at four o'clock on six hot afternoons**, three with a new high vent covered and three with it open. The shed averages 31 degrees covered and 27 degrees open. A four-degree drop from one vent needs no termites to explain it.

The shed at four o'clock, six hot afternoons



> **Key Concept:**
> Claim check. **A claim check is sorting a famous nature story into the parts a source backs and the parts it overstates.** A museum guide who reads a dated source before repeating a popular animal story to a school group is running a claim check.

A poster at the railway station shows the third story. **A Shinkansen bullet train in Japan sits beside a kingfisher**, with a nose shaped like its beak. An engineer named Nakatsu said in an interview that trains entering tunnels made a pressure boom, and that the way a kingfisher dives into water inspired the new nose (Kobayashi, 2005).

The third story



A Shinkansen bullet train in Japan



A kingfisher diving into water



Trains entering tunnels made a pressure boom

The 500-Series nose, he said, was “almost identical to a kingfisher’s beak”. **He also gave figures**, saying it helped “reduce air pressure by 30% and electricity use by 15%”, with the train running about 10% faster than the one before (Kobayashi, 2005). Those numbers are his own. The design went through tests and computer simulations, a part the poster leaves out.

He also gave figures

- [x] Reduce air pressure by 30%
- [x] Electricity use by 15%
- [x] About 10% faster than the one before

Each story now has a line in Ned's notebook. **Velcro from a burr is backed, and Velcro from NASA is a myth.** The kingfisher nose is the engineer's own account, with his numbers. The termite building is contested, so it stays out of anything Ned builds.

Each story now has a line

Story	Ned's notebook
Velcro from a burr	Backed
Velcro from NASA	A myth
The kingfisher nose	The engineer's own account
The termite building	Contested

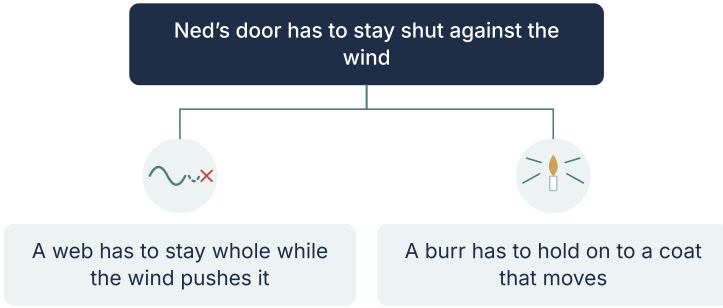
The check changes where his ideas come from. **Ned stops starting from stories** and goes back to watching living things himself. A spider's web across the shed doorway sways in the wind for three days without tearing, and he writes it down as a second living system to study.



A spider web stretched across a shed doorway, bending in the wind.

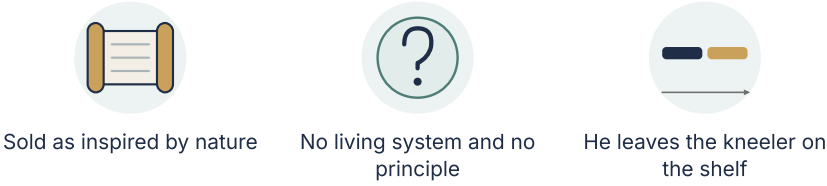
The web and the burr meet different problems. **A web has to stay whole while the wind pushes it**, and a burr has to hold on to a coat that moves. Ned's door has to stay shut against the wind, so each system speaks to part of his problem. He keeps one card for each.

The web and the burr meet different problems



Labels on shop shelves need the same check. **A garden kneeler sold as "inspired by nature"** tells Ned nothing about which living thing was studied or what it does. A label with no living system and no principle behind it is a sales line. He leaves the kneeler on the shelf.

Labels on shop shelves need the same check



A school caretaker whose coats keep sliding off a row of hooks could start from a living system, watching how a burr holds and writing the principle in plain words. The caretaker would then check any famous story before quoting it to the head teacher. The coats, the hooks and the walls are the real limits.

A school caretaker whose coats keep sliding off

- [x] Watch how a burr holds
- [x] Write the principle in plain words
- [x] Check any famous story before quoting it

Children can run the same steps. **An eight-year-old niece of Ned's watches a snail cross the patio** and writes slow, sticky and carries its home. She turns the third note into a question about her school bag. The living thing and its problem come first, and the clever part comes later.

A snail crosses the patio



Slow



Sticky



Carries its home

Three levels close this section, and each one asks for more checking. **The starter turns your Try it notes into a principle.** The middle level checks one famous nature story against a source, and the advanced level brings a principle to a real limit at work, such as space, cost or safety.

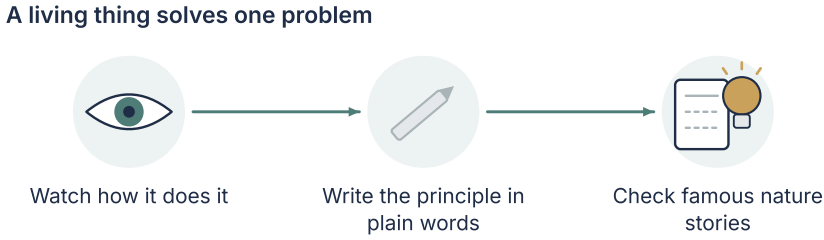
System to principle, at three levels

- The starter: your Try it notes into a principle
- The middle: one famous story against a source
- The advanced: a principle to a real limit at work

Exercise:

System to principle.

1. Starter. From your Try it, **state the principle in plain words**, with the living thing's name left out.
2. Middle. Pick one popular nature design story and write one line that a source backs and one line that is overstated.
3. Advanced. For a real limit at work, name a nature principle that could apply and write one limit it must meet (Scott et al., 2004).



Key idea:

Watch how a living thing solves one problem, write the principle in plain words and check famous nature stories before they steer your design.

Quick check:

What is a living system? Answer: A plant, an animal or a group of them, seen together with one problem it meets. Who invented Velcro? Answer: George de Mestral, a Swiss engineer and inventor, after burrs stuck to his dog's fur. What does a claim check do? Answer: It sorts a famous story into the parts a source backs and the parts it overstates. Why is the termite building story contested? Answer: Mound cooling is still only partly understood.

4.10.2 From a Principle in Nature to a Design of Your Own

Imagine Ned with a card pinned above his shed door. **It reads many small hooks, each catching a little, together hold firm**, and the door below it still bangs open in every gale. A strip of shop Velcro would only copy de Mestral's answer, so Ned wants a shape of his own for a wooden door.

A card pinned above his shed door



Many small hooks, each catching a little



The door below still bangs open



A shape of his own for a wooden door

A principle on a card is only half a design. **The other half is something Ned can screw to real wood**, in materials that survive rain and a slammed door. Here I show you how to sketch several shapes, scale one and clear your notes of borrowed claims before you build. Treat these steps as practice.

A principle on a card is only half a design

- The other half is something Ned can screw to real wood
- Materials that survive rain and a slammed door
- Several shapes before you build

In 4.10.1 Ned found the burr's principle and checked the famous stories about it. **Now the door is the problem**, and the burr sits only in the notes. Velcro is one shape the principle has already taken, and Ned is looking for one that fits a door in the wind. He has £10 to spend.

Now the door is the problem



The burr sits only in the notes



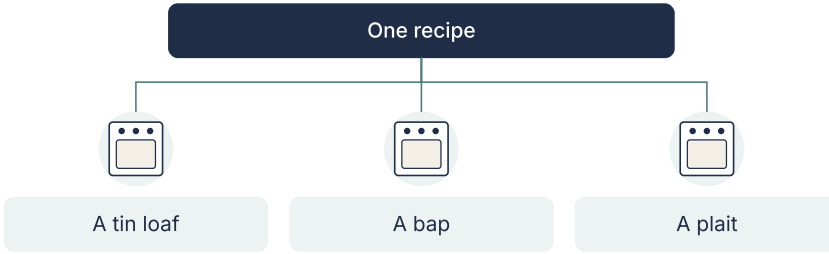
Velcro is one shape the principle has already taken



He has £10 to spend

A bread recipe is a good picture of the step. **One recipe can come out as a tin loaf, a bap or a plait**, and each is still the same bread. The picture stops at the oven, because a recipe swaps flour for flour, while a principle has to move from plant stuff into wood, metal or plastic.

A bread recipe



> **Key Concept:**
>
> Form. **A form is one shape a principle takes in something people make.** The burr principle could take the form of a brush doormat that scrapes boots, a bristle draught strip or a glove with a grippy palm, and each one is a different form of the same principle. Each form brings its own materials and its own weak spots.

Fifteen minutes and a pencil come next. **Four forms go down on one page**, a stiff brush on the door edge meeting a rough mat on the frame, a row of plastic hooks catching a cord, a rubber flap covered in bumps and a wire comb that grips a loop of rope. None of them looks like a burr.

Four forms go down on one page

Form	Catches
A stiff brush on the door edge	A rough mat on the frame
A row of plastic hooks	A cord
A rubber flap covered in bumps	The frame
A wire comb	A loop of rope

Four forms are worth the time, because Ned's first shape is the one closest to the shop strip, and a door sits a long way from a burr (Hashemi & Tubau, 2026). **The wire comb comes last**, after he stares at the rope that ties the door back in summer. He would never have drawn it first.

Four forms are worth the time

- [x] The first shape is closest to the shop strip
- [x] A door sits a long way from a burr
- [x] The wire comb comes last

> Exercise:
>
> Try it. Write one principle from nature at the top of a page. **Sketch one human design** that uses it.

A burr does its job on a dog's coat, and a door catch does its job in the rain. **The brush form has to work in Ned's shed**, so he writes down what it needs before he buys a single part (Cropley, 2006). The door edge is only three centimetres thick, so any brush fixed to it must be slim.

The brush form has to work in Ned's shed



A burr does its job on a dog's coat



A door catch does its job in the rain



The door edge is only three centimetres thick

His notes for the brush form have five lines. **Nylon bristles take the place of plant hooks**, and they must be stiff enough to grip in wind and loose enough to let go when pulled. No point may be sharp at a child's height, the brush has to work wet, and one hand must open the door.

His notes for the brush form have five lines

- [x] Nylon bristles take the place of plant hooks
- [x] Stiff enough to grip, loose enough to let go
- [x] No sharp point, works wet, one hand opens it

Size brings its own change. **A burr's hooks are too small to see and hold a few hairs each**, while a door in a gale pulls far harder. Ned's answer is a longer strip, forty centimetres of brush with hundreds of bristles meeting the mat at once. More grips share the pull, just as the burr's many hooks shared it.

Size brings its own change

The burr	The door
Hooks too small to see	Forty centimetres of brush
A few hairs each	Hundreds of bristles meeting the mat at once

One thing must survive every change, and that is the principle itself. **Many small grips sharing the pull** has to be true of the finished catch. A single big latch would hold the door too, and it would have lost the burr's idea on the way. Ned checks each sketch against the card above the door.

One thing must survive every change



Many small grips sharing the pull

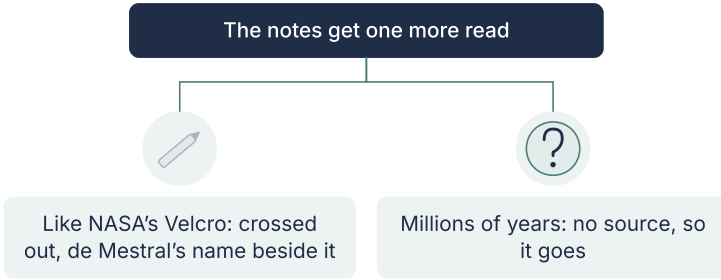
A single big latch would lose the idea

Each sketch checked against the card

> **Key Concept:**
>
> Scale change. **A scale change is moving a principle from the size it works at in nature to the size people need.** A shoe maker taking the burr principle into a fastening for a five-year-old goes from hooks too small to see to a strap a small hand can grip. A scale change can run up or down.

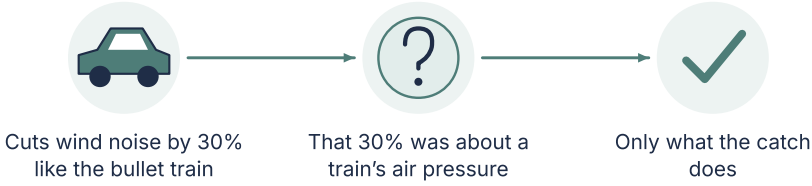
The notes get one more read before the build. **Two lines in the margin say "like NASA's Velcro" and "nature has tested this for millions of years"**. The NASA line matches a known myth, so he crosses it out and writes de Mestral's name beside it. He has no source for the second line, so it goes too.

Two lines in the margin



His brother wants to sell the catch at the village fair. **The draft label says it "cuts wind noise by 30% like the bullet train"**, borrowing the kingfisher figure. That 30% was an engineer's own account of a train's air pressure, and it says nothing about a door. Ned rewrites the label to say only what the catch does.

His brother wants to sell the catch



> **Key Concept:**
>
> Borrowed claim. **A borrowed claim is a line about your own design that takes its proof from someone else's famous story.** A cycle shop that labels a helmet "tough as a woodpecker's skull" has made a borrowed claim, because the helmet's own tests are never mentioned. The same helmet sold on its own crash test results would carry a claim it had earned.

The four forms still need choosing between. **Evidence on how well people pick their own ideas is mixed** (Silvia, 2008; Rietzschel et al., 2006), so Ned writes three tests first. The catch must hold the door in a gale, open with one hand and cost under £10. Each form gets a tick or a cross for every test.

Ned writes three tests first

- [x] Hold the door in a gale
- [x] Open with one hand
- [x] Cost under £10

The brush form passes all three. **A £6 brush strip and a £3 mat offcut come to £9**, a pound under the limit. The plastic hooks need two hands, and the rubber flap lets go in strong wind. The wire comb holds well but costs £14 in parts, so it stays on the page.

The four forms against the tests

Form	Result
The brush	Passes all three, £9
The plastic hooks	Need two hands
The rubber flap	Lets go in strong wind
The wire comb	Holds well, £14 in parts

A quick prototype comes first, the cheap stand-in you met in 4.8.3. **An old scrubbing brush is screwed to the door edge**, and a doormat offcut is nailed to the frame where the bristles meet it. The whole build takes twenty minutes and costs nothing, since both parts were already in the shed.

A quick prototype comes first



An old scrubbing brush on the door edge



A doormat offcut nailed to the frame



Twenty minutes, costs nothing

The first windy night gives the test. **The door stays shut until morning**, and Ned opens it with one pull. After a week of rain the bristles have flattened and the grip is weaker. He swaps the scrubbing brush for the stiffer £6 strip, and the next gale finds the door still shut.



A brush fixed along a shed door edge, meeting a mat strip on the frame.

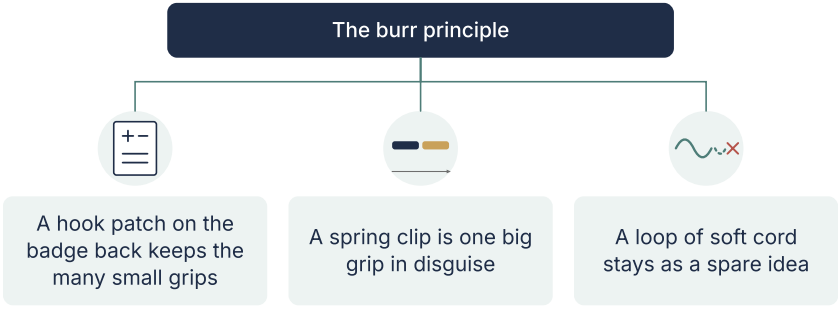
Work problems use the same steps. **A hospital team wants name badges that stay on scrub tops without pins**, so they write the burr principle at the top and sketch three forms. The badge must survive a hot wash, come off fast and never snag a blanket or a patient’s skin.

A hospital team wants name badges that stay on

> - Scrub tops without pins
> - Survive a hot wash and come off fast
> - Never snag a blanket or a patient's skin

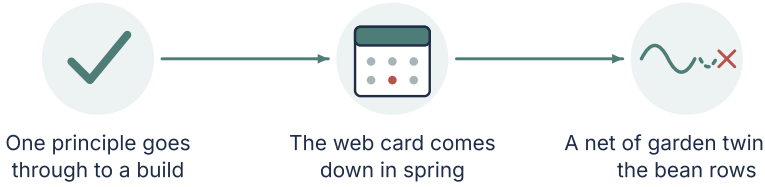
Their three forms are a hook patch on the badge back, a spring clip and a loop of soft cord. **The hook patch keeps the many small grips**, while the clip is one big grip in disguise. The team crosses the clip out before anyone buys a part, and the cord stays as a spare idea.

Their three forms



The web card waits its turn. **One principle goes through to a build before the next card comes down**, so Ned leaves the web alone until the door catch is finished. In spring he takes the web card down and sketches its first form, a net of garden twine for the bean rows.

The web card waits its turn



The net needs materials of its own. **Twine takes the place of silk**, wooden posts take the place of the branches a web hangs from and the net must span a whole bean row. The scale change grows again, from a web the size of a doorway to a net four metres long.



A twine net stretched between wooden posts along a row of young bean plants.

New tests can pick a new winner. **A parent who wants a cupboard catch a toddler cannot open** keeps the burr principle and the four sketches. Every test changes, to holding against a tugging toddler, opening only with an adult's grip and costing under £15. The brush now fails, and the wire comb, with its tight loop, passes all three.

New tests can pick a new winner

A cupboard catch a toddler cannot open	Form
Holding against a tugging toddler	The brush now fails
Opening only with an adult's grip, under £15	The wire comb passes all three

Three levels close this section, and each one takes the principle closer to a build. **The starter adds a scale note under your Try it sketch.** The middle level asks you to reread your notes for borrowed claims, and the advanced level needs a real problem at work and a quick prototype built for it.

Principle to design, at three levels

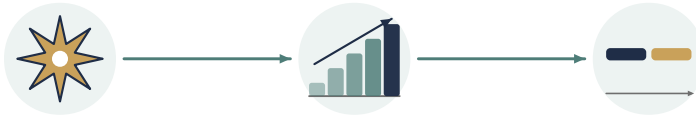
- The starter: a scale note under your Try it sketch
- The middle: reread your notes for borrowed claims
- The advanced: a quick prototype for a real problem

Exercise:

Principle to design.

1. Starter. Under your Try it sketch, **note how big the principle is in nature and how big your design must be**, and what keeps it working at the new size.
2. Middle. Reread your notes and drop or rewrite any claim that matches a known overstatement.
3. Advanced. For a real work problem, build a quick prototype of one nature principle in your own field (Scott et al., 2004).

A form people can build



Turn a nature principle into a form

Carry it to the size you need

Keep borrowed claims out of your notes

Key idea:

Turn a nature principle into **a form people can build**, carry it to the size you need and keep borrowed claims out of your notes.

Quick check:

What is a form? Answer: One shape a principle takes in something people make. What is a borrowed claim? Answer: A line about your own design that takes its proof from someone else's famous story. What is a scale change? Answer: Moving a principle from the size it works at in nature to the size people need. What do you do with a borrowed claim you cannot back? Answer: Drop it or rewrite it.

4.11 Examining and Developing an Idea

4.11.1 Six Thinking Hats: Examining an Idea Through Different Modes of Thinking

IMAGINE HAMID, A CAMPSITE warden, with three people arguing about his idea. **He wants to turn the old laundry block into a wet-day games room.** His brother says campers will love it, his wife lists every danger and the owner asks only what it costs. None of them is listening to the other two.



Arguments go round in circles when everyone looks a different way at once. **Hamid's fix is to give all three the same job for a few minutes**, then the next job, until every side is covered. Here I show you how to run the modes on one idea and end with a clear next step. Treat these steps as practice.



An empty laundry block at a campsite on a rainy day, with tents in the field beyond.

Edward de Bono set out this method in his 1985 book Six Thinking Hats, with a hat for each way of looking. **Here each mode gets a plain**

name, such as facts, risks or benefits, and no hats are needed. A pencil, a sheet of paper for each mode and a kitchen timer are enough for Hamid's first go.

De Bono, 1985

- Six Thinking Hats, a hat for each way of looking
- Here each mode gets a plain name
- A pencil, a sheet for each mode and a kitchen timer

A mechanic servicing a bike is a good picture of the method. **Brakes get checked, then gears, then tyres**, each with its own tool and its own few minutes. Nothing is checked twice at once. The picture stops at the workshop, because a bike's parts sit apart and one fact about an idea can also be a risk.

A mechanic servicing a bike



Key Concept:

Thinking mode. **A thinking mode is one kind of looking at an idea, kept on its own for a set time**, such as facts only or risks only. A bakery owner weighing Sunday opening who spends five minutes listing only costs is working in one thinking mode.

Facts come first, with five minutes on the timer. **Only things anyone could check go on the facts sheet.** The block is twelve metres by eight, one corner of the roof leaks and there is no power socket. The site has forty pitches, and it rained on nine days last August.

Only things anyone could check

- [x] The block is twelve metres by eight
- [x] One corner of the roof leaks, no power socket
- [x] Forty pitches, rain on nine days last August

Keeping opinions out is the hard part. **"Campers will love it" is a hope**, so Hamid moves it to the benefits sheet for later. "The floor is concrete" stays, because anyone can walk in and see it. A facts sheet with hopes on it lets the hopes slip past as if they were checked.

Keeping opinions out

Line	Sheet
Campers will love it	Benefits, since it is a hope
The floor is concrete	Facts, since anyone can see it

Some facts are not known yet. **A line Hamid cannot check goes down with a question mark**, such as whether the old wiring could take a socket. The question mark turns into a job, and the electrician's visit on Wednesday answers it. Guessing would have put a hope on the facts sheet again.

Some facts are not known yet



A line Hamid cannot check

It goes down with a question mark

The electrician's visit on Wednesday

Risks come next, again for five minutes. **A wet concrete floor could be slippery**, the leak drips onto the spot where a table would go, and noise could carry to the nearest tents. Hamid's wife fills most of this sheet, and for once nobody interrupts her, because risks are what everyone is writing.

Risks come next

- [x] A wet concrete floor could be slippery
- [x] The leak drips where a table would go
- [x] Noise could carry to the nearest tents

Benefits get the same five minutes. **Families would stay on site on wet days** and buy hot chocolate from the shop, and the Saturday quiz would have a dry home. His brother writes fastest here. Each sheet now holds the view of one person at full strength, without the others cutting across it.

Benefits get the same five minutes



Families would stay on site on wet days

Hot chocolate from the shop

The Saturday quiz would have a dry home

Everyone writes in every mode, though. **Hamid's wife adds two benefits of her own**, and his brother finds a risk nobody else saw, the shop being short of staff on busy wet days. When people take turns at every side, nobody is left owning just one of them.

Everyone writes in every mode

- Hamid's wife adds two benefits of her own
- His brother finds a risk nobody else saw
- Nobody is left owning just one side

> Exercise:
>
> Try it. Pick one idea. **Examine it in three modes, facts, risks and benefits**, for three minutes each on separate sheets.

Judging an idea well means checking it against the real world from more than one side (Cropley, 2006). **Separate sheets make those sides visible.** Before, the risks and benefits cancelled each other out in talk. On paper, Hamid can see eleven risks and nine benefits side by side, and none of them has been talked away.

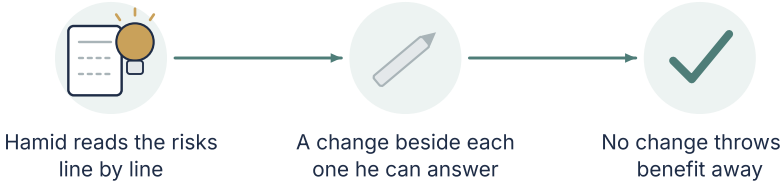
Separate sheets make those sides visible

In talk	On paper
Risks and benefits cancelled each other out	Eleven risks and nine benefits side by side
Lines talked away	None of them talked away

A fourth sheet opens once risks and benefits are both down. **Hamid reads the risks line by line** and writes a change beside each one he can

answer. His brother, who wrote most of the benefits, checks that no change throws a benefit away. A change that would cost a benefit gets crossed out and written again.

A fourth sheet opens



> **Key Concept:**
>
> New options mode. **The new options mode is the part of an examination that writes changes to the idea itself**, aimed at the risks already listed. If a library's risks sheet says a late opening would leave one person alone at the desk, a new option is a rota with two names after six.

Three changes answer the worst risks. **Rubber mats from the farm shop cover the wet floor**, the leaky corner becomes the place to park wet bikes and the room closes at nine so the tents stay quiet. The power socket gets no answer yet, so it stays on the risks sheet with a question mark.

Three changes answer the worst risks

Risk	Change
The wet floor	Rubber mats from the farm shop
The leaky corner	The place to park wet bikes
Noise to the tents	The room closes at nine

The order of the modes is part of the method. **New options written before the risks are known** would answer problems nobody had found. Facts first gives everyone the same ground to stand on. Hamid's brother asked to open with benefits, and the owner said no, since his hopes would have coloured every sheet after it.

The order of the modes is part of the method

> - Facts first gives everyone the same ground
> - New options only once the risks are known
> - Benefits first would colour every sheet after it

At the end Hamid reads the four sheets one after another. **A trial for August comes out of them**, wet days only, with mats down and the doors shut at nine. The owner agrees to pay for the mats, which cost £60, and the socket waits until the trial shows whether the room gets used.

A trial for August



Wet days only



Mats down and the doors shut at nine



Mats which cost £60

A thin sheet would still have told Hamid something. **Had the benefits sheet held one line**, the decision would have been to drop the idea or rethink it. Nine benefits against eleven risks, with changes for the worst three, tell Hamid the idea has earned a trial.

A thin sheet would still tell Hamid something

- [x] One line of benefits: drop the idea or rethink it
- [x] Nine benefits against eleven risks
- [x] Changes for the worst three: a trial

> **Key Concept:**
>
> Decision mode. **The decision mode is the last mode, which reads the notes from every other mode and names one next step and who takes it.** A football club that has run its modes on a new kit decides "Order twenty shirts in sizes for under-tens, Mo to place the order by Friday."

Groups need the modes on paper. **Each person writes alone in a mode before anyone reads out**, the write-alone habit this module started with (Mullen et al., 1991). Hamid's three helpers each had their own sheet for every mode, and the reading out came after the timer.

Groups need the modes on paper



Mixed modes are the usual slip. **A "yes, but" on the benefits sheet** is a risk in disguise, so it moves to the risks sheet. A "what if we" on the facts sheet is a new option, and it waits for its own mode. Moving a line takes seconds and keeps each sheet honest.

Mixed modes are the usual slip

Line	Moves to
A yes, but on the benefits sheet	The risks sheet
A what if we on the facts sheet	Its own mode, new options



A campsite room with rubber mats on the floor and families playing board games on a rainy day.

The first wet day of the trial shows the room working. **Eleven families come in by ten o’clock**, and the shop sells thirty hot chocolates before lunch. One child slips on a mat edge, so Hamid tapes the edges down that evening. That small risk was not on any sheet, and it goes on the list for the next examination.

The first wet day of the trial



Eleven families by ten o’clock



Thirty hot chocolates before lunch



Hamid tapes the mat edges down

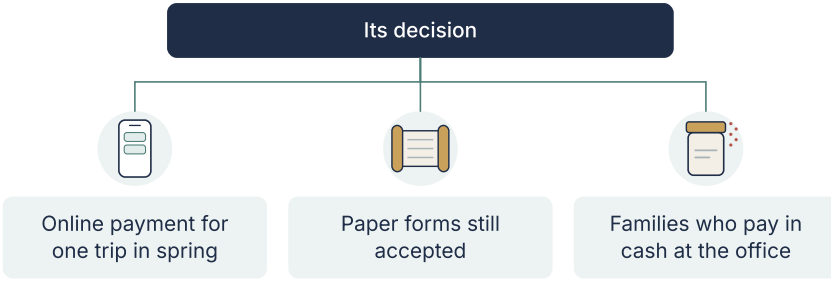
One person keeps the clock. **The owner keeps time at the Friday meeting** and calls each new mode when the timer rings. She writes on the sheets like everyone else, and her only extra job is the switch. Without a timekeeper, one mode can swallow the whole hour.

One person keeps the clock

> - The owner keeps time at the Friday meeting
> - She calls each new mode when the timer rings
> - Without a timekeeper, one mode can swallow the hour

Work ideas fit the same sheets. **A school office weighing online payments for school trips** lists how parents pay now, then risks, benefits and new options. Its decision is to run online payment for one trip in spring, with paper forms still accepted. Paper stays because the risks sheet named families who pay in cash at the office.

A school office weighing online payments



A family can use the modes for a big home choice. **Getting a dog goes through facts, risks, benefits and new options** at the kitchen table, with each person writing alone. The new options sheet turns up a friend's dog to walk for a month first, which becomes the decision.

Getting a dog



Facts, risks, benefits and new options



Each person writing alone



A friend's dog to walk for a month first

Small choices need no sheets at all. **The modes earn their half hour when an idea costs money or touches many people**, like a games room or a dog. Picking which biscuits to sell at the shop counter can be settled in a minute by just trying a new box.

Small choices need no sheets at all

> - An idea that costs money or touches many people
> - Like a games room or a dog
> - Biscuits for the shop counter: just try a new box

Three levels close this section, and each one adds more people or more modes. **The starter adds two modes to your Try it sheets.** The middle level brings in other people with their own sheets, and the advanced level runs a real work idea past the people it would affect.

Modes on one idea, at three levels

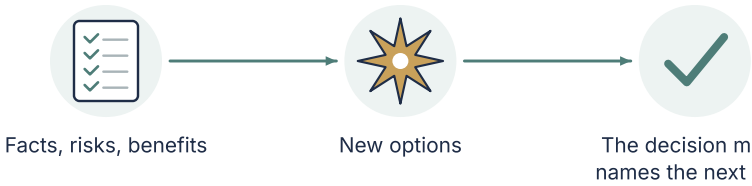
- [x] The starter adds two modes to your Try it sheets
- [x] The middle brings in other people
- [x] The advanced runs a real work idea

Exercise:

Modes on one idea.

1. Starter. After your Try it, **add a new options mode and then a decision mode**, each on its own sheet.
2. Middle. With one to three others, each write every mode alone on paper before anyone reads out.
3. Advanced. For a real work idea, run the modes with criteria from the people the idea would affect (Scott et al., 2004).

One mode at a time



Key idea:

Look at an idea **one mode at a time**, facts, risks, benefits and new options, then let the decision mode read every sheet and name the next step.

Quick check:

What is a thinking mode? Answer: One kind of looking at an idea, kept on its own for a set time. Why do facts come first? Answer: They give everyone the same ground before risks and benefits. What does the new options mode write? Answer: Changes to the idea aimed at the risks already listed. What does the decision mode name? Answer: One next step and who takes it.

4.11.2 Sketches, Drafts, Models and Prototypes: Giving an Idea a Form

Imagine Farah, who runs a small riding stables, explaining her idea to the owner over a cup of tea. **Each pony would get its own bay in the tack room**, with saddle, bridle and brush hung together under its name. The owner nods politely and then asks the one question words cannot answer. “What would it look like?”

Each pony would get its own bay



Saddle, bridle and brush hung together



Under its name



What would it look like?

An idea in your head is easy to love and hard for anyone else to see. **Giving it a shape lets people react to the idea itself**, and shows gaps you had talked past. Here I walk through four shapes an idea can take, from a pencil line to a prototype. Treat these steps as practice.



A tack room at a stables with saddles and bridles hung on mixed hooks along one wall.

The four shapes are a sketch, a draft, a model and a prototype. **Each one answers a different question**, and each costs a little more time than the one before. A prototype costs the most, because real people use it for a real job. Farah starts with the cheapest and only moves on when it has done its job.

Four shapes an idea can take

Shape	Costs
A sketch	A pencil
A draft	A reading
A model	A shoebox and an afternoon
A prototype	A weekend of lessons

A tailor fitting a suit works the same way. **Chalk marks come first, then a loose tacked jacket, then the finished cloth**, and each fitting fixes what the last one showed. The comparison stops at the price, because cloth costs far more than card and most ideas can stay cheap for much longer than a suit can.

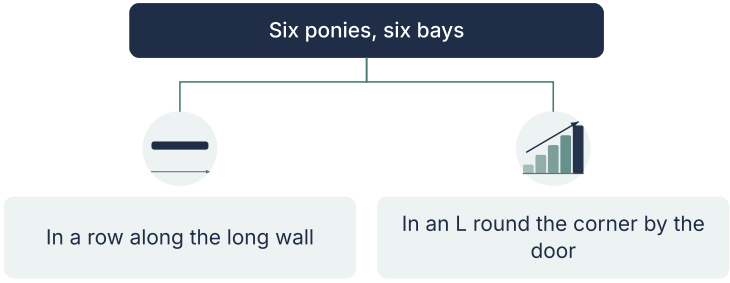
A tailor fitting a suit



> **Key Concept:**
>
> Sketch. **A sketch is a quick drawing that shows where the parts of an idea sit**, made in minutes and easy to throw away. A café owner drawing two boxes and a door to see whether a second counter fits is making a sketch.

Farah's first sketch goes on the back of a feed bill. **Six ponies, six bays, in a row along the long wall.** Then she draws a second sketch of the same idea, with the bays in an L round the corner by the door. Two sketches take ten minutes, and each one shows something the other hides.

Two sketches of the same idea



The row keeps every bay in a line, but the saddle for the pony stabled furthest away sits furthest from the door. **The L puts the two busiest ponies nearest the yard.** On a single sketch Farah would have kept the row, because it was her first picture and it looked neat.

Each one shows something the other hides

- The row keeps every bay in a line
- The furthest saddle sits furthest from the door
- The L puts the two busiest ponies nearest the yard

The sketches go to Josie, the head groom, before anyone else. **She picks the L in seconds**, because she carries the saddles every morning and the row would add a long walk with each one. Two sketches gave her something to choose between, where one would only have asked for a yes or a no.

The sketches go to Josie



She picks the L in seconds



She carries the saddles every morning



Two sketches to choose between

Science Says:

In one study, novice designers made web adverts either several at once or one after another (Dow et al., 2010). The team reported that “ads created in the Parallel condition significantly outperformed those from the Serial condition”, and the parallel ads were more varied. **Making several forms at once went with better adverts.** It was one study, with web adverts.

A drawing has a limit worth knowing. **Sketches show places well and words badly**, and part of this idea is words, since children aged eight to twelve must learn to hang a bridle back without a tangle. Sketching as a

way of thinking has its own home (see 3.3.2), so here it is one step on a longer road.

Sketches show places well and words badly

- [x] Children aged eight to twelve
- [x] Hang a bridle back without a tangle
- [x] Sketching has its own home, 3.3.2

> Exercise:
>
> Try it. Take one idea. **Make two quick sketches of it**, each a different layout, and write one thing each sketch shows that the other hides.

The words become a draft. **Farah writes the card that would hang on the tack room door**, five short lines on putting tack back. Her first try uses words like “throatlatch” and “keeper”, which the eight-year-olds have never heard. A draft on paper shows that in a way the idea in her head never could.

The words become a draft



The card on the tack room door



Five short lines on putting tack back



Throatlatch and keeper

> **Key Concept:**
>
> Draft. **A draft is a first written version of the words an idea needs**, rough enough to change and complete enough to read aloud. A plumber's first go at a leaflet on bleeding radiators, written in pencil before any printing, is a draft.

The second draft uses plain words and a picture beside each line. **"Buckle the strap round the hook" replaces two of the hard words.** Farah reads it to her niece, who is nine, and the niece can say back every step. That small reading takes three minutes and fixes the card before it is ever printed.

The second draft

First try	Second draft
Hard words	Buckle the strap round the hook
Words only	A picture beside each line

Paper is flat, and a tack room has height, a low beam and a door that swings in. **The next shape is a shoebox**, with card saddles folded from cereal boxes hanging on drawing pins and a strip of card for the beam. Farah opens the little door and sees at once that it hits the nearest bay.

The next shape is a shoebox



Card saddles folded from cereal boxes



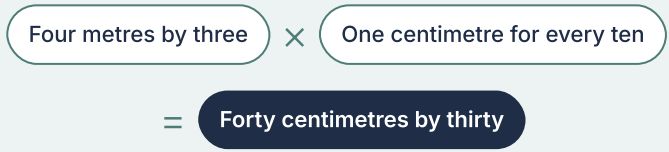
A strip of card for the beam



The little door hits the nearest bay

The door clash is real only because the shoebox was built to measure. **Farah measured the room first**, four metres by three. At one centimetre for every ten, the floor came out forty centimetres by thirty, the size of a boot box, and the door was cut to swing the way it really does.

Built to measure



People react to a model in a way they never react to words. **The owner picks up the box and turns it round**, and she points to where the hay nets hang now. Nobody had mentioned hay nets. A shape in the hand lets other people see the idea well enough to add what they know.

People react to a model



The owner turns the box round



Where the hay nets hang now

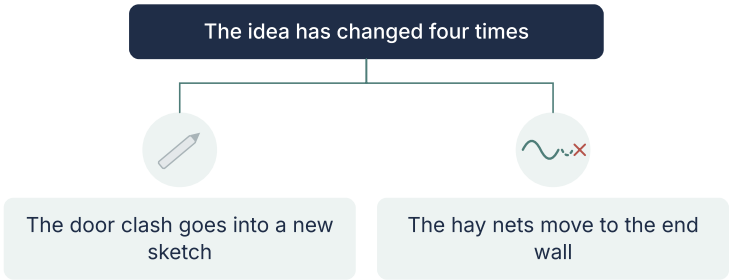


Nobody had mentioned hay nets

> **Key Concept:**
>
> Model. **A model is a small or simple solid version of an idea that people can look at from every side**, and nobody uses it for the real job. A teacher arranging matchboxes on a tray to plan desks for thirty pupils has made a model.

Studies of design thinking describe making forms of an idea, getting reactions and redesigning as part of the work (Razzouk & Shute, 2012). **Each shape so far has fed the next one**, with the door clash going into a new sketch and the hay nets moving to the end wall. The idea has changed four times and cost one shoebox.

Each shape so far has fed the next one



Last comes a prototype in the real room. **Farah sets up two bays for one weekend of lessons**, for the two busiest ponies, and leaves the other four as they are. Real children with real tack show what no shoebox can. Testing a prototype with its users has its own home (see 4.8.3), so this section stops at building one.

Last comes a prototype in the real room

> - Two bays for one weekend of lessons
> - The other four as they are
> - Testing has its own home, 4.8.3

The weekend gives Farah her answer. **The two ponies with marked bays are tacked up first on both mornings**, and nobody hunts for a brush. The four on the old hooks take their usual time. One bridle still ends up on the wrong hook, because the name labels are small.

The weekend gives Farah her answer

Ponies	Mornings
The two with marked bays	Tacked up first, ten minutes quicker
The four on the old hooks	Their usual time

Josie times both mornings and finds the two marked bays ten minutes quicker to tack up. **The owner agrees to mark all six bays**, and Farah orders bigger name labels before she drills a single hole. The children ask whether their own ponies are next.

The owner agrees to mark all six bays



The order matters because each step is dearer. **A sketch costs a pencil**, a draft a reading, a model a shoebox and an afternoon, and a prototype a weekend of lessons and two sets of hooks at £18. A prototype built before the door clash was found would have put hooks in the wrong place.

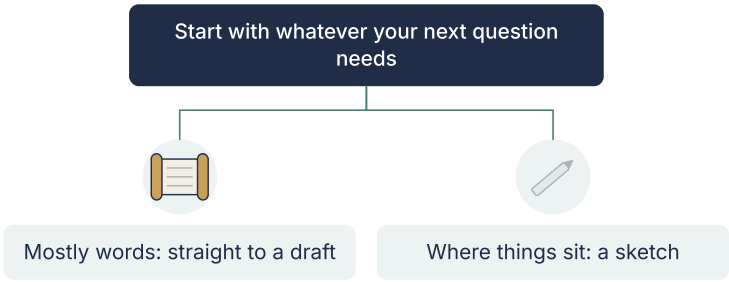
The order matters because each step is dearer

- [x] A sketch costs a pencil
- [x] A model costs a shoebox and an afternoon
- [x] A prototype: two sets of hooks at £18

Some ideas skip shapes. **An idea that is mostly words goes straight to a draft**, and an idea about where things sit starts with a sketch. A

birthday treasure hunt needs a draft of the clues and a sketch of the garden, and nobody would build it in a shoebox. Start with whatever your next question needs.

Some ideas skip shapes



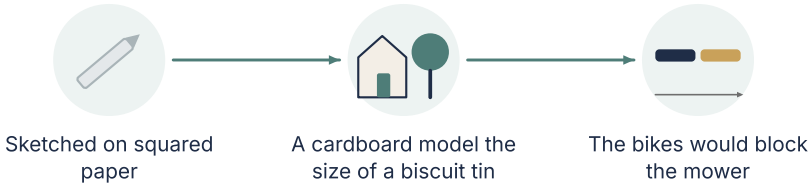
Work ideas use the same run of shapes. **A dentist's receptionist planning a calmer waiting area** sketches the chairs, drafts the sign about waiting times and makes a model with toy furniture. The dentist moves one toy chair and points out the wheelchair space, which the sketch missed. The real chairs stay put until the toy ones are right.



Toy chairs arranged on a tray as a model of a dentist's waiting area, with one gap for a wheelchair.

At home the shapes help with a shared plan. **A family planning a new shed sketches it on squared paper**, drafts a list of what must fit inside and builds a cardboard model the size of a biscuit tin. The model shows the bikes would block the mower, so they move the door. Nobody lifted a spade to learn that.

A family planning a new shed



Three levels close this section, and each one takes your idea one shape further. **The starter turns a Try it sketch into a model or a draft.** The middle level compares two shapes of one idea, and the advanced level builds a shape for a real work idea that the people it affects can react to.

Shapes for one idea, at three levels

- The starter: a Try it sketch into a model or a draft
- The middle: two shapes of one idea
- The advanced: a shape for a real work idea

Exercise:

Shapes for one idea.

1. Starter. Turn one Try it sketch into **one paper model or one draft paragraph**.

2. Middle. Compare your two sketches side by side and list every way they differ before choosing one to take further.
3. Advanced. For a real work idea, make a shape the people it affects can react to (Scott et al., 2004) and check it against real limits (Cropley, 2006).

The cheapest shape that answers your next question



A sketch for places



A draft for words



A model for how it stands

Key idea:

Give an idea **the cheapest shape that answers your next question**, a sketch for places, a draft for words and a model for how it stands, before you build a prototype.

Quick check:

What does a sketch show? Answer: Where the parts of an idea sit. What is a draft? Answer: A first written version of the words an idea needs. Why make a model before a prototype? Answer: People can look at it from every side and add what they know, for the price of some card.

4.11.3 Trying the Idea, Gathering Feedback and Revising It

Imagine Tobi at the shoe-hire counter of a bowling alley. **Every family in the queue asks their size** in bowling shoes, and the line backs up to the door. His idea is a floor mat with printed footprints and sizes, so people can stand on it and check. He lays it down on a Friday night.

Every family in the queue asks their size



The line backs up to the door



A floor mat with printed footprints and sizes



Laid down on a Friday night

An idea only shows what it can do once people use it. **Trying it, asking about it and changing it are three moves that work as a set**, and each one feeds the next. In this section I take one small idea through all three moves twice. Treat these steps as practice.

Three moves that work as a set

- [x] Trying it
- [x] Asking about it
- [x] Changing it



A queue of families at a bowling alley shoe-hire counter, with racks of shoes behind it.

A user test of a quick prototype has its own home earlier in this module (see 4.8.3). **Here the idea is already real and in use**, so the test happens in the normal day with normal customers. Nobody is invited, and nobody is told there is anything to test. Customers just meet the mat on their way to the counter.

Here the idea is already real and in use

- The normal day with normal customers
- Nobody is invited or told there is a test
- Quick prototypes have their own home, 4.8.3

A cook tasting soup works the same way. **A spoonful, a pinch of salt, then another spoonful**, and each taste checks the last change. The picture stops at the pot, because a soup has one taster with one tongue, and an idea has many users who all want slightly different things.

A cook tasting soup

The soup	An idea
A spoonful, a pinch of salt, another spoonful	Each try checks the last change
One taster with one tongue	Many users who all want different things

> **Key Concept:**
>
> Try window. **A try window is a short, fixed stretch of real use set aside for watching an idea at work**, with the start and end time written down. A garden centre owner who watches a new trolley bay from nine to nine fifteen on a Tuesday is using a try window.

Tobi's window runs from ten o'clock to ten past on Saturday morning. **He tapes the mat by the counter and keeps quiet**, with a tally sheet under the till. One column counts groups who name a size without asking, and the other counts groups who still ask. His phone timer sits face up beside the till.

Tobi's window runs from ten to ten past



He tapes the mat by the counter and keeps quiet



A tally sheet under the till



His phone timer face up

Fourteen groups come through in the ten minutes. **Nine name their size without asking**, and the children love jumping from footprint to footprint. Then one dad walks round to the far side of the mat, because

the numbers are printed facing the counter and read upside down from the queue.

Fourteen groups in the ten minutes

- [x] Nine name their size without asking
- [x] The children jump from footprint to footprint
- [x] One dad walks round to the far side of the mat

The dad's walk fits neither column on the tally sheet. **Tobi rules a third column headed "other"** and puts the walk there. A sheet with only the columns he expected would have had nowhere to keep the one thing he did not expect. Tobi circles it before he goes home.

The tally sheet



Ten minutes is short enough to watch every group closely and long enough to see more than one kind of customer. **The try costs Tobi nothing extra**, because he is at the till anyway. A whole day of watching would have buried the dad's walk under hundreds of other marks.

Ten minutes is short and long enough



Watch every group closely



More than one kind of customer



The try costs Tobi nothing extra

> Exercise:
>
> Try it. Pick one idea. **Try it for ten minutes in real use**, and write down one surprise in a single line.

Asking comes next. **Tobi's question is about the mat and the queue**, and it keeps the customer's own taste out of it. Fear of being judged is one of the brakes studied in group idea work (Diehl & Stroebe, 1987). A question about a mat on the floor asks nobody to defend a view.

Tobi's question is about the mat and the queue

- It keeps the customer's own taste out of it
- Fear of being judged is one of the brakes
- Nobody has to defend a view

The question gets written down before Saturday. **A sticky note on the till holds the exact words**, so every person hears the same question. Tobi tries it once on his sister at home. Words made up on the spot can slide into "Is it any good?", because that sounds friendly and it is the easiest thing to ask.

The question gets written down before Saturday



A sticky note on the till



Every person hears the same question



Tried once on his sister at home

> **Key Concept:**
>
> Descriptive question. **A descriptive question is a question about what a person saw or did with an idea**, with their opinion left out. A bus driver asking a passenger "Where did you look for the timetable?" has asked a descriptive question.

One mum gets the question after her family has their shoes. **"What did you do when you saw the mat?"** She says she looked for her size, gave up because the numbers faced the wrong way, and asked him anyway. Her answer matches the dad's walk round the mat, so two people point to the same problem.

Two people point to the same problem

Who	What they did
One dad	Walked round the mat
One mum	Gave up because the numbers faced the wrong way

She points out one more thing while her boys lace up. **Her younger son could not find his size at all**, because the smallest footprint on the mat is a 13 and he takes a 10. Tobi adds that to the "other" column as a problem for a later round. He notes the size range a new mat would need.

She points out one more thing

- [x] Her younger son takes a 10
- [x] The smallest footprint on the mat is a 13
- [x] A problem for a later round



A shoe-hire assistant leaning over the counter to talk to a mother holding two pairs of bowling shoes.

Tobi stops at one mum and one question on the first Saturday. **Her answer and the dad's walk already point to the same fix**, the way the numbers face. The printer had laid them out from behind the counter, where Tobi stands all day, so nobody at the alley had spotted it.

Revising means changing the idea because of what the try showed. **Tobi turns the mat round** so the numbers face the queue, and he changes nothing else. Turning a mat costs nothing, which makes it an easy first change. Theories of creativity count this kind of revising as part of making something new (Silvia, 2008).

Revising means changing the idea



Timing is the last choice. **Tobi gets his feedback after every version**, because he has one mat and one Saturday rush a week. In one study of web adverts, designers who made several versions and got feedback on them together did better than those who got it after each one (Dow et al., 2010).

Timing is the last choice

- Feedback after every version
- One mat and one Saturday rush a week
- Feedback on several versions together did better

Next Saturday at ten, the mat is back with the numbers turned round. **Fifteen groups come through, and thirteen name their size without asking.** Nobody walks round the mat, and the children still jump from footprint to footprint. Tobi pins the two tally sheets side by side on the staff room wall.

Two Saturdays at ten

Saturday	Groups
First	Fourteen, nine name their size
Second, numbers turned round	Fifteen, thirteen name their size

The queue tells the same story as the tally. **On the second Saturday the line never reaches the door**, and the lanes fill five minutes sooner than the week before. Odile, who runs the lanes, notices first, because her first game of the morning starts on time for once. She asks whether the mat can stay.

The queue tells the same story as the tally



The line never reaches the door



The lanes fill five minutes sooner



Odile asks whether the mat can stay

Judging an idea means testing it against the real conditions it has to survive (Cropley, 2006). **A Saturday rush with children and heavy balls is the real condition here.** A mat that works in an empty alley on a Monday morning has only passed half its test. Tobi's mat has now faced the rush twice.

A Saturday rush is the real condition here

- Children and heavy balls
- An empty alley on a Monday is only half the test
- The mat has now faced the rush twice

Key Concept:

Retest. **A retest is a repeat of an earlier try window, kept to the same length and tally sheet, run on the changed idea.** A school office that times the lunch queue on two Mondays, before and after moving the cutlery, has run a retest.

A worry from a colleague can arrive in the middle of all this. **Odile says children jumping along the mat could land against the ball rack.** A safety point gets acted on at once, even from one voice, so Tobi moves the rack a metre along the wall that evening. It does not wait for the next try window.

A safety point gets acted on at once



Children jumping could land against the ball rack

Even from one voice

The rack moves a metre along the wall

Feedback nobody asked for still goes on the sheet. **Odile's point gets its own dated line**, under the tallies, so anyone who later wonders about the rack can read why it moved. A change with no written reason can get undone by the next person who tidies up.

Odile's point gets its own dated line

- [x] Under the tallies
- [x] Anyone can read why the rack moved
- [x] A change with no written reason can get undone

Choosing between versions needs the notes as well as the memory. **People choosing among their own ideas can pass over the most original ones** (Rietzschel et al., 2006). The two tally sheets let Tobi pick the turned mat on what happened, where memory alone would have kept the version he liked first.

Choosing between versions needs the notes



People can pass over the most original ones



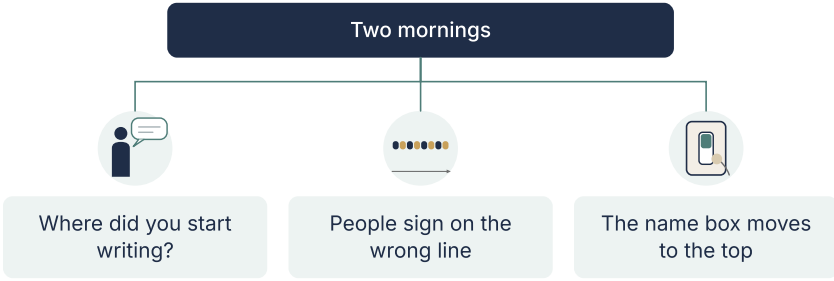
The two tally sheets



The turned mat on what happened

Work ideas fit the same moves. **An office receptionist tries a new visitor sign-in sheet** for one morning, asks one visitor "Where did you start writing?" and finds people sign on the wrong line. She moves the name box to the top and tries the next morning again. Two mornings, one change and one question each time.

An office receptionist tries a new sign-in sheet



A home idea works the same way. **A parent pins a new chore chart to the fridge** and watches for one week. Asked "What did you look at first?", a seven-year-old says the pictures, so the next chart has a picture beside every chore and the words get smaller. It stays up a second week.

A parent pins a new chore chart to the fridge



Three levels close this section, and each one adds one more move. **The starter adds a question to your Try it.** The middle level adds one change and a second try, and the advanced level runs two rounds of change on a real work idea. Each level uses the idea from your Try it.

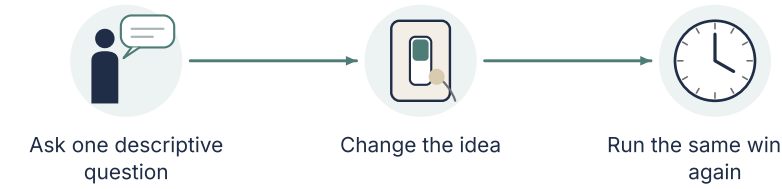
Try, ask, change, at three levels

- The starter adds a question to your Try it
- The middle adds one change and a second try
- The advanced runs two rounds on a real work idea

Exercise:

Try, ask, change.

1. Starter. After your Try it, **ask one person who used the idea one descriptive question**.
2. Middle. Change one feature from what you learned and run the same try window once more.
3. Advanced. For a real work idea, run two rounds of change, judged against criteria from the people it affects (Scott et al., 2004).



Key idea:

Try an idea **in real use for a set time**, ask one descriptive question, change the idea and run the same window again.

Quick check:

What is a try window? Answer: A short, fixed stretch of real use for watching an idea at work. What does a descriptive question ask? Answer: What a person saw or did, with their opinion left out. What is a retest? Answer: A repeat of an earlier try window, kept to the same length and tally sheet, run on the changed idea.

4.11.4 Deciding What to Finish, Change or Set Aside

Imagine Sami, who runs a small puppet theatre group, sitting in his garage with six show ideas pinned to the wall. **The group has eight weeks before the summer library tour**, and three puppeteers including him. Every idea has a fan in the group, and each fan has already bought something for it.

Six show ideas pinned to the wall



Eight weeks before the summer library tour



Three puppeteers including him



Every idea has a fan in the group

More ideas than time is a good problem to have. **A clear sort tells everyone where their effort goes next**, and stops six half-done shows turning into six unfinished ones. Here I sort a whole set in one go, so six fans in one garage end up with one plan. Treat these steps as practice.

A clear sort

- Tells everyone where their effort goes next
- Stops six half-done shows
- Six fans in one garage end up with one plan

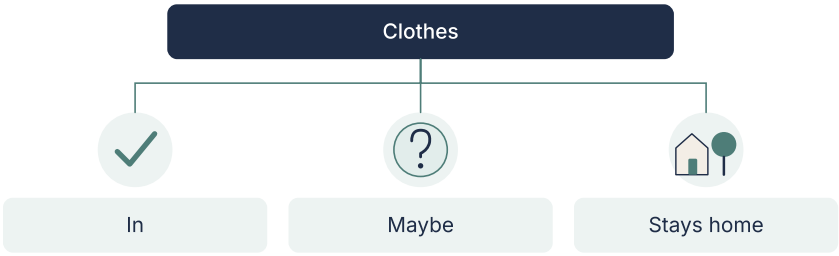
Finishing, revising or setting aside one idea against a yardstick has its own home earlier (see 3.4.3). **Here the job is a whole set of ideas at once**, with “change” doing the work of “revise”. Sami’s garage wall holds the whole set of six. Several ideas at once also raise a new question, which one to finish first.

Two homes for this job

Section	The job
3.4.3	Finishing, revising or setting aside one idea
Here	A whole set of ideas at once

Packing a suitcase for a short trip works the same way. **Clothes go into "in", "maybe" or "stays home"**, and the case only closes when the maybe pile is settled. The picture stops at the clothes, because a shirt stays the same shirt, and an idea in the middle pile can be reshaped until it fits.

Packing a suitcase for a short trip



> **Key Concept:**
>
> Three-pile sort. **A three-pile sort is one sitting in which every idea on the table goes into finish, change or set aside**, with no fourth pile for "not sure". A book club choosing its next six months of reading can run a three-pile sort on a list of twenty titles.

Sami's six cards read The Lost Sock, The Sea at Night, The Weather Song, The Talking Teapot, The Dragon of Dunmore and The Big Bear. **Each one has a script page or a few puppets made**, so none is a blank idea. The Lost Sock has had two full rehearsals already, and The Big Bear's fur took a month.

Sami's six cards

- [x] The Lost Sock, The Sea at Night, The Weather Song
- [x] The Talking Teapot, The Dragon of Dunmore, The Big Bear
- [x] Each has a script page or a few puppets made

The tour sets three hard limits, an idea you met in 4.6.3. **The whole show must pack into Sami's estate car**, it must run with three puppeteers, and libraries give each show a thirty-minute slot. Those three facts come from the tour itself, so nobody in the group can vote them away.



The open boot of an estate car packed with a folding puppet stage and two plastic boxes.

Two ideas fall at once. **The dragon's body needs five people to move it**, and the bear stands taller than the car roof. Both cards go into the set-aside pile in the first ten minutes, which saves weeks of work on shows the tour could never carry. Nobody has to defend or attack either show.

Two ideas fall at once

Show	Hard limit
The Dragon of Dunmore	The body needs five people to move it
The Big Bear	Stands taller than the car roof

Studies of limits and creativity point in more than one direction (Acar et al., 2019). **A limit can spark a fresh idea or shut one down**, and here it shuts the dragon out of one tour. The same dragon might suit a summer fair with a team of ten.

A limit can spark a fresh idea or shut one down



Studies point in more than one direction



It shuts the dragon out of one tour

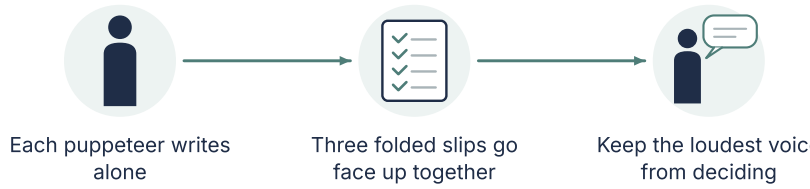


A summer fair with a team of ten

> **Key Concept:**
>
> Finish queue. **A finish queue is the order in which ideas in the finish pile get worked on**, one at a time, with each starting when the one ahead is done. A furniture restorer with three chairs ready to finish keeps a finish queue, and the second chair waits until the first is waxed and collected.

Four cards are left, and only one can be finished first. **Each puppeteer writes alone which show they think is strongest**, then the three folded slips go face up together. Your own sense of which idea is strongest is worth putting on paper (Silvia, 2008), and three slips keep the loudest voice from deciding.

Four cards are left



Two slips say The Lost Sock and one says The Talking Teapot. **The Lost Sock has a full script, finished puppets and two rehearsals**, so it goes in the finish pile. The teapot slip belongs to the newest puppeteer, who wrote its script and laughs at every line. The teapot gets a long look before it goes anywhere.

Two slips say The Lost Sock

- A full script, finished puppets and two rehearsals
- It goes in the finish pile
- The teapot gets a long look

> Exercise:
>
> Try it. Take four to six ideas. **Sort them into finish, change and set aside**, and write one reason beside each.

The Lost Sock goes first. **It gets the first three weeks to itself**, with a dress rehearsal for Sami's neighbours in week three. Splitting the weeks across four shows would leave four shows nearly ready and none fit to perform. Weeks four to eight go to the change pile and the tour bookings.

The Lost Sock goes first

Weeks	Work
One to three	The Lost Sock, dress rehearsal in week three
Four to eight	The change pile and the tour bookings

Finished needs a meaning everyone shares. **For The Lost Sock, finished means a run with no script in hand**, inside thirty minutes, with every puppet and prop packed in two labelled boxes. When the dress rehearsal ticks all three, the show is ready for its first library. Three plain checks leave nothing to argue about on the night.

Finished needs a meaning everyone shares



A run with no script in hand



Inside thirty minutes



Packed in two labelled boxes



Three puppeteers behind a small folding stage, holding sock puppets up for a dress rehearsal.

The change pile holds the sea story, the weather song and the teapot. **“Make it better” is no help to anyone on a Tuesday evening**, because nobody knows where to start. Until now, nobody had written down what any of the changes would actually be. The sea story alone had been “nearly there” at three meetings in a row.

Make it better is no help to anyone



Each idea in the change pile also gets one owner. **Sami’s name goes on the sea story**, the newest puppeteer takes the teapot she loves, and the third puppeteer takes the weather song. A change idea with no owner drifts from meeting to meeting while everyone waits for someone else. Owners report back at the next sort.

Each idea in the change pile gets one owner



> **Key Concept:**
>
> Change task. **A change task is one specific job that would move an idea toward the finish pile**, written so someone could start it the same day. A garden centre with an idea for a children's corner might write "Find a bench that fits under the awning" as a change task.

The Sea at Night needs a dark room, and library rooms have big windows. **Its first change task is a lightbox stage**, a box lit from inside so the shadow puppets show up in daylight. Its second is cutting the story from forty minutes to thirty. Written down, the two tasks show how big the change really is.

The Sea at Night needs a dark room



Library rooms have big windows



A lightbox stage lit from inside



Cut from forty minutes to thirty

The teapot is the oddest idea on the wall, and the one Sami nearly set aside. **Choosing from your own list can pass over its most original idea** (Rietzschel et al., 2006). Odd is no reason to drop a show, so the teapot stays in the change pile with one task, a test of its jokes on two nine-year-olds.

The oddest idea on the wall

- Choosing can pass over the most original idea
- Odd is no reason to drop a show
- Test its jokes on two nine-year-olds

Set-aside cards go into an envelope marked “tour”. **Parts of a set-aside idea can still be used**, and the dragon’s painted head turns up later as a fierce teapot lid. Nothing in that envelope is a failure, because each card answered a different question for a different job. The envelope lives in the puppet cupboard.

Set-aside cards go into an envelope



Judging is the half of creative work where ideas meet the conditions they have to fit (Cropley, 2006). **A sort turns a wall of possible shows into a plan** with weeks, people and tasks attached. Researchers who study idea tests call what they measure creative potential (Runco & Acar, 2012), and potential becomes a show only once someone finishes it.

A sort turns a wall of possible shows into a plan

- [x] Weeks, people and tasks attached
- [x] Idea tests measure creative potential
- [x] Potential becomes a show once someone finishes it

A sort is a picture of one evening, and piles can move. **Two weeks later the lightbox works**, so The Sea at Night joins the finish pile behind the sock. The finish pile now has a queue of two. The weather song still sounds like every other weather song after two change tasks, so it goes into the envelope.

Two weeks later

Show	Pile
The Sea at Night, the lightbox works	Finish, behind the sock
The Weather Song, after two change tasks	The envelope

Running the sort again keeps it honest. **Sami runs a fresh sort every other Tuesday**, and each sort takes twenty minutes. A hard limit can move too, such as one library offering a forty-minute slot. An idea that sits untouched in the change pile for two sorts in a row belongs somewhere else.

Running the sort again keeps it honest



A fresh sort every other Tuesday



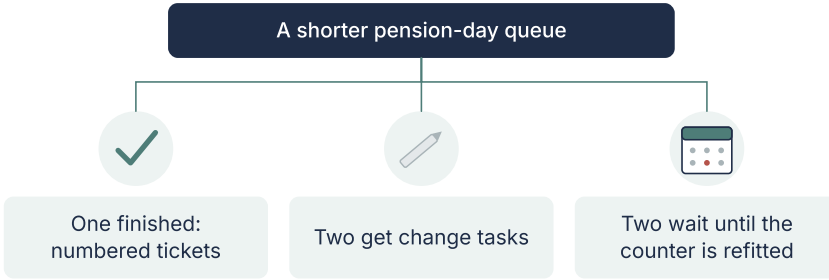
Twenty minutes each



A forty-minute slot at one library

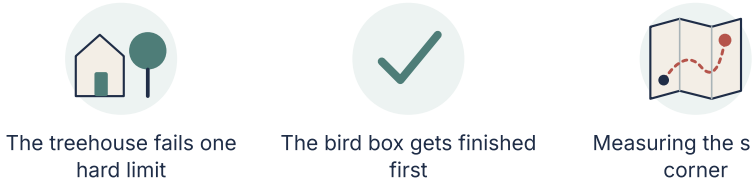
Work ideas sort the same way. **A village post office with five ideas for a shorter pension-day queue** has two hard limits, a fixed budget and a counter that cannot move. One idea is finished, two get change tasks and two wait until the counter is refitted next year. The finished idea is a roll of numbered tickets.

A village post office with five ideas



At home a sort settles a crowded weekend list. **A family with seven project ideas for the summer holidays** finds that the treehouse fails one hard limit, an adult free on weekdays. The bird box gets finished first, and the vegetable bed gets one change task, measuring the sunny corner. The treehouse waits for next summer.

A family with seven summer project ideas



Three levels close this section, and each one takes the sort further. **The starter adds one hard limit to your Try it sort.** The middle level settles the finish pile and the change pile, and the advanced level runs a sort on real work ideas with criteria from the people affected. Use the ideas from your own Try it sort.

Sort a set of ideas, at three levels

- The starter adds one hard limit
- The middle settles the finish and change piles
- The advanced sorts real work ideas

Exercise:

Sort a set of ideas.

1. Starter. Write **one hard limit of the job that forces at least one idea into set aside**.
2. Middle. Pick one idea to finish first, and write two change tasks for one idea in the change pile.
3. Advanced. Sort a set of real work ideas with criteria from the people they affect (Scott et al., 2004).

Finish, change or set aside



Work through the finish queue

Small change tasks

Sort again as the piles move

Key idea:

Sort every idea into **finish, change or set aside**, work through the finish queue one idea at a time, give every changing idea small change tasks and sort again as the piles move.

Quick check:

What is a three-pile sort? Answer: One sitting in which every idea goes into finish, change or set aside. What is a finish queue? Answer: The order in which ideas in the finish pile get worked on, one at a time. What makes a good change task? Answer: One specific job someone could start the same day.

4.11.5 Combining Methods: Running Two or Three Methods on One Challenge

Imagine Rafe, who manages a small ice rink, reading the Tuesday bookings. **The two o'clock session has had six skaters a week since September**, on ice built for two hundred. His two lists of ideas so far look the same, with cheaper tickets and a school poster. Neither list has sold one extra Tuesday ticket.

The two o'clock session



Six skaters a week since September



Ice built for two hundred



Cheaper tickets and a school poster

Both lists came from Rafe writing whatever came to mind at his desk. **This time he gives the problem two separate rounds**, each with its own method and its own sheet. Here I run two methods on Rafe's empty Tuesday, then pick from what they made. Treat these steps as practice.

This time the problem gets two separate rounds

- Each with its own method
- Each with its own sheet
- Then pick from what they made



A nearly empty ice rink in the afternoon, with two skaters near the barrier.

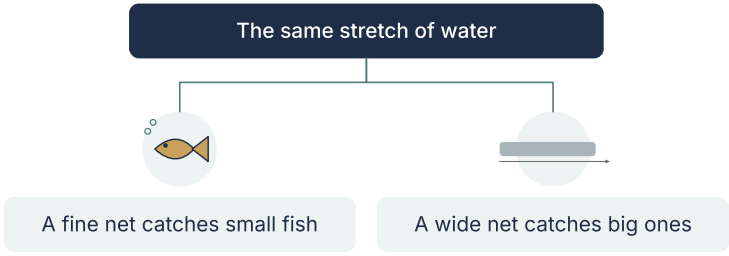
Any two methods you know can be paired. **Rafe picks two that pull in different directions**, the what-if question that changes a rule of the situation (see 4.9.2) and the worst idea that is written to fail on purpose (see 4.9.3). Both are already in his hands, so this section is about running them together.

Two that pull in different directions

Method	What it does
The what-if, 4.9.2	Changes a rule of the situation
The worst idea, 4.9.3	Written to fail on purpose

Fishing with two nets works the same way. **A fine net catches small fish and a wide net catches big ones**, and the same stretch of water gives up a different catch to each. The comparison stops at the nets, because fish are already in the water, and ideas only exist once a method makes them.

Fishing with two nets



> **Key Concept:**
>
> Method pair. **A method pair is two idea methods run one after the other on the same problem, with the same time for each**, so their lists can be laid side by side. A florist with a slow Monday who gives five minutes each to two methods is running a method pair.

The what-if round runs for five minutes. **"What if the ice were free?" "What if one group had the whole rink?" "What if the lights were off?"** Rafe writes eight what-ifs and the first idea each one suggests, from a free first visit to a glow-stick skate in the dark. Some are silly, which is fine at this stage.

The what-if round runs for five minutes



What if the ice were free?



What if one group had the whole rink?



What if the lights were off?

The worst idea round gets the same five minutes. **Charge double, ban beginners, play opera at full volume** and close the café. Then he looks for the useful piece inside each one. Banning beginners turns round into a session only for beginners, and opera turns into a quiet music afternoon for older skaters.

The worst idea round

Worst idea	Useful piece
Ban beginners	A session only for beginners
Play opera at full volume	A quiet music afternoon for older skaters

Each idea gets a small letter for the method that made it. **W goes beside the what-ifs and B beside the worst ideas**, so the two lists can be mixed later without losing where each idea came from. A tag takes a second to write and saves a guess later.

Each idea gets a small letter



W beside the what-ifs



B beside the worst ideas



Mixed later without losing where each came from

Read side by side, the two lists lean different ways. **The what-ifs change the whole afternoon**, with darkness, free ice and the rink for one group. The worst ideas end in smaller fixes, like a beginners' session or a music theme. Neither list on its own holds both kinds of idea.

The two lists lean different ways

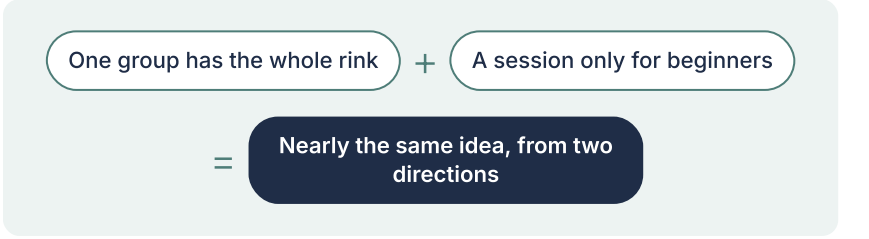
- The what-ifs change the whole afternoon
- The worst ideas end in smaller fixes
- Neither list on its own holds both kinds

> Exercise:
>
> Try it. Take one problem. **Run one method for five minutes, then a second method for five minutes**, on separate sheets.

One idea turns up on both lists. **"One group has the whole rink" and "a session only for beginners" are nearly the same idea**, reached from two directions. An idea that two different methods both

find is worth a second look, because it survived two very different kinds of push.

One idea turns up on both lists



Rafe then feeds the overlap back into the first method. **He writes "What if the beginners were two years old?"** and the answer is parents with toddlers, who are free on a Tuesday afternoon when older children are at school. Penguin-shaped skating frames, which small children push along the ice, are already in the store room.

The overlap goes back into the first method



> **Key Concept:**
>
> Method chain. **A method chain is a run of methods in which an idea made by one becomes the starting point for the next**, so each method works on the last one's result. A youth club that takes a harvest from a worst idea round and asks three what-ifs about it has built a method chain.

Side by side and chained are two different ways to combine. **Side by side shows what each method sees on its own**, which is useful early. Chaining digs into one promising idea, which is useful once something has turned up on both sheets. Rafe uses side by side first and the chain second, in one sitting of twenty minutes.

Two ways to combine

Way	Useful
Side by side shows what each method sees on its own	Early
Chaining digs into one promising idea	Once something turns up on both sheets

Two methods are enough for Rafe, and a third would earn its place only by pulling in a new direction. **Three similar methods give three similar lists**, plus the time to read them all. Rafe considers a third round and stops, because the overlap has already given him a lead worth testing.

Two methods are enough for Rafe

- [x] A third earns its place only by pulling in a new direction
- [x] Three similar methods give three similar lists
- [x] The overlap has already given him a lead



A row of small penguin-shaped skating frames lined up at the edge of the ice.

Complex training courses with several parts showed larger average effects than brief ones (Haase et al., 2025). **That finding is about whole courses**, which is a long way from any two methods on a Tuesday afternoon. It gives no promise that a given pair helps, so Rafe treats his pair as practice too.

That finding is about whole courses



Several parts showed larger average effects



A long way from two methods on a Tuesday



Rafe treats his pair as practice too

A big review of creativity training found that programmes built on thinking skills did well (Scott et al., 2004). **What matters for Rafe is that his two methods differ**, so the second one has something new to add. A pair of two list-making methods would only make a longer list. Rafe's pair passes that test.

What matters is that his two methods differ

- Programmes built on thinking skills did well
- The second one has something new to add
- Two list-making methods only make a longer list

Combining with other people adds one rule. **Each person writes alone in every round.** People working alone have come up with more ideas than talking groups (Mullen et al., 1991). Rafe's two coaches and the café manager join the second sitting, each with their own sheet for each method.

Each person writes alone in every round



More ideas than talking groups



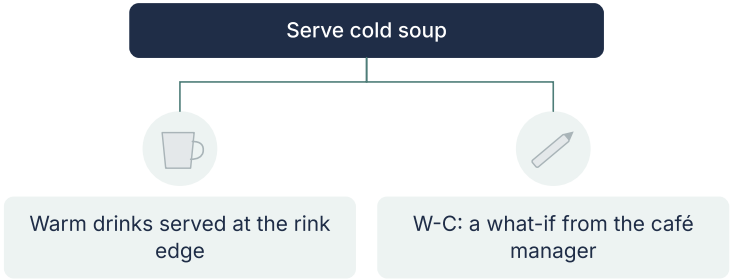
Two coaches and the café manager



Their own sheet for each method

Their sheets add eleven new ideas and one more overlap. **The café manager's worst idea, "serve cold soup", turns into warm drinks served at the rink edge**, which fits the toddler session neatly. The tags now carry initials as well, so W-C means a what-if from the café manager.

Eleven new ideas and one more overlap



> **Key Concept:**
>
> Select step. **A select step is the stage after the idea rounds where ideas are chosen against a few written limits**, and nobody adds new ideas while it runs. A car wash owner with twelve ideas for a quiet winter who picks two against a budget and a date has taken a select step.

Making many ideas and then judging them are two halves of creative work (Cropley, 2006). **Rafe's limits are two staff, a cost under £150 and a start before half-term.** Five ideas pass all three, and the dark glow-stick skate fails on staff, because it needs a marshal on the ice and a second on the lights.

Rafe's limits

- [x] Two staff
- [x] A cost under £150
- [x] A start before half-term

Choosing among your own ideas can go wrong (Rietzschel et al., 2006). **Rafe reads the five passing ideas aloud without their tags**, so he judges the idea itself and the method that made it carries no weight. The

toddler session comes out on top, with the music afternoon for older skaters kept in second place.

Read aloud without their tags



He judges the idea itself



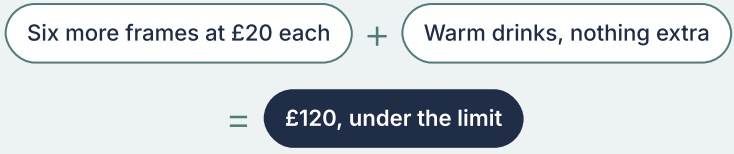
The toddler session comes out on top



The music afternoon in second place

The chosen idea is called Penguin Tuesdays. **Six more frames at £20 each come to £120**, which fits under the limit, and the café's warm drinks cost nothing extra to offer. The first Penguin Tuesday is booked for the week before half-term, with fourteen families signed up by Friday. Two coaches are enough to run it.

Penguin Tuesdays



Nothing here came from a bought kit. **Two methods you already know, a timer and three sheets of paper** did the whole job. A bought kit can be handy, and the thinking still comes from the people holding the pens.

Nothing here came from a bought kit



Two methods you already know



A timer



Three sheets of paper

Work problems suit the same pair. **A hair salon with too many missed appointments** runs five minutes of what-ifs and five of worst ideas. Both lists point to the reminder text, so the select step picks a shorter text sent a day earlier. The salon tries it for a month.

A hair salon with too many missed appointments

- What-ifs and worst ideas, five minutes each
- Both lists point to the reminder text
- A shorter text sent a day earlier

At home a family stuck on a rainy half-term runs the pair at breakfast. **The worst idea "everyone stays in bed all week" turns into one pyjama day**, and the what-if "what if the house were a hotel" turns into a breakfast menu cooked by the children. Both ideas came from the same ten minutes.

A rainy half-term at breakfast

Round	Idea
Everyone stays in bed all week	One pyjama day
What if the house were a hotel	A breakfast menu cooked by the children

A pair is worth its time when one method keeps giving you the same list. **That was Rafe's signal**, two lists of cheaper tickets and posters in a row. When a single method has already produced an idea that passes your limits, take it and save the second method for the next stuck problem.

A pair is worth its time

- [x] When one method keeps giving the same list
- [x] That was Rafe's signal
- [x] Save the second method for the next stuck problem

Three levels close this section, and each one adds one step to your Try it. **The starter tags every idea by its method.** The middle level adds a select step, and the advanced level runs a pair on a real work problem, in writing if others join. Use the problem from your own Try it.

Two methods, one problem, at three levels

> - The starter tags every idea by its method
> - The middle adds a select step
> - The advanced runs a pair on a real work problem

> Exercise:
>
> Two methods, one problem.
>
> 1. Starter. After your Try it, **mark every idea with a letter for the method that made it**.
> 2. Middle. Add a select step with three written limits and choose one idea.

3. Advanced. Run a method pair on a real work problem with criteria from the people it affects (Scott et al., 2004), and if others join, have each person write alone.

Two different methods on one problem



Key idea:

Run **two different methods on one problem**, tag where each idea came from, look for overlaps and finish with a select step against written limits.

Quick check:

What is a method pair? Answer: Two idea methods run one after the other on the same problem, with the same time for each. What is a method chain? Answer: A run of methods where an idea from one becomes the start of the next. When does a select step happen? Answer: After the idea rounds, with nobody adding new ideas.

4.12.1 Choosing a Method for the Difficulty You Are Facing

Imagine Maeve, who manages a small community radio station, at the studio whiteboard on a Monday. **Four problems are written there at once**, from a tired breakfast show to a row about music volume. She knows a good handful of creative methods by now, and every one of them seems to fit every problem.

Four problems written there at once



A tired breakfast show



A row about music volume



Every method seems to fit every problem

Knowing many methods is only half the skill. **The other half is matching a method to the kind of difficulty in front of you**, and no single method suits every problem. In this section I sort Maeve's four problems by what makes each one hard, then pick a method for each. Treat these steps as practice.

Knowing many methods is only half the skill

- Match a method to the kind of difficulty
- No single method suits every problem
- Sort the problems by what makes each one hard

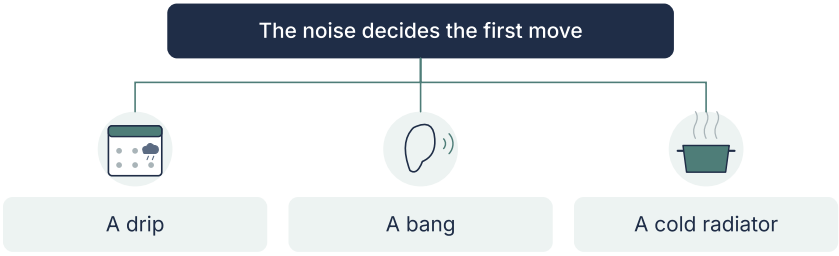
Choosing which ability to use at each step of a task has its own home (see 2.3.4). **Here the choice is between whole methods**, each built for one kind of trouble. The four problems on Maeve's whiteboard make that choice concrete. The question shifts from "which ability?" to "which tool for this job?"

Two kinds of choice

Question	Where
Which ability?	Each step of a task, 2.3.4
Which tool for this job?	Here, between whole methods

A plumber listens to the noise before opening the toolbox. **A drip, a bang and a cold radiator each send her to a different tool**, and the noise decides the first move. The picture stops at the toolbox, because a plumber's tools rarely overlap, and creative methods can do part of each other's job.

A plumber listens to the noise first



> **Key Concept:**
> Difficulty statement. **A difficulty statement is one sentence naming what makes a problem hard**, written before any method is picked. A café owner who writes "Customers queue at the till and leave before ordering" has written a difficulty statement.

Each problem gets one statement in Maeve's own words. **The first says nobody can name what is wrong with the breakfast show.** The second asks for thirty ideas for summer outdoor broadcasts, and the third says every new jingle sounds like the last. The fourth says younger listeners want the music louder and older listeners want it quieter.

Maeve's four difficulty statements

Problem	What is hard
The breakfast show	Nobody can name what is wrong
Summer outdoor broadcasts	Thirty ideas needed
Jingles	Every new one sounds like the last
Music volume	Younger want louder, older want quieter

Writing the statement is harder than it looks. **"We should get a new presenter" is a solution in disguise**, so Maeve crosses it out and writes what is hard. A statement with a fix hidden inside it would steer her straight to that fix and skip every other choice.

A solution in disguise



We should get a new presenter

Maeve crosses it out

She writes what is hard

Methods fall into a few families by the job they do. **Framing methods help when nobody agrees what the problem is.** Idea-making methods help when there are too few ideas, and shake-up methods help when the ideas keep coming out the same.

Methods fall into a few families

- [x] Framing: nobody agrees what the problem is
- [x] Idea-making: too few ideas
- [x] Shake-up: the ideas keep coming out the same

Two more families finish the set. **Trade-off methods help when making one thing better makes another worse**, and judging methods help when there are plenty of ideas and one has to be chosen. The volume complaints already look like a trade-off to her. Most problems belong to one family at a time.

Two more families finish the set



Trade-off: one thing better makes another worse

Judging: plenty of ideas, one to choose

Most problems belong to one family

> Exercise:
>
> Try it. Take one problem of your own. **Name the difficulty in one sentence**, then pick the method family that fits it.

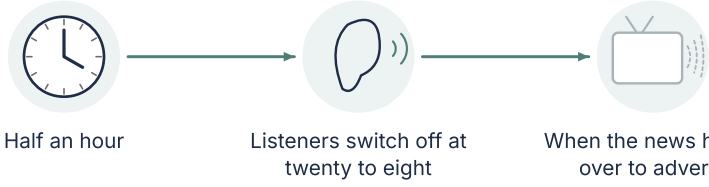
The breakfast show problem is the vaguest. **Framing comes first**, because no idea-making method can help until Maeve knows what the problem is. How a problem gets built matters in creative problem solving (Reiter-Palmon et al., 1998), and this one has no edges yet. Any idea for a tired show would be a guess.

The breakfast show problem is the vaguest

- Framing comes first
- How a problem gets built matters
- Any idea for a tired show would be a guess

She spends half an hour rewriting the problem three ways. **The third version is the one that sticks**, "Listeners switch off at twenty to eight, when the news hands over to adverts." That sentence points somewhere, and the vague feeling of tiredness has become a moment she can work on.

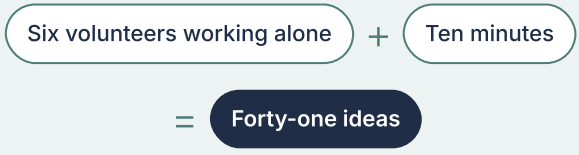
Rewriting the problem three ways



> **Key Concept:**
> Method family. **A method family is a set of methods built for the same kind of trouble, whose members differ in speed, cost and the number of people they need.** A gardener's weeding family holds hand pulling, a hoe and a layer of mulch, and the size of the bed picks between them.

The summer problem needs volume from six volunteers, so it gets the Alone first step from 4.1.2. **Talking groups make fewer and weaker ideas than the same people working alone**, mainly from production blocking (Mullen et al., 1991; Diehl & Stroebe, 1987). Ten minutes give forty-one ideas, from a beach broadcast to a live show from the bakery queue.

The summer problem needs volume



Two of the forty-one ideas match, a request show from the summer fair, written by two volunteers at opposite ends of the long table. **Maeve gives the fair show to the pair of them.** The rest of the list goes into a folder for the summer schedule, sorted by month, with the beach broadcast pencilled in for August.

Two of the forty-one ideas match



A request show from the summer fair



Written at opposite ends of the long table



The rest in a folder, sorted by month

The jingle problem is a shake-up problem. **The ideas exist, and they all sound the same**, so more of the same method would only give more of the same jingle. Maeve picks a random word from a dictionary, “kettle”, and asks how a jingle could sound like a kettle coming to the boil.

The jingle problem is a shake-up problem

- [x] The ideas exist, and they all sound the same
- [x] More of the same method gives more of the same
- [x] A random word from a dictionary

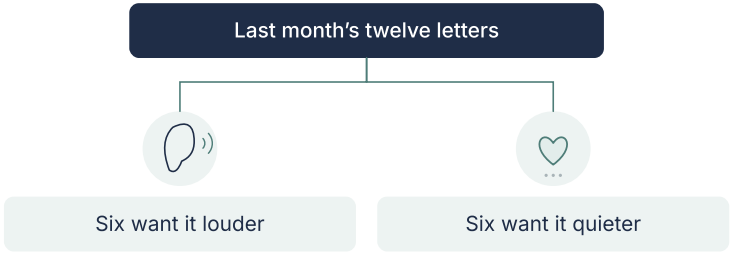
The answer is a jingle that starts quiet and rises to a whistle. **It sounds like none of the station’s other jingles**, and the presenters start humming it by Thursday. The kettle itself never appears, only the rising sound. One random word did what a fourth round of the usual method could never do.



A kettle on a studio desk beside a microphone and a pair of headphones.

The volume problem is a trade-off. **Louder suits one group of listeners and quieter suits the other**, and last month's twelve letters split six and six, so any simple fix leaves half the letter writers unhappy. The evidence on constraints and creativity is mixed (Acar et al., 2019). Maeve treats the clash itself as the thing to work on.

The volume problem is a trade-off



A trade-off method asks whether the two needs can be separated. **They can, by time of day**, with quieter music before nine in the evening and the louder mix after. Each group gets what it wants in the hours it

listens, and nobody has to lose. The evening presenters choose the louder tracks themselves.

The two needs separated by time of day

Hours	Music
Before nine in the evening	Quieter
After nine	The louder mix, chosen by the evening presenters

> **Key Concept:**
> Method mismatch. **A method mismatch is using a method from one family on a difficulty that belongs to another**, and the real difficulty stays where it was. A club arguing about two kit colours that holds a long idea session is in a method mismatch, because more ideas only make more to argue about.

Every family ends the same way. **Once a method has made its options, a judging step picks one** against the real limits of the job (Cropley, 2006). The breakfast show, the summer list, the jingle and the music plan each get that step before anything goes on air. For the jingle, the judge is whether it fits the station's sound.

Every family ends the same way



A big review of creativity training looked at how programmes matched what they taught to the skills they aimed to build (Scott et al., 2004).

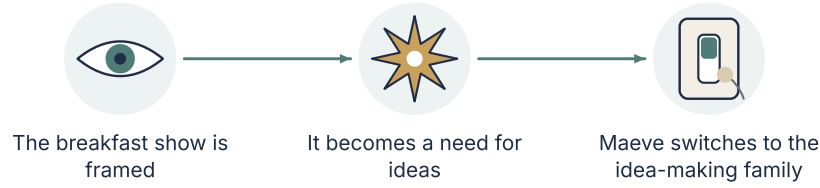
Maeve's sorting is a small, everyday version of that match. She photographs the whiteboard as a record of which family suited which kind of trouble, with the family and the result written beside each problem.

Maeve's sorting is an everyday match

- A review matched training to the skills it aimed to build
- She photographs the whiteboard
- The family and the result beside each problem

A difficulty can change halfway through. **Once the breakfast show is framed, its problem becomes a need for ideas** about the twenty-to-eight slot, so Maeve switches to the idea-making family. Watching for that change keeps a method from running on after its job is done. A method that has done its job gets put down.

A difficulty can change halfway through



Sometimes two families both seem to fit. **Start with whichever is quicker to try**, and switch if it stalls. A ten-minute shake-up round costs less than an afternoon of framing, so it gets the first go whenever Maeve cannot decide between the two. If the shake-up round gives nothing new, framing is next.

When two families both seem to fit

Try	Costs
A shake-up round	Ten minutes, so it gets the first go
Framing	An afternoon, next if the round gives nothing new

A car garage can sort its trouble this way. **“Customers never collect their cars on time”** turns out to be a framing problem, because nobody knows why and nobody had asked the customers. Three rewrites later the difficulty is that pick-up texts go out after five, when most customers are still at work. The fix is a text at noon.

A car garage sorts its trouble



A family with tense Sunday lunches can use the same first step. **Their difficulty statement reads “Nobody enjoys Sunday lunch, and nobody knows why”**, which marks it for framing. Rewritten, it becomes “The cooking falls on one person, who arrives at the table worn out.” That sentence points to a rota, and the rota is the next week’s job.



A family kitchen on a Sunday, with one person cooking at the stove while the others sit at the table.

Some problems need no creative method at all. **A broken transmitter needs an engineer**, and a missing licence needs a form filled in. A difficulty statement makes that plain, because a sentence like “The transmitter is broken” has only one sensible answer. Maeve rings the engineer and saves her methods for the problems that need them.

Some problems need no creative method at all

- [x] A broken transmitter needs an engineer
- [x] A missing licence needs a form filled in
- [x] Save methods for the problems that need them

The closing exercise gives three ways the choice can play out, one for each kind of trouble. **The starter is for an unclear difficulty**, the middle level for a group that needs many ideas and the advanced level for a real work problem. Each level uses the problem from your Try it.

Matching methods to difficulties, at three levels



The starter: an unclear difficulty

The middle: a group that needs many ideas

The advanced: a real work problem

> Exercise:
>
> Matching methods to difficulties.
>
> 1. Starter. If the need is unclear, **start with problem construction** before any idea-making method.
> 2. Middle. If a group needs many ideas, have everyone write alone first.
> 3. Advanced. For a real work problem, pick a method and add a judging step (Cropley, 2006; Scott et al., 2004).

Key idea:

Name the difficulty before you pick the method, choose from the family that fits that kind of trouble and finish with a judging step.

Name the difficulty before you pick the method



Quick check:

What is a difficulty statement? Answer: One sentence naming what makes a problem hard, written before any method is picked. Which family comes first when nobody knows what the problem is? Answer: Framing. What is a method mismatch? Answer: Using a method from one family on a difficulty that belongs to another.

4.12.2 Learning From Creative Work: Study, Reconstruct, Vary and Create

Imagine Lotte, who sells handmade greeting cards from a stall at a monthly craft fair. **At the stall opposite, a pop-up card stops her in her tracks.** When it opens, a paper fox rises out of a hedge, and three people buy one while she watches. She buys one too and carries it home in her coat pocket.

A pop-up card stops her in her tracks

- The stall opposite
- Three people buy one while she watches
- She carries one home in her coat pocket

Other makers' cards have pleased Lotte for years, and she has never taken one apart. **Learning from it runs in four steps**, studying the work, reconstructing it from what you learned, changing one part and making something of your own. In this section Lotte takes the fox card through all four steps. Treat these steps as practice.

Learning from it runs in four steps

- [x] Studying the work
- [x] Reconstructing it from what you learned
- [x] Changing one part, then making something of your own



A pop-up greeting card standing open, with a paper fox rising out of a green paper hedge.

The apprentice habit of copying a master and then changing things has its own home (see 1.2.2). **The new point here is the order of the four steps**, and what each one adds. Studying shows the parts, reconstructing tests whether you really saw them, and the last two steps turn what you learned into new work.

The new point here is the order

Step	What it adds
Studying	Shows the parts
Reconstructing	Tests whether you really saw them
The last two steps	Turn what you learned into new work

A mechanic learning a new engine takes it apart on a clean sheet, labels every piece and puts it back together. **Only then does she try a change**, such as a different filter. The picture stops at the engine, because engine parts are fixed, and the parts of a creative work can be reshaped in endless ways.

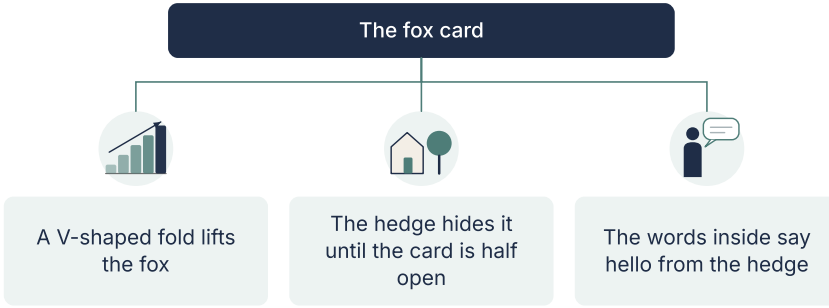
A mechanic learning a new engine

> - Takes it apart on a clean sheet
> - Labels every piece and puts it back together
> - Only then does she try a change

> 🔑 **Key Concept:**
>
> Working part. **A working part is a piece of a creative work that does a job for the person who meets it**, such as making them laugh, wait or look closer. In a radio advert, the pause before the price is a working part, because it makes listeners lean in.

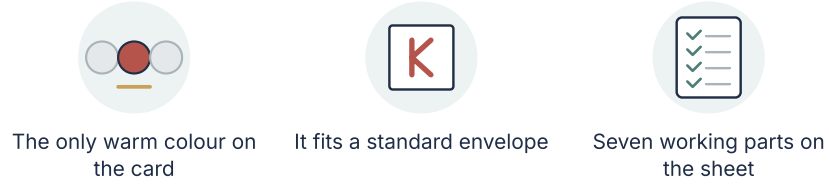
Lotte studies the card at the kitchen table with a pencil and a sheet of paper. The fair's noise is gone, and she can look slowly. **She lists every working part she can find.** A V-shaped fold lifts the fox, the hedge hides it until the card is half open, and the words inside say hello from the hedge.

She lists every working part she can find



The list grows as she looks harder. **The orange of the fox is the only warm colour on the card**, which pulls the eye straight to it. The card fits a standard envelope, so it posts without a fuss. Seven working parts end up on the sheet, each with one line on the job it does.

The list grows as she looks harder



How the parts connect matters as much as the parts themselves. **The fox only surprises because the hedge hides it**, so the fold and the hedge work as a pair. Take away either one and the card falls flat. Studying the relations between parts is what lets a pattern carry over to a new case (Gentner, 1983).

How the parts connect matters

- Take away either one and the card falls flat
- Studying the relations between parts
- Lets a pattern carry over to a new case

The card gets two readings, once as a buyer and once as a maker. **The buyer's reading notes what she feels**, a small jump of surprise and then a smile. The maker's reading hunts for what causes each feeling, and every cause she finds goes on the list as a working part.

The card gets two readings

Reading	Notes
As a buyer	What she feels, a small jump of surprise and then a smile
As a maker	What causes each feeling

> Exercise:
>
> Try it. Pick one short creative work you admire. **Study it for ten minutes**, and list its parts with one line on what each part does.

Reconstructing comes next, with the fox card shut away in a drawer. **Lotte makes a plain white version from her list alone**, using printer paper and a glue stick. Her own words describe each part, so the list has to carry everything she learned. The drawer stays shut until the reconstruction is done.

Reconstructing comes next



The fox card shut away in a drawer

A plain white version from her list alone

Printer paper and a glue stick

Plain materials keep the reconstruction honest. **White paper shows only the structure**, with no colour to hide a weak fold or a clumsy cut. Colour and lettering wait until the structure works, because they are the easiest parts to change and the least likely to fail. Plain paper is cheap enough to waste.

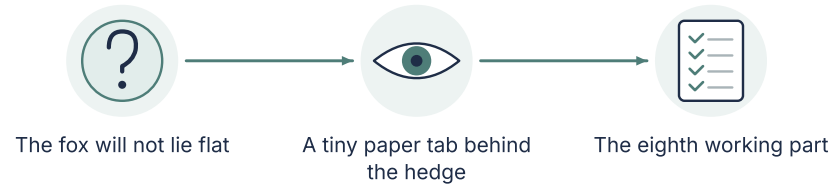
Plain materials keep the reconstruction honest

- [x] White paper shows only the structure
- [x] Colour and lettering wait
- [x] Plain paper is cheap enough to waste

> **Key Concept:**
>
> Reconstruction. **A reconstruction is a test of your own study, where the copy you make shows what your notes caught and what they missed.** A choir singer who sings her part from memory and then checks the printed score finds the two bars her ear skipped.

The first reconstruction fails usefully. **The fox will not lie flat when the card closes.** Lotte takes the original out of the drawer and finds a tiny paper tab behind the hedge, which she had missed. The tab goes on the list as the eighth working part. She cuts one from printer paper for the next attempt.

The first reconstruction fails usefully



Her second reconstruction works. **It opens, the fox rises and the card closes flat** in the white paper version. She folds it open and shut twenty times to be sure. Lotte now knows the card well enough to explain why it works, which is more than she knew from admiring it at the fair.

Her second reconstruction works

- It opens, the fox rises and the card closes flat
- Folded open and shut twenty times
- She can explain why it works

Knowledge feeds new ideas (Cropley, 2006). **The reconstructed card is Lotte's new knowledge in paper form**, and every part on the list is now something she can change on purpose. Before the study she could only admire the fox, and now she can work with it. The list and the reconstruction are her study notes.

Knowledge feeds new ideas



The reconstructed card in paper form



Every part now something she can change



The list and the reconstruction are her study notes

Varying starts from the tested white reconstruction. **Lotte keeps the fold, the hiding and the single warm colour**, and changes the subject. A hot-air balloon rises from behind a range of paper hills, in the one orange on a blue and green card. Changing one part keeps the cause of any new problem easy to find.

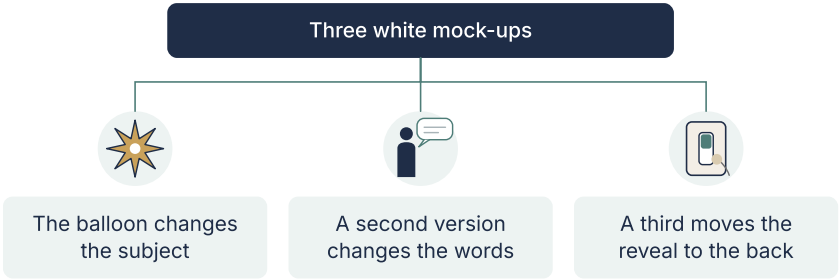
Varying starts from the tested reconstruction

Kept	Changed
The fold, the hiding and the single warm colour	The subject
Behind a range of paper hills	A hot-air balloon rises

> **Key Concept:**
>
> Departure point. **A departure point is the one part of a studied work you choose to change first**, with every other part kept for now. A busker who keeps a song's tune and rhythm and writes new words about the town has picked the words as the departure point.

She tries three departure points in all. **The balloon changes the subject**, a second version changes the words to "Up and away", and a third moves the reveal to the back of the card. Three white mock-ups sit side by side on the table by the end of the evening.

Three departure points



Choosing which version to keep is a skill of its own (Silvia, 2008). **Lotte asks one question of each mock-up**, whether it still gives the little shock of the fox, which comes straight from her buyer's reading. The balloon does, the new words alone feel thin and the back-of-card reveal loses the surprise.

One question of each mock-up

Mock-up	The little shock of the fox?
The balloon	Yes
The new words alone	Feel thin
The back-of-card reveal	Loses the surprise

Creating is the last step, where the varied version becomes a card of her own. **The balloon card gets colour, her own words and a fold she has tested**, and it leaves the fox behind. "Wish you were up here" goes inside, a line nobody else at the fair has used.

Creating is the last step

- [x] Colour, her own words and a tested fold
- [x] It leaves the fox behind
- [x] Wish you were up here goes inside

Twenty balloon cards go on Lotte's stall the next month, and fourteen sell, so she makes twenty more. **The maker of the fox card stops by and laughs**, because she can see the hedge in the hills. Lotte tells her where the idea started, which is simple good manners between makers.

Twenty balloon cards the next month



Fourteen sell, so she makes twenty more



The maker of the fox card laughs



Lotte tells her where the idea started



A craft fair stall with a row of balloon pop-up cards standing open on a cloth.

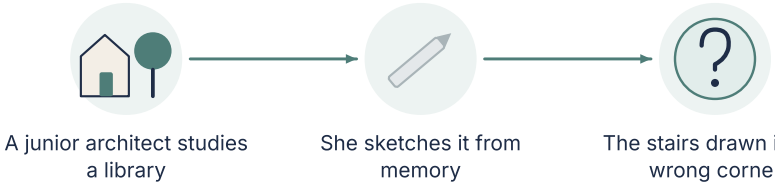
Learning from a work and copying it are different things. **The fox card itself never goes on sale at Lotte's stall**, and her two reconstructions stay in her drawer as study pieces, beside the three white mock-ups. Only the version with her own subject, words and colours goes out under her name.

Learning from a work and copying it

Stays in the drawer	Goes out under her name
The fox card and her two reconstructions	Only the version with her own subject, words and colours
The three white mock-ups	The balloon card

The same four steps fit work. A junior architect studies a library she admires, lists its working parts, sketches it from memory and then changes the entrance for a school she is designing. Her tutor holds the sketch beside the photos and finds the stairs drawn in the wrong corner.

The same four steps fit work



One work can teach only so much. **Lotte stops studying the fox card once her own versions no longer remind anyone of it**, and picks a new work to study, a folded paper lantern from a museum shop. The lantern has no picture at all, so every one of its working parts sits in a fold.

One work can teach only so much

> - Stop once your versions no longer remind anyone of it
> - A folded paper lantern from a museum shop
> - Every working part sits in a fold

At home the four steps can start from a favourite song. **A teenager learning guitar studies a chorus**, plays it back from memory, changes one chord and ends up with the start of a song of his own. He records it on his phone the same night. The chord he changed is his departure point.

A teenager learning guitar



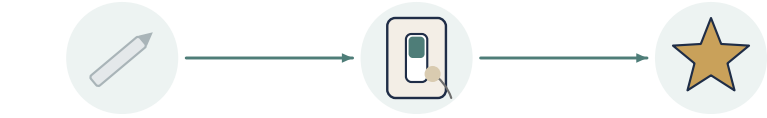
Picking the work to study is a choice worth a minute. **Lotte's rule is a short work she admires, a little beyond her current skill**, small enough to study in one evening. A whole novel or a cathedral would be too big for one study, and a work far below her level would leave nothing new to find.

Lotte's rule for picking the work

- [x] A short work she admires
- [x] A little beyond her current skill
- [x] Small enough to study in one evening

Each level of the closing exercise takes your Try it work one step further. **The starter reconstructs your study in your own words.** The middle level varies one part into a new version, and the advanced level runs the full cycle once in your own field. Keep the work you studied for the Try it.

Study, reconstruct, vary, create, at three levels

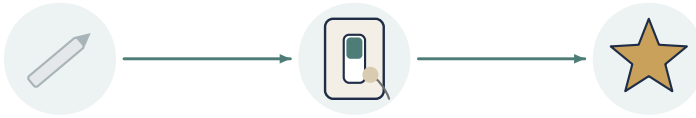


> Exercise:
>
> Study, reconstruct, vary, create.
>
> 1. Starter. **Reconstruct the parts in your own words**, with the original out of sight.
> 2. Middle. Vary one part and create a new version.
> 3. Advanced. In your own field, run the study, reconstruct, vary and create cycle once.

Key idea:

Study a work's parts and how they connect, reconstruct it from your notes, change one part at a time and finish with a version that is yours.

A work's parts and how they connect



Quick check:

What is a working part? Answer: A piece of a creative work that does a job for the person who meets it. Why keep the original out of sight during a reconstruction? Answer: So the gaps in your study show up. What is a departure point? Answer: The one part of a studied work you choose to change first.

4.12.3 Practising Through Writing, Images, Music, Movement and Making

Imagine Femi, the activities organiser at a small care home, with her notebook open. **For three weeks she has written lists of ideas for the hour after lunch**, when most residents doze in the lounge. Every list says quiz, bingo or a film. She closes the notebook and walks into the lounge with a pencil and a blank sheet.

Three weeks of lists for the hour after lunch

- Most residents doze in the lounge
- Every list says quiz, bingo or a film
- A pencil and a blank sheet

Pictures, sound, movement and making each show a problem from a different side, and Femi wants the ideas her written lists keep missing. Researchers have compared creative work in five fields side by side, on the view that creativity has general and field-specific sides (Glaveanu et al., 2013). In this section Femi tries four thinking forms besides words. Treat these steps as practice.



A care home lounge after lunch, with armchairs in a row facing a television.

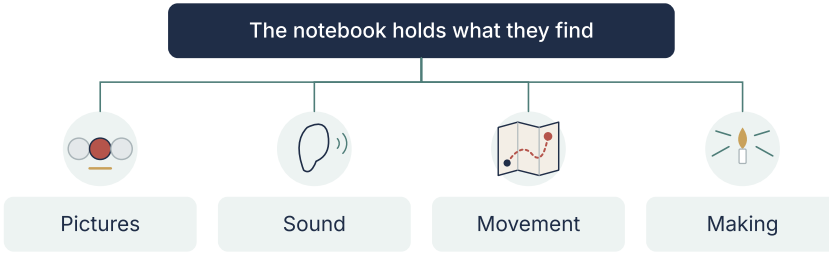
The lists all start from the same two words. **"Afternoon activity" calls up quiz, bingo and a film every time she writes it.** Her pen seems to know those three answers by heart. She decides to try other thinking forms for a week, to see whether they make her notice different things.

The lists all start from the same two words

- Afternoon activity
- Quiz, bingo and a film every time
- Other thinking forms for a week

The notebook still has a job at the end. **It will hold whatever the other thinking forms find**, one sentence at a time. The change is only in where the thinking starts, which for this week is anywhere except a list. A blank sheet on a clipboard goes with her from room to room.

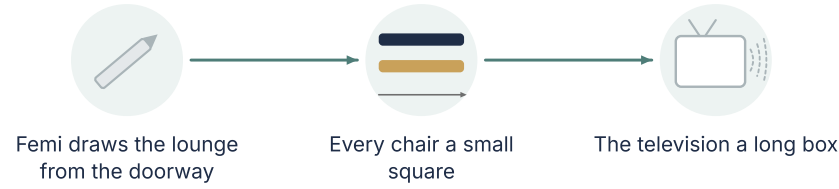
Four thinking forms besides words



> **Key Concept:**
>
> Thinking form. **A thinking form is one kind of material or sense you think through**, picked on purpose for a piece of work. A gardener who plans a new bed by laying out pots on the grass is working in the thinking form of making.

A picture comes first. **Femi draws the lounge from the doorway**, every chair as a small square and the television as a long box. Working with sketches as a way of thinking has its own home (see 3.3.2), so here the sketch is one of several thinking forms she tries in a row.

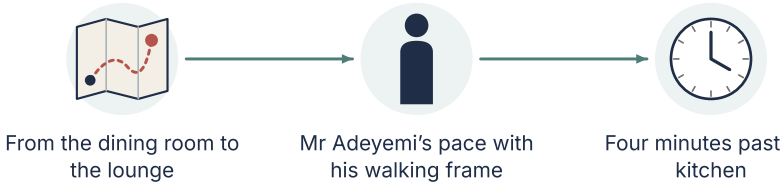
A picture comes first



The sketch shows something her lists never did. **All fourteen chairs face the television in two straight rows.** Nobody can see anyone else's face without turning round, and Femi counts the chairs twice to be sure. The room is set up for watching, and the residents do what the room asks.

Movement comes next. **Femi walks the route a resident takes from the dining room to the lounge**, at the pace of Mr Adeyemi with his walking frame. The walk takes four minutes and runs past the kitchen, where trolleys rattle and the floor is still wet from mopping. She times it on her watch.

Movement comes next



By the time she reaches the lounge, Femi is tired and a little cross. **Anyone arriving that way would want to sit down and close their eyes.** The dozing she has been trying to fix starts in the corridor, long before anyone reaches a chair. Mr Adeyemi makes that walk every day.

The dozing starts in the corridor

- Femi is tired and a little cross
- Anyone arriving that way would want to sit down
- Long before anyone reaches a chair

> **Key Concept:**
>
> Body sketch. **A body sketch is acting out part of an idea or a problem with your own body**, quickly and roughly, to feel how it works in space and time. A shop owner who pushes a pram through her own aisles to check the gaps is making a body sketch.

Sound is the third thinking form. **Femi sits in the lounge for ten minutes and lists every sound she hears**, the television, a ticking clock, the tea trolley and a door closing. There is no music and almost no talk. Then a resident hums three bars of an old song, and two others look up.

Sound is the third thinking form

In the lounge	Missing
The television, a ticking clock	Music
The tea trolley and a door closing	Almost no talk

The humming is the finding. **In that lounge, three bars of a song did what the television never had**, and people looked at each other. Femi asks the resident the name of the tune, and she says it was the last waltz at the town hall dances in 1962. Femi adds the tune to the sound list.

The humming is the finding



Three bars of an old song



People looked at each other

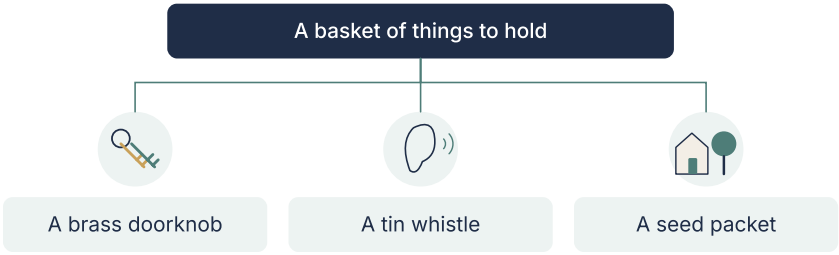


The last waltz at the town hall dances in 1962

> Exercise:
>
> Try it. Take one problem of your own. **Work on it in one thinking form besides prose**, a sketch, a short movement or a list of sounds.

Making is the fourth thinking form. **Femi fills a wicker basket with things to hold**, a brass doorknob, a wooden clothes peg, a tin whistle and a seed packet. She puts it on the tea table in the lounge and leaves the lid off. Two residents pick up the clothes peg and start talking about washing days.

Making is the fourth thinking form



Every object in the basket has passed a quick safety look. **Nothing is sharp, heavy or small enough to swallow**, and each piece fits in one hand. The doorknob came from Femi's own shed and the peg from the laundry, so the basket costs nothing to fill.

A quick safety look

- [x] Nothing sharp, heavy or small enough to swallow
- [x] Each piece fits in one hand
- [x] The basket costs nothing to fill

The talk about washing days runs for twenty minutes. **Each object hands a resident a story from their own life**, the mangle, the copper and the line across the yard. Bingo gives everyone the same numbers, and the basket gives each person something only they can say. Nobody looks at the clock.

Each object hands a resident a story



The mangle



The copper



The line across the yard

Each thinking form has shown her something, and the staff meeting is on Thursday. **Femi turns each finding into one written sentence**, ready to pin on the staff board. Four thinking forms give her four sentences to bring to the meeting, where the manager has asked for ideas that cost little.

Each finding becomes one written sentence

- Ready to pin on the staff board
- Four thinking forms, four sentences
- Ideas that cost little

Key Concept:

Translation. **A translation is the single written sentence that carries what a non-word thinking form showed into a plan someone can act on.** A stage manager who walks an actor's entrance and then writes "Enter from the left after the bell" has made a translation.

From the sketch comes a plan for staff to set the lounge chairs in three small circles before lunch ends. **From the walk comes a rest chair by the garden window**, halfway along the corridor, and Mr Adeyemi's daughter offers a cushion for it. Each translation fits on one line.

From thinking form to plan

Thinking form	Translation
The sketch	Chairs in three small circles before lunch ends
The walk	A rest chair by the garden window

The sound list turns into one old song played as the first residents arrive. **The basket becomes a basket on every tea table**, filled with objects from the residents' working lives. Four sentences now sit on one card, each from a different thinking form, and none of them is a quiz. The manager reads it before anyone else.

Two more translations

Thinking form	Translation
The sound list	One old song as the first residents arrive
The basket	A basket on every tea table

Judging the ideas comes after making them, against the real conditions of the home (Cropley, 2006). **Two staff are on duty after lunch**, so the chairs and the song cost nothing extra, and the rest chair needs one spare armchair from the store. The baskets need objects, and the residents' families are glad to send them.

Judged against the real conditions of the home



Two staff on duty after lunch



One spare armchair from the store



Objects from the residents' families

Laid side by side, two of the thinking forms point the same way. **The sketch and the walk both blame the room's set-up**, one from above and one from the corridor. Femi takes that agreement as her reason to try the chairs first. The song and the baskets wait for the second week.

Two thinking forms point the same way

- [x] The sketch and the walk both blame the room's set-up
- [x] Try the chairs first
- [x] The song and the baskets wait for the second week



Residents sitting in a small circle of armchairs, one of them holding a wooden clothes peg.

The first week of the new afternoon shows the change. **Nine residents are still awake and talking at half past two**, where before most were asleep. Mr Adeyemi stops at the rest chair every day to watch the birds on the feeder, and he arrives in the lounge ready to talk. Two residents ask for the circles to stay.

The first week of the new afternoon



Nine residents awake and talking at half past two



Mr Adeyemi stops at the rest chair



Two residents ask for the circles to stay

One resident likes the old quiet. **Mrs Okonjo asks to keep her chair facing the lounge window**, and it stays that way, because the birds on the feeder are her afternoon. A plan found in one thinking form can suit most of the room and still leave space for the one person who wants the afternoon as it was.

One resident likes the old quiet

- Mrs Okonjo keeps her chair facing the window
- The birds on the feeder are her afternoon
- Space for the one person who wants it as it was

Some people sketch easily and freeze when asked to act something out, and others are the reverse. **Femi's habit now is to pick the thinking form that feels a little awkward.** Care work is full of movement and talk, so the walk and the song came easily to her, and the sketch, her strange thinking form, found the chairs.

Pick the thinking form that feels a little awkward



The walk and the song came easily



The sketch was her strange thinking form



It found the chairs

A bus route planner can practise this at work. **She rides the route herself with a shopping trolley**, sketches each stop from the pavement and lists the sounds at the busiest one. The trolley ride shows a stop where the kerb is too high, which no timetable could have told her. The kerb goes on her list for the council.

A bus route planner rides the route herself



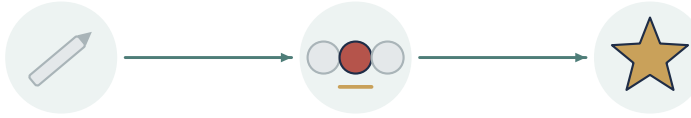
At home a family stuck on a crowded hallway can try two thinking forms in an evening. **One person sketches the hallway from the front door**, and another walks in with a school bag and a wet umbrella. The walk shows the coat hooks are behind the door, so the coats move to the opposite wall. It takes ten minutes.

A crowded hallway in an evening

- One person sketches it from the front door
- Another walks in with a school bag and a wet umbrella
- The coats move to the opposite wall

Your closing exercise starts from your Try it thinking form and adds one step at a time. **The starter turns that thinking form back into a single translation.** The middle level adds a second thinking form, and the advanced level uses one your own field already relies on. Keep the problem from your Try it.

One problem, many thinking forms, at three levels



The starter: one translation

The middle adds a second thinking form

The advanced uses one your field relies on

Exercise:

One problem, many thinking forms.

1. Starter. **Translate your Try it thinking form back into one written sentence.**
2. Middle. Work on the same problem in a second thinking form, and compare what the two thinking forms showed.

3. Advanced. Use a thinking form your own field relies on, such as plans for a builder or a rehearsal for a teacher (Scott et al., 2004).

Key idea:

Work on a stuck problem in more than one thinking form, pictures, sound, movement or making, then translate each finding back into one plain sentence.

More than one thinking form



Pictures, sound, movement or making

Translate each finding

One plain sentence

Quick check:

What is a thinking form? Answer: One kind of material or sense you think through. What is a body sketch? Answer: Acting out part of an idea or a problem with your own body to feel how it works. What does a translation do? Answer: It carries what a non-word thinking form showed into one written sentence someone can act on.

4.12.4 Applying Creativity at Home, at Work and in Everyday Decisions

Imagine Kwame, who manages a high-street pharmacy, sitting in his car outside work. **His week holds three problems at once.** The pharmacy phone never stops, he and his wife share her car across two shifts, and his own old car needs a costly repair. He turns the engine off and writes all three on the back of a parking ticket.

His week holds three problems at once



Creativity in everyday settings such as the workplace and the home has its own line of research (Kaufman & Beghetto, 2009). **This week Kwame needs his methods at home, at work and in the small decisions in between.** In this section he takes one method into each, and each place changes how it runs. Treat these steps as practice.

Everyday settings

- At home
- At work
- The small decisions in between



A man sitting in a parked car, writing on the back of a parking ticket against the steering wheel.

Each of Kwame's problems sits in a different part of his life. **The pharmacy has head office rules, a team and customers**, the car share has his wife, two shifts and a school run, and the repair decision is his alone, with a garage quote that stays open for a month.

Each problem sits in a different part of his life

Problem	Who is involved
The pharmacy	Head office rules, a team and customers
The car share	His wife, two shifts and a school run
The repair	His alone, a quote open for a month

Moving between these parts of his life changes who decides. **At work Kwame can decide and explain later**, at home every choice needs two yeses, and the repair is his call alone. Knowing who decides tells him who should share the ten minutes. At home that means both of them, on Sunday evening.

Moving changes who decides



At work Kwame can decide and explain later



At home every choice needs two yeses



The repair is his call alone

> **Key Concept:**
>
> Arena. **An arena is one area of life with its own people, rules and pace**, so the same method needs adjusting each time it moves to a new one. A teacher who plans lessons with a department at school and plans meals with two teenagers at home is working in two arenas. The school has a timetable and a head, and the kitchen has neither.

The pharmacy comes first, because it costs the most time. **Kwame gives the phone problem ten minutes in Tuesday's quiet hour**, before the lunchtime rush. He writes ideas as fast as he can, from a recorded message to a text that goes out when each prescription is bagged.

The pharmacy comes first



Ten minutes in Tuesday's quiet hour



A recorded message



A text when each prescription is bagged

Before the ten minutes start, the phone problem gets one rewrite. **"The phone rings too much" becomes a sentence about people who cannot tell when to come in**, and that points to quite different ideas.

Problems with no clear edges reward time spent deciding what the problem is (Reiter-Palmon et al., 1998).

The phone problem gets one rewrite

Before	After
The phone rings too much	People who cannot tell when to come in

> Exercise:
>
> Try it. Pick one difficulty at home or at work. **Apply one method to it for ten minutes**, and keep everything you write.

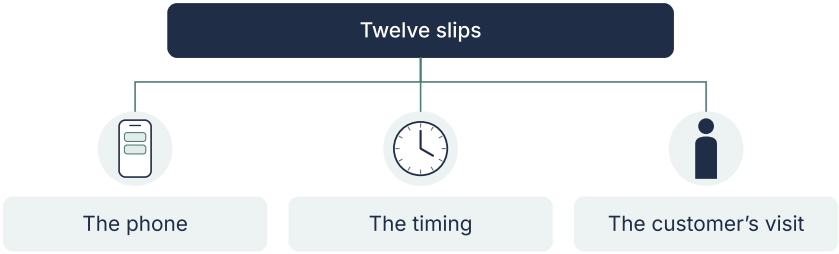
At work other people join in, and his team of four has ideas of its own. **Each of them writes ideas alone on a slip of paper.** Talking groups make fewer and weaker ideas than the same people working alone, mainly from production blocking (Mullen et al., 1991; Diehl & Stroebe, 1987). Twelve slips come back by evening, three of them suggesting a text.

His team of four writes alone

- [x] Each idea on a slip of paper
- [x] Twelve slips come back by evening
- [x] Three of them suggest a text

The twelve slips get read that evening. **He groups them by what they would change**, the phone, the timing or the customer's visit. The text idea leads the biggest group, and one odd slip suggests a window board listing the surnames of everyone whose bag is ready.

He groups them by what they would change



Head office sets a firm limit. **Any message to customers must use the approved wording and no names of medicines.** The text idea survives that limit, because "Your prescription is ready to collect" names nothing private. This limit shapes the wording and rules nothing else out. The window board fails at once, because surnames on glass are private.

Head office sets a firm limit



The car share is the home problem. **Kwame's home runs at a slower pace, with the people closer**, and nobody can be told what to do. Kwame and his wife give it ten minutes on Sunday evening, each drawing the week as seven boxes with the car's trips marked inside them.

The car share is the home problem

- A slower pace, with the people closer
- Ten minutes on Sunday evening
- The week drawn as seven boxes

The two drawings disagree on Wednesday. **Kwame thought Wednesday was free, and his wife has a night shift starting at seven.** The drawing finds the clash in a way a conversation in the hallway never did. They mark Wednesday in red and look for ideas for that one day, with the other six days already working.

The two drawings disagree on Wednesday



Kwame thought Wednesday was free



A night shift starting at seven



Wednesday marked in red

Ideas at home have feelings attached. **A lift from a neighbour on Wednesdays is the quickest fix**, and his wife shakes her head at it. They choose a bus for Kwame on Wednesdays, which takes twenty minutes longer and costs £3.40 each way. The stop is a five-minute walk from the pharmacy.

Ideas at home have feelings attached

Idea	Result
A lift from a neighbour on Wednesdays	His wife shakes her head
A bus for Kwame on Wednesdays	Twenty minutes longer, £3.40 each way

The repair decision is the third arena, the small everyday choice. **Nobody else is involved, and the quote stays open for a month.** Kwame has three options, pay £900 for the repair, buy a second-hand car, or cycle to work for a while and see. The garage has put its quote in writing.

Three options for the repair



Pay £900 for the repair



Buy a second-hand car



Cycle to work for a while and see

Writing the tests an idea must pass before you look at the options has its own home (see 4.1.3). **The new point here is how big the decision is**, because the size of what is at stake decides how much method it deserves.

How big the decision is

- Tests before options have their own home, 4.1.3
- The new point is the size of what is at stake
- It decides how much method it deserves

Key Concept:

Stakes. **The stakes of a decision are what you stand to lose if it goes wrong**, in money, time or goodwill. A couple choosing a paint colour for the spare room have low stakes, and the same couple choosing a house have high ones. A wrong colour costs a weekend and a tin of paint.

The repair carries high stakes, £900 that cannot be got back. **The second-hand car carries higher stakes still**, with an unknown history and a loan that would run for three years. Cycling for a while carries almost none, because the bike is already in the shed and the choice can end any day.

The stakes of the three options

Option	Stakes
The repair	£900 that cannot be got back
The second-hand car	Higher still, a loan for three years
Cycling for a while	Almost none, the bike is in the shed

Stakes are more than money. **Asking a neighbour for Wednesday lifts would have cost goodwill**, a small debt his wife had no wish to carry. Counting that kind of cost is why the slower bus won at home. His wife agrees it was the right call.

Stakes are more than money



Wednesday lifts would have cost goodwill

A small debt his wife had no wish to carry

The slower bus won at home

> **Key Concept:**
>
> Reversible choice. **A reversible choice is one you can undo cheaply if it turns out wrong**, which makes it a safe first move while a bigger choice waits. A shop owner who moves a display for a week before buying new shelves is making a reversible choice. If sales fall, the display goes back by Monday.

The reversible choice goes first. **He cycles the four miles to the pharmacy for two weeks**, with the repair quote pinned to the fridge. Wednesdays stay on the bus, because he closes late that day and the ride home would be in the dark. If cycling fails, the repair or the car is still there to choose.

The reversible choice goes first



Four miles for two weeks



The repair quote pinned to the fridge



Wednesdays stay on the bus

Each ride gets one line on the back of the quote, with the weather and the minutes. **Eight dry rides take twenty-two minutes each, and two wet ones take thirty.** The notes turn a vague worry about cycling into numbers he can judge at the end of the month.

One line for each ride

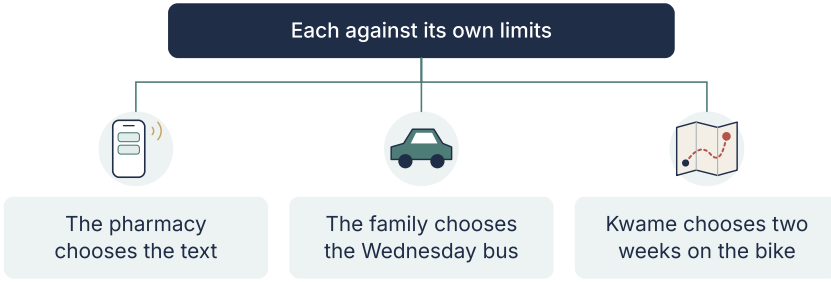
Rides	Minutes each
Eight dry rides	Twenty-two
Two wet ones	Thirty



A man in a pharmacy jacket locking a bicycle to a rail outside a shop at the start of the day.

Choosing comes only after the options are out, in every arena (Cropley, 2006). **The pharmacy chooses the text**, the family chooses the Wednesday bus and Kwame chooses two weeks on the bike. Each choice is checked against the limits of its own arena, head office wording, his wife's dislike of favours and the month-long quote.

Choosing comes only after the options are out



Two weeks later the results are in. **Calls to the pharmacy have dropped by about a third**, by the team's own tally on a sheet under the counter, and the phone rarely rings before ten. The Wednesday bus

works, and the bike works on dry days. Kwame sells the old car for scrap and keeps the bike.

The same habit can cover a whole day. **Each problem gets its arena named first**, then a method sized to its stakes. A small, reversible problem gets five minutes and a quick try, and a big one gets the full ten minutes, other people's slips and written tests. The whole sort fits on the back of any ticket.

Each problem gets its arena named first

- [x] A method sized to its stakes
- [x] Small and reversible: five minutes and a quick try
- [x] Big: ten minutes, slips and written tests

The habit travels to other jobs. **A nursery manager facing staff who all want August off** names her arena, writes ideas alone with her deputy and checks each against the rule on staff numbers per child. The choice is a swap list, which can be undone if it fails. Two staff agree a swap by Friday.

A nursery manager facing staff who all want August off



At home it can settle smaller things. **A family deciding where to go on a free Saturday** sees low stakes and an easy reversal, so five minutes of ideas and a vote is enough, and nobody writes anything down. They try the canal path, and if it rains they come home.

A free Saturday

- Low stakes and an easy reversal
- Five minutes of ideas and a vote
- The canal path, home if it rains

Your closing exercise builds on the difficulty from your Try it. **The starter adds written criteria before you choose.** The middle level brings in other people with written ideas first, and the advanced level takes a real work problem with its limits. All three levels keep the same difficulty.

Methods where you live and work, at three levels



Exercise:

Methods where you live and work.

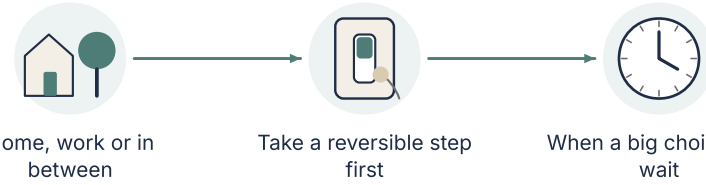
1. Starter. **Write your decision criteria before choosing** an option.
2. Middle. If other people are involved, have everyone write ideas first.

3. Advanced. Take a real workplace difficulty with its limits (Acar et al., 2019), and apply a method to it (Puccio et al., 2006; Scott et al., 2004).

Key idea:

Name the arena, size the method to the stakes and take a reversible step first when a big choice can wait, whether the problem sits at home, at work or in between.

Name the arena, size the method to the stakes



Quick check:

What is an arena? Answer: One area of life with its own people, rules and pace. What are the stakes of a decision? Answer: What you stand to lose if it goes wrong. Why take a reversible choice first? Answer: It can be undone cheaply while the bigger choice waits. What changes when a method moves from work to home? Answer: Who decides, how fast and who needs to agree.

4.12.5 Completing a Personal Project and Reviewing What You Learned

Imagine Esme, a retired hairdresser who has lived on Mill Lane for fifty years. **For months she has wanted to make an audio walk of the street's history**, for neighbours to play on their phones. She has a folder of notes and a phone that records. On the first of March she writes "Mill Lane walk" on a fresh page.

An audio walk of the street's history

> - Fifty years on Mill Lane
> - A folder of notes
> - A phone that records

Esme's plan has sat in that folder since last summer. **Finishing it takes a clear idea of done, a small first version and an honest look back** at the end. In this section Esme takes her walk from a page of notes to a finished recording, then reviews what she learned. Treat these steps as practice.

Finishing it takes three things

- [x] A clear idea of done
- [x] A small first version
- [x] An honest look back at the end



A terraced street with an old stone chapel at one end and a brick mill chimney at the other.

Nobody has asked Esme for the walk. **She wants the street's stories kept while people who remember them still live here**, and she wants to hear them told in a local voice. Those reasons are hers, and they will decide what counts as finished. Several of the neighbours who remember the mill working are over eighty.

Nobody has asked Esme for the walk



The street's stories kept



Told in a local voice



Neighbours who remember the mill

Writing signs that a single try has happened has its own home (see 4.1.4). **A whole project needs something larger**, a picture of the finished thing that tells Esme when to stop adding and start sharing. Without it, a history walk could grow for years and never reach a single listener.

A whole project needs something larger

- Signs for a single try: their own home, 4.1.4
- A picture of the finished thing
- When to stop adding and start sharing

Key Concept:

Personal project. **A personal project is a piece of creative work you choose, plan and finish for your own reasons**, with nobody setting it or marking it. A bus driver who builds a model of his first route in his spare room is running a personal project. The model has no buyer and no deadline, and he decides when it is done.

Esme writes her idea of done in three lines. **The walk has three stops, lasts fifteen minutes and plays from a link on the history society's page.** Every line can be checked by someone else. "Make it good" was her first try at a fourth line, and she crosses it out because nobody could ever tick it.

Her idea of done in three lines



Three stops is far fewer than her folder could fill. **The chapel, the corner shop and the mill gate make the first walk**, because each has

a story she can tell without more research. The flood of 1968, the tram line and the cinema wait for a later version. Each one gets its own line in the folder.

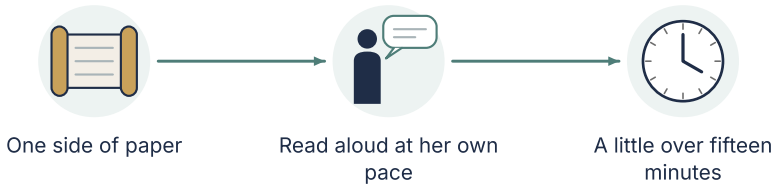
Three stops is far fewer than her folder could fill

The first walk	A later version
The chapel	The flood of 1968
The corner shop	The tram line
The mill gate	The cinema

> Exercise:
>
> Try it. Pick a small personal project. **Write what done looks like in three lines** that someone else could check.

Each stop gets a short script on one side of paper. **Esme reads every script aloud at her own pace before recording anything**, so she knows roughly how long it runs. The chapel script fills the whole side, and the shop and the mill fill most of a side each. The reading runs a little over fifteen minutes.

Each stop gets a short script



The first recording happens on a Sunday morning, standing at each stop in turn. **Wind roars across the phone at the mill gate**, and a delivery van drowns half of the chapel story. Esme listens back on a

bench and laughs at the van. The words are right, and the sound needs another go.

The first recording, on a Sunday morning

> - Wind roars across the phone at the mill gate
> - A delivery van drowns half of the chapel story
> - The words are right, the sound needs another go

Facts get checked between the two tries. **The town library's local archive confirms the mill's name and the year it opened**, and both go into the script. One family story about a fire at the shop turns out to be about a different street, so Esme drops it. The archive visit takes one afternoon.

Facts get checked between the two tries



The town library's local archive



The mill's name and the year it opened



A fire story from a different street, dropped

The second try moves the recording indoors. **Esme records each stop in her hallway, where the coats soak up echo**, and walks the route later with a stopwatch to check the timings. The chapel story runs seven minutes and the other two run five each, seventeen in all.

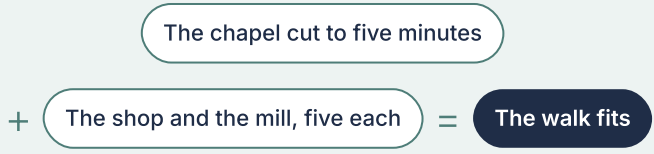
The second try moves indoors

Stop	Runs
The chapel	Seven minutes
The shop and the mill	Five each
In all	Seventeen

> Key Concept:
>
> Minimum version. **A minimum version is the smallest form of a project that still does its whole job for the people it is meant for**, so it can be finished and shared quickly. A family history project's minimum version might be one printed page about one grandparent, given to the cousins at Christmas. Every later page adds to a project that already works.

Seventeen minutes breaks the fifteen-minute line. **She cuts the chapel story to five minutes** by dropping a list of every vicar since 1840. The shop and the mill keep their five minutes each, and the walk fits. The shop stop includes one minute from Mrs Patel, who ran it for forty years, recorded in her front room.

Seventeen minutes breaks the fifteen-minute line



The minimum version is finished on the twentieth of March. **The link goes up on the history society's page by lunchtime**, under a photo

of the chapel door. Mr Okafor from number twelve walks it with his grandson the same afternoon. He tells Esme he had walked past the mill gate for thirty years without knowing it had a name.

The minimum version is finished



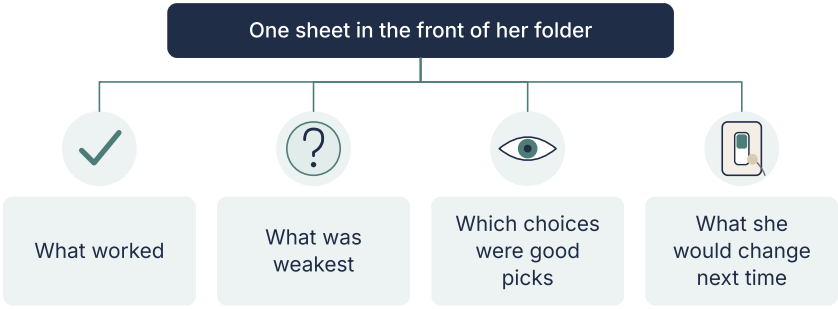
Finishing on a small version shapes the work that follows. **Esme now has a real walk to add to**, and each later stop joins something people already use. Judging a piece of work against the real world is part of finishing it (Cropley, 2006), and the real world here is a man and a boy at the mill gate.

Finishing on a small version shapes what follows

- A real walk to add to
- Each later stop joins something people already use
- Judged against the real world

Looking back after a single try has its own home in After the try (see 4.1.4). **A whole project gets four questions on one sheet**, what worked, what was weakest, which choices were good picks and what Esme would change next time. Each answer gets three lines at most, and the sheet goes in the front of her folder.

A whole project gets four questions



> **Key Concept:**
>
> Project review. **A project review is a written look back whose questions stay the same from one project to the next**, so the answers can be laid side by side. A gardener who writes four answers about this year's vegetable bed each October, and reads them each March, is keeping a project review.

A week passes before the review, on purpose. **The first messages from neighbours are warm**, and she wants the glow to fade a little before she judges her own work. The review happens at the library, away from the folder and the hallway where she recorded. She takes a pencil and nothing else.

A week passes before the review



What worked is easy to find. **Mr Okafor's walk and three more messages from neighbours** show the walk does its job. The corner shop stop gets the warmest messages, and every one of them mentions Mrs Patel's minute.

What worked is easy to find

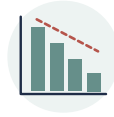
- [x] Mr Okafor's walk and three more messages
- [x] The corner shop stop gets the warmest messages
- [x] Every one mentions Mrs Patel's minute

What was weakest takes more thought. **Judging the strengths and weaknesses of your own work is part of creative skill** (Silvia, 2008). Esme's answer is the dates, because she reads them out in a flat voice like a list, and the chapel stop loses energy each time a year comes up. Three dates in one minute is too many.

What was weakest takes more thought



The dates read in a flat voice



The chapel stop loses energy



Three dates in one minute is too many

The third question looks at choices. **Making plenty is only part of the job, and picking well matters as well** (Rietzschel et al., 2006). Three stops was a good pick, and asking Mrs Patel for her memory was the strongest choice of all, while recording outdoors on a windy morning was a poor one.

The third question looks at choices

Choice	Pick
Three stops	Good
Asking Mrs Patel for her memory	The strongest
Recording outdoors on a windy morning	Poor

The fourth question turns the review forward. **Next time Esme will record one neighbour's voice at every stop**, read fewer dates and test her recording spot for wind before she starts. Each change comes from one of the first three answers, so the sheet links what happened to what comes next.

The fourth question turns the review forward

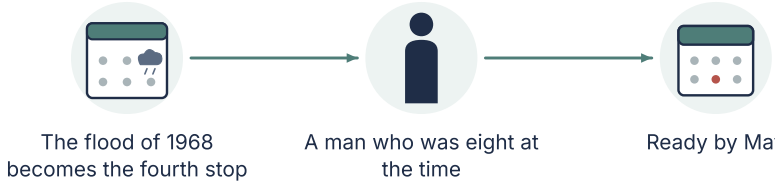
> - One neighbour's voice at every stop
> - Fewer dates
> - Test the recording spot for wind



A woman holding a phone out to record a neighbour speaking on a doorstep.

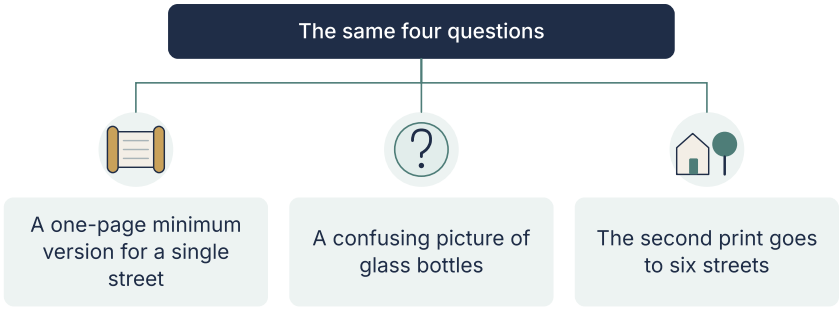
The next version starts from the review. **The flood of 1968 becomes the fourth stop**, with a memory from a man who was eight at the time. The minimum version still plays on the society's page while the new stop is made, so listeners never lose the walk. The fourth stop is ready by May.

The next version starts from the review



A work project can end the same way. **A council officer who designs a new recycling leaflet** writes what done looks like, prints a one-page minimum version for a single street and reviews it with the same four questions. The weakest answer, a confusing picture of glass bottles, shapes the second print, which goes to six streets.

A council officer designs a recycling leaflet



At home a family can run a small project the same way. **A couple building a raised bed for herbs** write three lines of done, plant three herbs first as their minimum version and review the bed at the end of

summer. Their review moves the mint into its own pot. The basil and thyme stay where they are.

A couple building a raised bed for herbs



Your closing exercise picks up the project from your Try it. **The starter finishes a minimum version.** The middle level adds the four-question review, and the advanced level takes a real project in your field and asks for feedback once. Use the project you chose for the Try it.

Finish, then review, at three levels

- [x] The starter finishes a minimum version
- [x] The middle adds the four-question review
- [x] The advanced asks for feedback once

> Exercise:
>
> Finish, then review.
>
> 1. Starter. **Complete a minimum version** of your Try it project.
> 2. Middle. Review it with what worked and what to change next, as a short checklist.
> 3. Advanced. Take a project in your own field to a finish, with feedback from the people it is for once along the way (Scott et al., 2004).

So each project teaches the next one



Key idea:

Write what done looks like, finish a minimum version and review it with fixed questions, so each project teaches the next one.

Quick check:

What is a minimum version? Answer: The smallest form of a project that still does its whole job for the people it is meant for. Why keep the review questions the same each time? Answer: So the answers from different projects can be laid side by side. Why write done in lines someone else could check? Answer: So you know when to stop adding and start sharing. Which review question looks forward? Answer: What you would change next time.

4.12.6 Daily Creative Drills: Ten-Minute Exercises for Each Ability

Imagine Bram, who drives a removal van, parked outside a terraced house at twenty to eight. **His mate has gone for coffee, and the first job starts at eight.** Most mornings Bram scrolls his phone in the cab until the door bangs. This morning he opens a small notebook on the steering wheel and writes the date at the top.

Twenty to eight outside a terraced house



His mate has gone for coffee



The first job starts at eight



A small notebook on the steering wheel

Bram has ten spare minutes on most working mornings. **A short drill can use them for one creative ability at a time**, with a different ability on different days. In this section Bram builds a week of ten-minute drills and keeps them going for a month, starting this morning.

Ten spare minutes on most working mornings

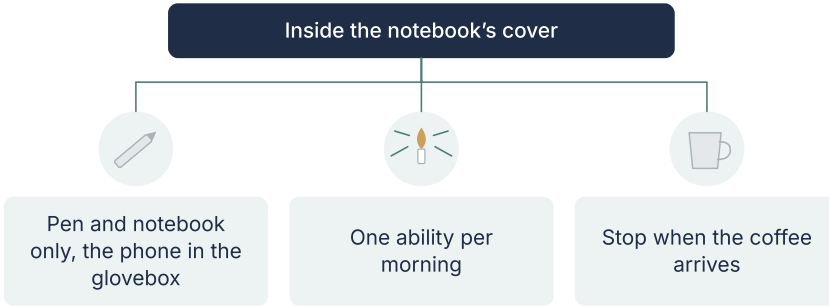
- A short drill for one creative ability at a time
- A different ability on different days
- Kept going for a month



A removal van parked outside a row of terraced houses in early morning light.

The ten minutes come with three plain rules. **Pen and notebook only, with the phone in the glovebox**, one ability per morning, and stop when the coffee arrives. The rules keep the drill small enough to start on a cold, tired morning. Bram writes them inside the notebook's cover.

Three plain rules



The four abilities here, fluency, flexibility, originality and elaboration, each have their own section in chapter 3.1 (see 3.1). **This section gives each one a short daily form**, small enough to fit before a day's work. The full exercises stay in their own sections. On a removal day, the minutes before the coffee arrives are the only quiet ones.

A short daily form for each ability



> **Key Concept:**
>
> Drill. **A drill is a practice move kept so small and fixed that starting it needs no decision**, so the only daily question is whether it happened. A swimmer who swims four lengths of one stroke at the start of every session is doing a drill.

Monday is for fluency, which here means as many ideas as he can find. **Bram picks one object in the cab, a moving blanket, and lists uses for it for five minutes.** Thirty-one uses fill a page, from a dog bed to a picnic rug to a sound screen for a drummer.

Monday is for fluency



One object in the cab, a moving blanket



Uses for five minutes



A dog bed, a picnic rug, a sound screen

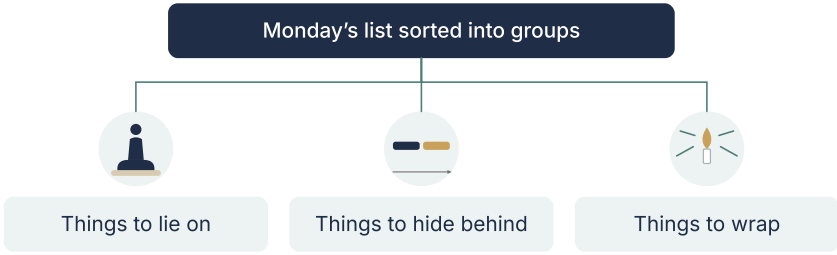
The second five minutes go on reading the list. **Bram counts his lines and writes the number at the bottom.** He circles the three that surprised him most. The number is only for him, a way to see whether next Monday's list comes out longer. Thirty-one is now the number to beat next week.

The second five minutes

- [x] Count the lines and write the number
- [x] Circle the three that surprised him most
- [x] Thirty-one is the number to beat

Tuesday is for flexibility, the number of different kinds of idea. **Bram takes Monday's list and sorts the uses into groups**, things to lie on, things to hide behind and things to wrap. Then he spends the rest of the ten minutes writing uses that belong to no group yet, such as a sail for a raft.

Tuesday is for flexibility



One object carries the whole week. **The moving blanket stays as the seed until Friday**, so each day's drill works on what the day before made. Next Monday starts a fresh week with a roll of parcel tape. A fixed seed means no time goes on choosing what to think about.

One object carries the whole week

- The moving blanket stays as the seed until Friday
- Next Monday starts with a roll of parcel tape
- No time goes on choosing what to think about

> Exercise:
>
> Try it. Pick one ability. **Run one ten-minute drill for it today**, and keep what you write.

Wednesday is for originality, ideas that are rare. **Bram looks for the uses nobody else on the crew would think of**, and writes three new ones that aim to be odd. A blanket as the walls of a puppet theatre on a garden table is the one he likes. Wednesday's list is short, and each line took longer to find.

Wednesday is for originality



Uses nobody else on the crew would think of

Three new ones that aim to be odd

The walls of a puppet theatre

Thursday is for elaboration, building one idea out in detail. **Bram takes one use from the week and builds it out**, with the size, the fixings and who would use it. The sound screen gets hooks, a frame from two broom handles and a note about where a drummer would sit. The drawing takes most of the ten minutes.

Thursday is for elaboration



The sound screen gets hooks

A frame from two broom handles

Where a drummer would sit

Friday is for judging. **Short drills still need a regular look at what they made** (Cropley, 2006), so Friday's ten minutes go on reading the week back. Bram picks one idea worth using, and the blanket over the banister to protect it on a tight staircase goes into the van's kit list.

Friday is for judging

- [x] Reading the week back
- [x] Pick one idea worth using
- [x] It goes into the van's kit list

Friday's pick has to pass one test. **The idea must work with the kit already in the van** and take under a minute on a job. The banister cover passes both, because every van carries blankets and the cover takes thirty seconds to throw over. Ideas that need a new tool wait for a slower week.

Friday's pick has to pass one test

Test	The banister cover
Works with the kit already in the van	Every van carries blankets
Takes under a minute on a job	Thirty seconds to throw over

> **Key Concept:**
> Rotation. **A rotation is a weekly plan that gives each day's drill to a different ability**, so no ability is left out and none takes over. A music student who practises scales on Monday, rhythm on Tuesday and sight reading on Wednesday is following a rotation.

Days without a removal job break the pattern, because there is no cab and no coffee run. **On those days Bram drills at the bus stop on the**

way to the depot, standing up with the notebook against the timetable. The bus comes every twelve minutes, which is just long enough.

Days without a removal job



No cab and no coffee run



Drills at the bus stop on the way to the depot



The bus comes every twelve minutes

Busy days squeeze the ten minutes. **On a two-job Thursday Bram has only five minutes**, so he keeps the day's ability and drops the drawing. A short drill at the usual moment keeps the run going, where a skipped day would leave a gap in the week.

Busy days squeeze the ten minutes

- Only five minutes on a two-job Thursday
- Keep the day's ability, drop the drawing
- A short drill keeps the run going

> **Key Concept:**
> Drill slot. **A drill slot is a moment already in the day that the drill borrows**, so the day itself does the reminding. A nurse who does her drill on the bench outside the ward before every shift has made that bench her drill slot.

Repeating the drill the next day is the start of a habit. **Bram's notebook shows the first two weeks were the hardest.** Three times he forgot

until the van door banged, and each time he did the drill at lunch, a poor second with the crew talking around him.

The first two weeks were the hardest



Three times he forgot



The drill moved to lunch



A poor second with the crew talking around him

A calendar taped inside the van door gets a tick for each finished drill. **Bram likes watching the row of ticks grow.** On the days the drill moved to lunch, he writes lunch beside the date, so the calendar shows where the slot slipped.

A calendar taped inside the van door

- [x] A tick for each finished drill
- [x] The row of ticks grows
- [x] Lunch beside the date where the slot slipped

> Science Says:
>
> One habit study followed volunteers repeating a daily behaviour for 12 weeks (Lally et al., 2010). For the 39 participants with a good model fit, “The median time to reach 95% of asymptote was 66 days” (Lally et al., 2010). **The asymptote is each person’s modelled limit of automaticity**, and many never reached it within the 84 days. The habits were everyday health ones, with nothing on creativity.

Sixty-six days is longer than Bram's first month. **The number gives him a reason for patience**, because a habit like his may take weeks or months to settle, if it settles at all. He expects the drill to need the notebook and the calendar for a good while yet.

The habit study (Lally et al., 2010)

66 days

Median time to feel automatic, in a study of 84 days

At the end of the month Bram judges the drill by one question. **Does it still happen on most working days?** How clever the lists are can wait for a later month, when the habit is steadier. For Bram the answer is yes, on all twenty working days, three of them at lunch.

One question at the end of the month

Question	Answer
Does it still happen on most working days?	Yes, all twenty working days
Where?	Three of them at lunch

The week's seed can come from the job. **A tight stair, a sofa that will not turn a corner or a customer who cannot decide** make good starting points, because they are real. For the third week the seed is a wardrobe on a narrow stair from a fourth-floor flat, and Monday's fluency drill lists ways to get it up.

The seed can come from the job

- A sofa that will not turn a corner
- A customer who cannot decide
- Real starting points



A wardrobe being carried up a narrow staircase, with a grey blanket over the banister.

A habit app lasted one week before Bram went back to the notebook. **The notebook needs no battery and no signal**, and the lists stay together in one place. Any tool that keeps the drill short and repeatable does the job, and none of them is needed to start.

A habit app lasted one week



The notebook needs no battery and no signal



The lists stay together in one place



Any tool that keeps the drill short

After a month the notebook holds twenty drills. **Mondays' lists have grown from thirty-one uses to forty-four**, and Wednesday's odd ideas have started to turn up in his Monday lists. The kit list has three new items from Friday sessions, and the crew uses all three.

After a month

Notebook	After a month
Mondays' lists	Thirty-one uses to forty-four
Wednesday's odd ideas	Turn up in his Monday lists
The kit list	Three new items the crew uses

A hotel receptionist can drill in the quiet hour after breakfast. **Her rotation uses the lobby**, with uses for a luggage trolley on Monday and three odd welcome ideas on Wednesday. On Friday she picks one, a map of local walks drawn by guests, and puts it on the desk, where guests add to it all week.

A hotel receptionist drills after breakfast



Uses for a luggage trolley on Monday

Three odd welcome ideas on Wednesday

A map of local walks drawn by guests

At home a parent and a ten-year-old can share the drill on the walk to school. **Monday is uses for an umbrella and Thursday is one idea built out in detail**, said aloud as they walk. The ten minutes from the gate to the playground are the drill slot, and nobody needs a notebook.

A parent and a ten-year-old on the walk to school

- [x] Monday: uses for an umbrella
- [x] Thursday: one idea built out in detail
- [x] From the gate to the playground

If Bram began again, he would start with the ability he uses least. **His weakest was elaboration**, because removal work rewards speed, so Thursday was the drill he dreaded and the one that grew most. Looking back, the day he wanted to skip was the one with most to give.

Start with the ability he uses least

> - His weakest was elaboration
> - The drill he dreaded
> - The one that grew most

Your closing exercise starts from the drill in your Try it. **The starter repeats it tomorrow, with patience about how long a habit takes.** The middle level spreads the drill across a week, and the advanced level ties the drill to your real work. Keep the same notebook for all three.

A week of drills, at three levels



Exercise:

A week of drills.

1. Starter. **Repeat your drill tomorrow**, and expect the habit to take weeks or months to feel automatic, if it ever does.
2. Middle. Rotate the abilities across the days of one week.
3. Advanced. Build a ten-minute drill on a problem from your real work.

Key idea:

Give ten minutes a day to one ability at a time, rotate the abilities across the week, keep a fixed drill slot and judge the week's ideas on Friday.

Ten minutes a day to one ability at a time



Rotate the abilities across the week

Keep a fixed drill slot

Judge the week's ideas on Friday

Quick check:

What is a drill? Answer: A practice move so small and fixed that starting it needs no decision. What does a rotation do? Answer: It gives each day's drill to a different ability. What is a drill slot? Answer: A moment already in the day that the drill borrows.

4.12.7 Creative Challenges of Rising Difficulty, From First Attempts to Open Projects

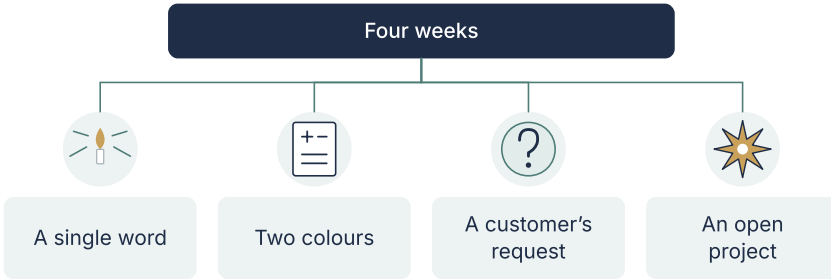
Imagine Pilar, who paints shop signs by hand in a workshop behind the high street. **Her lettering is neat, and every sign looks like the last one.** A new customer has asked for something with a bit of life in it, and Pilar is stuck. She tapes a blank board to her bench and plans a month of practice.

Every sign looks like the last one

- Her lettering is neat
- A customer asks for a bit of life
- A month of practice

Pilar's plan makes each week a little harder than the one before. **Each week takes something away**, until in the last week she sets the problem herself. Here I follow her through the four weeks, from a single word to an open project. Treat these steps as practice.

Each week takes something away





A sign painter's workbench with brushes in a jar, pots of paint and a blank board taped down.

Using limits on time, materials and rules as a creative tool has its own home (see 4.5.5). **Here the limits are a way to set the difficulty**, so the month starts with many of them and loosens as it goes.

Limits set the difficulty

> - Limits as a creative tool have their own home, 4.5.5
> - The month starts with many of them
> - They loosen as it goes

A climbing wall rises in difficulty the same way, with colour-coded routes. **A beginner starts on big holds set close together**, and each new colour takes a hold away or moves one further off. The comparison stops at the wall, because a route has one top, and a creative task can end in many places.

A climbing wall rises in difficulty



Big holds set close together



Each new colour takes a hold away



A route has one top

> **Key Concept:**
>
> Closed task. **A closed task is one with so many fixed limits that only a narrow range of answers fits**, which makes it a safe first attempt. A cook asked to make an omelette with three eggs, one herb and no cheese in ten minutes has a closed task. Its worth is speed, since a whole attempt fits into one short sitting.

Week one is a closed task. **The word is OPEN, the board is thirty centimetres by ten, the colour is black and the time is twenty minutes.** Pilar paints three versions in the hour, one in her usual capitals, one in tall thin letters and one with the O drawn as a door handle.

Week one is a closed task

Limit	Set to
The word	OPEN
The board	Thirty centimetres by ten
The colour	Black
The time	Twenty minutes

The tight limits leave her nowhere to hide. **With one word and one colour, every choice shows**, from the gap between letters to the weight

of each stroke. The door-handle O is the first thing in years that makes her laugh at her own work.

The tight limits leave her nowhere to hide



One word and one colour



The gap between letters



The door-handle O makes her laugh

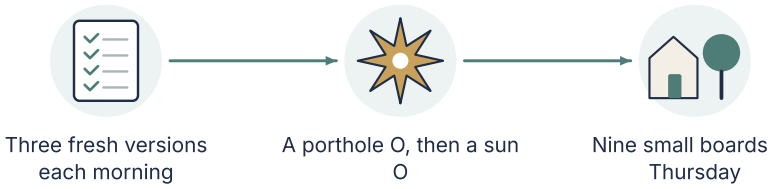
Realistic tasks were a mark of the stronger programmes in one large review of creativity training (Scott et al., 2004). **Pilar's tasks stay real from the start**, because every one of them is a sign a shop could hang. The closed task is small, and it is still the actual job.

Pilar's tasks stay real from the start

- [x] Realistic tasks marked the stronger programmes
- [x] Every one is a sign a shop could hang
- [x] The closed task is still the actual job

The closed task comes back on two more mornings that week, with the same word and the same limits. **Each morning Pilar paints three fresh versions**, and the door-handle O turns into a porthole O and then a sun O. Nine small boards lean against the workshop wall by Thursday.

The closed task comes back on two more mornings



> Exercise:
>
> Try it. Pick a field you work in. **Set yourself a tightly limited task**, with a fixed size, material and time, and make one attempt.

By Thursday the versions come in fifteen minutes and start to look alike. **That ease is Pilar's signal to step up.** A task that has stopped asking anything new has done its job, and staying on it longer would only polish the same three ideas.

That ease is Pilar's signal to step up

> - Versions come in fifteen minutes
> - They start to look alike
> - Staying longer would only polish the same ideas

Week two starts on Monday with a single change. **The word is still OPEN, and any two colours are allowed.** Pilar mixes a deep green and a gold, and the two colours let her paint a shadow under each letter so the word seems to stand off the board.

Week two starts with a single change



The word is still OPEN



A deep green and a gold



A shadow under each letter

> **Key Concept:**
>
> Step up. **A step up is a harder version of a task you have practised, made by handing one decision back to yourself.** A pianist who has played a tune with the right hand alone and then adds the left hand has taken a step up.

Two colours bring a decision week one never asked for. **Which colour carries the word, and which one supports it?** Pilar paints gold letters with a green shadow, then swaps them, and the green word reads from further away. The shadow goes into her next real sign, a café board on Friday.

Two colours bring a new decision

Try	Reads
Gold letters, green shadow	Well
Swaps them, a green word	From further away

The café board on Friday is the first test of the step up outside the workshop. **The shadow makes the menu readable from the bus stop**, and the owner points it out before Pilar says a word. A move learned on a practice board has earned its place in paid work.

The café board on Friday



Week three drops the fixed word altogether. **The customer's request is the task**, a sign for a bakery that has "a bit of life in it". Nobody has said what life means, which makes this an ill-defined problem, and it needs framing before any brush touches a board.

Week three drops the fixed word

- [x] The customer's request is the task
- [x] A sign for a bakery with a bit of life
- [x] An ill-defined problem that needs framing

How a problem gets built shapes the answers it allows (Reiter-Palmon et al., 1998). **Pilar spends an hour on the bakery's doorstep at seven in the morning**, watching who walks past. Most people look at the bread in the window before they look at any words, and many of them slow down at the smell.



A bakery window at seven in the morning, with loaves on display and people slowing down as they pass.

Her rewrite of the task comes out of that hour. **"Make people notice the bread first and the name second"** is a problem she can work on. The bakery owner, Mr Haddad, reads it and nods, which tells her the rewrite matches what he meant.

Her rewrite of the task

An hour on the doorstep + Mr Haddad's nod = Notice the bread first and the name second

The first bakery ideas are her usual ones, a big name across the window. **Pilar keeps sketching past them for most of an afternoon.** Ideas from later in a session can be more creative than the first ones (Beaty &

Silvia, 2012), and her twelfth sketch, the name small and low beside one gold loaf, is the keeper.

Keep sketching past the usual ones



Week four is an open project, and Pilar chooses it herself. **She will paint the town's lost shop signs on her workshop wall**, from the old ironmonger to the shoe repairer, using photographs from the library. Nobody has asked for it, and nobody will pay for it.

Week four is an open project

> - The town's lost shop signs on her workshop wall
> - From the old ironmonger to the shoe repairer
> - Photographs from the library

Choosing the project is part of the task. **Pilar picks the lost signs because she keeps thinking about them**, and because they use everything the month gave her, from single words to a gold shadow and a framed problem. A project she cares about will keep her painting on the evenings the wall goes badly.

Choosing the project is part of the task



She keeps thinking about them



They use everything the month gave her

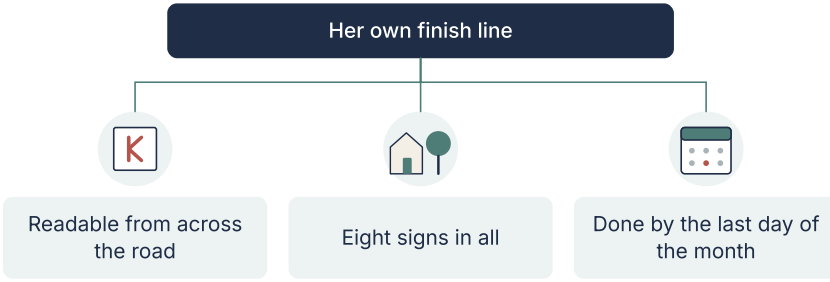


Painting on the evenings the wall goes badly

> **Key Concept:**
>
> Open project. **An open project is a piece of work where you set the problem, the limits and the point at which it is finished**, so nothing is decided by anyone else. A retired engineer who decides to build a clock from scrap parts, with no plan given to him, has started an open project. It sits at the top of the month, because every choice is his to make and defend.

An open project needs its own finish line, since no customer sets one. **Pilar writes three tests before she starts**, readable from across the road, eight signs in all and done by the last day of the month. Creative work needs a judging phase as well as a making phase (Cropley, 2006), and the three tests are Pilar's judging phase.

Three tests before she starts



She judges her own work as well as the tests. **People can judge fairly well which of their own ideas are the creative ones** (Silvia, 2008). Pilar walks across the road each evening and looks back at the wall, and twice she paints over a sign that passes the tests and still looks dull to her.

She judges her own work as well



Walks across the road each evening



Looks back at the wall



Twice paints over a dull sign

The wall is finished on the thirtieth. **People stop to photograph it**, and the café owner from week two asks for one of the old signs copied for her back room. Pilar's new work now has a shadow, a joke or a lost sign in it, and none of those came from her old habits.

The wall is finished on the thirtieth

- [x] People stop to photograph it
- [x] The café owner asks for an old sign copied
- [x] A shadow, a joke or a lost sign in new work

A park gardener can climb the same way. **Week one is a single bed with five fixed plants**, week two lets her choose one plant, week three is "make the entrance feel cooler in summer", and week four is a bed she designs from the soil up, with her own tests for finished. Only the plants change.

A park gardener climbs the same way

Week	Task
One	A single bed with five fixed plants
Two	She chooses one plant
Three	Make the entrance feel cooler in summer
Four	A bed she designs from the soil up

At home a child learning to bake can rise through the same stages. **The first cake follows a recipe exactly**, the second swaps one ingredient, the third answers "a cake Grandad will love" and the fourth is a cake she invents for her own birthday, judged by her own three tests.

Your closing exercise carries your Try it task up through three more stages. **The starter removes one limit and keeps the topic.** The middle level turns to a problem you have to frame first, and the advanced level is an open project with tests for finished.

Rising difficulty, at three levels



The starter removes one limit

The middle frames a problem first

The advanced is an open project with tests

> Exercise:
>
> Rising difficulty.
>
> 1. Starter. **Do the same topic again with one limit removed.**
> 2. Middle. Take an ill-defined problem in the same field, and construct the problem before you make anything, then give the ideas a long session.

3. Advanced. Choose an open project in your field, and write evaluate and finish criteria before you start.

Key idea:

Start with a closed task, take away one limit at a time, frame the vague problems before you solve them and finish with an open project judged by tests you wrote yourself.

Start closed, take away one limit at a time



Frame the vague problems → Finish with an open project → Tests you wrote yourself

Quick check:

What is a closed task? Answer: A task with so many fixed limits that only a narrow range of answers fits. What is a step up? Answer: A harder version of a practised task, made by handing one decision back to yourself. What must an open project have that nobody else provides? Answer: Its own finish line. What should you do with a vague request before making anything? Answer: Frame it as a problem you can work on, as Pilar did with the bakery.



Module

5

Training Creativity in Different Fields

5.1 Writing and Storytelling

5.1.1 Finding Stories, Characters and Voices

Imagine Elsie, a nurse who writes short stories on her days off. **At work she is full of good ideas**, such as a new way to sort the supply cupboard. At home, a blank story page leaves her stuck. Why should a mind that is quick on the ward go slow the moment a character needs a name?

Elsie at work and at home

Before	After
At work she is full of good ideas A new way to sort the supply cupboard	At home, a blank story page She is stuck

Her puzzle has an answer in research on writing. **Creative skill in one kind of task may not show up in another**, even when both tasks use words. In this section I show you that research, where stories come from and how to practise finding characters and voices at three levels.

In this section I show you



Research on writing



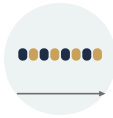
Where stories come from



Finding characters and voices

In 1.1.3 you met the idea that skill in one field may not carry over to another (Baer, 1998). **Writing is a good place to test that idea**, because a poem and a story are both made of words. If creative skill carried over anywhere, it should carry over between those two.

Writing is a good place to test that idea



Skill in one field may not carry over



A poem



A story

> Science Says:
>
> In one study, 50 eighth-grade students "wrote poems, stories, mathematical equations, and mathematical word problems, all of which were rated for creativity by experts." Once the team allowed for IQ, reading and maths results, the "creativity scores on the four tasks were not correlated" (Baer, 1991). **A strong poem did not go with a strong story.**

One study of 50 eighth-grade students

B1

Baer, 1991

- Poems, stories, equations and word problems
- Rated for creativity by experts

Not correlated means the scores did not move together. **The best poet in the class was no more likely to write the best story.** Baer ran follow-up studies with younger students and with adults, and they

"produced no significant correlations among creativity ratings of various products" (Baer, 1991). The pattern held at more than one age.

In a later study, Baer checked poems and stories alone, with 128 students in the same school year. **The two kinds of writing barely moved together.** "The correlation between these two measures of creativity was .19" (Baer, 1994). On a scale where 0 means no link at all and 1 means a perfect match, .19 is a weak link.

Poems and stories, 128 students

Measure	Result
The correlation	.19
The two kinds of writing	Barely moved together

The first study had a plain message for anyone who wants to write. In Baer's words, "general creative-thinking skills did not contribute to creative performance in these different tasks" (Baer, 1991). **Story skill grows on story pages.** Elsie's quick ideas on the ward are real, and they will not write her stories for her.

A plain message

- General creative-thinking skills did not contribute
- Story skill grows on story pages
- Practise on story pages

> **Science Says:**
>
> One small skill did go with story writing. In the first study, scores on a brief verbal fluency test "correlated significantly with story-writing creativity (r = .34) but not with the other three tasks" (Baer, 1991). **Fluency went with stories and nothing else** in that group of students. A verbal fluency test is a short test of how many words you can produce.

One small skill did go with story writing



A brief verbal fluency test



Fluency correlated with story-writing creativity (r = .34)



It did not go with the other three tasks

If Elsie ever wants to write poems beside her stories, the studies point one way. **Treat the poem as a second craft**, with its own practice pages and its own readers. A good week on stories may leave her poems where they were, and a good week on poems may leave her stories alone.

Treat the poem as a second craft

- [x] Its own practice pages
- [x] Its own readers

Stories have to start somewhere. **One interview study asked 60 French creators in five fields about how they work**, and scriptwriting was one of the five (Glaveanu et al., 2013). The team found "complex models of action and inter-action specific for each

domain". In plain words, each field had its own way of starting and going on.

60 French creators in five fields



Asked about how they work



Scriptwriting was one of the five



Complex models of action and inter-action

> **Key Concept:**
>
> The need to tell. The authors' summary, drawn from a few of the twelve scriptwriters, points to a need to express, to tell or speak, to show the world and to stage something (Glaveanu et al., 2013). **A story starts from something you want to show.** Before you hunt for a plot, write one line on what you want a reader to see, even if it is only a man at a bus stop.

Elsie's own seed is small. On most mornings she passes a man at the bus stop outside the hospital, and **he always holds two cups of coffee**. Nobody she has seen ever takes the second cup. She has wondered about him for weeks without writing a word.

Elsie's own seed is small



A man at the bus stop outside the hospital



He always holds two cups of coffee

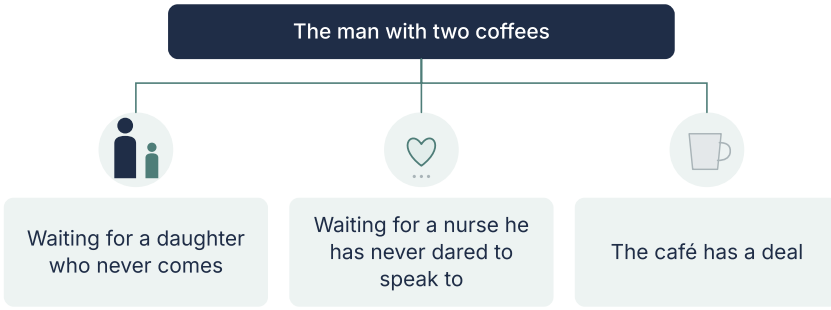


Nobody takes the second cup

> **Exercise:**
>
> Try it. Take one thing you saw today. **Write five story seeds from it**, one line each.

A story seed is one line that holds a person, a want and a problem. **The man with two coffees might be waiting for a daughter** who never comes, or for a nurse he has never dared to speak to. Perhaps he buys two because the café has a deal. Each line points to a different story.

One seed, many stories



Finding stories in one thing you saw works like squeezing an orange. **The first squeeze gives the easy juice**, and later squeezes give less but stranger drops. Where the picture stops is the fruit, because an orange runs dry, while one small sight can keep giving if you change whose eyes you look through.

Squeezing an orange

The idea	What it is like
Squeezing an orange	Finding stories in one thing you saw
The first squeeze gives the easy juice	Later squeezes give stranger drops



A bus stop on a grey morning, an older man in a long coat holding two paper coffee cups, steam rising from both.

A character is a person with a want. **Give each seed one person and one thing that person wants**, and the seed starts to move. The man wants his daughter to come, and a nurse on the early shift wants a quiet coffee before work. Two wants in one scene make the pull that keeps a reader turning pages.

A character is a person with a want



The man wants his daughter to come



A nurse on the early shift wants a quiet coffee



One person and one thing that person wants

A voice is the way a character sounds on the page. **The same moment told by two people becomes two stories.** The man might tell it in short, tired sentences about the cold. The nurse might notice the steam off the cups and the colour of the bus, and wonder who the second cup is for.

The same moment told by two people

	The man	The nurse
Tells it in	Short, tired sentences about the cold	The steam off the cups

> **Key Concept:**
> Three questions for a voice. Ask what this person notices first in a room. Ask which words this person would never say. Ask how long their sentences run when they are tired, and how long when they are happy. **Answer each question in one line**, then write a single sentence in that voice before you write the scene.

Choosing whose voice tells the scene is one of the first choices in any story. **Try the scene in the voice you would never pick first.** The man telling his own story gives a sad, slow scene, and a schoolboy who

watches him from the bus gives a funny, curious one. The facts stay the same, and the story changes.

Try the voice you would never pick first



The man telling his own story: a sad, slow scene



A schoolboy who watches him from the bus



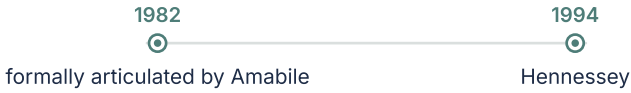
One of the first choices in any story



A schoolboy with his forehead against a bus window, looking out at a man on the pavement holding two coffee cups.

One way to judge which version is better has a clear start. Hennessey wrote that it was “Formally articulated by Amabile in 1982” (Hennessey, 1994). Its name is the consensual assessment technique, and consensual means agreed.

Formally articulated in 1982



> **Science Says:**
>
> The method rests on one rule. “A product or response is creative to the extent that appropriate observers agree that it is creative” (Hennessey, 1994). **Appropriate observers are people who know the field.** For a story, they are readers who know stories well. Their agreement is the measure, and your own feeling about the page is only one view among theirs.

The rule changes whose opinion you look for. **A friend who reads short fiction every week is an appropriate observer** for a story, and a kind uncle who never reads may not be. Praise from the uncle feels good. The friend can tell you which voice rang true and where the scene went flat.

An appropriate observer



> **Key Concept:**
> Reading like a judge. Pick two things a skilled reader would look for in a scene, such as whether the voice sounds like one person all the way through and whether the ending surprised them. **Rate your own two versions from 1 to 5 on each.** Then give both versions to one reader who knows stories, ask for the same two ratings and compare the numbers.

The scriptwriters' need to show the world points to the last step. **A story is finished when someone reads it.** Showing a short scene to a small real audience, such as a writing group or a family table, tells you which seeds and voices reach other people. It is the shape of the advanced level below.

A small real audience

- A writing group
- A family table
- Tells you which seeds and voices reach

Story seeds are everywhere in an ordinary day. **A queue, a lost glove or a neighbour's new car can each give five seeds** in the time it takes a kettle to boil. Keep one page for them and add seeds as they come. Most will stay seeds, and a few will grow into scenes that you want to finish.

Story seeds are everywhere



A queue



A lost glove



A neighbour's new car

Key Concept:

From seed to scene. A seed turns into a scene when it gets a place, a time of day and **one moment where the want meets a wall**. Write those under your favourite seed in three short lines. The man with two coffees at seven in the morning, as the last bus pulls away empty, is already a scene.

None of the studies in this section tested story seeds or voice questions as training. **The levels below are practice, with no promise attached.** They follow what the studies point to, which is story work done on story pages and judged by readers who know stories.

From seed to scene



Exercise:

Stories, characters and voices.

1. Starter. Take your best seed. **Give it three characters**, each with a different want, and write one sentence in each voice.
2. Middle. Write one short scene in two voices. Rate both on two things a skilled reader would look for, then ask one skilled reader to rate them.
3. Advanced. Finish a scene of one page and read it to a real audience. Note which lines they remember.

Stories, characters and voices at three levels



Three characters, each with a different want



One short scene in two voices



A scene of one page read to a real audience

Key idea:

A story starts from something you want to show, and story skill grows on story pages, judged by readers who know stories.

Quick check:

Why practise stories on story pages, when general idea games are quicker?
Answer: In the studies, creativity scores on poems and stories barely moved together, so skill on one kind of task did not go with skill on another.

5.1.2 A Writing Project From First Idea to Revision

Imagine Tariq, a bus mechanic who has entered a story competition at his library. **The limit is 2,000 words, and the deadline is the last day of the month.** For three weeks he has carried one idea, a night bus driver who keeps a list of every passenger who falls asleep. He has not written a line.

The competition at his library

- The limit is 2,000 words
- The deadline is the last day of the month
- One idea, a night bus driver

When is an idea ready to write? **Working writers answer with a path**, and the path starts before the first sentence. In this section I show you that path from first idea to revision, how to judge a draft and how to practise the whole project at three levels.

Working writers answer with a path



From first idea to revision



How to judge a draft



Practise the whole project



A mechanic in overalls sitting on an upturned crate in a bus depot at night, a small notebook on his knee and an empty page in front of him.

The path comes from interviews. Among the 60 French creators in one study were 12 scriptwriters, and they described how their writing moves from an idea to a finished script (Glaveanu et al., 2013). **A writer may "get to do some 'fieldwork'"**, going out to look, listen and gather.

12 scriptwriters among 60 French creators



From an idea to a finished script



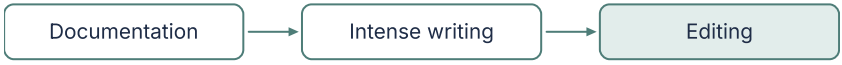
Some fieldwork



Interviews

> **Science Says:**
>
> The scriptwriters said "documentation can end up with a general plan or simply with material for further elaboration" (Glaveanu et al., 2013). Then "A central phase of intense writing starts from documentation and leads into the editing stage". **Gather, then write hard, then edit.** The study is a map drawn from interviews, and it does not test the path against any other.

The path in three phases



Documentation is the gathering part, notes and facts collected before the story takes shape. **Writing "enormously" and keeping notebooks came up in the interviews** (Glaveanu et al., 2013). For Tariq, it means riding the last bus of the night twice, with a notebook, before he decides what his driver is like.

Documentation is the gathering part

- [x] Notes and facts collected first
- [x] Writing enormously
- [x] Keeping notebooks

A writing project works like cooking a big pot of soup. **Fieldwork is the trip to the market**, intense writing is the cooking, and editing is the tasting at the end. Where the picture stops is the recipe, because a soup recipe is known before you start, and a story often finds its shape in the pot.

A big pot of soup

The idea	What it is like
A big pot of soup	A writing project
The trip to the market, the cooking, the tasting	Fieldwork, intense writing, editing



The inside of a night bus with its lights on, two passengers asleep against the windows and the driver's eyes visible in the mirror.

On his two rides, Tariq fills six pages. **The best notes are small and exact**, such as a woman who sleeps with her shopping held tight on her lap, and the driver's habit of slowing at one stop where nobody ever waits. None of it was in his idea, and all of it can go into the draft.

The best notes are small and exact



A woman who sleeps with her shopping held tight



The driver slows at one stop where nobody ever waits



Six pages from two rides

Notes are raw material, and a draft cannot hold them all. **Pick the few notes that point at the heart of the idea**, here the driver and his list. A draft that squeezes in every note reads like a shopping list. The rest stay in the notebook, where another story may want them.

Notes into a draft

Before	After
Every note squeezed in	The few notes that point at the heart
Reads like a shopping list	The driver and his list

> **Key Concept:**
>
> Fieldwork for a story. Go where your story happens, or somewhere like it, for half an hour. **Write down only what you see, hear and smell**, with no plot yet. Note one sentence somebody says. Back home, circle three notes you can turn into a place, a person or a line of talk.

The intense writing phase is fast. **The first draft is for getting the story out**, from beginning to end, and fixing comes in the editing stage. A writer who stops to polish every sentence may never reach the end, and the end is often where the story shows what it is about.

The first draft is for getting the story out



From beginning to end



Fixing comes in the editing stage



Stop to polish every sentence and you may never reach the end

> Exercise:
>
> Try it. From one story seed, write a one-page first draft in twenty minutes. **Keep going without fixing anything.**

The page you get will be rough, and rough is the point. **A finished bad draft is worth more to the next stage** than a perfect first paragraph, because editing needs a whole story to work on. Put the page away when the twenty minutes end, even if the ending is only a note to yourself.

Rough is the point

- A finished bad draft is worth more to the next stage
- Editing needs a whole story to work on
- Put the page away when the twenty minutes end

The twenty minutes are part of the exercise. **Time spent on a draft is one way to measure effort**, and one study set out to measure it in

story writing. Write the minutes at the top of each draft you finish, next to the date, so you can see where your writing time goes.

Time spent on a draft



One way to measure effort



Write the minutes at the top

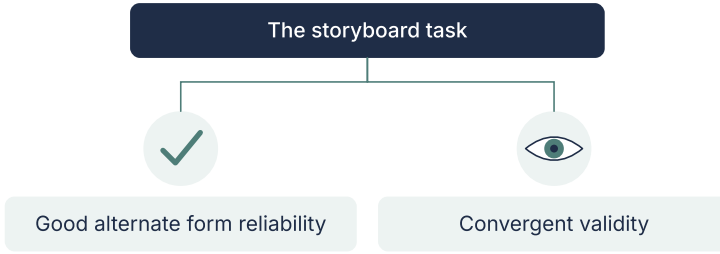


Next to the date

> **Science Says:**
> "The present study examines effort in narrative creative writing (operationalized as time-on-task) using a new assessment approach, the storyboard task" (Taylor et al., 2021). Time-on-task means **how long people spent writing**. "Participants (N = 125) completed alternate forms of the storyboard task in two sessions five weeks apart." The two forms were two versions of the same kind of task.

In 1.3.3 you met reliability and validity, the two checks a test has to pass. The team reported that "The storyboard task demonstrated good alternate form reliability and convergent validity with the criterion measures" (Taylor et al., 2021). **The new story test passed both checks**, and its two versions, taken five weeks apart, gave similar results.

The two checks a test has to pass



The study measured effort, and it does not tell you how many minutes make a good story. **A minute count and a word count are records, and neither one judges quality.** Tariq's first draft runs to 2,600 words in two evenings. It is over the limit, and the length tells him nothing yet about which parts are good.

Records, and neither one judges quality

- [x] A minute count
- [x] A word count
- [x] Tariq: 2,600 words in two evenings

> **Science Says:**
>
> Creative skill is partly tied to a field. One team wrote, "In contrast to a classic, but inaccurate 'g-factor view' of creativity, this perspective emphasises a multidimensional and partly domain-specific view" (Barbot et al., 2015). **A g-factor view is the idea of one general creative skill** that works the same everywhere, and the team called that view inaccurate.

A partly domain-specific view



Inaccurate: a classic g-factor view



Multidimensional



Partly tied to a field

Multidimensional means made of many parts. **Some parts of creative skill may travel between fields, and some belong to one field**, which is what partly domain-specific means. Finding a scene, hearing a voice and cutting a page are writing parts. A full project from idea to revision trains all of them on the same pages.

Writing parts

- Finding a scene
- Hearing a voice
- Cutting a page

Revision means seeing the story a second time with a reader's eyes. In 5.1.1 you met judges who agree as the measure of a creative product (Hennessey, 1994). **The same method reaches the process.** The judges in Hennessey's work could rate "the creativity of the process that went into producing that product" (Hennessey, 1994).

The same method reaches the process



Judges who agree



A creative product



The process

For a writer, the process lives in the notes you keep while you revise. **Write one line for each change you make**, what you changed and why, such as cut the sleeping man because he slowed the middle. A reader who sees both versions and your notes can judge your choices, and you can see your own habits.

One line for each change you make

What changed	Why
Cut the sleeping man	He slowed the middle

Tariq's competition comes with two limits, a word count and a date. **A story project needs to know which limit leads the revision.** The date decides how many passes he has time for. The 2,000 words decide what stays, and that is the limit he chooses to lead.

Two limits



A word count



A date



The 2,000 words decide what stays

> **Key Concept:**
> One limit per revision. Pick one limit for each pass through the draft, such as a word count, a reader of a certain age or a time to read aloud. **Revise the whole story for that one limit**, then stop. A second pass can take a different limit.

Cutting 600 words shows Tariq what the story is about. **The driver's list of sleepers is the heart**, and the long scene at the depot can go.

The woman with her shopping stays, in one sentence. The final draft is shorter, and every scene in it now points at the list.

Cutting 600 words

Before	After
The long scene at the depot	The driver's list of sleepers is the heart
The woman with her shopping	The woman stays, in one sentence

The advanced level asks for one real reader and one limited revision. **Choose a reader who knows stories** and ask where they lost interest. Revise once, under one limit, and keep your change notes. None of the studies here tested this path as training, so the levels below are practice, with no promise attached.

One real reader and one limited revision



Before any reader sees the draft, write it a second time from a different starting scene. **Two drafts side by side show you choices** that one draft hides, such as whether the story begins on the bus or at the depot. Keep both until you know which opening carries the list best.

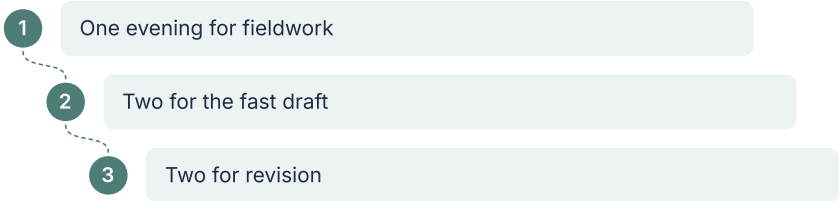
Two drafts side by side

- [x] Write it a second time from a different starting scene
- [x] Begin on the bus or at the depot
- [x] Keep both

> **Key Concept:**
> The cold read. Leave the draft alone for at least a day. Then read it aloud once, from start to finish, **and mark only the places where your own attention slipped**. Those marks are your first list of things to fix. A line you stumble over aloud usually needs cutting or a simpler word.

Short stories fit around ordinary weeks. **One evening for fieldwork, two for the fast draft and two for revision** is enough for a short story. Put the evenings in your calendar on the day you start, because a project with dates is harder to let slide than one kept in your head.

Short stories fit around ordinary weeks



A revision is finished when a full pass changes only small words. **That is the sign to stop and send the story.** Tariq reads his final draft aloud on the Sunday, changes two words, and hands it in at the library desk three days before the deadline, with the list of sleepers at its centre.

A revision is finished



A full pass changes only small words



Tariq reads his final draft aloud



Hands it in three days before the deadline

Exercise:

From idea to revision.

1. Starter. Write a second first draft of the same seed from a different starting scene. **Compare the two before anyone critiques either.**
2. Middle. Pick two things to improve, revise only for those and write one note for each change.
3. Advanced. Give the draft to one skilled reader. Revise once under a single limit, such as 20 percent fewer words.

From idea to revision, starter to advanced



A second first draft from a different starting scene



Revise only for two things



One skilled reader, one revision

Key idea:

A writing project moves from **gathering, to fast drafting, to slow revision**, and each stage gets its own sitting.

Quick check:

Which stages did the scriptwriters in the interview study describe? Answer: Gathering material, called documentation, then a phase of intense writing, then editing.

5.2 Drawing and Visual Design

5.2.1 Seeing, Sketching and Composing

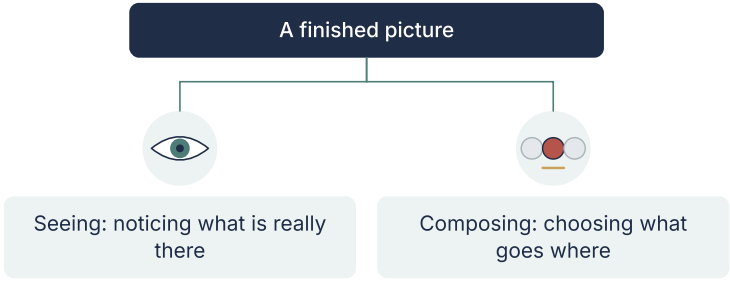
Imagine Wren, a retired postwoman who has bought her first sketchbook. **Every morning she sits on the same bench in the park**, facing a pond, a willow and a café with green chairs. She can see it all perfectly well. Why, then, does her drawing of it look so flat and so crowded?

Every morning on the same bench

> - A pond
> - A willow
> - A café with green chairs

Her trouble is with two skills that come before any finished picture. **Seeing is noticing what is really there, and composing is choosing what goes where** inside the edges of the page. In this section I show you where a drawing starts, what three studies found and how to practise both skills at three levels.

Two skills that come before any finished picture



Drawing starts with a want. In one interview study of French creators, the artists described how their work begins (Glaveanu et al., 2013). **Their work generally starts from an urge to create or make**, fed by a curiosity to see and understand, a wish to “find sensations” and a need to express something.

Drawing starts with a want



An urge to create or make



A curiosity to see



Artists in an interview study

The artists' word for that need to express was a "narrative desire", a wish to tell (Glaveanu et al., 2013). **Curiosity to see comes before the pencil.** For Wren, it means asking what in the park makes her want to draw at all. The answer is the light on the water under the willow, and not the café chairs.

A narrative desire



A wish to tell



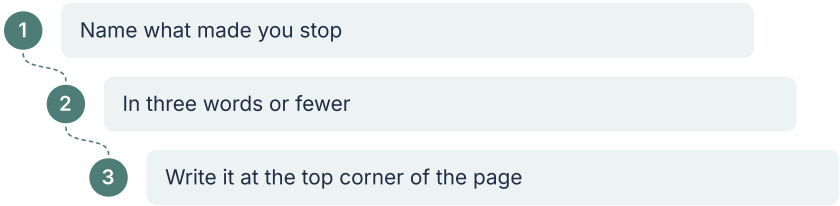
Curiosity to see comes before the pencil



What in the park makes her want to draw

> **Key Concept:**
>
> The one thing. Before you draw a view, **name the one thing that made you stop**, in three words or fewer, such as light under willow. Write it at the top corner of the page. Everything you put on the page after that either helps the one thing or gets left out.

The one thing



Glaveanu and colleagues cite a 1976 study for its discussion of the role of tension in art (as cited in Glaveanu et al., 2013). The study is background here, and the point for you is that a picture begins as a question about what to draw. One clear question is enough to begin.

For Wren, the question is which part of the park is worth a page. **A picture that answers no question is a list of things in a frame.** A picture that answers one question, such as how the light falls under the willow, has a reason for every mark on the paper.

Does the picture answer a question?

Picture	Reads as
Answers no question	A list of things in a frame
Answers one question	How the light falls under the willow



Light shining on the surface of a pond beneath the hanging branches of a willow, ripples spreading from a duck in the shadow.

Design writers have a name for thinking with the pencil. **One design writer gave a paper the title "Designerly ways of knowing: design discipline versus design science"** (Cross, 2001). The title is a name for a way of talking about design knowledge.

Designerly ways of knowing



A sketch is a fast question on paper, and a finished drawing is the answer you settle on. **Ten sketches of a willow take less time than one finished drawing**, and each one asks the page a slightly different question about where the light falls. Keep them small enough to finish in a minute each.

A sketch is a fast question on paper

- A finished drawing is the answer you settle on
- Ten sketches take less time than one finished drawing
- Each asks the page a slightly different question

Exercise:

Try it. In ten minutes, **make ten one-minute sketches** of things within reach, one per minute. Draw only edges and shadows.

In a one-minute sketch you cannot copy everything. **You have to choose the edges that matter most.** A cup becomes two curves and a shadow. A chair becomes four lines and the dark gap under the seat. Put the date on each page as a record of the practice, and keep the pages in date order in the book.

Choose the edges that matter most



A cup becomes two curves and a shadow



A chair becomes four lines



Put the date on each page

Key Concept:

The squint. Half close your eyes and look at the view for ten seconds. **Small details blur, and the big shapes of dark and light stay.** Draw those big shapes first, as flat patches, before any edge or detail. The squint shows you the bones of a picture, the part that still works when it is seen from across a room.

Wren's first drawing was crowded for a plain reason. **She drew everything she knew was in the park**, every chair, every branch and every duck. The squint shows her that the park, seen as dark and light, is mostly one bright pond and one dark willow. The chairs are tiny grey marks at the edge.

Wren's first drawing

Before	After
Everything she knew was in the park Every chair, every branch and every duck	Seen as dark and light Mostly one bright pond

In 3.3.2 you met a study that linked visual creativity to pictures in the mind (Palmiero et al., 2015). The new point is how strong those links were. **The authors called the size of their effects moderate**, and they said "caution should be taken before drawing any definitive conclusion" (Palmiero et al., 2015).

How strong those links were



Visual creativity and pictures in the mind



Effects the authors called moderate



Caution

> **Science Says:**
>
> In a questionnaire about creative accomplishments, "the majority of people belonged to an uncreative class, and smaller classes were found for visual arts and performing arts" (Silvia et al., 2009). **Most people belonged to an uncreative class**, and only small groups stood out in fields like visual art. Starting from nothing is a common place to start.

A class here means a group of people with a similar pattern of answers. **The visual arts group was small.** Wren sits with the large uncreative class in that study, which is where most people were.

Classes in the questionnaire



Each drawing in a sketchbook is a small step, and each step costs a minute. **Ten sketches a morning are a start that costs only a pencil.** Wren does not need to wait for talent before she begins, because the sketchbook is where the practice happens and the pages are where you can see it grow.

Ten sketches a morning



Each step costs a minute



A start that costs only a pencil



No need to wait for talent

Composing comes next. **Composing works like arranging furniture in a small room.** A sofa against one wall and a lamp in the corner make a room you can live in. Push every piece into the middle and the room feels crowded, even with the same furniture.

Arranging furniture in a small room

The idea		What it is like
Arranging furniture in a small room	≈	Composing
A sofa against one wall and a lamp in the corner	≈	Every piece in the middle feels crowded

Where the furniture picture stops is the edge. **A room has fixed walls, and a drawing has a frame you choose yourself.** You can move the frame closer or push it wider, and each move gives a new room for the same furniture. A sofa cannot leave a room, while a café chair can leave a drawing.

Where the furniture picture stops



A room has fixed walls



A drawing has a frame you choose yourself



Move the frame closer or push it wider



A hand holding up a postcard with a small rectangle cut out of it, the hanging branches of a willow framed in the hole.

The frame is the first choice. **Wren draws the park three times from the same bench**, once with the whole view, once with just the willow and the water, and once with only a single branch and its reflection. The first is crowded, the second is calm and the third is strange.

Wren draws the park three times

Day	1	2	3	4	5	6	7
The whole view	☐	☐	☐	☐	☐	☐	☐
Just the willow and the water	☐	☐	☐	☐	☐	☐	☐
A single branch and its reflection	☐	☐	☐	☐	☐	☐	☐

Strange is not a fault in a sketchbook. **The close frame of one branch may grow into a drawing of its own** on another day, so Wren marks it with a star before she moves on to the next page.

Strange is not a fault in a sketchbook



The close frame of one branch



May grow into a drawing of its own

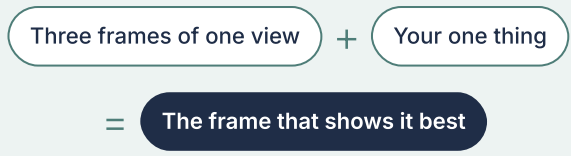


Marked with a star

> **Key Concept:**
>
> The card window. Cut a small rectangle out of a postcard and **hold it up between your eye and the view**. Move it closer and further until one framing feels right. Close to your eye, the window shows a wide view, and at arm's length it shows a small part. Draw only what sits inside the window.

Three frames of one view give you three pictures to choose from. **Choose the frame that shows your one thing best**, and leave the others in the sketchbook. For Wren, the second frame wins, because the light under the willow fills it and the café chairs have gone.

Choose the frame that shows your one thing best



In 5.1.1 you met a way to judge creative work by asking people who know the field (Hennessey, 1994). **For a drawing, those people are viewers who draw or look at art often.** A sister who paints or a

friend who visits galleries both count. A neighbour who says every drawing is lovely does not.

Viewers who draw or look at art often



A sister who paints



A friend who visits galleries



People who know the field

> **Key Concept:**
> The five-second look. Show your drawing to a viewer for five seconds, then turn it face down. **Ask what they remember seeing.** If they name your one thing, the frame is doing its job. If they name something else, that thing is pulling the eye away, and it is the first thing to shrink, move or rub out.

A good frame often leaves out more than it keeps. **Empty space gives the one thing room to breathe**, the way a quiet pause makes the next word in a speech land. Leave a band of plain paper around your one thing in at least one of your three frames, and see whether it looks stronger or lost.

Empty space

- [x] Gives the one thing room to breathe
- [x] Like a quiet pause in a speech
- [x] A band of plain paper around your one thing

Wren's sister paints on Sunday afternoons. **She sees the willow drawing for five seconds** and says her eye went straight to the café

chair Wren forgot to leave out. Wren rubs it out, and the light under the tree suddenly reads as the centre.

Her sister sees it for five seconds



Her eye went straight to the café chair



Wren rubs it out



The light under the tree

Seeing and composing fit into small gaps in the day. **A bus stop, a waiting room or a kitchen table** can each hold ten one-minute sketches. Carry a small sketchbook and a soft pencil, and treat each page as practice in noticing and framing.

None of the studies here tested these drills as training. **The levels below are practice, with no promise attached.** The advanced level asks you to finish one study for a real viewer, the shape the art interviews point to, where a picture is made to be seen.

Small gaps in the day

- A bus stop
- A waiting room
- A kitchen table

Exercise:

Seeing and composing.

1. Starter. Pick one view. **Draw it in three frames**, wide, middle and close, using the card window.

2. Middle. Develop the best frame into a fuller drawing. Give one viewer who draws the five-second look, then change one thing.
3. Advanced. Finish one study of your one thing and give it to a real viewer. Note where their eye went first.

Seeing and composing at three levels



Draw one view in three frames



The five-second look, then change one thing



Finish one study for a real viewer

Key idea:

See first, then choose the frame, and keep only what helps the one thing that made you stop.

Quick check:

What did the artists in the interview study say their work starts from?

Answer: Their work generally starts from an urge to create or make, fed by curiosity to see and understand, a wish to find sensations and a need to express.

5.2.2 A Visual Project From First Sketch to Finished Piece

Imagine Idris, a baker who has offered to make the poster for his village apple fair. **He has one good idea straight away**, a big red apple with the date written across it. He draws it carefully, colours it in and shows it to the fair committee. They say it looks like an advert for a supermarket.

His poster for the apple fair

- One good idea straight away
- A big red apple with the date written across it
- He draws it carefully and colours it in

A whole evening has gone on one idea, and the committee wants a new design by Thursday. **This section follows a visual project from first sketch to finished piece**, with three rough versions in place of one careful one and three levels to practise the path.

A visual project



From first sketch to finished piece



Three rough versions in place of one careful one



Three levels to practise the path

The first question for the committee is what the fair should feel like. **The chair says it is about every apple in the parish, from the cookers to the crab apples**, and one shiny red apple made it look like a

single kind. That gives Idris something to aim for before he picks up a pencil.

What the fair should feel like

> - Every apple in the parish
> - From the cookers to the crab apples
> - One shiny red apple made it look like a single kind

His second question is where the posters will go. **There will be five, in the pub, the shop window, the bus shelter, the post box by the green and the bakery itself.** Most people will see one from a few steps away, on their way somewhere else, so the poster has a few seconds at most.

Where the posters will go

- [x] The pub and the shop window
- [x] The bus shelter and the post box by the green
- [x] The bakery itself



Three small rough poster sketches pinned side by side on a corkboard, one showing an apple tree, one a crowd at a stall and one a basket of mixed apples.

Making several versions side by side works like trying on three coats before buying one. **You learn what suits you by comparing.** A single coat tried alone tells you only that it fits or it does not. Where the picture stops is the rail, since the shop hands you finished coats and you have to make every version yourself.

Trying on three coats

The idea	What it is like
Trying on three coats before buying one	Several versions side by side
A single coat tells you only that it fits	You learn what suits you by comparing

The study of making several versions at once used web adverts (see 4.11.2). **A poster is close to an advert**, since both catch a passing eye. A painting for your wall is further away, and the study did not test paintings. For your next poster, keep two or three versions alive at the start and gather feedback after, as practice.

A poster is close to an advert



Both catch a passing eye

A painting for your wall is further away

The study did not test paintings

> Exercise:
>
> Try it. For one poster or picture, sketch three thumbnails in six minutes. **Give each a different main picture.**

A thumbnail is a sketch the size of a stamp. **Small size keeps you from adding detail early**, so each thumbnail stays a quick question about the main picture and where it sits. Idris draws an apple tree, a crowd at a stall and a basket of mixed apples, each in two minutes.

A thumbnail is a sketch the size of a stamp

- [x] Small size keeps you from adding detail early
- [x] An apple tree, a crowd and a basket of apples
- [x] Each in two minutes

His first poster shows why the order counts. **One careful version soaks up all the effort**, and once it is coloured in, it is hard to throw away. Three rough versions cost less each, so dropping two of them hurts less, and the comparison shows which one deserves the colouring.

One careful version soaks up all the effort



Once it is coloured in, it is hard to throw away



Three rough versions cost less each



Dropping two of them hurts less



A wastepaper basket by a kitchen table holding one crumpled, carefully coloured poster of a single red apple.

Designers work in a similar way, by their own account. In the interview study of French creators, designers described “impulsions to ‘make’ things, to ‘build’”, and to work with their hands (Glaveanu et al., 2013). **Designers “present several ideas to the client”**, which keeps more than one version alive until someone else has seen them.

Designers work in a similar way



Impulsions to make things



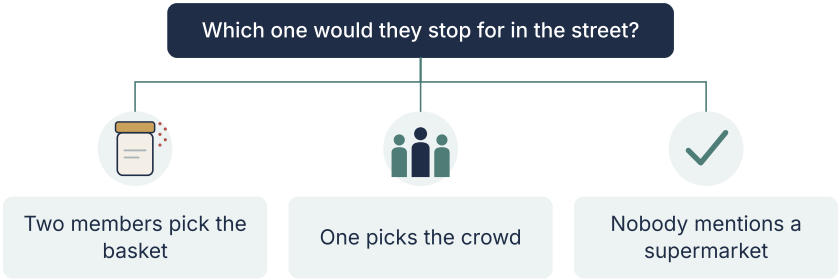
To build



Present several ideas to the client

Idris has no client, so the committee plays that part. **He takes all three thumbnails to the Thursday meeting**, still in pencil, and asks which one they would stop for in the street. Two members pick the basket and one picks the crowd, and nobody mentions a supermarket. He keeps all three for the next step.

The Thursday meeting



> **Key Concept:**
> Keep three alive. Take all three thumbnails one step further before you choose, for example **to rough colour at the size of a postcard**. Note under each what it gained or lost at the bigger size. A version that looked weak as a stamp sometimes comes alive at postcard size, and a favourite sometimes falls flat.

At postcard size, the crowd at the stall turns into a muddle of faces. **The basket of mixed apples gains the most**, because its colours carry the eye. The apple tree stays pleasant and plain. Idris picks the basket, and he writes one line under it to say why, bright colours that read from far away.

At postcard size

Thumbnail	At postcard size
The crowd at the stall	A muddle of faces
The basket of mixed apples	Gains the most
The apple tree	Pleasant and plain

In this book's terms, a poster brief is a task whose variables are not identified. **Nobody can tell you in advance which picture, colours and words will work** for your fair. Versions side by side let you try several sets of answers at once and compare them, where a single version tries only one set.

Nobody can tell you in advance



Nobody can tell you which picture will work



Nobody can tell you which colours will work



Nobody can tell you which words will work

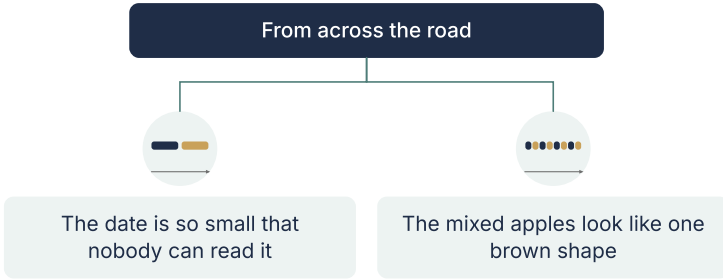
> Science Says:
>
> Designers in the interview study spoke of a prototype stage. **"The prototype stage can be optional"**, and at times it is required (Glaveanu et al., 2013). For a poster, that stage can be a full-size print in black and white, pinned up where people will see the real one.

A prototype stage

- The prototype stage can be optional
- At times it is required
- A full-size print in black and white

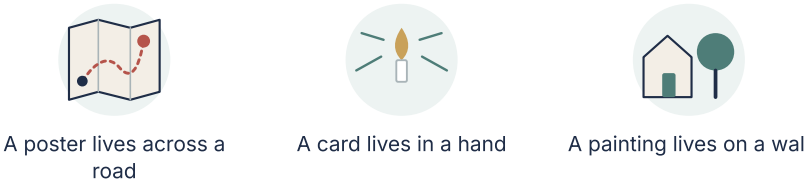
A test print of the basket design goes up on the window of the village shop. **From across the road, the date is so small that nobody can read it**, and the mixed apples look like one brown shape. He would never have seen either problem at his kitchen table, a foot from his eyes.

A test print in the shop window



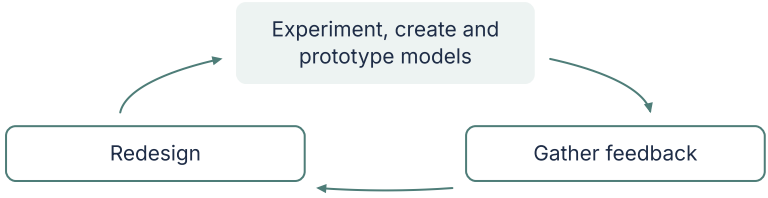
Test a picture where it will live. **A poster lives across a road, a card lives in a hand and a painting lives on a wall**, and each place asks for a different test. Stand where the viewer will stand, and look for as long as a passer-by would, a few seconds for a poster and longer for a card.

Test a picture where it will live



> **Science Says:**
>
> A review described design thinking as a way of working that "engages a person in opportunities to experiment, create and prototype models, gather feedback, and redesign" (Razzouk & Shute, 2012). **Idris's test print and redesign follow the same order on a small scale.** The review drew together earlier work, and it did not test the loop as a course in art.

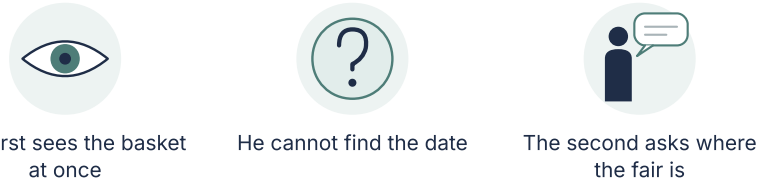
Design thinking



The second test print takes Idris ten minutes at the library copier. **He pins it to the board outside the bakery**, where the queue for bread stands every morning. Anyone waiting has a minute to look, which is longer than a passer-by gets and long enough to ask what they see.

Two stallholders from last year's fair look at a new test print. **The first sees the basket at once and cannot find the date.** The second asks where the fair is, since the poster never says. Two short answers show him two problems he had missed on his own.

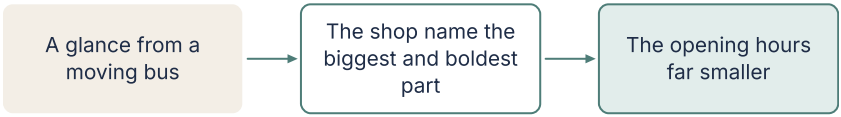
Two stallholders look at a new test print



> **Key Concept:**
> Visual hierarchy. Hierarchy means an order from most to least important. **Visual hierarchy is the order in which the eye reads the parts of a picture**, set mainly by size and contrast, so the most important part is seen first. A road sign works this way, with the town name big and bold and the small print read last, if at all.

A shop sign read from a moving bus gets even less time. **A passenger has only a glance**, so the shop name has to be the biggest and boldest part, with the opening hours far smaller. If the hours shout as loudly as the name, the bus has gone past before either one is read.

A passenger has only a glance



On the next print, both problems get fixed. **The date grows to three times its old size** and moves to the top, and the name of the village green goes under it in clear letters. The basket stays as the main picture, with fewer apples, so it no longer reads as one brown shape from across the road.

On the next print



In 5.1.1 you met judges who agree as the measure of creative work (Hennessey, 1994). **For a finished poster, the judges who count are appropriate observers**, people who know this kind of work, such as a local designer. Before you finish, ask yourself who those people are for your own piece.

The judges who count



Appropriate observers



People who know this kind of work



A local designer

A finished piece is a version you stop changing. **Name your limits before the last version**, such as the size of the paper, the number of colours and the date it must be up. Limits written down make the last version easier to call finished, because you can check each one off.

Name your limits before the last version

- [x] The size of the paper
- [x] The number of colours
- [x] The date it must be up

> **Key Concept:**
>
> The finish list. Write three or four checks the finished piece must pass, such as **the date readable from across the road**, two colours at most and ready by Friday. When every check is ticked, the piece is finished. A new idea that arrives after that point goes into the sketchbook for the next project.

The committee likes the final poster. **One woman at the fair says she came because she saw the basket in the shop window.** Idris keeps the first three thumbnails in a folder, because the apple tree may suit the fair next year.

The committee likes the final poster



She came because she saw the basket in the shop window



The first three thumbnails in a folder



The apple tree may suit the fair next year

The same path fits a birthday card, a shop sign or the cover of a family photo book. **Three thumbnails, one step further, one test where it will be seen and one redesign** can fit into a single weekend. None of the studies here tested this path as training, so the levels below are practice, with no promise attached.

The same path fits a birthday card



Exercise:

From sketch to finished piece.

1. Starter. Take all three thumbnails to rough colour. **Pick one, and write why it beat the others.**
2. Middle. Rank every part of your pick 1 to 5 by importance. **Make one greyscale version, in greys only,** where size and contrast follow that order, adding nothing new.

3. Advanced. Finish the piece under named limits, such as size, colours and date, and put it where it will be seen.

From sketch to finished piece at three levels



Pick one, and write why it beat the others



One greyscale version, in greys only



Finish the piece under named limits

Key idea:

Start with several versions side by side, test one where it will be seen, then redesign once and finish against your limits.

Quick check:

Why take all three thumbnails one step further before choosing? Answer: A version that looked weak as a stamp can come alive at a bigger size, and a favourite can fall flat.

5.3 Music and Sound

5.3.1 Playing With Rhythm, Melody and Sound

Imagine Marta, a librarian who plays an old keyboard in the evenings. **She can play forty pieces from sheet music**, some of them hard. One night her nephew asks her to make up a tune for his hamster, and her hands freeze on the keys. How can someone who plays well be stuck for four new notes?

Marta at her old keyboard

- She can play forty pieces from sheet music
- A tune for his hamster
- Her hands freeze

Playing from memory and making music up are two different jobs. **This section is about the second job**, playing with rhythm, melody and sound until something new comes out. I show you what one brain study saw while musicians made music up, where composers start and how to practise at three levels.

Two different jobs



Playing from memory



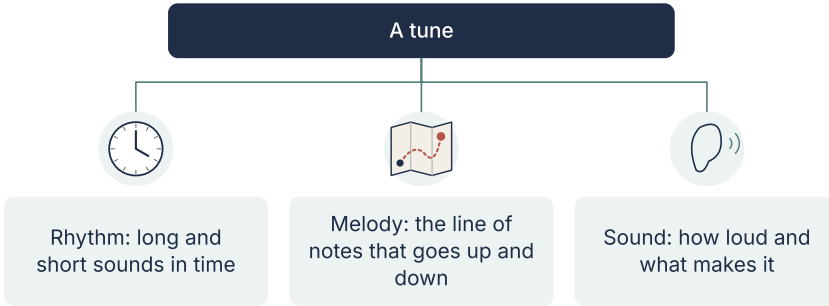
Making music up



This section is about the second job

Rhythm is the pattern of long and short sounds in time. **Melody is the line of notes that goes up and down**, the part you would hum. Sound is everything else, such as how loud the music is and what makes it, a voice, a key or a spoon on a pan.

Rhythm, melody and sound



> **Key Concept:**
>
> Three handles. Rhythm, melody and sound are **three handles on any tune**, and each one can turn while the other two stay still. A tune can keep its notes and change its rhythm, keep its rhythm and change its notes, or keep both and move to a new sound. Each turn gives a new version.

Making music up has its own name. **Improvisation means making music up as you play**, with no written notes to follow. In 2008, Limb and Braun put jazz musicians into a brain scanner while they played, to see what changes when music is made up on the spot (Limb & Braun, 2008).

Improvisation



Making music up as you play



No written notes to follow



Jazz musicians in a brain scanner, 2008

> **Science Says:**
> "Six highly skilled professional jazz musicians underwent functional MR brain scans" (Limb & Braun, 2008). A functional MR scan is **a brain scan that shows which parts are busy** while you do something. Each musician played a jazz piece learned by heart, and made music up over the same chords and backing. The scans compared the two.

The two kinds of playing looked different. Improvising went with "extensive deactivation of dorsolateral prefrontal and lateral orbital regions with focal activation of the medial prefrontal (frontal polar) cortex" (Limb & Braun, 2008). **The prefrontal cortex is the front part of the brain, behind the forehead.**

The two kinds of playing looked different

	Wide areas at the front sides	A small area at the front middle
Improvising	Went quiet	Got busier

In plain words, wide areas at the front sides of the brain went quiet, and a small area at the front middle got busier. **Making music up looked**

different in the scanner from playing a piece learned by heart, even with the same chords and the same player.



A jazz pianist lying in a large white brain scanner, a small keyboard resting on his lap and headphones over his ears.

The authors suggested what the quiet areas might mean. Improvising may be "internally motivated, stimulus-independent behaviors" that unfold "in the absence of central processes that typically mediate self-monitoring and conscious volitional control of ongoing performance" (Limb & Braun, 2008). **Self-monitoring means watching and checking yourself as you go.**

What the quiet areas might mean



Internally motivated



Stimulus-independent behaviors



In the absence of self-monitoring

Improvising works a little like chatting with a friend, and playing from memory is like reading a speech aloud. **In a chat you do not check each word before you say it**, and the talk still makes sense. A speech is checked in advance, and the reader follows the page.

Chatting with a friend

The idea		What it is like
Chatting with a friend	≈	Improvising
You do not check each word before you say it	≈	The talk still makes sense



Two friends talking over coffee at a café table, while behind them a man at a lectern reads from a printed speech.

Where the chat picture stops is the evidence. **The scans showed brain activity in six expert players**, lying still in a scanner. They did not test any way of teaching people to improvise, and they say nothing about beginners. What they offer you is a picture of two different jobs.

Where the chat picture stops



Brain activity in six expert players



Lying still in a scanner



Nothing about beginners

> **Key Concept:**
>
> Playing without the checker. As you saw in 2.1.2, when you make up music, **give yourself a stretch of time with no judging**, such as two minutes of playing where every note counts as fine. Judge afterwards, from a recording. Set a timer so you know when the free stretch ends.

In an interview study of French creators, the authors wrote that composers are moved by "a need to create music, to work on a song or a particular musical element" (Glaveanu et al., 2013). **Two of the twelve composers** named a particular musical element.

Composers are moved by a need to create music

- To work on a song
- Or a particular musical element
- Two of the twelve composers

For practice, I treat a musical element as a small part you can pick on its own, such as a rhythm, a short melody or a sound. **Pick one small piece and play with it.** For Marta, that means one short line at the top of the page, played a few times.

Pick one small piece and play with it



A rhythm



A short melody



A sound

> Exercise:
>
> Try it. Make up eight bars of rhythm only, on a tabletop or your knees. **Write the pattern down** before you add any notes.

A bar is a short block of beats, often counted in fours. **A rhythm with no tune yet is still music**, and it is easier to hear when each beat is clear. Marta taps a hopping pattern on the table for eight bars and writes long and short marks on a scrap of paper beside the keyboard.

A bar is a short block of beats



Often counted in fours



A rhythm with no tune yet is still music



Each beat is clear

Her first pattern is all even taps. **The third try adds a rest after every fourth note**, and the gap makes the rhythm sound new. A rest is a short silence, and silence counts as part of rhythm. She plays the rest with empty hands so she can feel the gap.

Her eight bars

Try	Pattern
First	All even taps
Third	A rest after every fourth note

Next she keeps the hopping rhythm and changes the notes. **A new melody on an old rhythm** gives her a tune that is hers, with a beat she already trusts. She tries three melodies on the same rhythm and keeps the one her nephew hums back to her straight away.

A new melody on an old rhythm



Keep the hopping rhythm



Change the notes



Three melodies on the same rhythm

One study looked at pianists with many different amounts of improvising behind them (Pinho et al., 2014). The sample was “39 professional pianists with varying backgrounds in classical and jazz piano playing”, and the team scanned them while they improvised.

39 professional pianists

- Varying backgrounds in classical and jazz piano playing
- Many different amounts of improvising
- Pinho et al., 2014

> **Science Says:**
> "We found total hours of improvisation experience to be negatively associated with activity in frontoparietal executive cortical areas" (Pinho et al., 2014). **More hours of improvising went with less activity** in brain areas that help with control. Improvisation training went with stronger working links between front areas of the brain. The study shows links with experience, and it trained nobody.

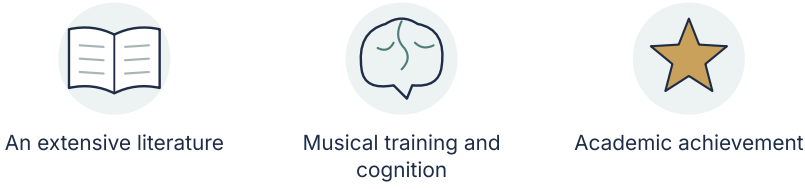
Negatively associated means that as one number went up, the other went down. **Pianists with more hours of improvising showed less activity** in those control areas while they played. The study looked at people who had already put in their hours, some few and some many, so it cannot say that the practice caused the brain pattern.

Negatively associated



Music lessons have their own research, with a different question. One study that combined many studies began, "An extensive literature has investigated the impact of musical training on cognition and academic achievement in children and adolescents" (Román-Caballero et al., 2022). **Its subject is thinking skills and schoolwork.**

Music lessons have their own research



Cognition here means thinking skills such as memory and attention, and academic achievement means results at school. **That combined study does not show that music practice raises creativity** in other fields, and it was never asked to. For your own playing, the useful question stays inside music, which is whether you can make up more and better tunes.

What that combined study does not show

- [x] That music practice raises creativity in other fields
- [x] Cognition: memory and attention
- [x] Academic achievement: results at school

> **Key Concept:**
> One element per session. Pick one element, rhythm, melody or sound, and **change only that one** for a whole practice session. Keep the other two fixed, and write the element at the top of the page. End the session when the timer rings, even if a new idea has just arrived.

Sound is the third element, and it is the easiest to forget. **Play the hamster tune on a high note, then a low one**, then tap it on a cup with a spoon. The rhythm and melody stay the same, and the tune feels different each time.

The hamster tune, one sound at a time



A phone app with different instrument sounds gives you the same game on a train. **Ten minutes of play a day** fits into the gap before dinner. Record a minute of each session on your phone, and play it back the next day before you start.

Ten minutes of play a day



The middle level uses a loop of two chords. **A chord is several notes played together**, and two chords played over and over make a simple backing. Marta loops two chords on her keyboard and makes up a line over them for two minutes. Most of it is plain, and one short run makes her smile.

> **Key Concept:**
> What the sound suggests. After you have played the same eight bars on a new source, **write one line on what the new sound made you want next**, such as slower, louder or shorter. Put that line under the bars before you leave the session. Read the line at the start of the next practice, and try that change once. The note is practice for listening, with no promise attached.

A loop of two chords

- [x] A chord is several notes played together
- [x] Two chords played over and over make a simple backing
- [x] Make up a line over them

The short run is a new musical element of her own, ready for the next session. **The advanced level keeps that idea and changes only the sound source.** None of the studies here tested these drills as training, so the levels below are practice only, with no promise attached.

> **Exercise:**
> Rhythm, melody and sound.
>
> 1. Starter. Keep the rhythm from your Try it. **Write a new melody** that fits it, and play both versions.
> 2. Middle. Loop two chords on a phone or keyboard. Improvise over them for two minutes without stopping.
> 3. Advanced. Keep one eight-bar idea. Play it on a new sound source, then note what the new sound suggests.

Rhythm, melody and sound at three levels



Write a new melody



Improvise over two chords for two minutes



One idea on a new sound source

Key idea:

Change one element at a time, rhythm, melody or sound, and write the chosen element at the top of the page.

Quick check:

What did the jazz scans show during improvising? Answer: Wide areas at the front sides of the brain went quiet, and a small area at the front middle got busier, in six expert players.

5.3.2 A Music Project From Idea to Performance

Imagine Theo, a plumber with a guitar who has promised a song for his grandmother's ninetieth birthday. **The party is in three weeks**, and forty relatives will be listening. He has four lines about her garden and a tune he hums in the van. Should he write every note, or leave room to make some up on the night?

A song for his grandmother

- [x] The party is in three weeks
- [x] Forty relatives will be listening
- [x] Four lines about her garden

A music project runs from a small idea to a moment when someone hears it. **In this section I follow that path**, from a first scrap of tune to a rehearsed piece with room for something live. I show you what one review found about making music up, and how to practise the project at three levels.

From a small idea to a moment when someone hears it





A plumber in work clothes sitting in a parked van, a guitar across his knees and a phone on the dashboard recording him.

Research on this part of music is young. A 2015 review opened with the words “Researchers have recently begun to examine the neural basis of musical improvisation, one of the most complex forms of creative behavior” (Beaty, 2015). **The neural basis means what the brain is doing.** Improvisation, making music up as you play, was the subject.

Research on this part of music is young



A 2015 review



The neural basis of musical improvisation



One of the most complex forms of creative behavior

> **Science Says:**
>
> The review brought together brain scans of people making music up with voice or instrument, including “jazz pianists, classical musicians, freestyle rap artists, and non-musicians” (Beaty, 2015). Freestyle rap is rap made up on the spot. **Making music up has been scanned in many kinds of player**, from experts to people who do not play at all.

Brain scans of people making music up



Jazz pianists



Classical musicians



Freestyle rap artists



Non-musicians

The first step of Theo’s project is the smallest. **A motif is a short scrap of tune**, a few notes long, that you can hum and repeat. You can

build a whole song from one. Theo's motif is the four notes he hums in the van, and it is already enough to start.

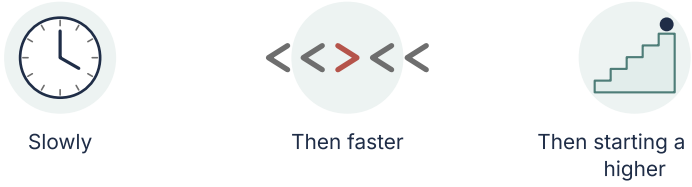
A motif is a short scrap of tune

- A few notes long
- You can hum and repeat it
- You can build a whole song from one

> Exercise:
>
> Try it. Hum a thirty-second sketch into your phone. **Use one motif only**, and repeat it with small changes.

Thirty seconds is short on purpose. **A short sketch keeps the motif in charge**, so you hear what it can do before you add anything else. Theo hums his four notes slowly, then faster, then starting a little higher. The third version sounds like something his grandmother would sing in the garden.

A short sketch keeps the motif in charge



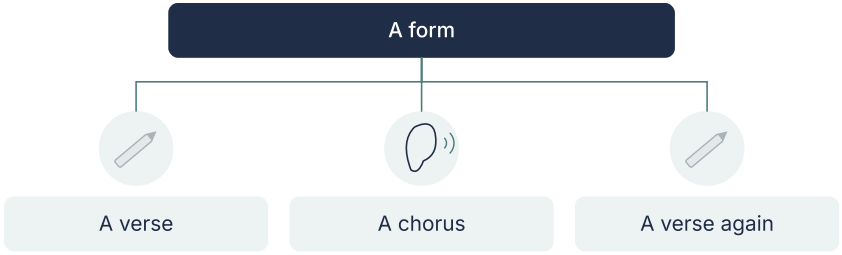
> **Key Concept:**
> Four ways to move a motif. **Repeat it** just as it is. Start it on a higher or lower note. Stretch it, with every note twice as long. Turn it upside down, so that a step up becomes a step down. Hum each version once into your phone, and keep the two that make you want to hear what comes next.

Four ways to move a motif



From a motif, a song needs a form. **A form is the order of the parts**, such as a verse, a chorus and a verse again. A fixed form works like the frame of a house. The walls go up in a known order, and inside each room you can still choose the furniture.

A form is the order of the parts



Where the house picture stops is time. **A house stands still, and a song moves past the listener once**, at the speed you play it. The form has to be clear enough for forty relatives to follow on a single hearing, with no way to walk back into a room.

Where the house picture stops



A house stands still



A song moves past the listener once



Clear enough for forty relatives

> **Key Concept:**
>
> Fixed parts and open parts. Write your song's form on a card, and mark each part as **fixed or open**. Fixed parts are learned by heart, note for note. Open parts are made up on the night inside a known frame, such as the same chords. Start with one open part only, and keep everything around it fixed. Add a second open part only after the first feels easy.

Draw the open part on the form card as an empty box, with the chords written above it and no notes inside. One look at the card on the night shows where the free stretch sits and which chords hold it. Keep the card on the music stand, where a quick glance from your seat is all it takes.

Draw the open part as an empty box

- The chords written above it
- No notes inside
- One look at the card on the night

Theo decides that the verses will be fixed and the middle will be open. **The words about the garden are learned by heart**, and the short guitar part between the second and third verses is made up each time. If

the open part goes badly, the fixed verse that follows will bring the song home.

Fixed and open in Theo's song

	Fixed	Open
Part	The verses	The middle
On the night	Learned by heart	Made up each time

The review found that improvising draws on more than one kind of brain activity. "Activation of premotor and lateral prefrontal regions suggests that a seemingly unconstrained behavior may actually benefit from motor planning and cognitive control" (Beaty, 2015). **Motor planning means planning movements**, such as where your fingers go next.

More than one kind of brain activity



Premotor and lateral prefrontal regions



Motor planning

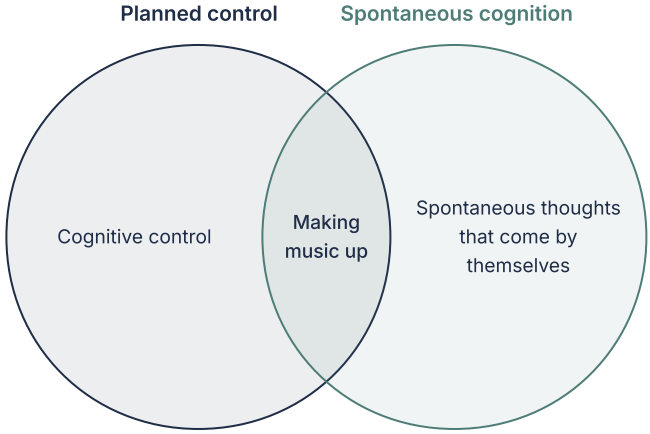


A seemingly unconstrained behavior

> **Science Says:**
>
> Cognitive control means steering your own thinking. **Making music up may lean on planning and control**, even though it looks free. The review added, "Yet activation of cortical midline regions points to a role of spontaneous cognition characteristic of the default network" (Beaty, 2015). The default network is a set of brain areas busy when the mind wanders.

Spontaneous cognition means thoughts that come by themselves. **Planned control and thoughts that come by themselves both turn up** in the review's picture of improvising. The review describes the brain while people play, and it does not test any way of training. For a music project, it fits a plan with fixed parts and one open part.

Both turn up in the review



Words come next for a song. **Fit the words to the motif**, and let the long notes fall on the words that count, such as garden, roses and her name. A word that has to be squeezed onto a short note will sound rushed, so swap it for a shorter one or move it.

Fit the words to the motif



Rehearsal follows. **Rehearse the fixed parts until your hands know them**, so that your attention is free on the night. Short daily runs through the fixed parts fit around a working week. Play the open part differently each time you rehearse, inside its frame, so that making it up feels normal by the day of the party itself.

Rehearse the fixed parts until your hands know them

- [x] Your attention is free on the night
- [x] Short daily runs
- [x] Play the open part differently

Rehearse in a place like the real one, if you can. **A garden has no walls to carry the sound**, so a quiet guitar that fills a spare room will vanish among forty people outdoors. Theo practises twice in his own back garden and learns to play the open part with a firmer hand.

A garden has no walls to carry the sound



A quiet guitar that fills a spare room



Forty people outdoors

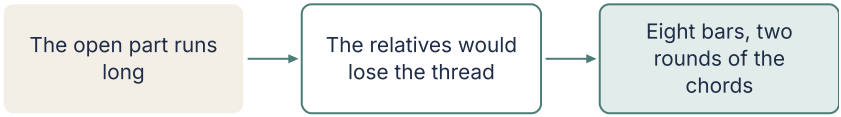


Practise twice in his own back garden

> **Key Concept:**
>
> One take. After a week of rehearsal, record the whole song in one take, **with no stopping and no second tries**. Treat the recording like the party itself. The next day, write down the single place where the song sagged, and make that place the only target of next week's rehearsal work.

The one take shows Theo that the open guitar part runs long. **The relatives would lose the thread**, and his grandmother would lose the garden. He sets the open part at eight bars, two rounds of the chords, and rehearses the move back into the last verse until it is smooth.

The open guitar part runs long



Plan for the open part going wrong. **Agree with yourself on a way home**, such as a strong chord you always land on before the last verse. A player who knows the way home can take a risk in the open part, because a mistake lasts only a few seconds and then the fixed music takes over again.

Agree with yourself on a way home



A strong chord before the last verse



Take a risk in the open part



A player who knows the way home

> **Key Concept:**
>
> A three-week plan. Week one is the motif, the form and the words. Week two is **rehearsal of the fixed parts** and play in the open part, ending with one take. Week three is fixing the place where it sagged, one listener and then no more changes for the last two days. Write the plan on the back of the form card, so it travels with the song.

A three-week plan



In 5.1.1 you met judges who agree as a measure of creative work (Hennessey, 1994). **For a song, the judges are listeners who know music**, such as a friend in a choir or a cousin who plays. One such listener can hear what forty kind relatives would never say.

Listeners who know music



Before the party, Theo plays the song to his cousin, who sings in a choir. **She asks him to sing the last line twice**, because it is the line about the roses and it deserves the space. He makes that one change and stops changing things. A song that keeps changing until the night is never quite learned.

One change from his cousin

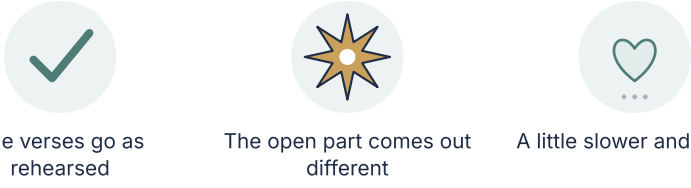
- Sing the last line twice
- The line about the roses
- He makes that one change



A large family gathered in a garden around an elderly woman in a chair, a man with a guitar singing to her beside a rose bush.

On the day, the verses go as rehearsed. **The open part comes out different from every rehearsal**, a little slower and softer, and it fits the quiet garden better than any version he planned. Nobody at the party can tell which part was made up. His grandmother asks to hear the whole song one more time before the cake.

On the day



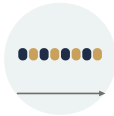
The project path works for any short piece of music. **A motif, a form with one open part, rehearsal, one take and one listener** can fit into three weeks of evenings. None of the studies here tested this path as training, so the levels below are practice, with no promise attached.

The project path



> **Exercise:**
>
> From idea to performance.
>
> 1. Starter. Build a short piece with a fixed form. **Leave one section open**, and make it up each time you play.
> 2. Middle. Rehearse for a week, then record one take with no stopping. Note the single place it sagged.
> 3. Advanced. Perform the piece for one listener who knows music. Make one change from what they say.

From idea to performance, starter to advanced



Leave one section open



One take with no stopping



One listener who knows music

Key idea:

Fix most of the piece and leave one part open, then rehearse, record one take and play it for a listener who knows music.

Quick check:

What did the 2015 review suggest about making music up? Answer: It may lean on planning and control, and on thoughts that come by themselves.

5.4 Making and Building

5.4.1 Materials, Tools and Hands-On Experiments

Imagine Freya, a hairdresser who wants a stand to hold her phone on the salon desk. **She has drawn a neat plan on the back of an appointment card**, with a slot for the phone and a small shelf for pens. She has never built anything, and she has no idea whether to make it from card, wire or wood.

A neat plan on the back of an appointment card

> - A stand to hold her phone on the salon desk
> - A slot for the phone
> - A small shelf for pens

Should she pick the material first, or the design? **A few small tests in the hands can try both.** In this section I show you where the idea of making as a creative practice comes from, what the material can teach you and how to practise small hands-on experiments at three levels.

The material first, or the design?



A few small tests in the hands



Where making as a creative practice comes from



What the material can teach you

Making has a movement behind it. One writer described the Maker Movement as "a community of hobbyists, tinkerers, engineers, hackers, and artists who creatively design and build projects for both playful and useful ends" (Martin, 2015). **Playful and useful are both allowed**, which is good news for a phone stand.

The Maker Movement



Hobbyists and tinkerers



Engineers and hackers



Artists



Playful and useful ends

> Science Says:
>
> Martin's article described "three elements of the Maker Movement". They are "digital tools, including rapid prototyping tools and low-cost microcontroller platforms", "community infrastructure, including online resources and in-person spaces and events" and "the maker mindset, aesthetic principles, and habits of mind" (Martin, 2015). **Tools, people and a way of thinking** make up the movement in his account.

A microcontroller is a tiny cheap computer that can run a small machine, such as a light that switches on by itself. **Rapid prototyping tools make quick test versions**, such as a 3D printer. Freya needs none of these for a phone stand. Card, a ruler and a craft knife are her tools for now.

Rapid prototyping tools make quick test versions

- A microcontroller is a tiny cheap computer
- Such as a 3D printer
- Freya needs none of these

The movement's newness has been questioned. Two authors set out "the theoretical roots of the movement" and drew links to research on education (Halverson & Sheridan, 2014). **They asked "whether the newness attributed to the maker movement is really all that new"** (Halverson & Sheridan, 2014).



A shelf in a community workshop holding a small 3D printer, a tray of tiny circuit boards and a row of cardboard models.

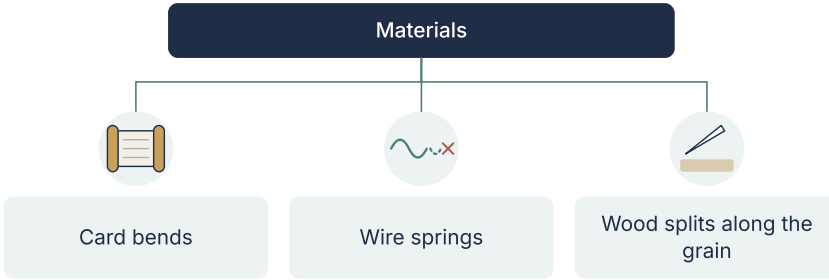
The same authors pointed to “points of tension between making and formal education practices” (Halverson & Sheridan, 2014). **A tension is a pull in two directions.** For an adult working alone, that pull can sit inside your own head, between a neat plan and a messy first try.

A tension is a pull in two directions



Materials push back, and the push is useful. **Card bends, wire springs and wood splits along the grain.** Each material tells you something your drawing could not, about weight, balance and what holds. A material test is a small question put to the stuff itself, such as whether this card will hold a phone upright.

Materials push back



> Exercise:
>
> Try it. Pick one small job. **Try it in three materials**, five minutes each, and note what each one did.

Fifteen minutes at the kitchen table give Freya three answers. **The card stand folds under the phone**, the wire bends into a clever shape but tips over, and a scrap of wood holds the phone firmly but will not take a slot without a saw. Three short tests have taught her more than an evening with the plan.

Fifteen minutes at the kitchen table

Material	What it did
Card	Folds under the phone
Wire	Bends into a clever shape but tips over
A scrap of wood	Holds the phone firmly

Testing materials works like tasting ingredients before you cook. **A cook tastes the lemon before deciding how much goes in**, because no recipe knows this lemon. Where the picture stops is the kitchen bin,

since a wrong taste costs nothing, while a wrong cut in wood can waste the only good piece you have.

Tasting ingredients before you cook



A cook tastes the lemon



No recipe knows this lemon



The kitchen bin

> **Key Concept:**
>
> The five-minute test. Give each material **five minutes and one question**, such as will it stand, will it bend back or will it hold weight. Write the answer in a line before you touch the next material. A test that runs longer than five minutes has turned into a build, so stop and write down what you have learned.

Artists talk about the body side of making. In the interview study of French creators, “Artists refer often to their work as a ‘physical’ necessity” (Glaveanu et al., 2013). **Making is done with hands and heads together**, and a material test puts your hands to work before your head has made up its mind.

Making is done with hands and heads together



A ‘physical’ necessity



Artists in the interview study



Hands and heads

For Freya, working hands first feels odd at the start. **She is used to deciding before she cuts**, the way she plans a haircut with a client before the scissors come out. With card and wire, a wrong move costs a few pennies, so she lets her hands lead for a while and writes down what they find.

Working hands first

Before	After
She is used to deciding before she cuts	With card and wire
She plans a haircut before the scissors come out	A wrong move costs a few pennies



Three rough phone stands on a kitchen table, one of folded card sagging, one of bent wire tipped on its side and one of plain wood.

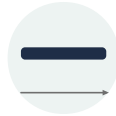
Hands get better with use, and that is a creative skill in its own right. A paper on habit argued that “mastery, for instance, is one of the highest levels of creative performance achieved within a habitual practice”

(Glăveanu, 2012). **Mastery means knowing a tool or material so well** that you can do new things with it.

Mastery



One of the highest levels of creative performance



Within a habitual practice



Hands get better with use

> **Science Says:**
>
> The same paper argued that splitting habit from creativity "misrepresents both habit and creativity with important theoretical and practical consequences" (Glăveanu, 2012). **Habit and creativity can work together**, in this view. Repeated work with one material builds the habits that let you try something new with it. The paper is an argument, and it does not report a study.

Classic methods have limits in new design work. **A professor of cognitive psychology and ergonomics wrote that "classic methods and ergonomic recommendations are useful in most run-of-the-mill design contexts"** and "of limited benefit when the design situation requires greater creativity" (Bonnardel, 2012). Ergonomic recommendations are rules for making things easy on the body.

Classic methods have limits in new design work

- A professor of cognitive psychology and ergonomics
- Useful in most run-of-the-mill design contexts
- Classic methods and ergonomic recommendations

In this book's terms, a design task that needs greater creativity is one whose variables are not identified. **A rule book cannot tell Freya which material suits a busy salon desk**, because nobody has made this stand before. Small experiments find out what no rule says, one test at a time.

A design task whose variables are not identified



A rule book cannot tell Freya



Which material suits a busy salon desk



Nobody has made this stand before

Key Concept:

One material only. Pick the material that won your first tests, and **build the whole thing from that material alone**, with no glue, tape or extra parts. Then rebuild it once, with one change. The limit is practice for noticing cuts, folds and slots before you reach for help.

Freya picks wood and rebuilds the stand twice. **The second version has a slot cut at a slant**, so the phone leans back, and a wider base so it cannot tip. She borrows a small saw from a neighbour, and the neighbour shows her how to start a cut without the blade jumping.

The second version

Change	The phone
A slot cut at a slant	Leans back
A wider base	Cannot tip

In 4.11.2 you met the advert study that favoured several versions at once (Dow et al., 2010). **The new point for making is to build the parallel versions in different materials.** Two small stands, one in wood and one in thick card, show you what each material gives and takes away.

Parallel versions in different materials



The advert study



Two small stands



One in wood

The stand has to suit the people who use it. **Bonnardel described the job of designers as finding products "both new and adapted to future users and usages"** (Bonnardel, 2012). For Freya, the users are her and two other stylists with wet hands, so the stand has to be easy to grab and easy to wipe.

Both new and adapted



Future users and usages



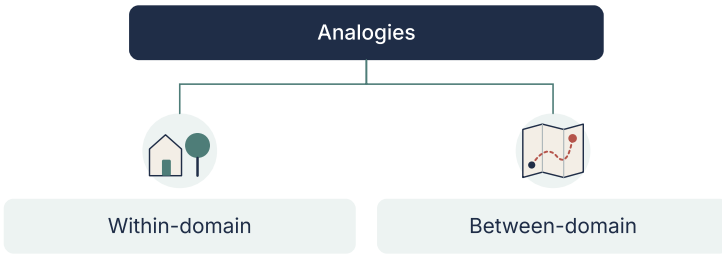
The stand has to suit the people who use it



Bonnardel, 2012

Physical test versions shape where your ideas come from. A study of engineers at work found that “Analogizing was found to occur frequently, entailing a roughly equal amount of within- and between-domain analogies” (Christensen & Schunn, 2007). **An analogy, in this study, is a comparison with something else**, from the same field or another one.

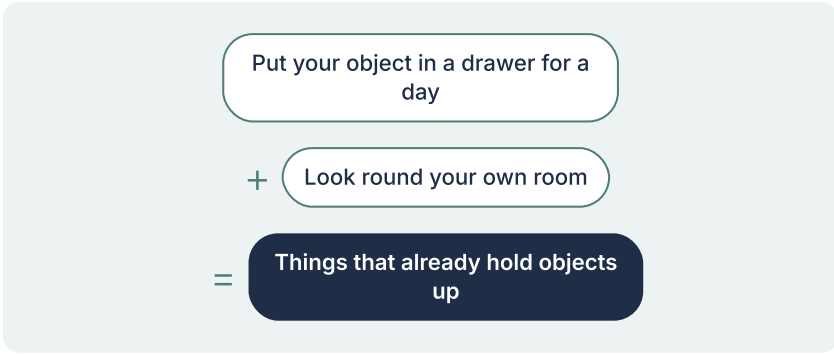
Analogizing was found to occur frequently



> **Science Says:**
> In that study, “reference to exemplars (in the form of prototypes) significantly reduced the number of between-domain analogies” (Christensen & Schunn, 2007). **With a test version in hand, engineers borrowed less from other fields.** The analogies served “identifying problems, solving problems, and explaining concepts.” The study watched engineers at work, so its link to hobby making is a guess.

A test version in your hand pulls your attention to itself. **When stuck, put your object in a drawer for a day** and look round your own room for things that already hold objects up. Come back to the object only after you have two fresh ideas on paper. Keep the ideas short, one line each.

When stuck



The advanced level asks you to share an experiment. **Community is one of the three elements in Martin's account**, and it can be a neighbour with a saw, a repair café or an online forum. Show one test and ask what they would change.

Community is one of the three elements

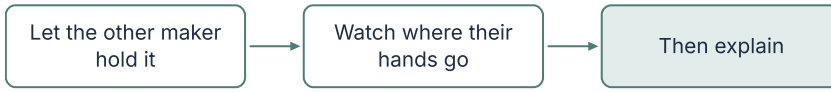


> **Key Concept:**
> Hands before words. When you share a test, **let the other maker hold it before you explain anything**. Watch where their hands go and what they try to do with it. Then bring out a photo of your earlier versions and ask what they would change. What their hands do first often tells you more than what they say.

None of the studies here tested these drills as training. **The levels below are practice, with no promise attached.** They follow the

order of the section, from one material, to two versions side by side, to a test shared with another maker who may see what you missed.

Hands before words



Exercise:

Materials and experiments.

1. Starter. Take the material that won your Try it. **Build the object from that material alone**, then rebuild it once with one change.
2. Middle. Build two small test versions side by side in two different materials. Note what each one gave and took away.
3. Advanced. Share one experiment with another maker. Ask what they would change, and try their idea once.

Materials and experiments at three levels



One material alone, then rebuild it once



Two test versions side by side



One experiment shared with another maker

Key idea:

Let the material answer small questions before you commit, with short tests in your hands and one change at a time.

Quick check:

In the engineering study, what happened to between-domain analogies when a test version was at hand? Answer: There were fewer of them, so the engineers borrowed less from other fields.

5.4.2 A Making Project From Model to Working Object

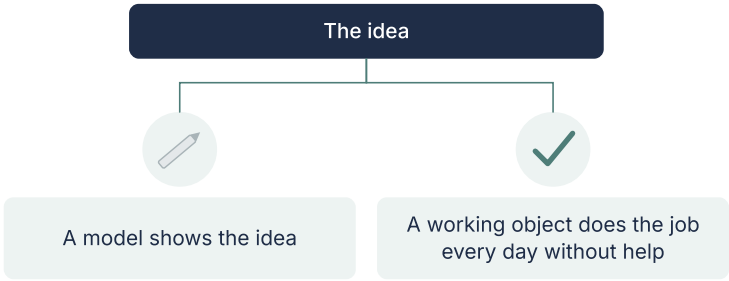
Imagine Yusuf, a school caretaker who lives in a flat with a tiny balcony. **He wants a drying rack that folds flat against the wall** and still holds a full load of washing. The shop racks either block the door or bend under wet jeans. He has wood, hinges and a free weekend.

A drying rack that folds flat against the wall

- A tiny balcony
- Holds a full load of washing
- The shop racks block the door or bend

When does a model become a working object? **A model shows the idea, and a working object does the job** every day without help. In this section I follow a making project from first model to working object, with what designers say about the path and how to practise it at three levels.

A model and a working object



Craft has been studied from the maker's own side. One study's title describes looking at craft "Through the Creator's Eyes" (Glăveanu & Lahlou, 2012). **The maker's view is the one that counts in a home project**, because the maker is often the user, the person who will hang the washing every Monday.

Through the Creator's Eyes



Craft studied from the maker's own side



The maker's view counts in a home project



Glăveanu & Lahlou, 2012

The first step is to say what working means. **A working object passes a test you can check**, such as folds to less than a hand's width and holds a full wash without bending. A test written down before you build keeps the project honest, because the object either passes or it does not.

A working object passes a test you can check

- [x] Folds to less than a hand's width
- [x] Holds a full wash without bending
- [x] Written down before you build

> Exercise:
>
> Try it. Write one sentence naming the object you want. **Add one test** that would prove it works.

Yusuf writes his test on the inside of a cupboard door. **Folds flat against the wall, holds one full load, and opens with one hand.** He has three checks in one test, each one easy to try. Every model he builds from now on will be held up against that line, and he reads it aloud before each build.

Three checks in one test



Folds flat against the wall



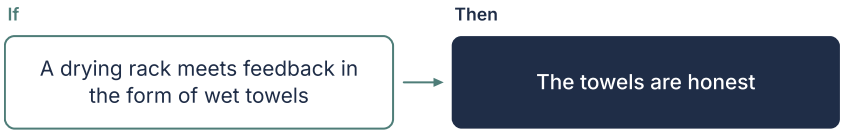
Holds one full load



Opens with one hand

In 4.8.3 you met the build, show and change loop. **The new point for making is that the loop runs on real loads.** A drying rack meets feedback in the form of wet towels, and the towels are honest in a way that people are not.

The loop runs on real loads



A model comes first, and it can be rough. **Build it from cheap stuff at a small size**, such as card and lolly sticks, to test how the parts move. Yusuf builds two small models on the kitchen table, one with arms that swing out like a gate and one with a frame that drops down like a table leaf.

Build it from cheap stuff at a small size



Card and lolly sticks



Test how the parts move



Two small models on the kitchen table

The gate model swings neatly and leaves a gap at the wall. The table-leaf model is ugly, and it holds more washing on its longer bars.

Both answer the same fold-flat and open-wide test, and each one fails in a different place. Write the fail on a sticky note and stick it to the model.

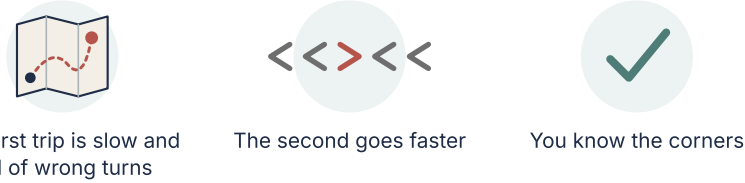
Two models, one test

Model	At the test
The gate model	Swings neatly and leaves a gap at the wall
The table-leaf model	Ugly, and holds more washing on its longer bars

> **Key Concept:**
> Two ways to move. Before you build full size, **make two small models that move in different ways**, such as swing, fold, slide or drop. Use the same test on both. Keep the one that passes more of the test, and write down the best part of the loser, because it may join the winner later.

A making project works like learning a new route to work. **The first trip is slow and full of wrong turns**, and the second goes faster because you know the corners. Where the picture stops is the road, since a route stays the same while a design keeps changing as you learn.

Learning a new route to work



The first trip is slow and full of wrong turns | The second goes faster | You know the corners

Models break, and breaking is their job. **A card model that tears at the hinge has told you where the strain sits** before you spend money on wood. Yusuf's table-leaf model splits at its fold twice, so he

knows the full-size hinge needs to be a strong one, fixed with long screws.

Breaking is their job

- A card model that tears at the hinge
- Has told you where the strain sits
- Before you spend money on wood



Two card and lolly-stick models of a folding rack on a kitchen table, one swinging out like a gate and one dropping down like a table leaf.

Borrowing helps at this stage. In 5.4.1 you met engineers who borrowed ideas from inside and outside their own field (Christensen & Schunn, 2007). **The study's own count was "55% within and 45% between domain."** For a drying rack, that means looking at other racks and at things that are not racks, such as umbrellas and folding chairs.

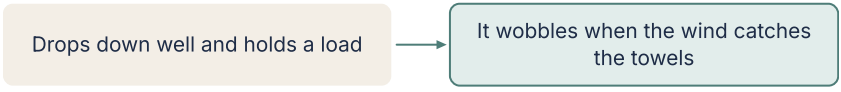
The study's own count



> **Science Says:**
>
> One designer in the French interview study described a stage where "the form is perfected and several of its details are progressively defined" (Glaveanu et al., 2013). **Detail work shapes the form at that stage.** For a box you are making, that could mean how the hinge sits and where a hand goes to open it. This is one designer's account from an interview study, and it does not test any way of training.

The table-leaf model goes to full size. **The first full-size rack drops down well and holds a load**, and then it wobbles when the wind catches the towels. Two small models never met the wind. The full-size test found a problem that only the real place could show.

The first full-size rack



The test now has a new line, stays still in the wind. **A working object often teaches you a test you did not know you needed.** Write the new line under the old ones, so that every later version is tried against the full list, old checks and new ones together.

A test you did not know you needed



Stays still in the wind



Write the new line under the old ones



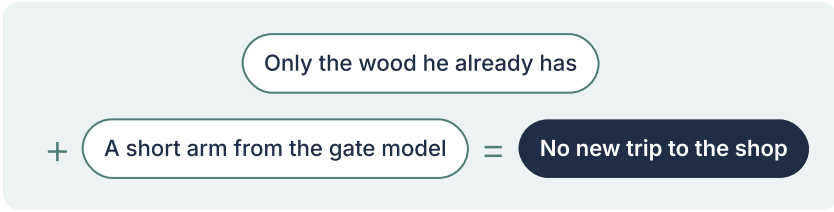
Every later version tried against the full list



A wooden drying rack folded down from a balcony wall, towels on its bars lifting in the breeze.

The redesign comes under a limit. **Yusuf allows himself only the wood he already has**, with no new trip to the shop. The limit pushes him to use the best part of the gate model, a short arm that swings out and braces the frame against the wall. The rack stops wobbling, and the arm folds away with it.

The redesign comes under a limit



The new arm brings a new risk. **A part that fixes one problem can cause another one**, such as a brace that stops the wobble and blocks the fold. Yusuf runs the whole test list again, from folds flat to stays still in the wind, before he calls the rack fixed.

A part that fixes one problem can cause another



A brace that stops the wobble



Blocks the fold



Run the whole test list again

> **Key Concept:**
> Run the whole list. After any change, **run every test on your list**, starting with the one that failed. Tick each one on paper and write the date beside it. A fix that breaks an old test is not a fix yet, and the dated ticks show you when the problem crept in.

Small details still need care once the form works. **A rounded edge, a hook for pegs and a catch that clicks** are small, and each one is used every week. Yusuf sands the edges and fits a brass catch that he can open with one hand full of washing. He writes each detail on the cupboard door under the test.

Small details

- [x] A rounded edge
- [x] A hook for pegs
- [x] A catch that clicks

Each detail gets its own small test. **Open the catch ten times with one hand full**, and count how often it sticks. Yusuf's catch sticks twice, so he files the edge of the brass hook and tries ten more. A detail passes when it works every time in the count.

Each detail gets its own small test



Open the catch ten times with one hand full



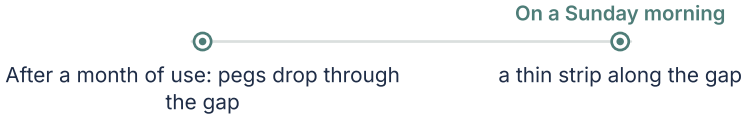
The catch sticks twice



File the edge of the brass hook

A working object keeps teaching after it is finished. **After a month of use, Yusuf notices that pegs drop through the gap** behind the top bar. He screws a thin strip along the gap on a Sunday morning, and adds a line to the test list for any rack he builds again.

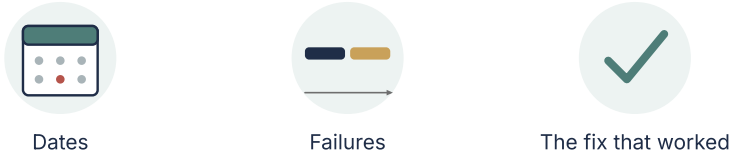
A working object keeps teaching



A notebook of these later fixes pays off. **Over a few projects the list grows into your own maker's rulebook**, with dates, failures and the

fix that worked. Keep it next to your tools so you open it before the next build. Date every entry so you can see what changed.

Your own maker's rulebook

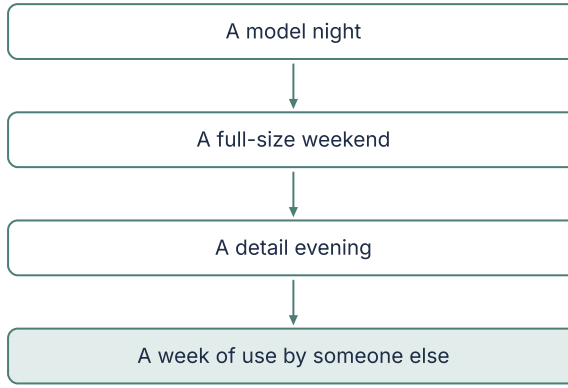


> **Key Concept:**
> The week test. Lend the object to one other person **for a whole week of ordinary use**. Ask them to write down every moment it annoyed them, however small it seemed at the time. A week shows problems that ten minutes never do, such as a hook in the wrong place on a busy morning.

Making projects fit into weekends and evenings. **A model night, a full-size weekend and a detail evening** will see a small object through, with a week of use by someone else at the end. Keep every model and every version of the test list in one box, so that the next project starts from what you learned.

Expect the middle to take the longest. **The full-size build and its fixes eat most of the hours**, because that is where the real place starts answering back. Yusuf planned one weekend and used two, and the second weekend was all wobble and brace.

Making projects fit into weekends and evenings



Expect the middle to take the longest

- The full-size build and its fixes eat most of the hours
- The real place starts answering back
- Yusuf planned one weekend and used two

Pick an object you will really use. **A small object with one clear job makes a good first project**, such as a key hook, a plant stand or a shelf for a row of books. A large first project can stall halfway, and a half-built object teaches less than a finished small one.

A small object with one clear job



The levels below follow the path of the section. None of the studies here tested this path as training, so they are practice, with no promise

attached. **The starter level builds two models**, the middle level tests and redesigns under one limit, and the advanced level puts the object in someone else's hands.

> Exercise:
>
> From model to working object.
>
> 1. Starter. Build two rough models that move in different ways. **Hold both against your test** and keep the better one.
> 2. Middle. Build it full size and run the test. Redesign once under one limit, and run every test once more.
> 3. Advanced. Give the object to one other person for a week of use. Fix the biggest annoyance they find.

From model to working object at three levels



Two rough models held against your test



Full size, then redesign once under one limit



A week of use by one other person

Key idea:

Write the test before you build, compare two models, and let real use and one other person show you what to fix.

Quick check:

What makes a working object different from a model? Answer: A working object passes a written test and does the job in real use, every day, without help.

5.5.1 Questions, Hypotheses and Inventive Experiments

Imagine Nia, a science teacher who runs the after-school club. **The club's bread mould jars never match**, even when every jar starts with the same slice. One brand grows a green film in three days, and another stays pale for a week. How can a simple kitchen test turn into a real experiment?

The bread mould jars never match

- Every jar starts with the same slice
- One brand grows a green film in three days
- Another stays pale for a week

Her puzzle sits at the heart of scientific creativity. **A good experiment starts with a clear question**, then a guess you can check, then a test that could prove you wrong. In this section I show you how researchers describe that path, what one history paper says about lucky-discovery stories and how to practise inventive experiments at three levels.

How researchers describe that path



A clear question



A guess you can check



A test that could prove you wrong



A classroom side bench with three sealed jars of bread, each labelled with a brand name and a start date, and a notebook open beside them.

A 1988 paper on scientific reasoning built a dual-search model from an earlier rule-induction tool. **“By extending Simon and Lea’s (1974) Generalized Rule Inducer, we present a general model of Scientific Discovery as Dual Search (SDDS)”** (Klahr & Dunbar, 1988). Dual search means looking in two places, like hunting for keys in your coat and then your bag.

Dual search



Nia reads the dual-search idea aloud once, then puts the paper aside. **The club only needs the two spaces on the page.** She leaves the full model name off the board and writes hypothesis space and experiment space as column headers before the first meeting ends.

> **Science Says:**
> In that study, “subjects had to formulate hypotheses based on their prior knowledge, conduct experiments, and evaluate the results of their experiments” (Klahr & Dunbar, 1988). **One group searched memory for ideas**, and the other generalised from earlier tests. The authors called the first search an hypothesis space and the second an experiment space.

Two spaces

Space	Where the search goes
Hypothesis space	Searched memory for ideas
Experiment space	Generalised from earlier tests

An hypothesis is a clear guess you can check. **An experiment space is the set of tests you could run**, such as changing one brand, one temperature or one day of light. Nia’s club has both spaces open at once, and the work is to move between them on purpose during the same meeting.

At the top of a shared page goes the club question. **Under it Nia draws two columns**, one for guesses and one for tests. Students fill both before anyone opens a jar, and a late arrival still has to add a line before touching the shelf. The page stays taped above the jars for the whole week.

A shared page

- [x] The club question at the top
- [x] One column for guesses
- [x] One column for tests

> **Key Concept:**
> Two spaces. Write your question at the top of a page. Under it, list three possible guesses in one column and three possible tests in the other. **Circle one guess and one test that fit each other**, then run only that pair this week. Keep the other ideas on the page for a later session.

Students who finish early add a third guess in light pencil. **Nia tells them the pencil guesses wait for week two**, so the circled pair stays clean. The club photographs the page once so a lost sheet can be redrawn from the phone.

The circled pair stays clean



One guess



One test



Pencil guesses wait for week two

An interview study asked scientists how their work starts. **The authors called it an “impulsion”**, a strong push from inside, like an itch you have to scratch (Glaveanu et al., 2013). It keeps tugging at you until you do something about it.

> **Science Says:**
> "the impulsion that drives scientists toward their work mainly concerns the need to 'solve,' to find an answer to a problem or question (S1, S2) and learn something new (S1, S4), coupled with great curiosity (S2, S5, S8)" (Glaveanu et al., 2013). **Three of the scientists spoke of great curiosity.** A club still needs a solvable question named on the page before the jars go on the shelf.

An impulsion

- A strong push from inside
- Like an itch you have to scratch
- The need to solve and learn something new

> **Exercise:**
> Try it. Write three questions about one odd result you noticed. **Pick the one you could test this week.**

A testable question names what you will change and what you will watch. **Does brand A grow mould faster than brand B on the same shelf** is testable. Is mould mysterious is not. Write the change and the watch-line under the question before you touch a jar, so the club can see both on the page.

A testable question

Testable	Not testable
⊕ Brand A against brand B on the same shelf	⊖ Is mould mysterious

Nia's first question is too wide for one club hour. **She circles one brand against one other brand on the same shelf**, with one week of photos as the watch window. The other wide questions stay on the page for a later meeting, so the club does not lose them.

Scientific creativity "has often been described as combinatorial", yet that description is "usually insufficiently formulated to count as a precise scientific explanation" (Simonton, 2021). In plain words, **the mixing idea is popular but loose**. Combinatorial means mixing old pieces in a new way, and that picture is usually not sharp enough to explain how a discovery happens.

The mixing idea is popular but loose

> - Combinatorial means mixing old pieces in a new way
> - Usually not sharp enough to explain how a discovery happens
> - Simonton, 2021

Jars, labels, a cupboard and a phone camera are already on hand for Nia. **The new arrangement is a fixed photo time each day**, the same shelf and two brands only. No student needs to buy a tool. The real invention sits in how the pieces are paired with the question on the page.

Already on hand



Jars and labels



A cupboard



A phone camera



A tray holding jars, sticky labels, a phone and a small torch, ready for a week of daily photos.

She sets the photo time by the school bell at 4 p.m. **A student with a phone on a tripod takes the shot**, and another ticks the date on the change log. The torch sits ready for dark winter afternoons when the cupboard shelf needs a little extra light from the side.

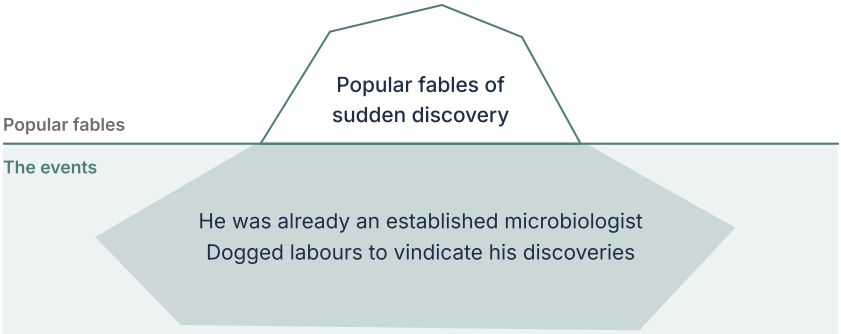
A fixed photo time each day

Day	1	2	3	4	5	6	7
The school bell at 4 p.m.	☐	☐	☐	☐	☐	☐	☐
A student with a phone on a tripod takes the shot	☐	☐	☐	☐	☐	☐	☐
Another ticks the date on the change log	☐	☐	☐	☐	☐	☐	☐

Popular stories about sudden discovery can mislead a club. **A history paper on Fleming's mould work warns against popular fables** (Lalchhandama, 2020). "But contrary to popular fables, the events were not that serendipitous. He was already an established microbiologist

and it took him dogged labours to vindicate his discoveries.” The club keeps that caution beside the surprise jar.

Fleming’s mould work



> **Key Concept:**
> Prepared follow-up. After any surprise result, **write three next checks** before you celebrate. Ask what else could explain the result, what you must keep the same next time and who could try to repeat it. A surprise opens a door, and the three checks are how you walk through without guessing.

The club’s green jar is a surprise, and it is unfinished. **Nia has the students write the three checks on the board** before anyone claims a winner. The next meeting repeats the test with a third brand held back as a spare control, still on the same shelf and photo time.

Prepared follow-up

- [ ] What else could explain the result
- [ ] What you must keep the same next time
- [ ] Who could try to repeat it

Planning the observation matters as much as the guess. **Nia's plan is a photo at 4 p.m. each day for seven days**, and a clear difference is mould covering more than half the slice. A gardener with two seed trays could plan one photo at noon for ten days, with a seedling taller than a pencil as the clear difference.

Two planned observations

Plan	A clear difference
A photo at 4 p.m. each day for seven days	Mould covering more than half the slice
One photo at noon for ten days	A seedling taller than a pencil

> **Key Concept:**
> One planned observation. Before you start, write the time of day, the number of days and the line that means the guess passed or failed. **Leave no room for a hazy later memory.** A runner who times one lap at 7 a.m. on five mornings, and calls it a pass if three laps beat last week's time, has one planned observation.

Dull results earn their place. **A pale jar that stays pale still answers the question**, and it frees the club to try a new guess next week. Crossing out a guess is progress when the test was fair. Write the crossed-out guess in the notebook so the club can see what has already been checked and why.

Dull results earn their place

- A pale jar that stays pale still answers the question
- Crossing out a guess is progress when the test was fair
- Write the crossed-out guess in the notebook

For your next kitchen or classroom test, try a tiny change log. **One line per day, with the time and one photo name**, is enough. Fancy software can wait until the question is stable, and a paper log still works when the wifi is down or the phone battery dies.

A tiny change log



One line per day



The time of day



One photo name

Keep the jars sealed for the whole week. **Throw them away in a tied bag after the last photo**, and never open a mould jar to sniff it. A sealed test is safer for a school club, and it still gives a clear photo record that anyone in the club can check later.

Keep the jars sealed

- [x] Sealed for the whole week
- [x] Throw them away in a tied bag after the last photo
- [x] Never open a mould jar to sniff it

After the first pale week, the club adds one more rule. **Nobody may move a jar to a warmer windowsill** in the middle of a test. The photo time and the shelf stay fixed so a dull week still counts as a fair

answer. A cook testing two cake tins keeps both on one oven shelf for the same reason.

One more rule



Nobody may move a jar to a warmer windowsill



The photo time and the shelf stay fixed

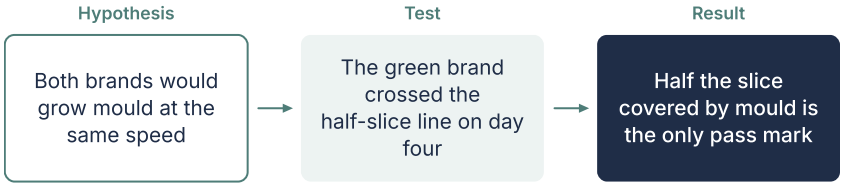


A dull week still counts as a fair answer

The middle level of practice runs a mini-experiment and notes the surprise. **Write the surprise in one sentence**, even if it is only that nothing changed. On the revision evening Nia lays the seven photos in a row, and the green brand crossed the half-slice line on day four while the pale brand never did at all.

Revising the guess is the advanced step. **The club crosses out its first guess**, that both brands would grow mould at the same speed, and writes a tighter one in every notebook. Half the slice covered by mould is the only pass mark, and a warmer shelf must wait for a brand new question in a later club week.

A tighter guess



Exercise:

Questions and inventive experiments.

1. Starter. Take your circled question. **Write one hypothesis and one planned observation**, with time, days and a pass or fail line.
2. Middle. Run the mini-experiment. Note the single biggest surprise in one sentence.
3. Advanced. Revise the hypothesis after the result. Keep the same test where you can, and write what changed in the guess.

Questions and inventive experiments, starter to advanced



One hypothesis and one planned observation



Run the mini-experiment and note the surprise



Revise the hypothesis after the result

Key idea:

Move between guesses and tests on purpose, with a narrow question, a written plan and follow-up checks after every surprise.

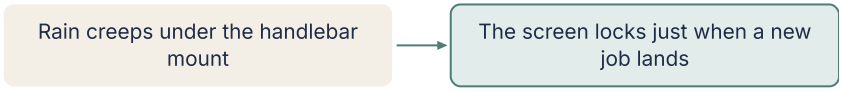
Quick check:

What two spaces did Klahr and Dunbar name? Answer: An hypothesis space, where you search memory for guesses, and an experiment space, where you generalise from tests you run.

5.5.2 An Invention Project From Problem to Prototype

IMAGINE CASS, A CYCLE courier whose phone dies in every wet shift. **Rain creeps under the handlebar mount**, and the screen locks just when a new job lands. Tape and a sandwich bag help for a day, then fog up and peel. How can a rough home prototype beat another full week of soggy phones on paid jobs?

Every wet shift



The path from a problem to a working test object is an invention project. **You watch the failure, name the jobs the fix must do, then build and test under real conditions.** In this section I show you how material tests enter the work and how to practise a small home invention project at the three levels.

An invention project


Watch the failure


Name the jobs the fix must do


Build and test under real conditions



A bicycle parked under a shop awning, a phone in a fogged plastic bag taped to the handlebars, rain beading on the tape.

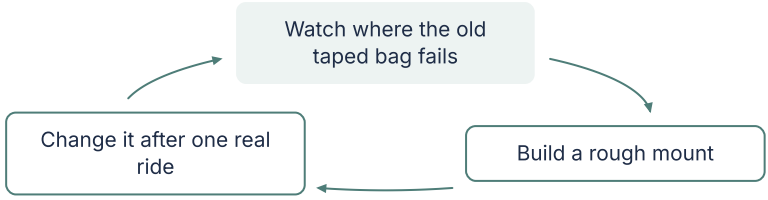
In 5.5.1 you met the two spaces of guesses and tests (Klahr & Dunbar, 1988). **The new point for an invention is that the test has to be a physical thing you can hold.** A note on paper still helps, and the ride has to answer as well when the rain starts in traffic.

The new point for an invention

> - The test has to be a physical thing you can hold
> - A note on paper still helps
> - The ride has to answer as well

The build, show and change loop from 4.8.3 already guides her work on the mount. She starts by watching where the old taped bag fails on one real ride in cold morning traffic. A gardener whose tomato cages blow over would start the same way, standing outside on one windy evening to see which leg lifts first.

The build, show and change loop



> Exercise:
>
> Try it. Watch the problem happen once in its real setting. **Write the exact spot and moment** the current fix fails.

Cass rides one wet job with the old bag still taped on. **Water sneaks in at the lower left corner** when she brakes hard at a light, and the screen locks before the next ping. She writes that spot and moment on a card under the bars before she buys any scrap from the kitchen drawer at home.

The exact spot and moment

> - Water sneaks in at the lower left corner
> - When she brakes hard at a light
> - The screen locks before the next ping

The card becomes the start of the job list. **Dry glass after a hard brake** is the pain she watched. A second line notes fog under the tape after five minutes at the lights. Both lines come from the ride itself, and neither one came from a quiet guess at the kitchen table at home.

The start of the job list

Line	From the ride
Dry glass after a hard brake	The pain she watched
Fog under the tape after five minutes at the lights	A second line

From that note she lists the jobs a new mount must do. **Keep the glass dry, wake with a thumb, leave one hand free to signal.** Dry glass heads the card, because that is the failure she watched on the wet ride. Each job is short enough to check in a few seconds at a red light.

The jobs a new mount must do



Some ideas help a lower job and hurt the top one. **A wide open frame would free her thumb but let rain reach the glass**, so it waits for a later build. Cass notes the open frame on the back of the card. The ranked card stays taped under the bars through every scrap session this week.

> **Key Concept:**
> Rank the jobs. From your failure note, **list up to three jobs the prototype must do** and rank them. Aim the first rough build at the top job only. Leave the lower jobs for a later build once the top one holds in real rain on the open road in cold morning traffic.

Rank the jobs

- [x] List up to three jobs the prototype must do
- [x] Aim the first rough build at the top job only
- [x] Leave the lower jobs for a later build

The first build is scrap from the kitchen drawer. **Cass cuts a bottle and pulls cling film over a cardboard frame**, built only to block the lower left corner she watched fail on that wet morning ride. The sandwich bag already went soft, so she picks plastic stiff enough to hold its shape over the glass.

The first build is scrap from the kitchen drawer



A cut bottle



Cling film



A cardboard frame

She times the first scrap build to twenty minutes. **If the corner patch is not on the phone by then**, she stops and sketches one change on the card. A short timed build keeps the top job in view and stops a fancy shell from creeping in before the wet corner is solved. A kitchen timer keeps her to it.

> **Science Says:**
>
> Two scientists in the French interview study named materials that included “experimental machines and technologies” and “lab equipment” (Glaveanu et al., 2013). **For these two scientists, real kit was part of the work.** Cass’s first mount is cardboard and cling film, built to show where water enters at the corner she watched on the morning ride.

Real kit was part of the work



Experimental machines and technologies



Lab equipment



Cass’s first mount is cardboard and cling film

Cardboard and film fail fast, and that is useful. **A failed first mount shows the wet corner** before she spends money on a harder shell. Keep the failed piece on the table while you plan the next shell. Mark the wet corner with a dark pen so the next shell covers that exact spot.

The pen mark becomes a build rule for version two. **Cover the marked corner first**, then check the thumb-wake job only after the glass stays dry in the test. Cass refuses a prettier shape until that wet corner passes on a hard brake in the yard behind her flat. The yard is by her door, so tests are quick.

A build rule for version two

- [x] Cover the marked corner first
- [x] Then check the thumb-wake job
- [x] Only after the glass stays dry

> **Key Concept:**
> Shoebox record. After each failed shell and each condition card, **drop both in one dated shoebox** beside the working mount. The box is the memory of what you already tried on this job. Open it before you cut a new scrap piece so an old failure does not return by accident on the next wet week.

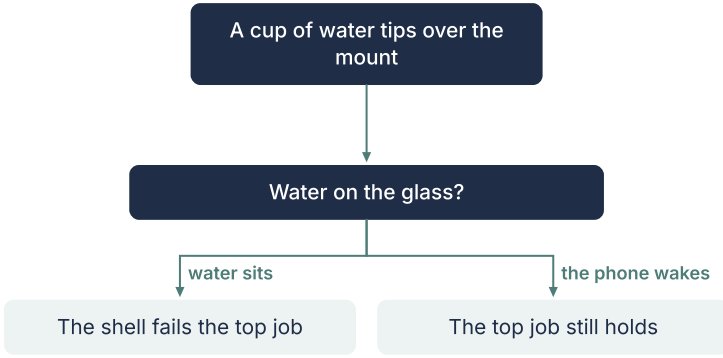
The bottle mount sheds water at the old corner. **The screen stays readable on a hard brake**, yet the bands slip on a bump. Dry glass was the top job, and it now holds on the yard test in light spray. The slip is a lower job for a later build, written under the ranked list on the card.

The bottle mount

Holds	A lower job
⊕ Sheds water at the old corner	⊖ The bands slip on a bump
⊕ The screen stays readable on a hard brake	

One concrete check comes before any new parts. **A cup of water tips over the mount on a parked bike**, then a wet thumb tries to wake the phone. If water sits on the glass, the shell fails the top job. If the phone wakes and only the bands have slipped, the top job still holds for this pass.

One concrete check





A bottle mount on parked handlebars, a measuring cup tipping water over the phone glass.

She writes the cup check on the same card as the ranked jobs. **Top job still means dry glass after a hard brake**, and the cup is only a stand-in when the sky will not rain. A real ride must follow any shower-head or cup pass before she trusts the mount for paid courier work in morning traffic.

A stand-in

> - Top job still means dry glass after a hard brake
> - The cup is only a stand-in when the sky will not rain
> - A real ride must follow

The Middle level repeats one test under three real conditions. **Cass keeps the same bottle mount and the same dry-glass check**, and she changes nothing on it between the runs. Dawn drizzle, noon shower and night bus-spray each get a pass or fail on the card in her jacket pocket. The card itself rides in a zip bag.

> **Key Concept:**
> Three conditions, no change. **Run the same test under three different real conditions**, and change nothing on the prototype between runs. Record pass or fail for each condition on its own card.

Shift one is a light drizzle at dawn. **Shift two is a hard shower at noon**, and shift three is night spray from bus wakes. All three wake the phone on the first thumb with a dry glass at the marked corner. Cass dates each card and drops it in a shoebox with the failed shells from Friday night.

Three shifts, one mount

Shift	Condition
Shift one	A light drizzle at dawn
Shift two	A hard shower at noon
Shift three	Night spray from bus wakes

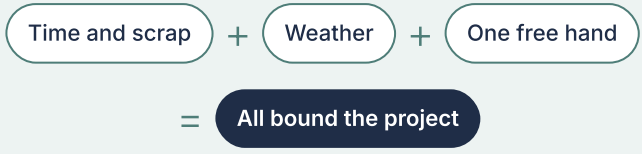
A kitchen drawer empties onto a towel for the next small tweak. **Wider bands stop the slip**, and the bottle shell stays because the top job already passed under three conditions on the road. She photographs the layout before any tape goes on, so a near-miss mix can be rebuilt later without guessing from a hazy memory.

The next small tweak

> - Wider bands stop the slip
> - The bottle shell stays
> - She photographs the layout before any tape goes on

Limits show up without asking. **Time, scrap, weather and one free hand** all bound the project (Acar et al., 2019). Write the limits you actually used after the three condition cards are full. Treat the list as a dated record of this build only, with no promise attached to the next one.

Limits show up without asking



For your next small invention, try this order on a rainy-day problem at home. **Watch one real failure, rank up to three jobs, then build for the top job only.** Repeat one test under three conditions before you trust the fix. Keep the first failures in a dated shoebox so you can see what you already tried this month.

Try this order

Try this now

1. Watch one real failure
2. Rank up to three jobs
3. Build for the top job only
4. Repeat one test under three conditions

On Monday Cass counts the paid jobs that stayed dry. **Four wet pickups, four dry screens**, and one near miss when a band crept up the bottle neck. She writes the near miss under job three on the card and leaves the bottle shell alone until the next scrap night after work.

Cass counts the paid jobs that stayed dry



Four wet pickups



Four dry screens



One near miss

A weekend plan fits the same shape. **Friday night to watch and rank**, Saturday for one rough build aimed at the top job, Sunday for three condition runs and the constraint list. A parent whose child's lunch box leaks onto homework could use the same weekend, testing on a walk, a bus ride and a warm classroom.

> **Exercise:**
>
> From problem to prototype.
>
> 1. Starter. From your failure note, list up to three jobs the prototype must do and rank them. **Aim the first rough build at the top job only.**

2. Middle. Run the same test under three different real conditions. Change nothing between runs, and record pass or fail for each condition.
3. Advanced. Document three constraints you used on the build. Date the page and keep it with the object.

From problem to prototype, starter to advanced



Rank up to three jobs and build for the top one



The same test under three real conditions



Three constraints you used on the build

Key idea:

Watch where the current fix fails, rank the jobs, build for the top one, then repeat one test under three real conditions, and keep a short dated log of the limits that shaped the result.

Quick check:

What materials did two scientists in the interview study name beside their push to solve and learn? Answer: Experimental machines and technologies, and lab equipment, named by two scientists.

5.6.1 Spotting Needs and Opportunities

Imagine Noor, who runs a small lunch café near a college gate. **Midweek trays come back half full**, and Friday queues spill onto the pavement. She keeps hearing that most new food ideas fail before they earn a pound. How can she spot a real need without guessing from fear at the busy front till?

A small lunch café near a college gate

- Midweek trays come back half full
- Friday queues spill onto the pavement
- She keeps hearing that most new food ideas fail

Spotting a need is the first business skill in this chapter. **You look for something people already want and buy**, then name an opportunity that is both new and fit for use. In this section I show you what one work-climate study found, how a failure-rate myth can warp that look and how to practise opportunity spotting at three levels.

Spotting a need



Something people already want and buy



An opportunity that is both new and fit for use



Opportunity spotting at three levels



A café counter at lunchtime with half-eaten trays on one side and a Friday queue at the door.

Amabile and her colleagues built a tool called KEYS to read the climate for creativity at work (Amabile et al., 1996). **Climate works like the weather inside a workplace**, the mood that makes trying something new feel easy or risky. KEYS is a set of workplace scales, so Noor borrows only its plain idea of listing helps and blocks.

Climate works like the weather inside a workplace

> - The mood that makes trying something new feel easy or risky
> - KEYS is a set of workplace scales
> - Amabile et al., 1996

Two lists go on the fridge door, helps on the left and blocks on the right, in the words her staff already use. “The oven is free after two” and the loud Friday rush sit under helps. “Nobody tastes a special on a Tuesday” sits under blocks, beside the midweek waste that makes staff wary of trying a new dish.

Two lists go on the fridge door

Helps	Blocks
⊕ The oven is free after two	⊖ Nobody tastes a special on a Tuesday
⊕ The loud Friday rush	⊖ The midweek waste

> **Science Says:**
>
> KEYS was "designed to assess perceived stimulants and obstacles to creativity in organizational work environments" (Amabile et al., 1996). **The way people saw their work setting, scored with KEYS, was found to "discriminate between high-creativity projects and low-creativity projects."**

Each cook fills in the two lists alone first, on a folded slip. **Jun, the newest cook, writes a block nobody else saw.** He never touches the chalk menu board without asking, because nobody has told him he may. Noor copies his line onto the fridge and writes "anyone can chalk the board" under helps.

Jun, the newest cook, writes a block nobody else saw



He never touches the chalk menu board without asking



Nobody has told him he may



Anyone can chalk the board

> **Key Concept:**
> Stimulants and obstacles. **Stimulants and obstacles are the things people at work feel help or block new ideas there.** A quiet hour after closing is a stimulant in a corner shop. A boss who mocks new window signs is an obstacle. Each one is felt by the people inside, so two cooks in one kitchen can name different ones.

A second pressure comes from failure stories. **A persistent myth says new products fail four times in five or more** (Castellion & Markham, 2013). That story can stop Noor from even writing down a need on a quiet grey Tuesday morning.

Stimulants and obstacles

Kind	In a corner shop
A stimulant	A quiet hour after closing
An obstacle	A boss who mocks new window signs

A supplier once told her nine in ten lunch specials die. **She wrote that claim on a sticky note** and stuck it beside the blocks list so the fear had a name. Every cook who opens the fridge reads it before the lunch rush.

She wrote that claim on a sticky note



Nine in ten lunch specials die



Beside the blocks list



The fear had a name

> Science Says:
>
> Castellion and Markham call an eighty-percent-or-higher failure rate “A persistent myth in product innovation and management” (Castellion & Markham, 2013). They point to “empirical studies since 1977 that the new product failure rate is 40% or less.” **“Self-interest also plays a major role in keeping this myth alive”** in their account.

The myth has already cost her. **Three ideas from last spring never reached a plate**, because one slow Tuesday felt like proof. She finds them in an old order book, a jacket potato bar, a breakfast wrap and a cheap kids’ box, and copies them onto fresh sticky notes to look at again in a calmer month.

The myth and the studies

	The persistent myth	Empirical studies since 1977
New product failure rate	Four times in five or more	40% or less

> Exercise:
>
> Try it. Pick a small business you know. **Write what it sells, who pays and one thing they buy nearby** that it lacks.

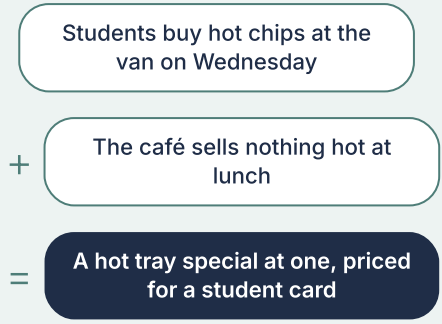
Her own answers are short. **The café sells sandwiches, salads and coffee**, and students and college staff pay for them. On cold Wednesdays the same students queue at a chip van across the road, because the café sells nothing hot at lunch.

Her own answers

What it sells	Who pays	What they buy nearby
Sandwiches, salads and coffee	Students and college staff	Hot chips at the van

The hot lunch across the road is the gap. “Students buy hot chips at the van on Wednesday” tells her who goes elsewhere. **“A hot tray special at one, priced for a student card”** turns the gap into an answer she can test on a Wednesday. The van shows that students will pay for hot food at lunch.

The hot lunch across the road is the gap





A café window looking out at students queuing for a chip van across the road on a cold Wednesday.

In 5.2.2 you met designers who kept several ideas alive for a client (Glaveanu et al., 2013). **The new point for opportunity work is to shortlist three statements for one gap.** For hot lunch, the three lines are a hot tray at one, a chip warmer by the till and a cup of soup sold with every sandwich.

Three statements for one gap



A hot tray at one



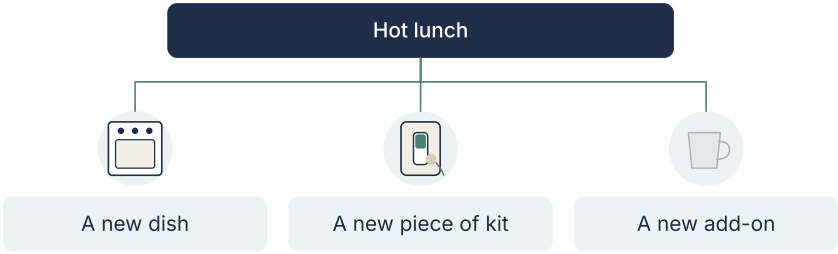
A chip warmer by the till



A cup of soup sold with every sandwich

Three lines that all say hot pie in new words would be one idea written three times. **Each of her lines reaches the gap a different way**, a new dish, a new piece of kit and a new add-on to something she already sells. If one route is blocked, the other two are still on the page.

Each line reaches the gap a different way



> **Key Concept:**
>
> Opportunity statement. **An opportunity statement is a short line that names who it is for, what they lack and what a better answer could be.** Students at a busy library who queue for a study desk lack a sure seat. A timed desk booking for exam week is an opportunity statement a library can test on a real Monday. Each part can be checked by asking the students it names, before any booking system is built.

In 5.4.1 you met products that need to be both new and adapted to use (Bonnardel, 2012). **For Noor, new without fit is a fancy dish nobody orders.** Fit without new is the same soup every day. She scores each of the three lines from 1 to 5 for novelty and again for fit, in light pencil under the line.

New and fit

New without fit	Fit without new
⊕ A fancy dish nobody orders	⊖ The same soup every day

She picks the hot tray special. **Novelty is a rotating pot at one**, and fit is the student-card price and the midweek gap. The free oven after two

is already on the helps list, so the pot needs no new kit. The chip warmer needs a new socket by the till, so it drops to the bottom of the page.

She picks the hot tray special

- [x] Novelty is a rotating pot at one
- [x] Fit is the student-card price and the midweek gap
- [x] The pot needs no new kit

Failure stories are one kind of myth among many. **Plucker, Beghetto and Dow wrote that myths about creativity "collectively strangle most research efforts in this area"** (Plucker et al., 2004). The supplier's nine in ten belongs to the same family, a story repeated until it sounds measured.

Myths about creativity

> - Collectively strangle most research efforts in this area
> - Plucker et al., 2004
> - The supplier's nine in ten belongs to the same family

She drops a line only when novelty and fit both score below 3, or when a live check shows nobody will pay for it. The live check is ten short asks at the till, each customer pointing to the line they would pay for. Seven point at the hot tray, two at the soup and one at the chip warmer.

Ten short asks at the till

Day	1	2	3	4	5	6	7
Seven point at the hot tray	☐	☐	☐	☐	☐	☐	☐
Two at the soup	☐	☐	☐	☐	☐	☐	☐
One at the chip warmer	☐	☐	☐	☐	☐	☐	☐

> **Key Concept:**
>
> Novelty and fit. **Novelty and fit are two qualities of a useful opportunity, covering how new it feels and how well it suits the people who will use it.** A rain poncho with a clip for a bus pass might score 4 on both for a cycling commuter who keeps losing her pass in the rain. Each score sits beside the line, so a high one cannot hide a low one.

Before any line is dropped from fear, **the supplier’s sticky note goes beside the Castellion and Markham numbers**. Nine in ten sits far above what those studies found, so the hot tray stays alive on the page.

Before any line is dropped from fear

- The supplier’s sticky note goes beside the Castellion and Markham numbers
- Nine in ten sits far above what those studies found
- The hot tray stays alive on the page

A short practice week fits this work. **One day for the gap, one for three statements, one for scores**, and one for the live check at the till. Each step takes less than an hour in the quiet after the lunch rush, and

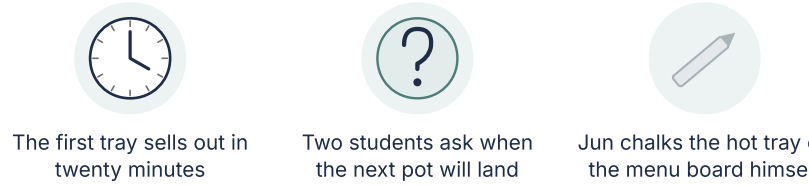
the live-check day comes straight after the scores day while the numbers are fresh.

A short practice week



On Wednesday at one the first tray sells out in twenty minutes. **Two students ask when the next pot will land**, and "Students ask for the next pot" goes under helps on the fridge, dated in a cook's hand. Jun chalks the hot tray on the menu board himself, without asking first.

Wednesday at one



Before the next special she reads the blocks list again. **Tuesday taste fear is still there**, so she keeps the trial on Wednesday only. One busy Wednesday says nothing about a Tuesday, and the block stays on the fridge until a Tuesday trial gives her a real answer.

Tuesday taste fear is still there

- She keeps the trial on Wednesday only
- One busy Wednesday says nothing about a Tuesday
- The block stays on the fridge

The steps work far from a kitchen. **A laundrette owner sees customers leave mid-wash** for a drink in the café next door, and writes three lines for that gap. A coffee machine suits students, a fold-for-you service suits busy parents and a book swap shelf suits retired regulars. Fit changes with the who, so she names the who first.

Fit changes with the who

Line	Suits
A coffee machine	Students
A fold-for-you service	Busy parents
A book swap shelf	Retired regulars

The levels below follow the same order as Noor's week. **They move from one gap to three statements**, then to scores on novelty and fit, then to a myth check before you kill or keep an idea.

The same order as Noor's week

- [x] One gap
- [x] Three statements
- [x] Scores on novelty and fit
- [x] A myth check before you kill or keep an idea

> Exercise:
>
> Spotting needs and opportunities.
>
> 1. Starter. Take the thing those payers buy elsewhere. **Write three opportunity statements** for how the business could offer it, one sentence each.

2. Middle. Rate each statement on novelty and fit from 1 to 5. Keep the highest on both scales.
3. Advanced. Write one failure claim you have heard. Set it beside the Castellion and Markham caution before you kill or keep the idea on the page.

Spotting needs and opportunities at three levels



Write three opportunity statements



Rate each on novelty and fit



Set one failure claim beside the caution

Key idea:

Find what your buyers get elsewhere, turn that gap into three short opportunity statements, score each for novelty and fit and set any scary failure rate beside a measured number before you drop an idea.

Quick check:

What did KEYS assess in work environments? Answer: Perceived stimulants and obstacles to creativity, and the scales discriminated high-creativity projects from low-creativity ones in those settings.

5.6.2 A Product or Service Idea From Concept to Test

Imagine Mateo, who wants to offer a weekend bike-tune service from a shed behind his flat. **Neighbours already ask him to fix squeaks**, and he has tools, but he has never sold a timed slot on a card. How can he turn a vague offer into a concept he can test without guessing from hope alone at the fence?

A weekend bike-tune service

- Neighbours already ask him to fix squeaks
- He has tools
- He has never sold a timed slot on a card

A product or service concept is a clear offer you can try on real people. **You write it down before you spend money on it.** In this section I show you how to write a concept card, test it lightly with real asks and practise the path at three careful levels. Treat these steps as practice.

A product or service concept



A clear offer you can try on real people



Write it down before you spend money on it



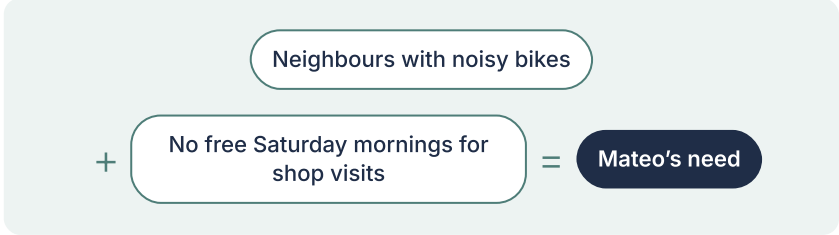
Practise the path at three careful levels



A backyard shed with a bike up on a stand, a handwritten card on the door offering weekend tune slots.

In 5.6.1 you met the helps and blocks lists from KEYS and the Castellion and Markham caution on failure rates. **The new point here is moving from a spotted need to a testable offer.** Mateo's need is neighbours with noisy bikes and no free Saturday mornings for shop visits. He dates each note so later rewrites stay honest.

From a spotted need to a testable offer



One name for a stepped path like his comes from the title of a 1990 paper by Cooper, "Stage-gate systems: A new tool for managing new products" (Cooper, 1990). **His first stage is small**, a two-hour

Saturday trial on tools he already owns. Nothing new gets bought until that trial has given him an answer.

His first stage is small



A two-hour Saturday trial



Tools he already owns

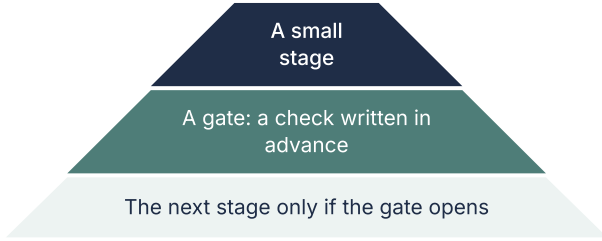


Nothing new gets bought

> **Key Concept:**
>
> Stage-gate. **A stage-gate is a path split into small stages, with a gate after each stage, a check written in advance that decides whether you go on.** A gate works like a ticket barrier between platforms, which opens only when your ticket is right. A choir planning a cake stall might bake one tray first, with a gate of twenty slices sold in an hour. Only then does it bake four more trays.

Mateo writes one concept on a card in thick marker. **Weekend bike tune in the shed, forty minutes, cash or transfer, for neighbours within a ten-minute walk.** That line is the offer he will show. A second line names a check that could prove the offer wrong before the month ends.

A stage-gate



The walk distance feels honest, because he already knows the neighbours who wave from those streets on his way to work. A wider area would bring strangers, longer walks with a broken bike and a different check. He keeps the card to streets he can walk in ten minutes, where a knock on the door is easy.

One concept on a card

- [x] Weekend bike tune in the shed
- [x] Forty minutes, cash or transfer
- [x] For neighbours within a ten-minute walk

> **Key Concept:**
>
> Product or service concept. **A product or service concept is a clear offer that names who it is for, what they get and how you will know it failed.** A dog-walking slot at six in the morning for owners who work night shifts is a concept. A vague hope to sell something someday is still only a wish, because nobody could say yes or no to it. The card form forces all three parts onto one line.

A concept names who, what and a check



Who it is for



What they get



How you will know it failed

> Exercise:
>
> Try it. Write one product or service concept in a single sentence. **Add one clear check a customer could prove false** within a week.

Forty minutes buys four jobs, gears, brakes, chain and tyre pressure, written in small letters under the offer. A neighbour can see what is inside the tune before saying yes. Anything bigger, like a buckled wheel, gets its own price after a look, so a forty-minute slot never swells into a whole afternoon.

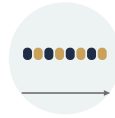
Forty minutes buys four jobs



Gears and brakes



Chain and tyre pressure



A buckled wheel gets its own price

His check is plain and dated on the card. If three neighbours book and **two say they wanted more than forty minutes**, the timing claim fails. If nobody books after two Saturdays of a door card, the walk-distance claim fails. Either result shapes the next rewrite of the card.

His check

If	The claim that fails
Two of three say they wanted more than forty minutes	The timing claim
Nobody books after two Saturdays of a door card	The walk-distance claim

> **Key Concept:**
>
> Falsifiable check. **A falsifiable check is a plain test that could prove an offer wrong within a set time.** A window cleaner who expects ten homes to book within a fortnight can be proved wrong by one quiet fortnight. A check with no date and no number can never fail, so it can never teach the window cleaner anything. A number the size of one street keeps the check small enough to run with one bucket and one ladder.

A falsifiable check



A plain test | Could prove an offer wrong | Within a set time

The starter level tests two concepts lightly on paper first. **He writes a second card for an evening puncture clinic** at the same shed under the same landlord rules. Both cards use the same size and the same marker, so neatness cannot pick the winner. He asks four neighbours which card they would book first, and why.

Two concepts tested lightly on paper

- [x] A second card for an evening puncture clinic
- [x] The same size and the same marker
- [x] Four neighbours asked which card they would book first

Rain on the first ask morning keeps two neighbours inside. **He waits under the shed roof** and tries again when the pavement dries after lunch. The door card stays up all day, so anyone walking past can still

read the offer. One neighbour reads it from her window and calls down a question about mudguards.

Three neighbours pick the weekend tune on the first dry afternoon. **One wants evening hours**, and one asks about a price for students. He writes each answer on a dated scrap and drops it into a jam jar on the workbench. The evening clinic card waits on the bench for a later month, when the evenings are lighter.

Three neighbours pick the weekend tune

Day	1	2	3	4	5	6	7
One wants evening hours	☐	☐	☐	☐	☐	☐	☐
One asks about a price for students	☐	☐	☐	☐	☐	☐	☐
Each answer on a dated scrap in a jam jar	☐	☐	☐	☐	☐	☐	☐

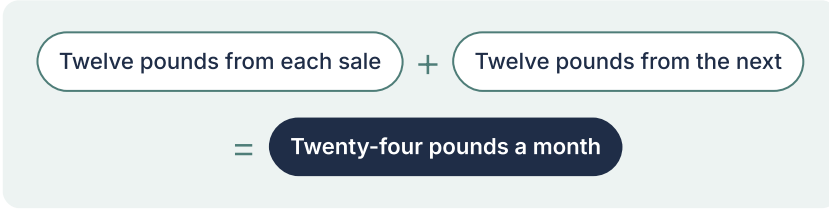
Before anyone books, the middle level asks a money question. **Each tune costs him about three pounds** in chain oil, grease and the odd brake pad. He sets the price at fifteen pounds, so twelve pounds is left from each sale. A repair fund for the stand and a share of the shed light come to twenty-four pounds a month.

The money question

A price of fifteen pounds – About three pounds in chain oil, grease and the odd brake pad = Twelve pounds left from each sale

Twenty-four divided by twelve is two. **Two sales a month cover the fixed costs**, a number small enough to reach through neighbours alone. The number gives his kill lines something to sit beside, because a month with fewer than two tunes means he is paying to work.

Two sales a month cover the fixed costs



The same sum can save a plan before it starts. **A teenager plans to sell potted mint at a school fair for two pounds a pot**, and each plastic pot of compost costs her two pounds forty. Every sale would lose forty pence. She lifts the price to three pounds and plants into washed yoghurt pots, and the sum works.

Potted mint at a school fair

Before	After
⊕ Two pounds a pot	⊖ Three pounds a pot in washed yoghurt pots
⊕ Every sale would lose forty pence	⊖ The sum works

The student who asked about a price gets an answer from the same sum. **A student price of twelve pounds leaves nine from each sale**, so three student tunes would cover the month. Mateo writes that line under the first sum and keeps the student price for weekday evenings, when the shed is otherwise quiet.

A student price

- Twelve pounds leaves nine from each sale
- Three student tunes would cover the month
- For weekday evenings, when the shed is otherwise quiet

A help, which KEYS calls a stimulant, is neighbours already knocking at the shed on quiet nights. **A block, which KEYS calls an obstacle, arrives as a landlord text about weekend tool noise**, and Mateo writes it on the blocks list. He moves the stand onto a thick rubber mat to soften the noise.

Helps and blocks at the shed

KEYS calls it	At the shed
A stimulant	Neighbours already knocking at the shed on quiet nights
An obstacle	A landlord text about weekend tool noise



A shed door card offering weekend bike tunes, a rubber mat under the stand, a quiet Saturday morning.

The advanced level writes what would kill the idea on paper first. **A kill line is a condition, written in advance, that would stop the offer.** Zero bookings after four advertised Saturdays is one. A written landlord ban on weekend tools is the other, because it would close the shed as a base.

Two kill lines



Zero bookings after four advertised Saturdays



A written landlord ban on weekend tools



Both written in advance

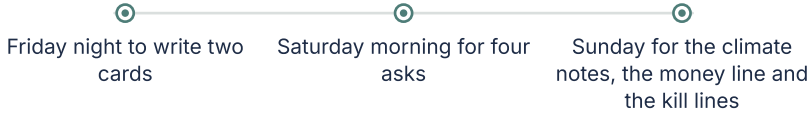
Both kill lines go under a copy of the Castellion and Markham caution. **Only dated fail rules earn ink on the real page.** A vague bad feeling stays off the list, and a pep talk from a kind friend leaves a written kill line where it is. Neither line uses an eighty-percent myth as a reason to stop.

Only dated fail rules earn ink

- [x] A vague bad feeling stays off the list
- [x] A pep talk leaves a written kill line where it is
- [x] No eighty-percent myth as a reason to stop

A weekend plan fits the first gate. **Friday night to write two cards**, Saturday morning for four asks, Sunday for the climate notes, the money line and the kill lines. On the third Saturday two neighbours book, both finish inside forty minutes and one books a second tune for a partner waiting at home.

A weekend plan fits the first gate



Each scrap in the jam jar has a date and a short quote, and the jar sits beside the kill lines so the myth and the real answers stay in one glance. A student books on the fourth Saturday, pays cash and asks about a puncture add-on for autumn, and that question joins the other scraps in the jar.

The jam jar



He parks the puncture idea on a new scrap and keeps the weekend tune as the live offer. **Four tunes this month is double the two his money line needs**, and neither kill line has been crossed. The first gate opens, and the next stage is a second month at the same price.

The first gate opens

- Four tunes this month is double the two his money line needs
- Neither kill line has been crossed
- The next stage is a second month at the same price

Across town, Amira tries the same path with a Tuesday soup flask for night-shift nurses at the ward door. **Her concept card names who,**

what and a heat check, and two skipped Tuesdays fail the hunger claim. She rewrites the card for Thursdays, the night the hospital canteen shuts early, and the levels below follow the same path.

Amira's Tuesday soup flask

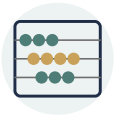
- [x] For night-shift nurses at the ward door
- [x] Two skipped Tuesdays fail the hunger claim
- [x] She rewrites the card for Thursdays

> Exercise:
>
> From concept to test.
>
> 1. Starter. Write two concept cards for one need. **Ask a few people in the target group** which they would try first and why.
> 2. Middle. For the most-picked card, write the cost of one sale, the price and a month's fixed costs. Work out the sales that cover them.
> 3. Advanced. Write what would kill the idea. Set it beside the Castellion and Markham caution before you stop or continue.

From concept to test at three levels



Two concept cards and a few asks



The sales that cover the costs



What would kill the idea

Key idea:

Turn a spotted need into a concept card with a falsifiable check, test two cards lightly with real asks, work out how many sales cover your costs and write a kill line before fear invents the ending for you.

Quick check:

What is a gate in a stage-gate? Answer: A check written in advance that decides whether you go on to the next stage.

5.7 Everyday Life and Home

5.7.1 Creative Solutions at Home and in Daily Routines

Imagine Eden, who walks back from the corner shop after dark. **Dinner is late, the sink fills and the hallway light is broken**, and the electrician cannot come for three weeks. Every evening she drops her keys somewhere in the dark hall, then hunts for them the next morning. Can a small creative fix make those evenings easier?

Every evening in the dark hall

- Dinner is late, the sink fills
- The hallway light is broken
- She drops her keys somewhere in the dark hall



A dark hallway with a coat hook by the door and a set of keys lying on the doormat.

A tiny change to a daily friction can be a creative act, even when nobody else sees it. **In this section I show you a study of why people make things**, a review of how researchers define everyday creativity, and a ten-minute fix you can practise at three levels.

A tiny change to a daily friction



A study of why people make things



How researchers define everyday creativity



A ten-minute fix

The broken light is one friction Eden cannot fix herself, because the wiring is the electrician's job. **Her fixes work around it** with card and tape from the kitchen drawer. Anything that needs a ladder or a tradesperson goes on a separate list for the landlord. The bulb and the switch stay untouched until the electrician comes.

Her fixes work around it

Her fixes	For the landlord
⊕ Card and tape from the kitchen drawer	⊖ Anything that needs a ladder or a tradesperson

> 🔑 **Key Concept:**
>
> Daily friction. **A daily friction is a small snag that comes back in the same routine every day.** A café till drawer that sticks each morning at opening time is a daily friction for whoever works the early shift. Each morning it costs a few seconds and a little temper.

Daily friction



A small snag



Comes back in the same routine every day



A café till drawer that sticks each morning

In 1.1.3 you met everyday creativity and a diary study that linked creative days with flourishing the next day (Conner et al., 2018). **The question for this section is why people bother to make things in daily life.** Eden wants an answer before she starts, because she has three frictions and only enough energy for one fix a night.

Two online studies asked people about the reasons behind the things they create in daily life. **Eden finds the paper while the kettle boils** on Monday afternoon. She reads its main result twice, because it bears on which of her three frictions to start with.

Two online studies

- The reasons behind the things they create in daily life
- Benedek et al., 2020
- Eden finds the paper while the kettle boils

> **Science Says:**
> "Across two online studies totaling 750 participants, enjoyment was the strongest motive for everyday creativity, consistent with previous research linking creativity to intrinsic motivation and positive affect" (Benedek et al., 2020).

Enjoyment was the strongest motive



750 participants



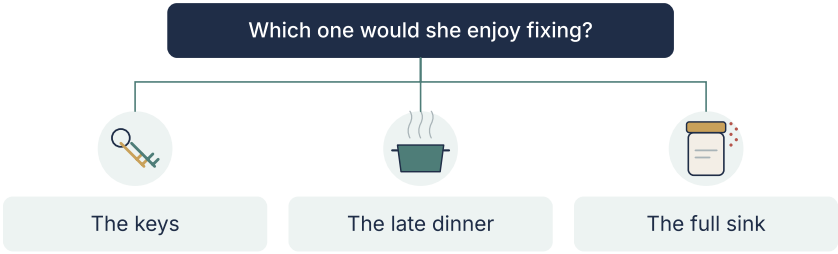
Two online studies



Linked to intrinsic motivation and positive affect

Eden writes her three frictions on the back of an envelope and asks which one she would enjoy fixing. **The keys win, because she likes cutting and drawing on card.** The late dinner and the full sink can wait their turn. She sets the kitchen timer for ten minutes so the fix stays small enough to finish before bed.

Three frictions on the back of an envelope



Before she picks up the scissors she writes what the fix must do. **It has to show her the hook in the dark** with no power, since the hallway light is dead. She circles the keys on the envelope and puts the other two lines aside for next week.

What the fix must do

- [x] Show her the hook in the dark
- [x] Work with no power
- [x] Small enough to finish before bed

> **Key Concept:**
>
> Motive. **A motive is the reason a person gives for doing something.** Two neighbours can grow the same giant marrow, one to win a rosette at the village show and one to make soup for a sick friend, and each has a different motive.

Motive



The reason a person gives for doing something



A rosette at the village show



Soup for a sick friend

On Monday she cuts a key tag from a cereal box and draws a fat white moon on it with a paint pen. **The moon catches the street light through the front door glass**, so she can see the coat hook in the dark. She threads the tag onto the hook and hangs her keys beside it.

A key tag from a cereal box

- A fat white moon drawn with a paint pen
- The moon catches the street light through the front door glass
- She can see the coat hook in the dark

When she comes in from the shop that evening, the pale moon is the first thing she sees inside the door. She hangs her keys straight away. **The fix asks nothing new of her hands.** Her right hand still reaches for the dead light switch out of habit, and the hook sits just below it.



A card key tag with a white moon drawn on it, hanging on a coat hook beside a set of keys.

On Tuesday the tag swings round on the hook and shows its blank back. **She draws a second moon on the reverse**, so the tag reads the same whichever way it turns. The back moon comes out a little wonky, and she likes it more than the first. Her keys go onto the hook without a search that night.

A second moon on the reverse

- The tag reads the same whichever way it turns
- The back moon comes out a little wonky
- She likes it more than the first

In 5.4.1 you met mastery inside a habitual practice (Glăveanu, 2012). **Eden's walk home is a habit, and the moon tag lives right inside it.** Her fix rides on a path she walks every evening, which is why she chose a hook by the door over a bowl in the kitchen.

Eden's walk home is a habit



The moon tag lives right inside it



A hook by the door



A bowl in the kitchen

> Exercise:
>
> Try it. Pick one daily friction. **Spend ten minutes improving it** in a way you can finish today.

The starter level builds two variants of the same fix. **Variant A is the moon tag on the hook.** Variant B is a shallow card tray on the shoe rack, with the same moon drawn on its rim. She uses A on Monday and Tuesday nights, then cuts the tray in ten minutes on Wednesday afternoon.

Two variants of the same fix

Variant	What it is
Variant A	The moon tag on the hook
Variant B	A shallow card tray on the shoe rack

The tray holds her keys on Wednesday and Thursday nights, but she has to bend down in the dark to find it. **The tag lets her hang the keys without stopping**, and she grins at the moon each time. On Friday morning she keeps the tag because she enjoyed using it more, and the tray goes into the paper recycling.

The tray and the tag

The tray	The tag
⊕ She has to bend down in the dark to find it	⊖ She can hang the keys without stopping

Her sister visits on Saturday evening and hangs her own keys on the moon hook without being told. “Very tidy,” she says. **A guest who uses the fix unexplained** gives Eden a second small test, and the tag passes it. Eden pushes a paper clip through the tag as a second loop so both sets of keys fit.

A guest who uses the fix unexplained



Her sister hangs her own keys on the moon hook



Very tidy



A paper clip as a second loop

Does a cereal box tag count as creative at all? It is a fair question, since nobody but Eden and her visitors will ever see the tag. **A 2021 review sorted studies of everyday creativity** in a planned, step by step way, and it reports where the definition stands.

> **Science Says:**
>
> The review states that “a comprehensive definition of everyday creativity is still missing”, and it adds that the “lack of a single approach for assessing everyday creative outcomes has led to an ambiguous understanding of this concept” (Ilha Villanova & Pina e Cunha, 2021).

Where the definition stands

> - A comprehensive definition of everyday creativity is still missing
> - The lack of a single approach for assessing everyday creative outcomes
> - Ilha Villanova & Pina e Cunha, 2021

I treat Eden's moon tag as practice and make no bigger claim for it. **Her own test is whether she keeps using it.** Her sister called it tidy, and the keys hang there whatever anyone calls it. A tag she stops using would tell her more than any label.

Her own test



Whether she keeps using it



Her sister called it tidy

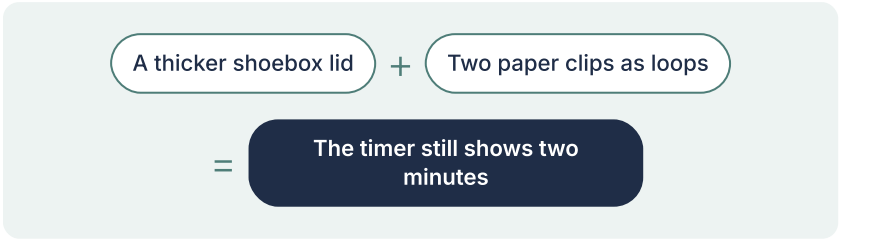


A tag she stops using would tell her more

The middle level names one limit as a design rule and rebuilds the kept fix inside it once. She writes **"ten minutes and scrap only" on a hall card** and pins it beside the coat hook. Evidence on whether limits help or hurt creative work is mixed (Acar et al., 2019), so the rule is her own design choice.

On Sunday afternoon she rebuilds the tag under that rule. **The first tag has gone soft around the hole**, so she cuts a new one from a thicker shoebox lid and bends two paper clips into loops. The moon goes on in the same white pen, and the timer still shows two minutes when she hangs it.

The rebuild under that rule



The advanced level repeats the kept fix for three days and notes one mood word each day. **Eden writes her words on the back of the hall card** on three evenings, from Sunday to Tuesday. She keeps them as a record of her practice only, outside any health or therapy use.

A mood word each day

Day	1	2	3	4	5	6	7
Three evenings, from Sunday to Tuesday	☐	☐	☐	☐	☐	☐	☐
One mood word each day	☐	☐	☐	☐	☐	☐	☐
A record of her practice only	☐	☐	☐	☐	☐	☐	☐

Key Concept:

Repeat run. **A repeat run is using the same kept fix on several days in a row to see whether it holds.** A baker who keeps a new tray layout for three busy mornings is doing a repeat run. One good morning could be luck, and three show whether the layout lasts.

Repeat run



The same kept fix on several days in a row



A baker keeps a new tray layout for three busy mornings



Three show whether the layout lasts

The three words read calm, calm, rushed. **The rushed evening was a late bus home from her sister’s**, and the keys still went straight onto the hook in the dark. She leaves the shoebox tag where it is and turns the hall card back to the rule side. Next morning the keys are waiting on the hook.

The following Wednesday she picks the late dinner from the envelope list and works under the same rule. **She cuts a strip of card and draws five quick meals on it**, from beans on toast to egg fried rice. The strip goes inside the cupboard door above the hob, where she looks first when she is hungry and tired.

Five quick meals on a strip of card



Beans on toast



Egg fried rice



Inside the cupboard door above the hob

Start your own list with three frictions and circle the one you would enjoy fixing. **Shrink the job until it fits ten minutes** with materials you already have. If the fix still feels like a chore, pick a smaller friction and try again the next evening. Date the friction you pick to see how long the fix lasts.

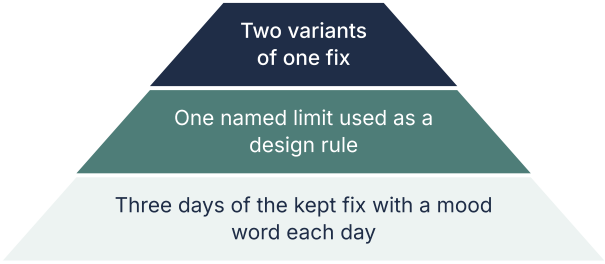
Start your own list

Try this now

1. Three frictions
2. Circle the one you would enjoy fixing
3. Shrink the job until it fits ten minutes

The levels below follow Eden's order after her first ten-minute fix. **They move from two variants of one fix**, to one named limit used as a design rule, to three days of the kept fix with a mood word each day. Each level adds one thing to the fix you already have.

Eden's order after her first fix



Exercise:

Creative solutions at home.

1. Starter. Make two variants of the same routine fix. **Use each one for two days** and keep the one you enjoyed using.
2. Middle. Name one constraint as a design rule and rebuild the kept fix inside it once.
3. Advanced. Repeat the kept fix for three days. Note one mood word each day as a practice record only, outside any therapy use.

Creative solutions at home at three levels



Two variants of the same routine fix



One constraint as a design rule



Three days and one mood word each day

Key idea:

Pick a daily friction you would enjoy fixing, compare two small variants, rebuild the one you keep inside one named limit and note how three days went.

Quick check:

What motive for everyday creativity came out strongest in two online studies with 750 participants? Answer: Enjoyment (Benedek et al., 2020).

5.7.2 Cooking, Gardening, Celebrations and Family Projects

Imagine Jonas, who cooks for his two children, Ada and Finn, on weeknights. **The same buttered pasta comes round four times a week**, and the basil on the balcony rail is dry. Grandma Pat turns seventy on Saturday, and money is tight. How can the stove and the balcony become places for creative practice without wearing the family out?

Weeknights for Ada and Finn

- The same buttered pasta comes round four times a week
- The basil on the balcony rail is dry
- Grandma Pat turns seventy on Saturday, and money is tight

In the kitchen he makes something every evening, and he tends the balcony most weekends. **A small change inside a familiar dish can count as practice**, and so can a party planned around one clear limit. In this section I show you how the reasons for making can shift between kinds of making, and how to practise at three levels.

Two places for creative practice



A small change inside a familiar dish



A party planned around one clear limit



How the reasons for making can shift

In 5.7.1 you met a study of why people make things in daily life (Benedek et al., 2020). **The same paper looked at different kinds of making**, among them music and visual arts. Jonas has cooked for ten years and kept the balcony pots for one summer, and he has never asked why he does either.

The same paper looked at different kinds of making

- Among them music and visual arts
- Jonas has cooked for ten years
- He kept the balcony pots for one summer

> **Science Says:**
> Benedek and colleagues report that “the relevance of motives differed across creative domains” (Benedek et al., 2020).

From that line he takes one plain step. **He asks why he cooks and why he gardens as two separate questions**, and he gets two different answers. At the stove he wants to feed the children well before homework. On the balcony he wants ten quiet minutes with his hands in the soil after a day at a desk.

Two separate questions

Place	What he wants
At the stove	To feed the children well before homework
On the balcony	Ten quiet minutes with his hands in the soil

Each answer sets its own rule for practice. **In the kitchen any change has to land on time**, so a new dish must cook in the same twenty minutes as the old one. On the balcony time is less pressing, and he can try something slow that takes a few days to show.

Each answer sets its own rule

In the kitchen	On the balcony
⊕ Any change has to land on time	⊖ Time is less pressing
⊕ A new dish must cook in the same twenty minutes	⊖ Something slow that takes a few days to show

> **Key Concept:**
>
> Variation. **A variation is a familiar dish or plant bed with one part changed and the rest kept the same.** A knitter who works her usual winter hat pattern in a new wool colour is making a variation. A gardener who sows her usual row of radishes a fortnight earlier is varying a bed.

Variation



A familiar dish with one part changed



A usual winter hat pattern in a new wool colour



A row of radishes a fortnight earlier

On Monday he keeps the usual buttered pasta and changes one part. **He grates the zest of one lemon over the bowls** and leaves everything else as it was. The pasta still reaches the table in twenty minutes, before Ada's spelling homework comes out. He tastes one forkful at the stove before he serves.

Over dinner Ada eats every strand, asks what the yellow bits are and says the bowl tastes like summer. She wants the same again tomorrow. **Finn finds it sharp** and leaves a ring of pasta round the edge of his bowl. Jonas guesses that half a lemon might suit him better.

Over dinner

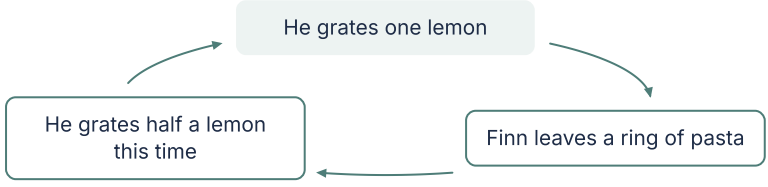
Who	The bowl
Ada	Eats every strand and says it tastes like summer
Finn	Finds it sharp and leaves a ring of pasta



Buttered pasta in a bowl with lemon zest, and a grater and half a lemon beside it.

On Tuesday he makes the second round of the variation. **He grates half a lemon this time**, and both bowls come back empty. Nothing is left round the edge of Finn's bowl. He writes "half a lemon" in pencil on the inside of the pasta cupboard door, where he will see it before the next pasta night.

The second round of the variation



Lime is Ada's idea for next week. **Jonas writes lime under the lemon line** and saves it for another night. Finn asks for peas, and peas go on the cupboard door under lime. Finn draws a tiny pea pod beside his word so he can find it without reading.

The cupboard door



Half a lemon



Lime is Ada's idea



Finn asks for peas

> Exercise:
>
> Try it. Pick one familiar dish or garden bed. **Change one part only** and cook or tend it once.

On Wednesday the children help plan Grandma Pat's party. **The starter level plans a small celebration with one constraint**, and Jonas picks a budget of eight pounds for a picnic on the balcony. Evidence on whether limits help creative work is mixed (Acar et al., 2019), so he treats the eight pounds as a rule for this party.

A small celebration with one constraint

- A budget of eight pounds
- A picnic on the balcony
- Evidence on whether limits help creative work is mixed

The list is Ada's job, and Finn adds up the prices on Jonas's phone. **A melon at two pounds fifty, biscuits at one pound eighty and lemonade at one pound fifty** come to five pounds eighty. The two pounds twenty left over buys a small bunch of yellow tulips from the corner shop.

The picnic list

A melon at two pounds fifty + Biscuits at one pound eighty + Lemonade at one pound fifty = Five pounds eighty

Nothing else for the party may cost money. **The plates and the blanket come from the kitchen cupboard**, and Finn draws the birthday card on the back of an old cereal box. Ada wants paper bunting, so she cuts flags from old school worksheets and threads them on kitchen string. She cuts twenty flags in one evening.

Nothing else for the party may cost money



The plates and the blanket from the kitchen cupboard



A birthday card on an old cereal box



Twenty flags from old school worksheets

The middle level is a family project that ends in one physical piece. **On Thursday after school the three of them make a drip waterer for the dry basil.** Jonas rinses an empty juice bottle, and Finn pokes three small holes in its cap with a cocktail stick while Ada holds it still.

A drip waterer for the dry basil

- [x] An empty juice bottle
- [x] Three small holes in its cap
- [x] Neck first into the soil beside the basil

> **Key Concept:**
>
> Family project. **A family project is a piece of making that several people in one household plan and build together.** Two grandparents who live with their grandchildren and build a wooden go-kart with them over the school holidays are running a family project. The grandparents saw the wood and the children paint the number on the side.

Family project



Several people in one household



Plan and build together

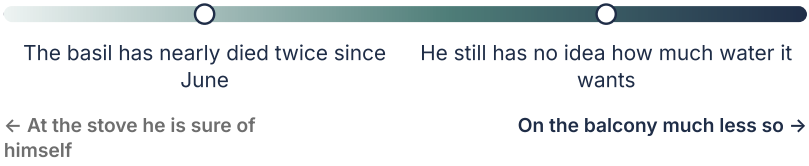


A wooden go-kart over the school holidays

With Ada pouring, they fill the bottle with water and push it neck first into the soil beside the basil. **The water seeps out slowly through the three holes**, and the soil darkens around the neck. Finn wants to check it every ten minutes, so Jonas sends him to bed with a promise to look first thing.

At the stove he is sure of himself, and on the balcony much less so. **The basil has nearly died twice since June**, and he still has no idea how much water it wants. Whether a cook's knack should carry over to a balcony is a question of domain-specificity, which asks if creative skill stays inside one area.

Sure at the stove, less so on the balcony



> **Science Says:**
>
> Acar and colleagues write that “Domain-specificity is a topic of debate” (Acar et al., 2024).

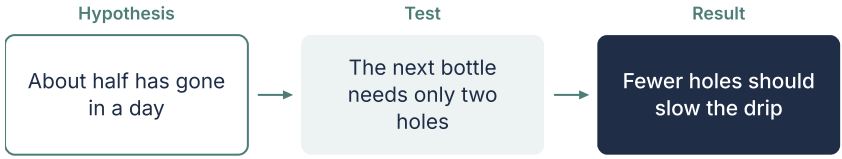
On Friday morning the soil around the bottle is still damp, and the basil leaves have lifted. About a third of the water has gone overnight, and Jonas marks the water line. Ada pushes a fingertip into the soil to feel it, and Finn draws a smiling leaf on the bottle in marker pen before school.

Overnight

Day	1	2	3	4	5	6	7
On Friday morning the soil around the bottle is still damp	☐	☐	☐	☐	☐	☐	☐
About a third of the water has gone overnight	☐	☐	☐	☐	☐	☐	☐
Jonas marks the water line	☐	☐	☐	☐	☐	☐	☐

On Friday evening Jonas tops up the bottle and notes how far the water has dropped. **About half has gone in a day**, so he decides the next bottle needs only two holes. Fewer holes should slow the drip and make a full bottle last through a hot weekend. That change waits for the next family project.

Fewer holes



On Saturday afternoon Grandma Pat climbs the stairs and finds the bunting tied along the balcony rail. **The picnic food sits on the blanket**, and the tulips stand in a jam jar beside the basil. She asks who made the bottle in the soil, and Finn tells her the whole story twice.

Saturday afternoon



The bunting tied along the balcony rail

The picnic food sits on the blanket

The tulips stand in a jam jar

The picnic stays inside eight pounds from the first list to the last biscuit. **Jonas checks the receipt against the list**, and the tulips have used up the last two pounds twenty. Grandma Pat takes a bunting flag home in her handbag, and Ada starts planning next year's party with the same limit.

The picnic stays inside eight pounds

- [x] Jonas checks the receipt against the list
- [x] The tulips have used up the last two pounds twenty
- [x] Ada starts planning next year's party with the same limit



A balcony picnic on a blanket, with paper bunting along the rail and tulips in a jam jar.

The advanced level teaches one small skill to someone else. **On Sunday Jonas picks zesting for Ada** because it takes five minutes and needs no hot pan. Ada is nine and has never held a grater, so he shows her once how to keep her knuckles clear of the teeth and stop at the bitter white layer.

One small skill for Ada

- Zesting takes five minutes and needs no hot pan
- Ada is nine and has never held a grater
- Keep her knuckles clear of the teeth

Her first strokes press hard on one side of the lemon, and she tastes the bitterness. **She turns the lemon and uses lighter strokes**, and the next curls come off thin and yellow. For Ada this is mini-c, the size of creativity you met in 1.1.3, because the skill is new to her even though Jonas knows it.

Mini-c



She turns the lemon and uses lighter strokes



The next curls come off thin and yellow



The skill is new to her

> Key Concept:
>
> Handoff. **A handoff is the moment a skill you know becomes someone else's to practise.** A fishmonger who shows a Saturday helper how to fillet one mackerel, then hands over the knife and watches, is making a handoff. The helper's first fillet is ragged, and it is the helper's own.

Handoff

- A skill you know becomes someone else's to practise
- A fishmonger hands over the knife and watches
- The helper's first fillet is ragged, and it is the helper's own

Her version uses the zest of a whole lemon, more than his Tuesday half. **Jonas cooks the pasta, and Ada stirs her zest in at the end**, and even Finn clears his bowl. Ada copies the pencil note onto a recipe card and adds her own line, "more zest". Grandma Pat rings that evening and asks Ada for the recipe.

The levels below follow Jonas's week after the lemon pasta. **They move from a small celebration with one constraint**, to a family project with one physical piece, to teaching a small skill to someone else. The

Try it comes first, and Jonas fitted all three levels into the six days after his Monday pasta.

Her version

- [x] The zest of a whole lemon, more than his Tuesday half
- [x] Ada stirs her zest in at the end
- [x] Grandma Pat asks Ada for the recipe

> **Exercise:**
>
> Cooking, gardening and family projects.
>
> 1. Starter. Plan a small celebration with one constraint. **Stay inside that constraint** from the first list to the last tidy up.
> 2. Middle. Family project. Make one physical piece with the people you live with.
> 3. Advanced. Teach one small skill that is new to the learner, then watch them try it once without taking over.

Cooking, gardening and family projects at three levels



A small celebration with one constraint



One physical piece with the people you live with



Teach one small skill that is new to the learner

Key idea:

Ask why you make in each place, change one part of a familiar dish or bed, plan a party inside one limit, make one piece together and hand a skill on.

Quick check:

What did Benedek and colleagues report about motives across creative domains? Answer: That “the relevance of motives differed across creative domains” (Benedek et al., 2020).

5.8 Moving Between Fields

5.8.1 Carrying a Method From One Field to Another

Imagine Leila, a primary teacher who runs a Saturday art club after lunch each week. **She wants to carry her sketch warm-up into Monday science**, hoping the same method will open careful looking at the leaves on the tray. How can she move a method from one domain to another without pretending the move is free?

A sketch warm-up into Monday science

- A Saturday art club after lunch each week
- Careful looking at the leaves on the tray
- Without pretending the move is free

Carrying a method is different from borrowing a fact from another subject. **Here the question is whether a practised way of working travels to a new domain.** In this section I show you why claims about far transfer need careful limits and how to practise an honest classroom trial at three levels.

Carrying a method



A practised way of working



Travels to a new domain



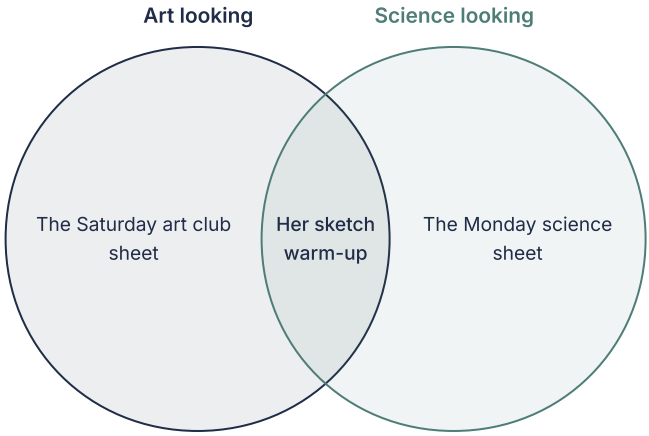
An honest classroom trial at three levels



A classroom desk with a sketchbook open to a two-minute leaf drawing beside a tray of real leaves for science.

In 5.1.1 you met evidence that creative performance can be domain specific, including weak links between poem and story tasks (Baer, 1991, 1994). **The new point here is far transfer of a method**, with its dimensions named before any claim. Leila treats art looking and science looking as two separate scores from the start.

Two separate scores



A large map of transfer came from Barnett and Ceci, who set out when and where people apply what they learn (Barnett & Ceci, 2002). **Their map treats transfer as a move with many dimensions**, and a claim has to say which of them it covers. Leila will name hers on paper before the first Monday trial.

A large map of transfer



When and where people apply what they learn



A move with many dimensions



Barnett & Ceci, 2002

> **Science Says:**
> "arguments surrounding the question of whether far transfer occurs have made little progress toward resolution" because of "a failure to specify various dimensions along which transfer can occur" (Barnett & Ceci, 2002). **"Estimation of a single effect size for far transfer is misguided"** in view of that complexity. They add that "evidence for transfer under some conditions is substantial, but critical conditions for many key questions are untested."

Far transfer has made little progress

- A failure to specify various dimensions
- A single effect size is misguided
- Evidence for transfer under some conditions is substantial

An effect size is one number for how big a result is, like a single score for a whole football season. **One number for all of far transfer would blur every kind of move together**, the way one season score hides which games were won at home and which away.

An effect size



One number for how big a result is



A single score for a whole football season



Hides which games were won at home and which away

For Leila, a good Saturday says nothing yet about Monday. **Each move gets its own test**, and the test has to name what moved and what

stayed behind. Her art club success is real, and it stays on the art club sheet until science gives its own answer.

> **Key Concept:**
>
> Far transfer. **Far transfer is using what you learned in a setting that looks quite different from where you learned it.** A choir breathing drill tried in a swimming lesson is a far-transfer try. The same drill tried in a second choir would be near transfer, because almost nothing about the setting changes.

Far transfer



A setting that looks quite different



A choir breathing drill in a swimming lesson



Near transfer: a second choir

Her warm-up moving from Saturday club to a Monday art lesson would be a short hop. **Science is a long jump**, with a new subject, a new kind of answer and a new idea of what a good look is. That is why she plans the move on paper first, with no guess that it will simply work.

A short hop and a long jump



A new subject and a new kind of answer

A new idea of what a good look is

← Saturday club to a Monday art lesson

Science is a long jump →

Leila names her method on a planner page before the week begins. **The method is a two-minute looking sketch before any talk.** Saturday

art club is the method's home, and Monday science on leaves is the new ground she wants it to reach.

The method on a planner page

- A two-minute looking sketch before any talk
- The method's home: Saturday art club
- New ground: Monday science on leaves

Key Concept:

Source and target domain. **The source domain is where a method already works, and the target domain is where you want to try it.** A chef's knife drill might have the kitchen as its source and a pottery class as its target. A nurse's handover checklist might move from the ward to a family camping trip. Naming both keeps a win in one from posing as a score in the other.

Source and target domain



Where a method already works



Where you want to try it



A chef's knife drill from the kitchen to a pottery class

She draws a small table on the board before the children arrive. **Time is two minutes of sketching**, calm looking is quiet eyes on the leaf, and labels means one true label after each sketch. These three rows are what she will score after the trial.

A small table on the board

Row	What it means
Time	Two minutes of sketching
Calm looking	Quiet eyes on the leaf
Labels	One true label after each sketch

Each row gets a fit score from 1 to 5 after the trial. **A 5 means the row worked just as she planned it on the board**, and a 1 means it barely worked at all. The same small numbers on every row show her at a glance which part of the move held.

A fit score from 1 to 5

- A 5 means the row worked just as she planned it
- A 1 means it barely worked at all
- The same small numbers on every row

> Exercise:
>
> Try it. Name one method you already use. **Write its source domain and a target domain** where you want to try it.

The starter level lists what must change for the method to fit science looking. **Art sketching allows any mark on the page.** Science looking needs the leaf's edge and veins named after each sketch, so Leila lists three changes and stars a rule to label one part when the sketch ends.

Art sketching and science looking

Art sketching	Science looking
⊕ Any mark on the page	⊖ The leaf's edge and veins named after each sketch

She asks one art-club child what looking means on a Saturday. **Careful marks without rushing the pencil** is the answer she hears. Science needs that calm plus a true name for a leaf part, so she writes the child's words at the top of the plan.

> **Key Concept:**
>
> Transfer dimensions. **Transfer dimensions are the named ways a method can change when it moves from one domain to another.** A swimming coach carrying a breathing count from the pool to a running track might name the surface, the pace and the breath rate. Each one gets its own score, so a good pace cannot hide a poor breath rate. Naming them first turns a vague hope into three checks.

Transfer dimensions



The surface, from the pool to a running track



The pace



The breath rate, with its own score

A method may need remapping before it fits a new domain (Glaveanu et al., 2013). **The label rule is her remap**, the one change that turns an art warm-up into science looking. She writes remap beside the starred change, so art club success stays a different score from science labels.

The label rule is her remap



On Saturday she tries the move the other way. **The science label rule goes into art club**, and two children stop drawing as soon as they have named the stem. A rule that helps one domain can cramp another, so the label stays a Monday rule.

The move the other way

- The science label rule goes into art club
- Two children stop drawing as soon as they have named the stem
- The label stays a Monday rule

The middle level runs a twenty-minute trial in the target domain and scores fit afterwards. **A timer on the front desk runs the plan**, two minutes of leaf sketching, one minute to label and ordinary science talk for the rest. She scores fit from 1 to 5 on time, calm looking and whether labels matched the real leaf.

A timer on the front desk runs the plan

Day	1	2	3	4	5	6	7
Two minutes of leaf sketching	☐	☐	☐	☐	☐	☐	☐
One minute to label	☐	☐	☐	☐	☐	☐	☐
Ordinary science talk for the rest	☐	☐	☐	☐	☐	☐	☐

Time scores 4, calm looking scores 5 and labels score 2. **Several children drew well and then labelled the wrong part of the leaf.** The method travelled in part, and the label step needs a sharper prompt next week. The scores go on a Monday science sheet, apart from the art club sheet.

Fit scores after the first trial



The advanced level writes a transfer claim that names its limits. **Leila writes that a two-minute looking sketch can support leaf science when a label prompt is added**, in her class, on Monday mornings only. Other schools and other topics stay outside the claim.

A transfer claim that names its limits

- [x] When a label prompt is added
- [x] In her class
- [x] On Monday mornings only
- [x] Other schools and other topics stay outside

She reads the claim to a colleague in the staff room after school. **The colleague asks which dimension failed**, and Leila points to labels at 2. Leila writes prompt at the top of a fresh page and books the same science lesson for the retry.

The colleague asks which dimension failed



Labels at 2



Prompt at the top of a fresh page



The same science lesson booked for the retry

Every word in a claim needs a clear meaning before the claim can travel (Plucker et al., 2004). **The words careful looking get a plain meaning on the sticky**, a correct label after a two-minute sketch, so the colleague can test the same thing in her own room.

In week two she changes only the label prompt and runs the leaf trial again. **Labels rise to 4**, time stays 4 and calm looking stays 5. Her planner shows the two weeks side by side, the art days marked in green and the science days in blue, with the new prompt written into the Monday plan.

Labels rise to 4



Not every carry works. **A dad carries his work habit of a morning to-do list into Saturday family cooking**, names time, tools and success, and runs it twice. Success scores 1 both times, because the children want to cook by taste, so his honest claim keeps the list at work.

Not every carry works

- A morning to-do list carried into Saturday family cooking
- Success scores 1 both times
- The children want to cook by taste

A score of 1 is still a result. **It shows the dad where his method stops**, and it saves him from forcing a list onto a kitchen that runs on taste. Leila's labels at 2 told her something similar, only about one dimension and with a fix in reach.

A score of 1 is still a result



It shows the dad where his method stops



Leila's labels at 2



A fix in reach



A family kitchen on a Saturday, a to-do list pinned by the cooker and children tasting sauce from a spoon.

She keeps the first weak claim in a folder marked old claims, and the revised claim goes on the staff-room board. **Art club keeps its own score sheet on the cupboard door**, so a Saturday success cannot erase a Monday miss.

Old claims and the revised claim

A folder marked old claims	The staff-room board
The first weak claim	The revised claim

A week later the colleague runs the same twenty minutes with her own class. **Her labels score 3 with the new prompt**, and the sticky gains one line naming a second class. The claim grows only as far as a new test has carried it, and the levels below follow the same path for your own carry.

A claim grows with each new test

- [x] Her labels score 3 with the new prompt
- [x] The sticky gains one line naming a second class
- [x] The levels below follow the same path

Exercise:

Carrying a method between domains.

1. Starter. List what must change for your method to fit the target domain. **Star one change** to try first.
2. Middle. Run a twenty-minute trial in the target domain. Score fit on your named dimensions and note what broke and what held.

3. Advanced. Write a transfer claim that names who, where and when it held, and which claims stay outside it.

Carrying a method between domains at three levels



Star one change to try first



A twenty-minute trial scored on named dimensions



A transfer claim that names who, where and when

Key idea:

Name the method and its two domains, remap what must change, trial it with scored dimensions and write a transfer claim that names its limits.

Quick check:

Why did Barnett and Ceci say a single effect size for far transfer is misguided? Answer: Because transfer has many dimensions, and comparing them without naming those dimensions mixes different kinds of transfer evidence together.



Module

6

Sleep, Movement and Food

6.1 Sleep and Rest

6.1.1 How Sleep Supports Creativity, and a Workable Sleep Routine

Imagine Gareth, a driving instructor in his forties, on the sofa at eleven at night with a lesson plan on his knee. **Tomorrow's pupil, Niamh, froze at a roundabout last week and cried.** He has written the plan three times, and every version starts at the busy Hobb Lane roundabout. He puts the pen down and goes to bed.

Eleven at night, a stuck lesson plan



Niamh froze at a roundabout last week



Three versions, all starting at Hobb Lane



He puts the pen down and goes to bed

Creative work happens inside an ordinary day, and the night belongs to that day. **This section builds a sleep routine you can keep**, and shows one way to use the night after real work on a problem. I follow Gareth through one stuck evening and the weeks after it, as his routine takes shape around early lessons.



A man on a sofa late at night with a lesson plan on his knee and a lamp on beside him.

Every section in this module rests on one plain note. **This module is not medical advice.** It sums up research and official guidance for healthy adults and diagnoses nothing. If you are pregnant, have a sleep disorder or a long-term illness, or plan a big change to how you sleep, eat or move, talk to a qualified clinician first.

This module is not medical advice

- [x] It sums up research and official guidance for healthy adults
- [x] It diagnoses nothing
- [x] Talk to a qualified clinician first

Sleeping after real work on a problem has its own home (see 1.3.2), in a study of insight after training (Wagner et al., 2004). **The work has to come first**, and Gareth has done his share, three drafts in one evening. That study used one puzzle task, so it gives no promise that sleep makes anyone more creative in general.

The work has to come first

Before	After
Three drafts in one evening Real work on the problem	Sleep, then a morning revisit No promise of more creativity in general

> Exercise:
>
> Try it. Pick a stuck problem. **Work on it for 15 minutes, sleep, and revisit it the next morning.**

At breakfast Gareth gives the lesson plan ten minutes. **He reads the three drafts once and sees what they share**, since every one of them starts at Hobb Lane. Niamh's fear is the roundabout, and he has put it first each time. The new plan starts in the empty car park of the retail park before the shops open.

Ten minutes at breakfast



He reads the three drafts once

Every one starts at Hobb Lane

The new plan starts in an empty car park

The plan builds up from there, the car park, then quiet estate roads, then a small roundabout with a clear view. **The busy junction moves to the end of week three.** Niamh drives the car park loop eleven times that morning and asks to go round again. On the way home she says the lesson felt short.

The plan builds up from there

1. The car park
2. Quiet estate roads
3. A small roundabout with a clear view
4. The busy junction at the end of week three

> **Key Concept:**
>
> Morning revisit. **A morning revisit is a short, planned return to a stuck problem soon after waking**, with the last drafts in front of you and a firm limit on the time. A baker who leaves a failed recipe card by the kettle and reads it with her first tea is making a morning revisit. The time limit keeps the revisit from swallowing the morning.



A learner car alone in a large empty car park in early morning light, with no other cars around.

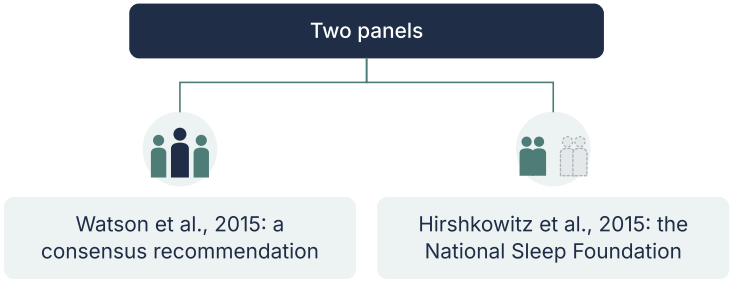
Early lessons fill Gareth's diary. **His first pupil arrives at half past seven on four days a week**, so he leaves home at seven and sets his alarm for a quarter past six. Up to now his bedtime has drifted between eleven and one, wherever the evening's paperwork happened to end. Friday's first lesson is at nine.

Early lessons fill his diary

Before	Time
First pupil, four days a week	Half past seven
He leaves home	Seven
His alarm	A quarter past six
Friday's first lesson	Nine

Adult sleep guidance comes from expert panels. **Two groups of sleep scientists "developed a consensus recommendation for the amount of sleep needed to promote optimal health in adults"** (Watson et al., 2015), and a second panel from the National Sleep Foundation weighed the evidence through its own vote (Hirshkowitz et al., 2015).

Adult sleep guidance comes from expert panels



> **Science Says:**
>
> The first panel wrote that "Adults should sleep 7 or more hours per night on a regular basis to promote optimal health." **Short sleep comes with costs**, "Sleeping less than 7 hours per night is also associated with impaired immune function, increased pain, impaired performance, increased errors, and greater risk of accidents" (Watson et al., 2015). Their evidence covered adults aged 18 to 60, and the first panel looked at health, with no measure of creativity.

The second panel set its figures by age. **"Seven to 9 hours is recommended for young adults and adults, and 7-8 hours of sleep is recommended for older adults"** (Hirshkowitz et al., 2015). Gareth is forty-four, inside the first panel's range of 18 to 60, so seven hours is his floor.

The second panel set its figures by age

Age group	Recommended
Young adults and adults	Seven to 9 hours
Older adults	7-8 hours

These hour counts are meant for healthy sleepers. **Anyone who snores heavily, lies awake most nights or falls asleep in the day should see a clinician** before building a routine around them. The first panel says the same, "People concerned they are sleeping too little or too much should consult their healthcare provider" (Watson et al., 2015).

These hour counts are meant for healthy sleepers



Snores heavily



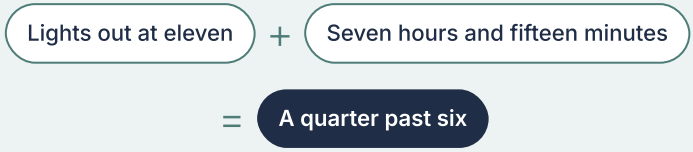
Lies awake most nights



Should see a clinician

Gareth works backwards from the alarm. **Seven hours before a quarter past six is a quarter past eleven**, so lights out at eleven gives him seven hours and fifteen minutes, with a little room for falling asleep. He writes “11 to 6.15” on the first page of his diary.

Gareth works backwards from the alarm



Falling asleep is the one part he cannot set by the clock. **Some nights he lies awake for twenty minutes**, and the spare quarter of an hour is there for those nights. His phone charges in the hall overnight, so the alarm clock by the bed does the waking.

Falling asleep cannot be set by the clock

- Some nights he lies awake for twenty minutes
- The spare quarter of an hour covers them
- His phone charges in the hall

> **Key Concept:**
>
> Sleep window. **A sleep window is the set span of hours kept for sleep each night**, written down with a start and an end, so other plans fit around it. A student nurse who keeps midnight to eight for sleep through exam month, and books revision only outside it, is keeping a sleep window.

Weekends are the hard part. **The first panel asks for seven hours "on a regular basis"** (Watson et al., 2015), and Gareth's Saturday nights at his brother's end near one. He sets Sunday's alarm for eight, which keeps the seven hours, and drops the second film. Sunday's lessons start at ten, so the later alarm costs him nothing.



The evenings need a change as well. **Lesson plans and invoices used to run until the moment he went to bed**, with the folder on the bedside table. Gareth moves that work to eight o'clock and closes the folder at ten, a full hour before lights out. Invoices take the first forty minutes and lesson plans the rest.

The evenings need a change



Work moves to eight o'clock

Invoices take the first forty minutes

The folder closes at ten

Hard thinking in the gap after work has its own home under heavy breaks (see 2.2.3). **For Gareth that gap is the last hour before bed**, and the stuck plan is the heaviest thing he could fill it with. He keeps that hour for packing the car bag, a shower and the radio.

The last hour before bed

- [x] Packing the car bag
- [x] A shower
- [x] The radio

The first week of quiet evenings feels odd. **Twice he reaches for the folder at half past ten**, and both times he writes the stuck point in one line at the top of the next day's diary page. The line is waiting for him at breakfast.

The first week of quiet evenings feels odd



Twice he reaches for the folder

The stuck point in one line

Waiting for him at breakfast

> **Key Concept:**
> Wind-down hour. **A wind-down hour is the last hour before bed, kept free of demanding work**, so the day's hardest problem is set down before sleep. A shop owner who cashes up by nine and spends the hour before bed walking the dog and reading a novel is keeping a wind-down hour.

For one working week Gareth keeps a short log in the back of the diary. **Each line holds the time he went to bed, the time he woke and one line from his morning revisit.** Four nights land inside the window. Wednesday reads twenty to midnight after a late match on television, six hours and thirty-five minutes in all.

One working week in the log

Each line holds	In the log
The time he went to bed	Wednesday, twenty to midnight
The time he woke	Six hours and thirty-five minutes in all
One line from his morning revisit	A small change to a lesson plan

The log has one rule. **Each line is written before he leaves the house**, so the times come from the night just gone and the revisit line from that morning's ten minutes. Five lines take him under a minute a day, and Wednesday's is written in the car with the heater running.

The log has one rule

Day	1	2	3	4	5	6	7
Written before he leaves the house	☐	☐	☐	☐	☐	☐	☐
Times from the night just gone	☐	☐	☐	☐	☐	☐	☐
Under a minute a day	☐	☐	☐	☐	☐	☐	☐

The log turns a vague habit into numbers he can read. **The morning lines are the part he enjoys most**, since three of the five carry a small change to a lesson plan. Thursday's line moves a hill start for another nervous pupil to a quiet lane by the cemetery.

The log turns a vague habit into numbers



Four nights inside the window



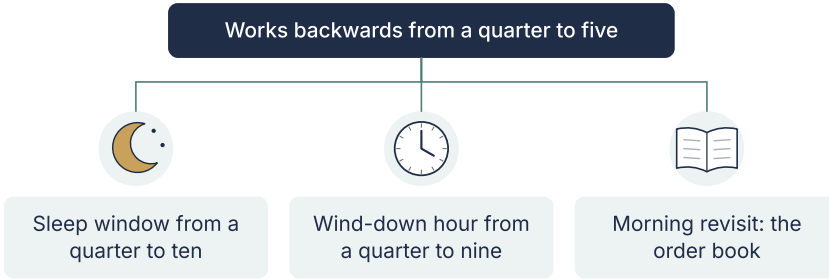
Three of five carry a change



A hill start moved to a quiet lane

The same routine fits other early starts. **A baker who opens at six works backwards from a quarter to five**, so her sleep window starts at a quarter to ten, and her wind-down hour runs from a quarter to nine until then. Her morning revisit is the order book, read once with the first batch in the oven.

A baker who opens at six



At home a parent with a teenager can use it as well. **The two of them set their sleep windows side by side** on a sheet on the back of the bathroom door, and each picks one stuck job to sleep on, a school essay for one and a birthday plan for the other. Breakfast becomes their morning revisit.

A parent and a teenager

- Sleep windows side by side on the bathroom door
- A school essay and a birthday plan
- Breakfast becomes their morning revisit

The closing exercise builds the routine one piece at a time. **The starter sets the window**, the middle level protects the last hour before bed and the advanced level tracks five nights with a morning revisit. Each level keeps the stuck problem from your Try it.

A routine you can keep, at three levels



The starter sets the window

The middle protects the last hour

The advanced tracks five nights

Exercise:

A routine you can keep.

1. Starter. **Set a sleep window of 7 hours or more tonight.**
2. Middle. Protect the last hour before bed from high-demand work on the stuck problem.
3. Advanced. Track 5 nights of bedtime, wake time and a morning revisit of one problem.

Key idea:

Work the problem first, keep a sleep window of at least seven hours and a quiet last hour, then come back to the problem soon after waking.

Work the problem first, then sleep on it



Quick check:

How many hours does the first panel advise for adults aged 18 to 60? Answer: 7 or more hours a night, on a regular basis. What is a sleep window? Answer: The set span of hours kept for sleep each night. What does a wind-down hour keep out? Answer: Demanding work. Who should see a clinician before using these figures? Answer: Anyone with a sleep problem or worry about their sleep.

6.1.2 Breaks, Daydreaming and Returning to an Unfinished Idea

Imagine Rosalind, a dressmaker, in her workroom above a florist on a Friday afternoon. **The left sleeve of Imogen's wedding dress keeps puckering at the elbow**, and two hours of pinning have made it worse. The fitting is on Tuesday. She hangs the sleeve on the dress form, switches off the lamp and goes home.

A Friday afternoon in the workroom

- The left sleeve keeps puckering at the elbow
- Two hours of pinning have made it worse
- The fitting is on Tuesday

Every maker leaves work unfinished for a while, and the time away is part of the work. **This section is about the breaks between one attempt and the next**, and about coming back to an idea you set down. I follow Rosalind from that Friday to the fitting. The steps are practice, and no study tested them as written.



A wedding dress on a dress form in a workroom, with one lace sleeve pinned at the elbow.

Nothing in this module is medical advice. It draws on research for healthy adults and offers no diagnosis or treatment. If you have trouble with attention, sleep or your health, or plan big changes to your daily routine, talk to a qualified clinician first. The daydreaming advice here is for safe, everyday settings only.

Nothing in this module is medical advice



Incubation, setting a problem aside, has its own home (see 1.3.2). **One large review gathered the incubation research**, and it opens with "A meta-analytic review of empirical studies that have investigated incubation effects on problem solving is reported" (Sio & Ormerod, 2009). A meta-analytic review pools the results of many studies into one.

One large review gathered the incubation research



Science Says:

The review notes that "Although some researchers have reported increased solution rates after an incubation period (i.e., a period of time in which a problem is set aside prior to further attempts to solve), others have failed to find effects." **The evidence on breaks is mixed.** It adds that "The existence of multiple types of incubation effect provides evidence for differential invocation of knowledge-based vs. strategic solution processes across different classes of problem" (Sio & Ormerod, 2009).

In plain words, the review found more than one way a break can help, and different kinds of problem seem to use different ways. **No single break recipe suits every problem.** A puckering sleeve is a practical

puzzle, and the review promises Rosalind nothing about it. Some puzzles may need fresh knowledge, and others a fresh way of searching.

The evidence on breaks is mixed

Some studies	Others
⊕ Increased solution rates after an incubation period	⊖ Failed to find effects
⊕ More than one way a break can help	⊖ No single break recipe suits every problem

Friday's two hours were not wasted. **Rosalind pinned the sleeve four ways and wrote down why each one failed**, so the problem is well loaded before she leaves. Longer first attempts went with larger gains from a break in the review (Sio & Ormerod, 2009), which gives the two hours a second use.

Friday's two hours were not wasted



> **Key Concept:**
>
> Preparation stint. **A preparation stint is the first stretch of real work on a problem before any break**, long enough to know where the problem pushes back. A teacher who spends an hour marking a muddled essay and listing what confuses her, before she makes a cup of tea, has done a preparation stint.

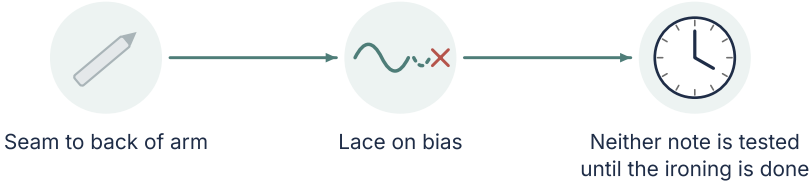
Monday starts with linings to press and a tin of mixed buttons to sort for a waistcoat order. **Neither job needs much thought**, and both keep her hands busy for an hour. Rosalind puts a pencil and a strip of pattern paper on the end of the ironing board before she starts.

Monday starts with easy jobs

- [x] Linings to press
- [x] A tin of mixed buttons to sort
- [x] A pencil and a strip of pattern paper

Halfway through the third lining a thought about the sleeve drifts in. **She writes "seam to back of arm" on the strip and carries on ironing**, without stopping to work it through. Two more words, "lace on bias", go down while she sorts the buttons by size. Neither note is tested until the ironing is done.

A thought about the sleeve drifts in



> Exercise:
>
> Try it. **During an easy job that keeps your hands busy, keep a pencil and slip within reach.** Write two or three drifting words, then carry on.

Her busy-hands jobs follow the easy-task pattern from one lab study (Baird et al., 2012). **Nobody can promise what a wandering mind**

will bring back, and the study cannot show that the drifting itself does the work. Rosalind keeps the habit because the words cost her nothing to catch.

Her busy-hands jobs follow one lab study

> - The easy-task pattern (Baird et al., 2012)
> - Nobody can promise what a wandering mind will bring back
> - The words cost her nothing to catch

Light and heavy breaks have their own home (see 2.2.3). **Rosalind's rule is to fill a break with work her hands know well**, such as pressing, sorting or tacking a hem. Invoices and a tricky new pattern wait until the sleeve has had its next go, since both count as heavy in her workroom.

Rosalind's rule for a break

Light: work her hands know well	Heavy: wait until the sleeve has had its next go
Pressing and sorting	Invoices
Tacking a hem	A tricky new pattern

At eleven she takes the sleeve down. **She tries the first note and moves the seam to the back of the arm**, and the pucker at the elbow is gone. The second note, cutting the lace on the bias, she sets aside for the next dress, since the sleeve already lies flat.

At eleven she takes the sleeve down

Before	After
A pucker at the elbow Two notes on a strip	The seam moved to the back of the arm The pucker is gone

Some places are no place for a drifting mind. **On Tuesday Rosalind drives the dress to Imogen's house**, forty minutes through town traffic, and her attention stays on the road. The radio stays off, and any thought about the hem waits until the car is parked. Imogen's mother opens the door before she can knock.

Some places are no place for a drifting mind



Forty minutes through town traffic



The radio stays off



Thoughts about the hem wait

> **Key Concept:**
>
> Safe drift list. **A safe drift list is a short written list of easy jobs where a wandering mind puts nobody at risk**, kept where the work happens so a break can start without a choice. A potter who pins "wedge clay, sweep the floor, sort the glazes" beside her wheel keeps a safe drift list.

The other side of the list matters as much. **Driving, using a sharp blade or running a machine need full attention**, so a mind that drifts there is a danger to you and others. Each safe job on a list needs a matching no-drift job on the other side.

The other side of the list

- [x] Driving
- [x] Using a sharp blade
- [x] Running a machine

Writing her own list takes Rosalind ten minutes on Monday evening. **The safe column holds pressing, button sorting, tacking hems and winding bobbins.** The no-drift column holds the overlocker, the rotary cutter and the drive to fittings. The list goes on the wall beside the sewing machine.

Her own list, beside the sewing machine

Safe column	No-drift column
Pressing	The overlocker
Button sorting	The rotary cutter
Tacking hems and winding bobbins	The drive to fittings

Breaks sit inside a day that still needs a full night, since sleeping under seven hours is linked with impaired performance (Watson et al., 2015). **A busy-hands break in the morning is no fix for a short night.** Rosalind keeps her sewing to daylight hours in the week of a wedding.

Breaks sit inside a day that still needs a full night



The fitting goes well, and Imogen turns in front of the mirror twice. **Rosalind tries one more test the next week**, on two unfinished jobs,

a waistcoat collar and a bridesmaid's hem. Each gets twenty minutes away, the collar with plain rest in the garden chair and the hem with button sorting.

One more test the next week

Test	Waistcoat collar	Bridesmaid's hem
Twenty minutes away	Plain rest in the garden chair	Button sorting
Brings back	One new line	Three new lines

> **Key Concept:**
> Break swap. **A break swap is giving two unfinished problems two different kinds of break of the same length**, then comparing what each one gives back. Keeping the length equal makes the comparison fair. A chef who leaves one new sauce while he rests and another while he peels potatoes, then tastes both with fresh notes, is running a break swap.

The hem brings back three new lines and the collar one. **One swap proves nothing**, and Rosalind treats it as a note about her own habits. The review's finding on rest against an easy task covers only word puzzles of the insight kind (Sio & Ormerod, 2009).

One swap proves nothing



A note about her own habits



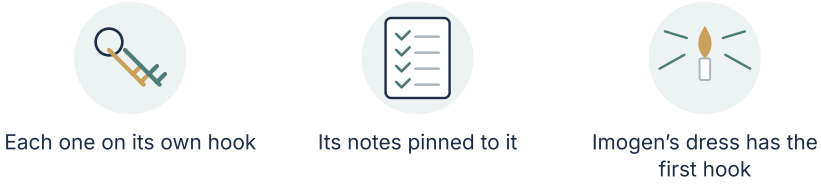
The finding covers only word puzzles



Of the insight kind

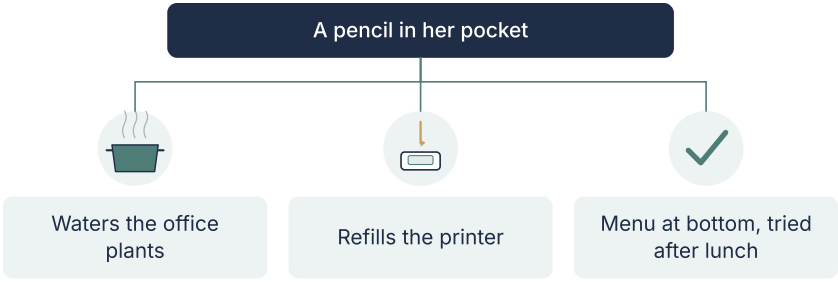
Unfinished jobs need somewhere to wait. **Rosalind hangs each one on its own hook with its notes pinned to it**, so nothing goes missing while it rests. The collar has waited on its hook since Thursday, with three lines from the swap pinned to the lapel. Imogen's dress has the first hook.

Unfinished jobs need somewhere to wait



The same pattern works in an office. **A web designer stuck on a menu layout waters the office plants and refills the printer**, with a pencil in her pocket. A note reading "menu at bottom" goes down by the printer, and she tries it after lunch. The layout goes to the client that afternoon.

A web designer stuck on a menu layout



At home it can settle a family puzzle. **A father planning a surprise party sorts the recycling and pairs socks** while the guest list sits unfinished on the table. Two names he had forgotten drift in, and he

writes them on the back of an envelope. The party goes ahead with all twenty names.



A man pairing socks on a sofa, with an envelope and a pencil beside him.

A student stuck on the ending of an essay can try it in a shared house. **She repots the basil on the windowsill with a pencil beside the pots**, and three words for the last paragraph go down on the edge of a newspaper. She finishes the repotting first.

A student stuck on an essay ending

> - She repots the basil on the windowsill
> - Three words on the edge of a newspaper
> - She finishes the repotting first

The closing exercise moves from a list to a test. **The starter writes your safe drift list**, the middle level lengthens your first attempt and the advanced level runs a break swap on two of your own unfinished problems. Use real problems from your own week at every level.

Safe breaks, at three levels



The starter writes your safe drift list

The middle lengthens your first attempt

The advanced runs a break swap

Exercise:

Safe breaks.

1. Starter. **List three busy-hands breaks where the mind can drift, such as ironing or sorting buttons, and three unsafe settings, such as driving or using machinery.** Keep the first list at the workspace.
2. Middle. Make a longer first attempt before the break.
3. Advanced. Give two unfinished problems same-length breaks, one plain rest and one an easy chore. On return, compare the new ideas.

Key idea:

Work the problem first, fill the break with a safe job your hands know and catch drifting thoughts in a few words, knowing the evidence on breaks is mixed.

Work first, then a safe break



Quick check:

What does the incubation review say about earlier studies? Answer: Some found gains after a break, and others failed to find effects. What is a preparation stint? Answer: The first stretch of real work on a problem before any break. Where should a mind never drift? Answer: In settings like driving or using machinery. Does a break make up for short sleep? Answer: No. A full night still matters, since short sleep is linked with impaired performance.

6.2 Physical Activity

6.2.1 Walking, Aerobic Exercise, Strength and Balance

Imagine Tunde, a team leader at a call centre on an industrial estate, at his desk. **Head office wants a new staff rota by Friday, one that is fair to the parents on his team.** He has stared at the same spreadsheet for an hour. At one o'clock he puts on his jacket and walks out past the loading bays.

A new staff rota by Friday

> - Fair to the parents on his team
> - The same spreadsheet for an hour
> - At one o'clock he walks out past the loading bays

Moving the body is part of a working day that makes ideas. **This section covers walking for ideas, then the aerobic, strength and balance work** that official guidance asks of adults. I follow Tunde through one lunchtime walk and the weeks after it, along with his mother, Grace, who is seventy-one.

This section covers





A man in a jacket walking past loading bays on an industrial estate at lunchtime.

Every section in this module comes with the same plain note. **None of this is medical advice.** What follows is research and official guidance for healthy adults, with no treatment in it. If you have a heart, joint or other health condition, are pregnant, or plan a big change to how you move, talk to a qualified clinician first.

None of this is medical advice



Research and official guidance for healthy adults



A heart, joint or other health condition



Talk to a qualified clinician first

The walking research in this section rests on a plain comparison of sitting and walking. **"In Experiment 1, while seated and then when walking on a treadmill, adults completed Guilford's alternate uses (GAU) test of creative divergent thinking and the compound remote associates (CRA) test of convergent thinking"** (Oppezzo & Schwartz, 2014).

Sitting and walking, in Experiment 1

Test	Kind of thinking	Asks for
Guilford's alternate uses (GAU)	Creative divergent thinking	Many uses of an object
Compound remote associates (CRA)	Convergent thinking	One word linking three others

> **Science Says:**
>
> The same paper reports that "Four experiments demonstrate that walking boosts creative ideation in real time and shortly after." **More people gained on the many-ideas test than on the one-answer test**, "Walking increased 81% of participants' creativity on the GAU, but only increased 23% of participants' scores for the CRA" (Oppezzo & Schwartz, 2014). The GAU asks for many uses of an object, and the CRA asks for one word linking three others. It is one paper.

The same paper found that "when seated after walking, participants exhibited a residual creative boost" (Oppezzo & Schwartz, 2014). **The walk can come first and the writing straight after**, which suits Tunde's lunch hour. He loops the estate for twenty-five minutes, past the tyre depot and the bakery wholesaler, with the rota question in his head.

The walk can come first and the writing straight after



The loop has one rule. **Tunde leaves his phone in his desk drawer and carries a folded sheet and a pen**, with the rota question written at the top. He writes nothing on the walk itself, and the sheet stays folded until he sits down.

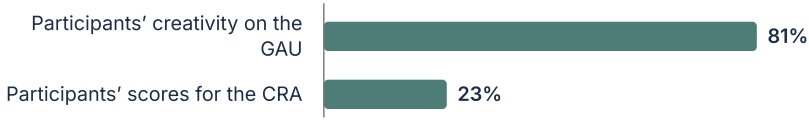
The loop has one rule

- [x] Phone in his desk drawer
- [x] A folded sheet and a pen
- [x] The sheet stays folded until he sits down

> Exercise:
>
> Try it. **Take a 10-minute walk, then write a 5-minute idea list** on a problem you are stuck on.

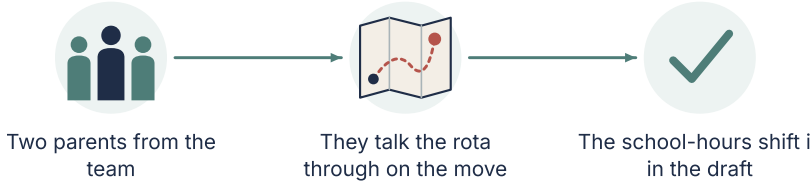
Back in the break room, Tunde gives the list five minutes. **Eleven rota ideas fill the page**, including a school-hours shift from half past nine to half past two that nobody on the team had put forward. A shift swap board and a term-time pattern follow it onto the list.

Walking increased creativity scores (Oppezzo & Schwartz, 2014)



On Thursday he walks again with two parents from the team. **They talk the rota through on the move** and sit down to write as soon as they are back. By Friday the school-hours shift is in the draft, with a note that head office still has to agree the cover.

On Thursday he walks again



> **Key Concept:**
>
> Walking ideation. **Walking ideation is planning a walk as one part of an idea session**, with the walking and the writing booked together. The walk gets a time and a question, like any other part of the session. A florist who walks to the flower market and lists new bouquet ideas on the bench outside before she buys is using walking ideation.

Ideas are only one reason to walk. **Tunde's lunchtime loop counts toward the weekly activity his body needs**, if he walks briskly enough. The official advice is set by how hard the effort is and how many minutes it fills in a week. For Tunde the lunch loop is the easiest place to start.

Ideas are only one reason to walk

Before	After
The lunchtime loop for the rota Walking for ideas	→ The same loop, walked briskly enough Weekly activity his body needs

The UK's National Health Service, the NHS, says "Moderate activity will raise your heart rate, and make you breathe faster and feel warmer" (National Health Service, 2024). **Its quick test is "if you can still talk, but not sing"** (National Health Service, 2024). On his next loop Tunde tries a line of a song and runs out of breath.

> **Key Concept:**
>
> Moderate intensity. **Moderate intensity is effort in the middle of your own range**, harder than a stroll and well short of your hardest. A man mowing a sloping lawn with a push mower, warm and breathing faster but able to chat over the fence, is working at moderate intensity.

The NHS quick test



Raise your heart rate



Breathe faster and feel warmer

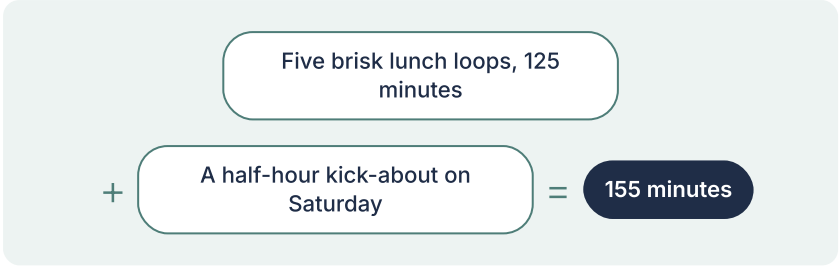


You can still talk, but not sing

> **Science Says:**
>
> The 2020 guidelines of the World Health Organization (WHO) say "All adults should undertake 150-300 min of moderate-intensity, or 75-150 min of vigorous-intensity physical activity, or some equivalent combination of moderate-intensity and vigorous-intensity aerobic physical activity, per week." **Strength work is a separate target**, for all major muscle groups "on 2 or more days a week" (Bull et al., 2020). These are health targets, with no creativity measure in them.

Adding up the week takes a minute. **Five brisk lunch loops of twenty-five minutes make 125 minutes**, and a half-hour kick-about with his son on Saturday brings the total to 155. That sits inside the band for moderate activity, with room to grow toward 300 on lighter weeks at work.

Adding up the week takes a minute



For people without a medical reason to hold back, the WHO notes that a check-up is generally unnecessary before light or moderate activity up to brisk walking (Bull et al., 2020). Anyone with a condition, or anyone planning harder training, should ask a clinician first. Tunde has no condition to report, so he starts the same week.

The 2020 WHO guidelines for all adults

Target	Per week
Moderate-intensity aerobic activity	150-300 min
Vigorous-intensity aerobic activity	75-150 min
Strength work for all major muscle groups	2 or more days

Strength needs its own slots in the week. **The NHS lists carrying heavy shopping bags, lifting weights, working with resistance bands, body-weight exercises such as push-ups and sit-ups, and heavy gardening such as digging** among the activities that strengthen muscles (National Health Service, 2024). Tunde picks resistance bands, which fit in his work bag.

The NHS lists activities that strengthen muscles



Carrying heavy shopping bags



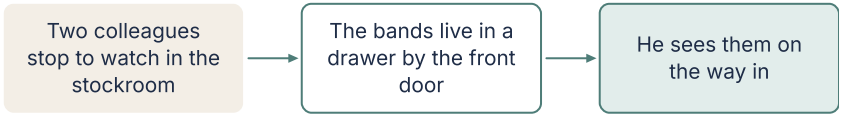
Working with resistance bands



Heavy gardening such as digging

The first try with the bands happens in the stockroom at work, and two colleagues stop to watch. **The sessions move home**, where the bands live in a drawer by the front door and he sees them on the way in. Nobody laughs in his own hallway.

The sessions move home



> **Key Concept:**
>
> Muscle-strengthening activity. **Muscle-strengthening activity is activity that works all the major muscle groups at moderate or greater effort.** A woman who digs over her allotment bed every Sunday morning is doing muscle-strengthening activity. The load can be soil, a band or the weight of your own body.

On Tuesdays and Thursdays Tunde gives the bands twenty minutes after work, covering legs, back, chest and arms. **Two sessions a week reach the strength target.** Push-ups on the hall floor finish each session. He starts with the lightest band and moves up one colour after three weeks.

Tuesdays and Thursdays, twenty minutes after work

1. Legs and back
2. Chest and arms
3. Push-ups on the hall floor
4. Up one colour after three weeks

Exercise never pays for lost sleep. **Short sleep comes with impaired performance and more errors** (Watson et al., 2015), so Tunde's bands stay at six in the evening and never push his bedtime back. His bedtime stays at half past ten on band nights and loop days alike.

Exercise never pays for lost sleep



Short sleep: impaired performance and more errors



Bands stay at six in the evening



Bedtime stays at half past ten

Grace is over sixty-five, so her guidance differs. **For older adults the WHO adds "varied multicomponent physical activity that emphasises functional balance and strength training at moderate or greater intensity on 3 or more days a week, to enhance functional capacity and to prevent falls"** (Bull et al., 2020). Balance is in the advice for her age group alone.

Grace is over sixty-five

- Varied multicomponent physical activity
- Functional balance and strength training
- On 3 or more days a week, to prevent falls

Every Wednesday she goes to a dance class at the church hall. **"Dancing also combines aerobic and balance components"** (Bull et al., 2020). On Monday and Friday she stands on one foot at the sink while lifting two tins of beans, which makes three days in her week. None of this is about ideas.

Grace's three days

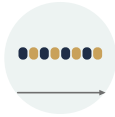
Day	Activity
Wednesday	A dance class at the church hall
Monday and Friday	One foot at the sink, lifting two tins of beans



Older women and men dancing in pairs in a church hall with a piano at one side.

One review covers single bouts of exercise and thinking. **Its authors write that "although the research findings are mixed, researchers have generally concluded that there is a small positive effect"** (Chang et al., 2012). That review looked at thinking tasks in general, so it says nothing certain about ideas. Tunde walks for the rota and his health alike.

One review covers single bouts of exercise



The research findings are mixed



A small positive effect



Thinking tasks in general

Outdoor walks bring something of their own. **"Walking outside produced the most novel and highest quality analogies"** (Oppezzo & Schwartz, 2014), and the same paper found that the effects of being outdoors and of walking could be pulled apart. Tunde keeps the outdoor loop for the questions that need a fresh comparison.

Outdoor walks bring something of their own

- The most novel and highest quality analogies
- Being outdoors and walking could be pulled apart
- The outdoor loop for questions that need a fresh comparison

A primary teacher stuck on a class assembly can use the same pattern. **She walks the edge of the playground for ten minutes during morning break** and writes her list in the staff room before the bell. Her assembly on kindness gets its opening from a list of nine.

A primary teacher stuck on a class assembly

- Ten minutes at the edge of the playground
- Her list in the staff room before the bell
- An opening from a list of nine

The closing exercise builds on your Try it walk. **The starter walks during one idea block**, the middle level adds a strength session and the advanced level takes the walk outside for analogies. Keep the stuck problem from your Try it for the starter and the advanced level.

Walk, then build, at three levels



The starter walks during one idea block

The middle adds a strength session

The advanced walks outside for analogies

Exercise:

Walk, then build.

1. Starter. **Walk on a treadmill or along a corridor during one idea block.**
2. Middle. Add one muscle-strengthening session this week.

3. Advanced. Take one outdoor walk for analogies or idea quality.

Key idea:

Walk before or while you make ideas, reach the weekly aerobic minutes at a pace where you can talk but cannot sing, add strength on two days and, after sixty-five, add balance.

Walk before or while you make ideas



Talk but cannot sing

Strength on two days

After sixty-five, add balance

Quick check:

What did the walking paper find for many-idea tasks? Answer: Walking raised creativity for 81% of participants on the uses test. How can you tell moderate effort? Answer: You “can still talk, but not sing”. How many days a week of strength work does the WHO advise for adults? Answer: 2 or more. Who gets the WHO balance advice? Answer: Older adults, 65 and over.

6.2.2 Your Weekly Movement Plan, Including Sedentary Days

Imagine Lorna, a bookkeeper working from home, on the last Monday of the month. **Six clients need their month-end figures by Friday**, each with a short written report. Last month she sat at the desk from half past eight until six on all five days. This morning she opens a fresh page in her notebook before she opens the spreadsheets.

The last Monday of the month

- [x] Six clients need month-end figures by Friday
- [x] Last month: half past eight until six
- [x] A fresh page before the spreadsheets

Knowing the weekly targets is one thing, and fitting them into a real week is another. **This section turns the targets into a seven-day plan**, with a way through the days when work keeps you in a chair. I follow Lorna through one month-end week and the changes she makes after it.

Fitting the targets into a real week

> - A seven-day plan
> - A way through the days when work keeps you in a chair
> - One month-end week and the changes after it



A spare bedroom set up as an office, with a desk, two screens and a pile of client folders.

This module gives no medical advice. It reports research and official guidance meant for healthy adults and treats no condition. If you are pregnant or have just had a baby, live with a long-term condition or disability, or plan a big change to how you move, ask a clinician to shape your plan.

This module gives no medical advice

- [x] Research and official guidance meant for healthy adults
- [x] Pregnant, or a long-term condition or disability
- [x] Ask a clinician to shape your plan

The weekly targets and the walking study have their own home (see 6.2.1). **The new work here is fitting them into a week**, day by day and hour by hour. The World Health Organization (WHO) revises its guidance over time, and "These 2020 WHO guidelines update previous WHO recommendations released in 2010" (Bull et al., 2020).

The new work here is fitting them into a week



The weekly targets, 6.2.1



Day by day and hour by hour



2020 WHO guidelines update those from 2010

Seven columns go on the page, one for each day. **Each walk and each strength session goes into a real slot**, with a start time she can keep in a month-end week. Client calls get booked around the slots. Monday, Wednesday and Friday get a thirty-minute walk at eight, before the first report of the day.

Seven columns, one for each day

Day	Slot
Monday, Wednesday, Friday	A thirty-minute walk at eight
Tuesday, Thursday	Strength at five, twenty minutes
Saturday	A forty-minute swim
Sunday	A thirty-minute walk with her sister

Saturday gets a forty-minute swim at the leisure centre, and Sunday a thirty-minute walk with her sister. **The aerobic minutes come to 160 for the week**, from three weekday walks, the swim and the Sunday walk. Strength goes on Tuesday and Thursday at five, twenty minutes of body-weight work on the bedroom floor.

The aerobic minutes for the week

Three weekday walks + The swim and the Sunday walk = 160 for the week

> **Key Concept:**
>
> Movement grid. **A movement grid is a seven-day table that ties each planned bout of activity to a day and a time.** A night-shift porter who marks his gym sessions on the rota beside his shifts, so they never clash with sleep, is keeping a movement grid. The table shows clashes before the week starts.

The table shows clashes before the week starts



A seven-day table



Each bout of activity at a day and a time



Never clash with sleep

> **Exercise:**
>
> Try it. **Draft a 7-day grid with aerobic minutes and 2 strength slots**, each one in a real time slot.

The grid goes on the side of the bookcase by her desk, where she sees it every time she reaches for a folder. **Ticks go in as the week runs**, a green tick for a walk or swim and a blue one for strength. A missed slot gets a circle, so the gaps show at a glance.

Ticks go in as the week runs

Day	1	2	3	4	5	6	7
A green tick for a walk or swim	☐	☐	☐	☐	☐	☐	☐
A blue one for strength	☐	☐	☐	☐	☐	☐	☐
A circle for a missed slot	☐	☐	☐	☐	☐	☐	☐

Month-end days are the hard ones. **Between the walks the work keeps her sitting for hours at a stretch**, with the reports needing long runs of focus. A good week of walks still leaves days that are mostly spent in a chair.

Month-end days are the hard ones



Sitting for hours at a stretch



Long runs of focus



Days mostly spent in a chair

A desk job hides how long the sitting runs. **On Monday Lorna counts, and finds three and a half hours without standing**, from the end of her walk at half past eight to lunch at noon. The count goes on the grid in red, under Monday.

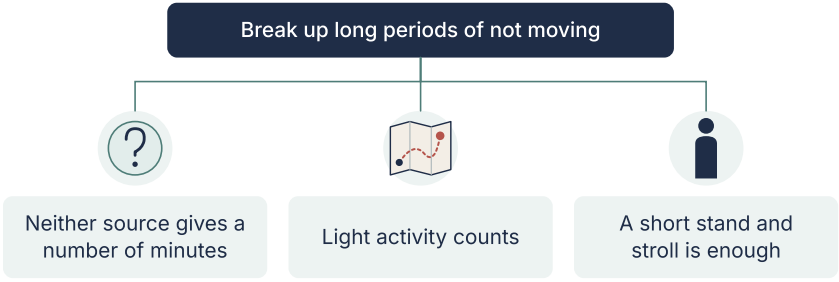
A desk job hides how long the sitting runs

Monday	Count
From the end of her walk at half past eight	To lunch at noon
Three and a half hours without standing	In red on the grid

> **Science Says:**
> The WHO advises that "Adults should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits." **No sitting threshold could be set**, since "evidence was insufficient to quantify a sedentary behaviour threshold." The guidelines include "new specific recommendations for pregnant and postpartum women and people living with chronic conditions or disability" (Bull et al., 2020).

The NHS gives the same advice in plainer words. **Adults should "break up long periods of not moving with some activity"** (National Health Service, 2024). Neither source gives a number of minutes, so any count you use is your own choice. Light activity counts, which means a short stand and stroll is enough to break a stretch.

The NHS gives the same advice in plainer words



Month-end days get a count of her own. **She stands or walks for three minutes each hour, five times a day**, at ten, eleven, twelve, two and three. These are practice numbers of my own, and no source gives them. They suit Lorna because each break fits between two client files.

Month-end days get a count of her own



Three minutes each hour, five times a day



Practice numbers, no source gives them



Each break fits between two client files

> **Key Concept:**
>
> Sitting break. **A sitting break is a short spell on your feet that cuts a long stretch of sitting in two**, planned into the day so it happens without a decision. A lorry driver who gets out at every fuel stop to walk once round the cab is taking sitting breaks.

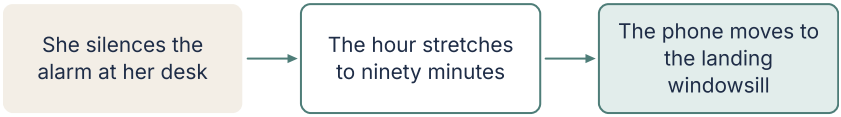
The breaks are plain. **She carries the post down to the hall, waters the plants on the landing or walks to the end of the garden and back.** A phone alarm marks each hour, and she stops it only once she is on her feet. Five breaks add fifteen minutes on her feet to a desk day.

The breaks are plain

- [x] She carries the post down to the hall
- [x] Water the plants on the landing
- [x] Walk to the end of the garden and back

Tuesday is the first day of breaks, and it feels slow. **Twice she silences the alarm at her desk and keeps typing**, and both times the hour stretches to ninety minutes. From Wednesday the phone sits on the landing windowsill, so stopping the alarm means standing up and walking to it.

Tuesday feels slow





A woman watering a row of plants on a landing windowsill, with a phone in her other hand.

The morning walks earn a second job. **The walking study called walking “a simple and robust solution to the goals of increasing creativity and increasing physical activity”** (Oppezzo & Schwartz, 2014). Lorna puts each weekday walk straight before the report she finds hardest to write. She keeps the same park loop each time, so the route itself needs no thought.

The morning walks earn a second job



On Wednesday the hardest report is for a garage whose sales have dropped. **She walks for thirty minutes round the park**, then sits

straight down and writes the opening in fifteen minutes. The opening explains the drop through a closed road outside the garage, which she noticed on the walk itself.

Wednesday's hardest report



> **Key Concept:**
> Walk slot. **A walk slot is the place in a working day where a walk sits directly before the task that needs fresh ideas.** A songwriter who walks to the post office and back before every writing session, and picks up her guitar the moment she gets in, has a walk slot.

Gains in thinking straight after exercise are mixed, with a small positive effect overall (Chang et al., 2012). **Lorna treats the walk slot as a habit she likes**, with no promise attached. Some mornings the report still comes slowly. The minutes count toward her week either way.

Gains straight after exercise are mixed

- A small positive effect overall (Chang et al., 2012)
- A habit she likes, with no promise attached
- The minutes count toward her week either way

The walk slot changes the order of Lorna's day. **The hardest report moves to the hour after the walk**, and the routine checks of bank entries move to the afternoon. A dull task waits more happily than a report that needs a fresh opening.

The walk slot changes the order of Lorna's day

Hour after the walk	Afternoon
⊕ The hardest report	⊖ Routine checks of bank entries
⊕ A report that needs a fresh opening	⊖ A dull task waits more happily

At the end of the week Lorna reads the grid. **Five slots have green or blue ticks, and two have circles**, the Thursday strength session lost to a client call and the Saturday swim lost to a closed pool. The aerobic total comes to 120 minutes, short of the plan.

Aerobic minutes for the week



Cutting sleep to fit a workout has costs of its own, among them impaired performance and more errors (Watson et al., 2015), so a six o'clock run to make up the minutes is ruled out. The strength session moves to Wednesday lunchtime, and a Sunday cycle with her sister replaces the swim when the pool is shut.

Adjust the plan without cutting sleep

Lost	The plan now
A six o'clock run to make up the minutes	Ruled out
The Thursday strength session	Wednesday lunchtime
The Saturday swim, pool shut	A Sunday cycle with her sister

The same plan works at home with children. **"Among children and adolescents, an average of 60 min/day of moderate-to-vigorous intensity aerobic physical activity across the week provides health benefits"** (Bull et al., 2020). Lorna's sister copies the grid for her family, with a row for each person. Her two boys' football and bike rides fill their rows by Wednesday.

The same plan works at home with children



60 min/day across the week



A row for each person



Football and bike rides by Wednesday

A student revising for exams can build the same grid. **Her sitting breaks fall between past papers**, and her walk slot comes straight before the essay question she dreads most. Strength goes on two evenings, once the day's last paper is marked.

A student revising for exams

- Sitting breaks fall between past papers
- A walk slot before the essay question she dreads
- Strength on two evenings

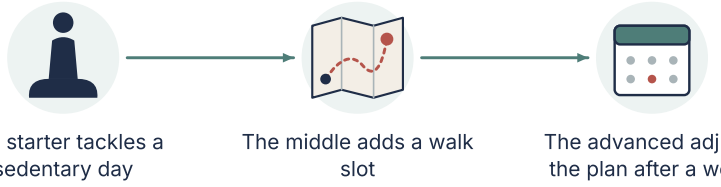
A shop manager on her feet all day has the opposite week. **Her sedentary hours come in the evening**, so her sitting breaks go into the two hours of television after tea. Her first one comes at the end of the first programme. Her grid has walks on her days off and strength on Monday and Thursday mornings.

A shop manager on her feet all day

- Her sedentary hours come in the evening
- Sitting breaks in two hours of television
- Walks on her days off

The closing exercise starts from your Try it grid. **The starter tackles a sedentary day**, the middle level adds a walk slot and the advanced level adjusts the plan after a full week. Keep the same grid for all three levels.

A week that moves, at three levels



Exercise:

A week that moves.

1. Starter. **On a sedentary day, stand or walk 3 minutes each hour, 5 times.** These are practice numbers that no source gives.
2. Middle. Put one walk straight before a creative work block.
3. Advanced. Adjust the plan after one week without cutting sleep.

Every walk and strength session in a real slot



Key idea:

Put every walk and strength session in a real slot on a seven-day grid, break up long sitting with short spells on your feet and adjust the plan each week without taking time from sleep.

Quick check:

What did the WHO find about a sitting threshold? Answer: The evidence was insufficient to set one. What is a walk slot? Answer: The place in a working day where a walk sits directly before the task that needs fresh ideas. Where do the three-minute breaks in the starter come from? Answer: They are practice numbers that no source gives. Why is an early run ruled out to make up missed minutes? Answer: Cutting sleep brings impaired performance and more errors.

6.3 Eating to Support the Brain

6.3.1 Dietary Patterns and Adequate Nutrition

Imagine Desmond, a taxi driver who eats most of his meals from petrol-station shelves. **A sandwich, a bag of crisps and a chocolate bar make up his usual lunch**, eaten in the cab between fares. On Sunday his sister Marcia hands him a hospital leaflet about something called the MIND diet, and he reads it at the rank on Monday.

Desmond's usual lunch

> - A sandwich, a bag of crisps and a chocolate bar
> - Eaten in the cab between fares
> - A hospital leaflet about the MIND diet

This section is about the whole mix of what you eat across weeks. **I show you what two studies found about one well-known eating pattern**, and how to practise small changes at three levels. Nothing here is medical advice, so talk to a qualified clinician about an eating disorder, a health condition or any big change to your diet.

This section is about the whole mix of what you eat

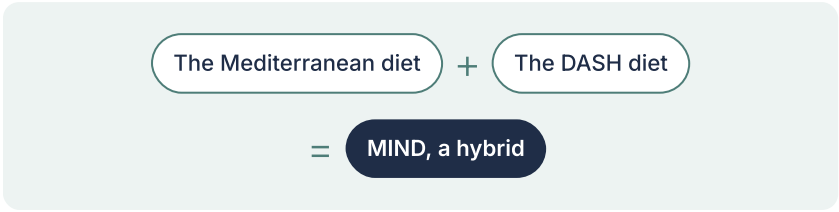




A taxi parked at a petrol station at night, with a sandwich and a bag of crisps on the passenger seat.

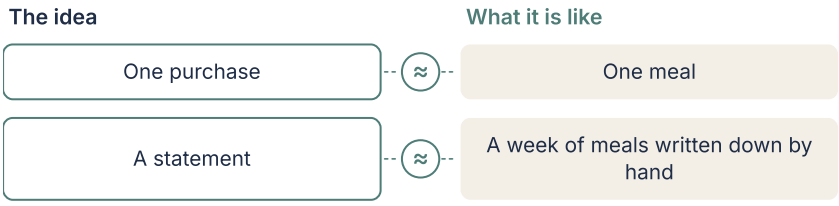
The leaflet starts with where the diet's name comes from. The MIND diet was built as "a hybrid of the Mediterranean diet and the DASH (Dietary Approaches to Stop Hypertension) diet" (Barnes et al., 2023). **MIND joins two older eating patterns into one**, and Desmond had heard of neither of them before Sunday.

Where the name comes from



A bank statement is a good picture of an eating pattern. **One purchase tells you little about how someone spends**, and one meal tells you little about how someone eats. The picture stops at the bank, because a statement adds itself up and a week of meals has to be written down by hand.

A bank statement is a good picture of an eating pattern



> **Key Concept:**
>
> Dietary pattern. **A dietary pattern is the overall mix of foods a person eats across weeks**, as opposed to any single food or meal. A shepherd who eats porridge, bread, cheese and stew on most days of the year has a dietary pattern built on grains and dairy.

Before he changes anything, Marcia asks him to write down a whole week of meals. **Twenty-one meals go on the back of a fuel receipt**, and fourteen of them came from the same petrol-station fridge.

Breakfast is a bacon roll every day, and dinner is a takeaway on four nights out of seven.

A whole week of meals



Twenty-one meals on the back of a fuel receipt



Fourteen from the same petrol-station fridge



A takeaway on four nights out of seven

The leaflet picks out two foods by name. The score behind MIND "specifies consumption of green leafy vegetables and berries but does not score other types of fruit" (Morris et al., 2015). **Leaves and berries get their own place in the score**, while the banana Desmond buys with his bacon roll counts for nothing there.

The leaflet picks out two foods by name

Food	In the MIND score
Green leafy vegetables	Scored
Berries	Scored
Other types of fruit, such as the banana	Not scored

The leaflet rests on two different studies of the same diet. **The first is older, and the second is a trial, a study that assigns people to different diets and compares the groups.** Marcia, a ward clerk, has seen hospital posters quote the first and skip the second, so she wants her brother to read both.

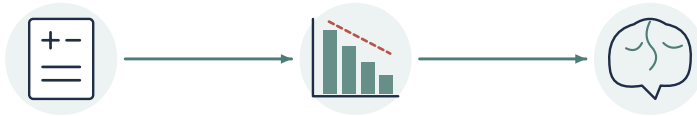
Two different studies of the same diet

Study	The first	The second
Study	Observational, older	A trial
Assigns people to diets	No	Yes, and compares the groups

> **Key Concept:**
>
> Observational study. **An observational study is research that records what people already do and tracks what happens to them**, without assigning anyone a diet or a treatment. A survey that follows how far a thousand commuters cycle each year, and later compares their health, is an observational study.

The older study grew out of earlier observational work that linked the Mediterranean and DASH diets with slower cognitive decline, and its authors noted that "neither diet is specific to the nutrition literature on dementia prevention" (Morris et al., 2015). **Their score was meant to capture "dietary components shown to be neuroprotective"**, which means foods linked with protecting the brain's nerve cells.

The older study grew out of earlier work



> **Science Says:**
> In an observational study, "The MIND score was positively associated with slower decline in global cognitive score" and "with each of five cognitive domains" (Morris et al., 2015). **Eating closer to the MIND list went with a slower decline on thinking tests.** The authors wrote that "Replication of these findings in a dietary intervention trial would be required to verify its relevance to brain health."

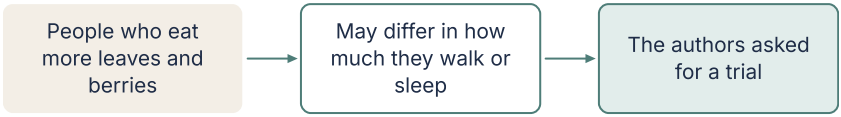
A cognitive domain is one area of thinking with its own set of tests. **The difference in decline rates between the top third of MIND scores and the bottom third** was "equivalent to being 7.5 years younger in age" (Morris et al., 2015). Desmond reads that line twice, because it sounds like a promise.

A cognitive domain

- One area of thinking with its own set of tests
- Top third against bottom third of MIND scores
- Desmond reads that line twice

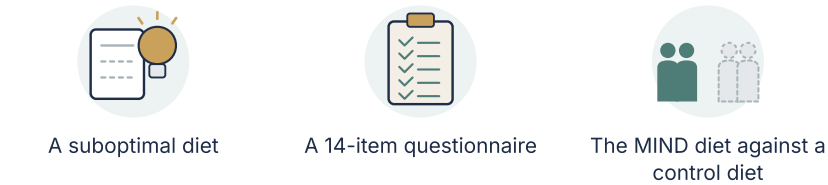
An association means two things turned up together, and it leaves the cause open. **People who eat more leaves and berries may differ from others in many other ways**, such as how much they walk or sleep. That is why the authors themselves asked for a trial before anyone treated the link as proof.

An association leaves the cause open



The trial came eight years later. **It took people with "a suboptimal diet, as determined by means of a 14-item questionnaire"** and compared the MIND diet with a control diet (Barnes et al., 2023). A suboptimal diet is one that falls short of what it could be, which describes Desmond's fuel receipt well.

The trial came eight years later



> **Science Says:**
>
> The trial found that "changes in cognition and brain MRI outcomes from baseline to year 3 did not differ significantly between those who followed the MIND diet and those who followed the control diet with mild caloric restriction" (Barnes et al., 2023). **After three years, the two diets showed no clear difference on thinking or brain scans.** The report added that "improvements in global cognition scores were observed in both groups."

The trial gave the gap in global cognition as "0.035 standardized units; 95% confidence interval, -0.022 to 0.092" (Barnes et al., 2023).

Standardized units put different tests on one scale, so the gap is a small fraction of a unit. **A confidence interval is an uncertainty range, and this one runs from 0.022 below zero to 0.092 above, so it includes zero.**

A confidence interval is an uncertainty range

- [x] The gap: 0.035 standardized units
- [x] From 0.022 below zero to 0.092 above
- [x] So it includes zero

A control diet is the comparison group's diet, here one with slightly fewer calories than usual. **The two studies point in different directions, so the evidence on MIND and thinking is mixed.** Neither study measured creativity, so no meal in this section comes with a promise about ideas.

The two studies point in different directions

Study	Found
Observational (Morris et al., 2015)	Slower decline on thinking tests
Trial (Barnes et al., 2023)	No clear difference after three years
Either, on creativity	Not measured

> **Key Concept:**
>
> MIND-style plate. **A MIND-style plate is a meal built around the plant foods and fish that the MIND diet puts first**, such as green leafy vegetables, nuts, berries, fish and olive oil. A bakery owner's lunch of grilled trout on spinach with a handful of walnuts is a MIND-style plate.

A MIND-style plate



Green leafy vegetables and berries



Nuts and olive oil



Fish

> Exercise:
>
> Try it. List this week's meals. **Mark each one that comes close to a MIND-style plate.**

Two of his twenty-one meals come close to the plate. **One is Sunday dinner at Marcia's**, fish with greens and a bowl of strawberries after, and the other is a Wednesday dinner at home. Every petrol-station meal is far from it, and so are the four takeaways.

Two of his twenty-one meals come close to the plate



Sunday dinner at Marcia's



A Wednesday dinner at home



Every petrol-station meal is far from it

He starts with the meal he eats in the cab every day. **Lunch is the one he controls**, because the rank sits two streets from a supermarket as well as the petrol station. A bag of salad leaves and a tin of sardines cost him less than the sandwich, crisps and chocolate.

Lunch is the one he controls

The petrol station	The supermarket
⊕ A sandwich, crisps and chocolate	⊖ A bag of salad leaves and a tin of sardines
⊕ Eleven ingredients	⊖ They cost him less

The first change is one day a week. **On Thursdays he adds a bag of leaves to lunch and a punnet of blueberries for the afternoon**, and he writes a tick on the receipt list. One tick a week is small enough that a long shift cannot squeeze it out.

The first change is one day a week

Day	1	2	3	4	5	6	7
On Thursdays, a bag of leaves	☐	☐	☐	☐	☐	☐	☐
A punnet of blueberries for the afternoon	☐	☐	☐	☐	☐	☐	☐
A tick on the receipt list	☐	☐	☐	☐	☐	☐	☐

At the rank a fellow driver, Errol, offers his own advice. **“A glass of red is good for the brain,” he says**, and he calls it the Mediterranean part.

At the rank, Errol offers his own advice



A glass of red is good for the brain



He calls it the Mediterranean part



Desmond adds the zero line



Two taxi drivers talking beside their cabs at a rank, one holding a paper cup.

A large analysis found that “The level of alcohol consumption that minimised harm across health outcomes was zero (95% UI 0.0-0.8) standard drinks per week” (GBD 2016 Alcohol Collaborators, 2018). **The best estimate was zero standard drinks per week.** The figures in brackets are the uncertainty range around that estimate, from 0.0 to 0.8 standard drinks per week.

A large analysis of alcohol

> - The level that minimised harm was zero
> - Uncertainty range from 0.0 to 0.8 standard drinks per week
> - GBD 2016 Alcohol Collaborators, 2018

Desmond adds the zero line under his ticks, and Errol shrugs. For a week Desmond reads the label on everything he buys at the petrol station. **The sandwich lists eleven ingredients and the sardine tin lists three.** He leaves the shelf of vitamin gummies alone, because Marcia told him pills are a question for a doctor.

For a week Desmond reads the labels

Label	Lists
The sandwich	Eleven ingredients
The sardine tin	Three
The vitamin gummies	A question for a doctor

Three weeks on, five of his twenty-one meals each week come close to the plate. **Lunch on Monday, Thursday and Friday joins the two dinners he already had.** The Monday lunch is sardines and leaves, eaten at the rank before the afternoon airport fares start. Nothing about his thinking has been measured.

Three weeks on



Work kitchens can use the same marks. **A care home cook lists a month of lunches** and finds green leaves on the menu twice. She adds a side of greens to two more lunches each week and pays for them by serving smaller portions of chips.

A care home cook lists a month of lunches



Green leaves on the menu twice

A side of greens to two more lunches

Smaller portions of chips

At home a family can mark one week of dinners together. **A couple with two teenagers puts a tick beside each dinner with fish or leaves**, and the teenagers choose which dinner changes next. The list stays on the fridge door, so the next week can be compared with it.

At home a family marks one week of dinners

- [x] A tick beside each dinner with fish or leaves
- [x] The teenagers choose which dinner changes next
- [x] The list stays on the fridge door

Three levels close this section, and each one adds one change. **The starter adds one day with leaves or berries.** The middle level takes on one claim that alcohol is good for health, and the advanced level reads labels for a week with no stacking of supplements.

One pattern, small changes, at three levels



The starter adds one day with leaves or berries

The middle takes on one alcohol claim

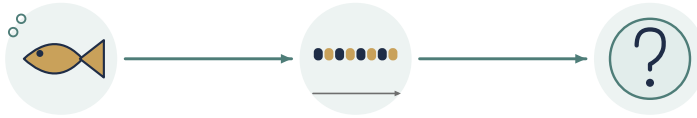
The advanced reads labels for a week

> Exercise:
>
> One pattern, small changes.
>
> 1. Starter. Add one day this week with **a serving of green leafy vegetables or berries**.
> 2. Middle. Write down one claim that alcohol is good for health, and cut it with the finding that the level of alcohol with the least harm was zero (GBD 2016 Alcohol Collaborators, 2018).
> 3. Advanced. Read the labels on what you buy for one week, and take no stack of supplements.

Key idea:

Look at **the pattern across weeks**, build some meals on the MIND-style plate and treat the evidence on diet and thinking as mixed.

Look at the pattern across weeks



Some meals on the MIND-style plate

The evidence on diet and thinking is mixed

No promise about ideas

Quick check:

What is a dietary pattern? Answer: The overall mix of foods a person eats across weeks. What is an observational study? Answer: Research that records what people already do, without assigning a diet. What did the MIND trial find against the control diet? Answer: No significant difference in thinking or brain scans after three years. What level of alcohol minimised harm? Answer: Zero.

6.3.2 Practical Meals, Hydration and When Supplements May Matter

Imagine Agnieszka, a dental nurse who works four long days a week, from eight in the morning until seven at night. **Her water bottle comes home full most evenings**, and dinner is whatever the freezer offers at half past seven. Halina, a colleague, keeps a jar of vitamin tablets on the staff room shelf and swears by them.

Four long days a week

- From eight in the morning until seven at night
- Her water bottle comes home full most evenings
- Dinner is whatever the freezer offers

This section turns food, water and pills into practical habits for a busy week. **I show you a dinner plan, what research says about water and when a supplement may matter**, with three levels of practice. Nothing here is medical advice, and any supplement, health condition or big change to your diet belongs with a qualified clinician.

Practical habits for a busy week





A dental practice staff room with a full water bottle on a locker and a jar of vitamin tablets on a shelf.

Research on water and thinking has been gathered in one review. Its authors wrote, “Herein, we integrate emerging evidence regarding the effects of both dehydration and additional acute water consumption on

cognition and mood" (Masento et al., 2014). **Dehydration means the body has less water than it needs**, and cognition is the work of thinking.

Research on water and thinking in one review



Dehydration: less water than the body needs



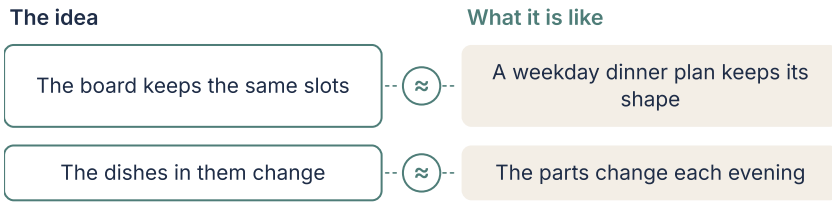
Additional acute water consumption



Effects on cognition and mood

A school canteen menu board is a good picture of a weekday dinner plan. **The board keeps the same slots every week, and the dishes in them change**, so the cooks never start from a blank board. The picture stops at the serving hatch, because a canteen cooks for hundreds and you cook for one household.

A school canteen menu board



> **Key Concept:**
>
> Template dinner. **A template dinner is a fixed meal shape with swappable parts that repeats through the week**, so each evening changes the parts and keeps the shape. A hospice kitchen that serves a grain, a vegetable and a protein every night, with different ones each night, is running a template dinner.

Agnieszka writes down a fortnight of dinners first. **Nine of the fourteen came from the freezer**, three were toast and two were a meal at her sister's. She cooks on Sundays only, because the long days leave her with half an hour between getting home and going to bed.

A fortnight of dinners

Dinners	Came from
Nine	The freezer
Three	Toast
Two	A meal at her sister's

In 6.3.1 you met the MIND diet and the mixed evidence on diet and thinking (Barnes et al., 2023; Morris et al., 2015). **Here the job is turning that pattern into dinners a tired person can make**, with no promise about thinking or creativity. Agnieszka wants a shape she can fill without deciding anything at seven in the evening.

Turning that pattern into dinners



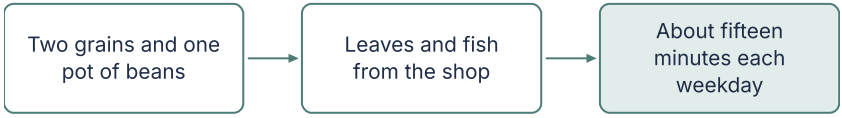
Her template has four parts. **A green leafy vegetable, a fish or beans, a whole grain and a spoon of olive oil** go on every plate, and only the choices inside each part change. Monday might be salmon, spinach and brown rice, and Tuesday chickpeas, kale and barley.

Her template has four parts

Part	Monday	Tuesday
A green leafy vegetable	Spinach	Kale
A fish or beans	Salmon	Chickpeas
A whole grain	Brown rice	Barley

Sunday becomes the day that fills the parts. **She cooks two grains and one pot of beans in a single afternoon**, and the leaves and fish come from the shop on the way home. Each weekday dinner then takes about fifteen minutes to put together, because the slow parts are already done.

Sunday becomes the day that fills the parts



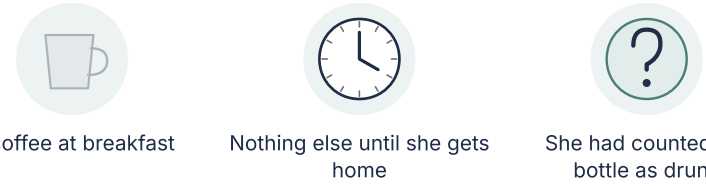
The first week on the template goes better than the fortnight before it. **Four of the seven dinners follow the four parts**, and the other three are a portion of fish pie from the freezer on Wednesday, a takeaway on Friday and a meal at her sister's on Saturday.

The first week on the template

Day	1	2	3	4	5	6	7
Four of the seven dinners follow the four parts	☐	☐	☐	☐	☐	☐	☐
Fish pie from the freezer on Wednesday	☐	☐	☐	☐	☐	☐	☐
A takeaway on Friday, her sister's on Saturday	☐	☐	☐	☐	☐	☐	☐

Water is the second change, and it starts small. **Agnieszka notes what she drinks on one working day**, and the list is short, a coffee at breakfast and nothing else until she gets home. She is surprised, because she had counted the bottle as drunk simply because she carried it.

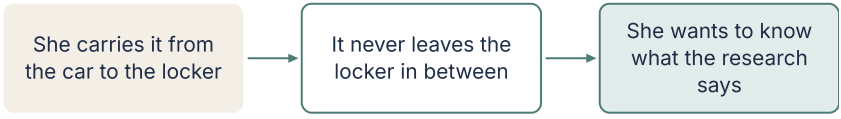
Water is the second change



> **Key Concept:**
> Hydration check. **A hydration check is a short note of thirst and mood made at a set point in the day**, with no other measurement. A tram driver who writes "thirsty, flat" in a notebook at the end of every run is keeping a hydration check.

The full bottle on her locker had been the clue for weeks. **She carries it from the car to the locker and back again**, and on most days it never leaves the locker in between. Before changing anything, she wants to know what the research says about water.

The full bottle had been the clue



> **Science Says:**
> A review found that "particular cognitive abilities and mood states are positively influenced by water consumption" (Masento et al., 2014). **Drinking water went with better scores on some thinking skills and some moods.** The authors added that "The impact of dehydration on cognition and mood is particularly relevant for those with poor fluid regulation, such as the elderly and children."

The same review named "methodological weaknesses, including inconsistent measurements in cognitive assessment and the lack of objective hydration state measurements" (Masento et al., 2014). **The studies measured thinking in different ways and seldom checked the water in people's bodies.** Agnieszka keeps her hydration check as a habit to watch, with one line at lunch and one at four o'clock.

What the review found, and its weaknesses

Found	Weaknesses
⊕ Water consumption positively influenced some abilities	⊖ Inconsistent measurements in cognitive assessment
⊕ Particularly relevant for the elderly and children	⊖ Lack of objective hydration state measurements

Her mother, Ewa, is seventy-eight and lives alone. **The review's line about older people makes Agnieszka think of her**, so on Sunday visits she puts a glass of water beside her mother's plate. Ewa drinks it with lunch and asks for a jug on the table the next week.

Her mother, Ewa, is seventy-eight



A glass of water beside her plate

Ewa drinks it with lunch

A jug on the table the next week

> Exercise:
>
> Try it. Drink a glass of water with your next meal. **Note only how thirsty you were and how your mood felt.**

After a week the lines show a pattern. **Four o'clock reads "thirsty" on every working day**, and lunch reads "fine" on three of the four. She moves her bottle from the locker to the shelf beside the sterilising room door, where she passes it about twenty times a shift.

After a week the lines show a pattern

Check	Reads
Four o'clock	Thirsty on every working day
Lunch	Fine on three of the four

The new place for the bottle works. **By the second week it comes home empty on three days out of four**, and her four o'clock line reads "fine" twice. The only day it comes home full is a Thursday with two emergency patients and no lunch break.

The new place for the bottle works

Before	After
On the locker	On the shelf by the sterilising room door
Comes home full most evenings	Empty on three days out of four

Her husband, Tomasz, has his own habit to look at. **He drinks a can of beer every evening "for his heart"**, a line from a friend. The zero line on alcohol from 6.3.1 answers that claim, so he agrees to leave the beer for one week.

Tomasz has his own habit to look at



A can of beer every evening



For his heart, a line from a friend



The zero line from 6.3.1

By Sunday the cans are still in the fridge. **Tomasz puts the money he would have spent in a jar on the windowsill**, and the two of them plan a day out with it. He keeps the week going into a second one without being asked.

By Sunday the cans are still in the fridge

1. The money goes in a jar
2. They plan a day out with it
3. He keeps the week going into a second one

In January Halina bought her jar on a two-for-one offer, a three-month supply. **She leaves the lid off on the staff room shelf so anyone can take one**, and two of the hygienists do most mornings. Nobody has asked what the tablets are for.

Halina's jar

- [x] Bought on a two-for-one offer
- [x] The lid off on the staff room shelf
- [x] Nobody has asked what the tablets are for

Supplements are the last part of the section. **Halina's jar promises energy and a sharp mind on the label**, and the label names no study. Agnieszka decides the jar can wait until she knows whether her body is short of anything.

Supplements are the last part of the section



Energy and a sharp mind on the label



The label names no study



The jar can wait

> **Key Concept:**
>
> Diagnosed deficiency. **A diagnosed deficiency is a low level of a nutrient found by a clinician's test**, the case in which a supplement may matter. A crane operator told after a blood test that one nutrient is low, and given a plan by the doctor, has a diagnosed deficiency.

Three nutrients get a name here, and only a name, vitamin D, vitamin B12 and iron. **For vitamin D, "one way to know if you're getting enough is a blood test that measures the amount of vitamin D in your blood"** (Office of Dietary Supplements, 2022). This fact sheet comes from the United States, as do the two below.

Three nutrients get a name, and only a name

Nutrient	Fact sheet
Vitamin D	A blood test measures the amount in your blood
Vitamin B12	Your doctor can test your level
Iron	Most people in the United States get enough

For B12, "Your doctor can test your vitamin B12 level to see if you have a deficiency" (Office of Dietary Supplements, 2023b). **Iron has its own line, "Most people in the United States get enough iron. However, certain groups of people are more likely than others to have trouble getting enough iron"** (Office of Dietary Supplements, 2023a).

The vitamin D fact sheet says it provides "information that should not take the place of medical advice" (Office of Dietary Supplements, 2022). **At her next check-up Agnieszka asks the practice nurse whether any test is worth having**, and the nurse says nothing in her notes calls for one. The question takes two minutes and settles the jar.

The question takes two minutes



Work rotas can use the same template. **A tram depot manager with six staff on split lunches** sets a shared shape for the staff fridge, a leafy salad, a tin of fish or beans and a grain pot, with names on the lids. The staff choose the fillings, and the shape keeps the shopping list short.

A tram depot manager with six staff

> - A leafy salad
> - A tin of fish or beans
> - A grain pot, with names on the lids



Three children at a kitchen table each pointing at a different bowl of food in the middle.

At home a template dinner suits a family with mixed tastes. **A father with three children sets the four parts and lets each child choose one part a night**, so Thursday's beans come from the youngest and Friday's fish from the oldest. Nobody argues about the whole dinner, only about one part.

A family with mixed tastes



The father sets the four parts

Each child chooses one part a night

Nobody argues about the whole dinner

Three levels close this section, and each one adds one step. **The starter builds one dinner on the MIND-style plate.** The middle level drops one alcohol-for-health habit for a week, and the advanced level asks a clinician before any supplement for a named deficiency.

Meals, water and pills, at three levels



The starter builds one MIND-style dinner

The middle drops one alcohol-for-health habit

The advanced asks a clinician first

Exercise:

Meals, water and pills.

1. Starter. Build **one Mediterranean or MIND-style dinner** this week.
2. Middle. Remove one alcohol-for-health habit for a week.

3. Advanced. Before taking any supplement, ask a clinician about **a named deficiency**.

Key idea:

Give dinner **a fixed shape with parts that change**, drink water with meals and leave supplements to a clinician's test.

Give dinner a fixed shape

- Parts that change
- Drink water with meals
- Leave supplements to a clinician's test

Quick check:

What is a template dinner? Answer: A fixed meal shape with swappable parts that repeats through the week. What does a hydration check record? Answer: Thirst and mood at a set point in the day. When may a supplement matter? Answer: When a clinician's test has found a diagnosed deficiency.

6.4 Stimulants and Enhancement Claims

6.4.1 Caffeine, Alcohol, Supplements and Other Substances

Imagine Ollie, a sign-writer who paints shop fronts and pub boards by hand. **He drinks four coffees before noon and a pint of beer with lunch**, because he believes the beer loosens his lettering ideas. On a Monday in March he paints a bakery fascia and starts to wonder what the cups and the pint really do.

What do the cups and the pint really do?



This section looks at caffeine, alcohol, supplements and products sold to sharpen thinking. **I show you the official caffeine guidance, one study on coffee and ideas and what alcohol research says**, with three levels of practice. Nothing here is medical advice, and pregnancy, health conditions or any concern about drinking or other substance use belong with a qualified clinician.

This section looks at caffeine, alcohol and supplements



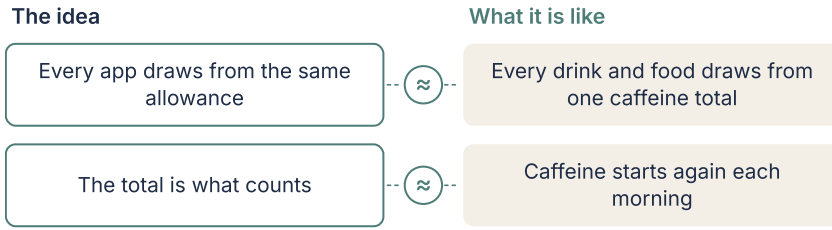
The caffeine guidance in this section comes from one scientific opinion. **"Following a request from the European Commission, the EFSA Panel on Dietetic Products, Nutrition and Allergies was asked to deliver a scientific opinion on the safety of caffeine"** (EFSA Panel on Dietetic Products, Nutrition and Allergies [NDA], 2015). The panel counted caffeine from every food and drink together.

One scientific opinion on caffeine

- A request from the European Commission
- The EFSA Panel on Dietetic Products, Nutrition and Allergies
- Caffeine from every food and drink counted together

A phone's monthly data allowance is a good picture of caffeine across a day. **Every app draws from the same allowance, noticed or unnoticed**, and the total is what counts. The picture stops at the bill, because data left over can roll on and caffeine starts again each morning.

A phone's monthly data allowance



Key Concept:

Caffeine budget. **A caffeine budget is a day's planned caffeine total, counted from all drinks and foods**, with every source added together. A lifeguard who adds up the tea at the pool, the cola at lunch and the chocolate bar at four is keeping a caffeine budget.

Ollie notes his cups for one working week. **Each weekday has four coffees before noon**, so the week's mornings come to twenty cups, and the pub board on Thursday adds a cola in the afternoon. He writes down when each cup comes, as well as how many.

Ollie notes his cups for one working week

When	Cups
Each weekday before noon	Four coffees
The week's mornings	Twenty cups
Thursday afternoon	A cola

The times surprise him more than the total. **Three of the four morning cups land in the first two hours**, while he is measuring and spacing the letters. The fourth comes at half past eleven, when he sits in the van and sketches ideas for the next job.

The times surprise him more than the total

> - Three of the four cups land in the first two hours
> - Measuring and spacing the letters
> - The fourth at half past eleven, in the van

His first cup is the biggest of the day. **It is a large mug from the café by the builders' yard**, drunk in ten minutes while the van warms up. He starts to see each cup as its own amount, separate from the day's total.

His first cup is the biggest of the day



A large mug from the café by the builders' yard



Drunk in ten minutes



Each cup as its own amount

> **Key Concept:**
>
> Single dose. **A single dose is the caffeine taken at one time**, such as one cup or one can. A locksmith who drinks one mug of strong coffee before a night call has taken a single dose.

A single dose is the caffeine taken at one time



One cup



One can



One mug of strong coffee before a night call

> **Science Says:**
>
> The EFSA panel found that "Single doses of caffeine up to 200 mg (about 3 mg/kg bw for a 70-kg adult) do not give rise to safety concerns" and "Habitual caffeine consumption up to 400 mg per day does not give rise to safety concerns for non-pregnant adults" (NDA, 2015). **These are safety limits for adults who are not pregnant.**

The same opinion set a lower line in pregnancy. **"Habitual caffeine consumption up to 200 mg per day by pregnant women does not give rise to safety concerns for the fetus"** (NDA, 2015). It also said "For children and adolescents, the information available is insufficient to derive a safe caffeine intake."

EFSA safety limits (NDA, 2015)



Those figures describe safety, and they say nothing about creativity. **A habitual amount is what someone takes on a normal day, week after week.** By that measure Ollie's four morning coffees are habitual, because they come every working day.

Those figures describe safety

- [x] They say nothing about creativity
- [x] A habitual amount: a normal day, week after week
- [x] Ollie's four morning coffees are habitual

> Exercise:
>
> Try it. Estimate today's caffeine in milligrams. **Compare your largest single dose with EFSA's 200 mg.**

The bigger question for Ollie is whether coffee helps his ideas. **One study gave people either caffeine or a dummy pill and then set them thinking tasks.** The dummy pill, a placebo, looked the same and held no caffeine, so the two groups could be compared fairly.

One study, two groups

Group	Dose	n
Caffeine	200 mg, about one 12 oz cup of coffee	44
Placebo	A dummy pill with no caffeine	44

> **Science Says:**
>
> The study found that "participants who consumed 200 mg of caffeine (approximately one 12 oz cup of coffee, n = 44), compared to those in the placebo condition (n = 44), showed significantly enhanced problem-solving abilities. Caffeine had no significant effects on creative generation or on working memory" (Zabelina & Silvia, 2020). **One cup helped solving and left idea generation unchanged.**

The authors checked whether belief explained the result. **"The effects remained after controlling for participants' caffeine expectancies, whether they believed they consumed caffeine or a placebo, and changes in mood"** (Zabelina & Silvia, 2020). This is one study of 88 people, so I hold it loosely.

What the coffee study found, and its limits

Found	Limits
⊕ Enhanced problem-solving abilities	⊖ No significant effects on creative generation
⊕ Effects remained after controlling for expectancies	⊖ One study of 88 people

The result still fits a sign-writer's day in a useful way. **Measuring, spacing and fitting letters to a board are problems with right answers**, and sketching new ideas for a shop front is generation. The two kinds of work already sit at different times of his morning.

The two kinds of work in his morning

Work	Kind
Measuring, spacing and fitting letters	Problems with right answers
Sketching new ideas for a shop front	Generation

He keeps two coffees for measuring and drops the other two, the half past eleven cup among them. **He sketches the next job's ideas in the van with a glass of water**, and the sketches come out much as they did before. From the next Monday his mornings hold two coffees, one at eight and one at ten.

He keeps two coffees for measuring

Before	From the next Monday
Four coffees, the fourth at half past eleven	One at eight and one at ten
Sketches with a coffee in the van	Sketches with a glass of water

The big café mug goes too. **He asks for a small cup on the way to the yard**, and the woman behind the counter starts pouring it when she sees the van pull in. His notebook for that week shows ten morning cups against the twenty of the week before.

The big café mug goes too

- A small cup on the way to the yard
- She starts pouring it when she sees the van
- Ten morning cups against the twenty of the week before



A café counter with a row of small takeaway cups and a van parked outside the window.

The lunchtime pint is the harder habit. **In 6.3.1 the level of alcohol with the least harm came out as zero.** A comment in The Lancet put it in its title, “No level of alcohol consumption improves health” (Burton & Sheron, 2018).

The lunchtime pint is the harder habit



The least harm came out as zero



No level of alcohol consumption improves health



Burton & Sheron, 2018

The study he half-remembers on beer and ideas is real. **After a small amount of beer, "Alcohol impaired executive control, but improved performance in the Remote Associates Test, and did not affect divergent thinking ability"** (Benedek, Panzierer, et al., 2017). The drinkers reached a blood alcohol level of 0.03, in a set of lab tasks.

After a small amount of beer

- Alcohol impaired executive control
- Improved performance in the Remote Associates Test
- Did not affect divergent thinking ability

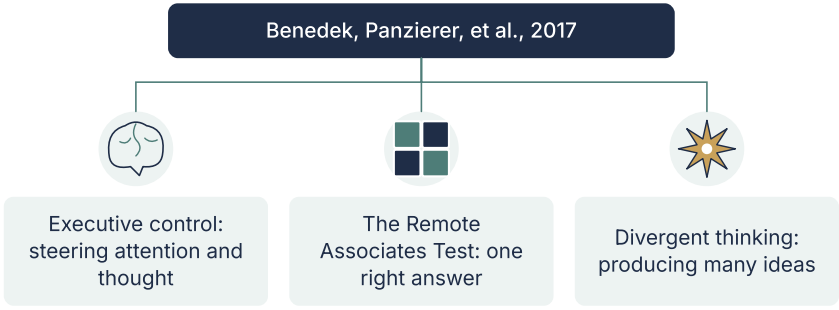


A pub board half painted on an easel in a workshop, with a jug of water and two glasses on the bench.

Executive control is the steering of attention and thought. **The Remote Associates Test is a word-linking puzzle with one right answer**, and divergent thinking is the work of producing many ideas. The authors read their result as evidence "that higher cognitive control

is not always associated with better cognitive performance" (Benedek, Panzierer, et al., 2017).

Three ideas from the beer study



That is a point about how the mind works, and it never makes alcohol a creativity aid. **The health evidence outweighs a set of lab puzzles**, and the beer left the many-ideas work unchanged. Ollie swaps the lunchtime pint for a lemonade with his sandwich.

The health evidence outweighs a set of lab puzzles

- [x] Alcohol is no creativity aid
- [x] The beer left the many-ideas work unchanged
- [x] A lemonade with his sandwich

Two weeks later the lemonade is still there. **His lettering ideas for the pub board come in the van at half past eleven**, as they did when he had the pint. The pint had been taking credit for ideas that came anyway, and the pub owner pays for the finished sign that Friday.

Two weeks later the lemonade is still there



Ideas still come at half past eleven

The pint had been taking credit

The pub owner pays that Friday

Drinks sold to sharpen thinking sit in a fridge by the till at the wholesaler where he buys his paint. **The cans of energy drink have "sharpens focus" printed on them.** Pills are a separate matter, and as 6.3.2 set out, a supplement may matter for a diagnosed deficiency under a clinician's care.

Drinks sold to sharpen thinking

- [x] A fridge by the till at the wholesaler
- [x] Sharpens focus printed on the cans
- [x] Pills: a diagnosed deficiency, 6.3.2

> **Key Concept:**
>
> Enhancement claim. **An enhancement claim is a promise that a product or substance makes thinking better**, which needs a named study behind it. A bag of dog food that says it "keeps older dogs sharp" and names no research is making an enhancement claim.

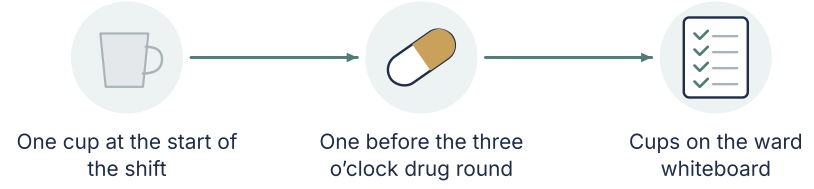
At the till he copies the words off one can into his notebook. **The can says "sharpens focus" and names no study anywhere on it**, and its small print lists caffeine among the contents. He puts the can back in the fridge and buys a bottle of water.

At the till



A night shift on a hospital ward can use a caffeine budget as a team. **A charge nurse plans one cup at the start of the shift and one before the three o'clock drug round**, so the cups land on the work with right answers. The staff write their cups on the ward whiteboard beside the tea rota.

A night shift on a hospital ward



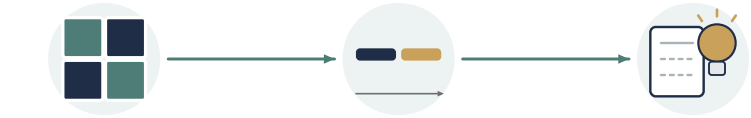
At home the same reading habit works on a weekly shop. **A grandfather buying a bedtime drink for his grandchildren checks the label for caffeine before anything goes in the basket.** He picks a hot milk powder with none listed and leaves the cola on the shelf for the adults.

A grandfather buying a bedtime drink

- He checks the label for caffeine
- A hot milk powder with none listed
- The cola stays on the shelf for the adults

Three levels make up the exercise, and each one adds one step. **The starter matches caffeine to problem-solving work.** The middle level writes down why alcohol is no creativity tool, and the advanced level checks one product's claim against the study it names, if it names one.

Three checks, at three levels



The starter matches caffeine to problem-solving

The middle: why alcohol is no creativity tool

The advanced checks one product's claim

> **Exercise:**
>
> Three checks.
>
> 1. Starter. If you use caffeine for work, **save it for problem-solving blocks**, since the study found no gain for idea generation.
> 2. Middle. Write why alcohol is no creativity tool, using **the zero line and the beer study's limits**.
> 3. Advanced. For one product or drink sold as sharpening focus or creativity, copy its exact claim, note whether a published study is named, and if one is, write **what that study measured**.

Count caffeine as one daily budget



Use it for problems with right answers

Alcohol is no help to ideas

Nor are enhancement claims

Key idea:

Count caffeine as **one daily budget**, use it for problems with right answers and treat alcohol and enhancement claims as no help to ideas.

Quick check:

What is a caffeine budget? Answer: A day's planned caffeine total, counted from all drinks and foods. What did one cup of caffeine change in the study? Answer: Problem solving improved and idea generation stayed the same. What should an enhancement claim have behind it? Answer: A named study.



Module

7

Keeping Creativity Active Over Time

7.1 Managing Strain

7.1.1 Stress, Fatigue and Creative Frustration

Imagine Bronwen, a stained-glass maker finishing a window for a village chapel. **Most mornings bring an email from the chapel warden changing a colour she has already cut**, and on Friday a panel from the diocese will judge her full-size drawing. By Wednesday she sits at the bench with her hands flat on the glass.

A window for a village chapel

> - Most mornings bring an email changing a colour
> - A panel from the diocese on Friday
> - By Wednesday her hands lie flat on the glass

This section looks at stress, tiredness and the frustration of a stuck day. **I show you what research says about different kinds of pressure, and what one lost night of sleep did in one study**, with three levels of practice. I follow Bronwen through her week up to the panel on Friday.

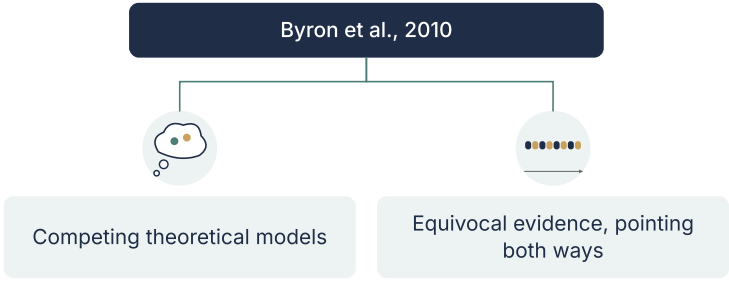
This section is about creative work under pressure, and it is not medical or psychological advice. **Burnout, a sleep disorder or anxiety that will not lift is a matter for a clinician.** Strain is never the price of good work, and nothing here asks you to suffer for it.

This section is not medical advice

- [x] Burnout is a matter for a clinician
- [x] So is a sleep disorder or anxiety that will not lift
- [x] Strain is never the price of good work

The research this section draws on began with an open question. **A team gathered the experiments on pressure because "Competing theoretical models and equivocal evidence leave unanswered questions regarding stressors' effect on creativity"** (Byron et al., 2010). A stressor is anything that puts you under pressure, and equivocal means pointing both ways.

The review began with an open question



> **Key Concept:**
>
> Stressor type. **A stressor type is the kind of pressure behind a hard day**, named before you try to change it. A lighting designer who writes "the director keeps changing the cues" on one card and "press night is Thursday" on another has sorted two stressor types.

A hill walker meets two kinds of hard going. **A steep slope is hard because of how much it asks, and fog is hard because she cannot see the path**, so each needs its own answer.

Two kinds of hard going

A steep slope	Fog
⊕ Hard because of how much it asks	⊖ Hard because she cannot see the path
⊕ Needs its own answer	⊖ Needs its own answer

Her week has both kinds. **From Monday to Wednesday three emails change three colours**, the sky, the dove and the border, and each change undoes work she had planned in a set order. Friday's panel is the other weight, five people known for sending designs back.

Her week has both kinds



Three emails change three colours



The sky, the dove and the border



Five people known for sending designs back



A half-built chapel window on a light box, with the blue sky section lifted out and set aside.

The team pooled the results of 76 experiments in which researchers set the pressure on purpose (Byron et al., 2010). **They concluded that "the effect of stressors on creative performance depends on how stress-inducing the stressor is and what type of stress is induced."** Both the amount and the kind of pressure counted.

Each of those experiments set people under a chosen pressure beside a control condition. **The 76 studies held "82 independent samples" between them** (Byron et al., 2010), so some studies tested more than one group. The review "aims to clarify this association", the link between stressors and creative work.

The review pooled the results (Byron et al., 2010)



> ✎ Exercise:
>
> Try it. Name today's stressor as judging or no control. **Rate today's block 0, 1 or 2.**

Bronwen writes two cards and pins them above the bench. **The emails go on the "no control" card and the panel on the "judging" card.** She rates Wednesday's block a 2, the worst of the week, because both pressures landed on the same afternoon.

Two cards above the bench



The emails go on the no control card



The panel goes on the judging card



Wednesday rated a 2, the worst of the week

Her scale is simple. **A 0 means the block barely touched the work, a 1 means it slowed her and a 2 means it stopped her.** Monday was a 1 and Tuesday a 1, so Wednesday stands out on the card.

Her scale is simple

Rating	Meaning
0	The block barely touched the work
1	It slowed her
2	It stopped her

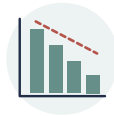
> **Science Says:**
> The review found "a curvilinear relationship between evaluative stress and creativity such that low evaluative contexts increased creative performance over control conditions, whereas highly evaluative contexts decreased creative performance" (Byron et al., 2010). **Light judging went with better creative work, and heavy judging went with worse.** A context is the setting a person works in, so a low evaluative context is a setting where judging is light.

Curvilinear means the line bends, so a little judging and a lot of judging do different things. **Light judging went with better work than the control conditions**, and heavy judging fell below them.

Curvilinear means the line bends



Light judging: better work than the control conditions



Heavy judging: work fell below them



A little and a lot do different things

> **Key Concept:**
>
> Evaluative stress. **Evaluative stress is pressure that comes from knowing your work will be judged.** A trainee hairdresser who knows the salon owner will watch her first cut on a paying client feels evaluative stress.

The panel is heavy judging, and Bronwen cannot move it. **She can change the hour she spends on the drawing itself.** She closes the workshop door for thirty minutes, mutes her phone and lets nobody see the drawing until the half hour ends.

She can change the hour she spends on the drawing

Out of her hands	Hers to change
⊕ The panel is heavy judging	⊖ The workshop door closed for thirty minutes
⊕ Bronwen cannot move it	⊖ Her phone muted, nobody to see the drawing

Inside the closed half hour she works on the dove. **She draws its head three times and keeps the third**, the first version she has liked all week. When the door opens again, the drawing goes back in its folder until Friday.

Inside the closed half hour



She draws the head of the dove three times

She keeps the third

The drawing goes back in its folder

> **Science Says:**
>
> The same review found "a linearly negative relationship between uncontrollability and creativity such that more uncontrollability decreased creative performance" (Byron et al., 2010). **The less say people had, the worse their creative work went.** The authors wrote that "stressors' effect on creativity is more complex than previously assumed and points to the need for understanding boundary conditions that shed light on inconsistent findings."

Linear means the line runs one way, so each step of lost control goes with a little more harm. **Boundary conditions are the limits within which a finding holds**, and the authors wanted them mapped. Bronwen cannot stop the warden's emails, but she can take back one choice inside the day.

She turns the no-control card over and lists what is still hers. **The order of the cuts, the hour she reads email and the time she stops for the day** go on the back. Each one is small, and each one is a choice the warden never touches.

The back of the no-control card

- [x] The order of the cuts
- [x] The hour she reads email
- [x] The time she stops for the day

> **Key Concept:**
>
> Uncontrollability. **Uncontrollability is the part of a task you have no say over**, such as its order, its timing or its changes. A market trader whose pitch is moved by the council each week, without warning, works with uncontrollability.

Tiredness is the third pressure of the week. **On Wednesday night she thinks about working straight through to Friday morning.** One study kept people awake, and "Twelve subjects went 32 h without sleep, and 12 others acted as normally sleeping controls" (Horne, 1988). Thirty-two hours is a full night awake and most of the days on either side.

One study kept people awake (Horne, 1988)

Group	Size
Went 32 h without sleep	Twelve subjects
Normally sleeping controls	12 others

"As compared with the control condition, sleep loss impaired performance on all test scales" (Horne, 1988), including how well people switched approach and how unusual their ideas were. The drop showed "even on an initial 5-min test component", within the first five

minutes. The author's own conclusion was hedged, "Apparently, 1 night of sleep loss can affect divergent thinking."

Sleep loss impaired performance on all test scales



How well people switched approach



How unusual their ideas were



Even on an initial 5-min test

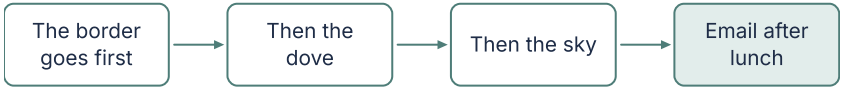
That is one study of 24 people and one lost night. **It says nothing about everyday tiredness, burnout or long-term fatigue**, which belong with a clinician. Bronwen goes to bed at eleven and leaves the last of the cutting for Thursday morning.

One study of 24 people and one lost night

- It says nothing about everyday tiredness
- Burnout and long-term fatigue belong with a clinician
- Bronwen goes to bed at eleven

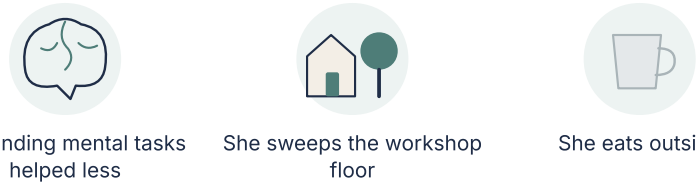
On Thursday she chooses the order of the cuts herself. **The border goes first, then the dove, then the sky**, and she answers any email after lunch. For twenty minutes the only plan on the bench is her own, and the dove comes out in one try.

She chooses the order of the cuts herself



At lunch she leaves the accounts alone. **In a large review, breaks packed with demanding mental tasks helped less with a stuck problem** (Sio & Ormerod, 2009), so she sweeps the workshop floor and eats outside. The sky panel is still waiting when she comes back in.

A lunch break that leaves the accounts alone



On Thursday afternoon a fourth email changes the border again. **Bronwen puts it on the no-control card and keeps the same window as her problem.** She switches the stressor she can reach by showing the drawing to her studio partner, Rhodri, who only says which part catches his eye.



Five people around a table looking at a full-size window drawing, with one pointing at the border.

That small showing is light judging. **Rhodri points at the dove, and Bronwen redraws its wing in ten minutes.** On Friday the panel approves the design with two small changes, both to the border the warden had already changed twice. The diocese gives her a date in May to fit the window.

That small showing is light judging



Rhodri points at the dove



She redraws its wing in ten minutes



The panel approves with two small changes

A school drama teacher can sort her week the same way. **She pins “the head keeps moving rehearsals” on one side of her planner and “the inspector watches on Tuesday” on the other.** She sets her own lesson order and runs a light run-through for one colleague first. Her rating for the week drops from a 2 to a 1.

A school drama teacher sorts her week

On her planner	Stressor type
The head keeps moving rehearsals	No control
The inspector watches on Tuesday	Judging

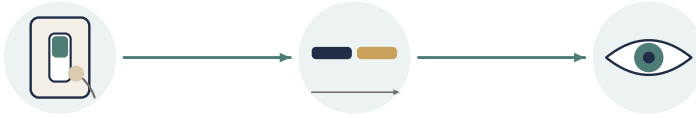
At home a father planning his daughter’s birthday games can do the same in miniature. **His mother keeps changing who is invited, so he fixes the order of the games himself.** He tries the treasure clues on his daughter’s older cousin, a light showing, before the party. The cousin solves every clue but the last, so he rewrites that one.

A father planning birthday games

- His mother keeps changing who is invited
- He fixes the order of the games himself
- A light showing with an older cousin first

Three levels close this section, and each adds one step. **The starter adds one control lever for twenty minutes.** The middle level reduces one heavy judging cue for thirty minutes, and the advanced level switches only the stressor you named while keeping the same problem.

Pressure by type, at three levels



The starter adds one control lever

The middle reduces one heavy judging cue

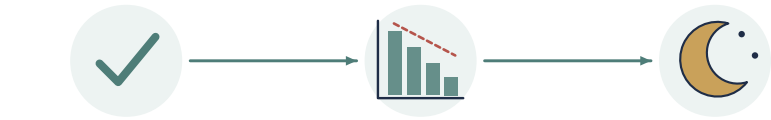
The advanced switches only the stressor you named

Exercise:

Pressure by type.

1. Starter. For 20 minutes, **add one control lever** by choosing the order of your subtasks yourself.
2. Middle. For 30 minutes, reduce one heavy judging cue by closing the door, muting notifications or pausing live critique.
3. Advanced. After a frustrating block, **switch only the stressor type you named** and keep the same problem.

Name the kind of pressure first



Key idea:

Name the kind of pressure first, because light judging can help, heavy judging and lost control go with worse work and one lost night of sleep can dull your ideas.

Quick check:

What is a stressor type? Answer: The kind of pressure behind a hard day. What did light judging do in the review? Answer: It went with better creative work. What did more uncontrollability do? Answer: It went with worse creative work. What did one lost night do in one study? Answer: It impaired performance on the divergent thinking tests.

7.1.2 Mood, Mental Health and the Myth of the Suffering Genius

Imagine Hamish, a folk fiddler, tuning up in his front room on a grey Tuesday evening. **He is sure his finest reels came in "the dark winter"**, the year the boatyard closed and he barely left the house. Part of him half hopes for another one. He plays the first reel from that year and puts the bow down.

A grey Tuesday evening

> - His finest reels came in the dark winter
> - The year the boatyard closed
> - He puts the bow down

Many makers carry a story like Hamish's, where pain is the price of good work. **This section looks at what mood research and the studies of so-called mad genius say**, and at how to plan sessions around moods that help. I follow Hamish through a fortnight of playing and the plan he makes after it.



A man holding a fiddle in a dim front room, with the bow resting on his knee.

This section is about creative practice and mood, and it is not medical or psychological advice. **If your mood stays low, or worry or thoughts of harming yourself are growing, that is a matter for a clinician.** In an emergency, call the emergency services or a crisis line. Creative practice is no treatment for any of these.

Mood, and when to seek help

- [x] A low mood that stays is a matter for a clinician
- [x] In an emergency, call the emergency services or a crisis line
- [x] Creative practice is no treatment

The suffering-genius story has been studied as a belief in its own right. **One critic opens a review of the evidence by naming the belief**, "Many people believe that the 'mad genius' notion, which has been a favorite cultural fixture for centuries, is based on established scientific fact" (Schlesinger, 2009).

The belief has been studied in its own right

> - The mad genius notion
> - A favorite cultural fixture for centuries
> - Is it based on established scientific fact?

> **Key Concept:**
> Suffering-genius myth. **The suffering-genius myth is the belief that distress or illness is what makes great art**, so that pain looks like a tool worth keeping. A young poet who skips her doctor's appointment because she fears treatment will dull her writing is acting on the suffering-genius myth.

Pressure from deadlines and judges has its own home (see 7.1.1). **Mood is a different matter**, the feeling you carry into the room before any judge appears. Hamish's sister, Morag, books him into her ceilidh band's practice on a bright Saturday morning, and he goes along mostly to please her.

The practice runs for two hours in the church hall. **Hamish leaves with two new tunes half made**, one built on a phrase the accordion player kept repeating. He writes “buzzing” on the back of the set list, the only word he can find for how the morning felt.

Two hours in the church hall



Two new tunes half made



One built on a phrase the accordion player kept repeating



Buzzing, on the back of the set list

The set list gives him an idea. **For the next fortnight he writes one mood word after every session**, with the date and the tune he worked on. Ten sessions go into the log, and he adds no notes about his health, only the feeling of the hour. The log lives in his fiddle case.

A fortnight of mood words

Day	1	2	3	4	5	6	7
One mood word after every session	☐	☐	☐	☐	☐	☐	☐
The date and the tune he worked on	☐	☐	☐	☐	☐	☐	☐
No notes about his health	☐	☐	☐	☐	☐	☐	☐

A mood word is a feeling word, such as buzzing, calm or flat. Buzzing is lively, calm is steady and flat is low. **It says nothing about health**, and a log like this is no diagnosis. Hamish keeps it to one word so the log stays quick and the playing comes first.

A mood word is a feeling word

Word	Means
Buzzing	Lively
Calm	Steady
Flat	Low

> Exercise:
>
> Try it. **List one mood word for your last creative hour.** Mark it activating and positive, or fear and anxiety, with no diagnosis.

At the end of the fortnight the ten words fall into groups. **Four are bright and lively words**, such as buzzing and cheerful. Three are calm, two are flat and tired, and one, nervous, came the night before a pub gig. The two new tunes from the band practice are still the strongest things he has made all month.

The ten words fall into groups



Four bright and lively words



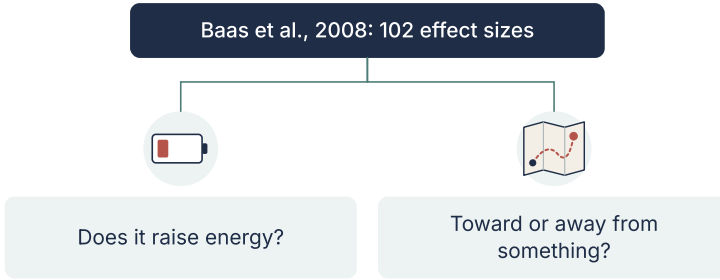
Three calm, two flat and tired



One nervous, before a pub gig

A large review gathered the research on mood. **“This meta-analysis synthesized 102 effect sizes reflecting the relation between specific moods and creativity”** (Baas et al., 2008). Its studies compared people in a given mood with mood-neutral controls. It sorted each mood by whether it raises energy and whether it pulls a person toward or away from something.

The mood review sorted each mood



> **Science Says:**
>
> The review found that "positive moods produce more creativity than mood-neutral controls (r= .15)", a small average effect. **Bad moods as a group did no better**, with "no significant differences between negative moods and mood-neutral controls (r= -.03) or between positive and negative moods (r= .04)" (Baas et al., 2008). The r figures measure how closely two things move together, and all three are small.

The review looked at kinds of mood as well. **"Creativity is enhanced most by positive mood states that are activating and associated with an approach motivation and promotion focus (e.g., happiness)"** (Baas et al., 2008). An approach motivation means moving toward something you want, and a promotion focus means aiming at gains. Hamish's buzzing morning fits that description.

Creativity is enhanced most by activating good moods



Approach motivation: moving toward something you want



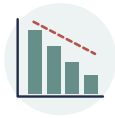
Promotion focus: aiming at gains



His buzzing morning fits

Fear and worry sit at the other end. **Moods like "fear, anxiety" were "associated with lower creativity, especially when assessed as cognitive flexibility"** (Baas et al., 2008). These moods come with an avoidance motivation, a pull away from harm, and a prevention focus, a watch for danger. His nervous night before the gig gave one bar he threw away.

Fear and worry sit at the other end



Lower creativity, especially cognitive flexibility



Avoidance motivation, a pull away from harm



A prevention focus, a watch for danger

Sadness gave no lift either. **"Negative, deactivating moods with an approach motivation and a promotion focus (e.g., sadness) were not associated with creativity"** (Baas et al., 2008). A deactivating mood lowers your energy, and Hamish's two flat, tired sessions fit it. Neither gave him a phrase he kept.

Sadness gave no lift either

- A deactivating mood lowers your energy
- Not associated with creativity
- His two flat, tired sessions fit it

Key Concept:

Activating mood. **An activating mood is a feeling that raises your energy and readiness to act**, whether it is pleasant, like happiness, or unpleasant, like fear. A footballer who runs onto the pitch grinning and bouncing on her toes is in an activating mood. Sadness and calm sit on the low-energy side.

The findings held widely. **"With a few exceptions, these results generalized across experimental and correlational designs, populations (students vs. general adult population), and facet of creativity (e.g., fluency, flexibility, originality, eureka/insight)"** (Baas et al., 2008). Experimental designs set the mood on purpose, and correlational ones measure the mood people already have.

The findings held widely

Across	Such as
Designs	Experimental and correlational
Populations	Students vs. general adult population
Facet of creativity	Fluency, flexibility, originality, insight

The mad-genius question has its own studies. **One research team came back to it with "a new dataset"** and compared people in creative jobs with others (Kyaga et al., 2013). Creativity there is measured by job title alone, and the illnesses are the ones the team chose to study.

A new dataset on the mad-genius question

- People in creative jobs compared with others
- Creativity measured by job title alone
- The illnesses the team chose to study

Key Concept:

Total-population study. **A total-population study is research that uses the records of everyone in a population**, with no sample picked out. A city that checks every household's water bills for a year to see who uses most is running a total-population study.

Critics of the mad-genius idea worry about what it does. **One critic says many claims in this field "have had unfortunate implications for the perception of creativity and the credibility of psychological research in general"** (Schlesinger, 2009). A story that ties art to illness can shape how people see both.

What the story does



Unfortunate implications for the perception of creativity



And for the credibility of psychological research



It ties art to illness

> **Science Says:**
>
> The large study drew on "a considerably larger sample of patients (n = 1,173,763)" and found that "Except for bipolar disorder, individuals with overall creative professions were not more likely to suffer from investigated psychiatric disorders than controls" (Kyaga et al., 2013). **The evidence on mad genius is mixed.** A critic of the field urges readers "to evaluate this evidence for themselves" (Schlesinger, 2009).

The one exception, bipolar disorder, is a link found in records. **A link in records says nothing about cause**, and illness is no route to better playing. Hamish reads the line about bipolar disorder twice and decides the dark winter tells him about the boatyard, and little about his reels.

The large study (Kyaga et al., 2013)

Finding	What it means
Except for bipolar disorder, creative professions were not more likely to suffer	The evidence on mad genius is mixed
A link with bipolar disorder found in records	It says nothing about cause

Hamish plans one session a week around a good mood. **Saturday mornings now begin with a tune he loves to play**, before any work

on new material, and he plays with Morag's band when he can. Distress is never fuel in the plan, and a low week means no new tunes are expected.

One session a week around a good mood

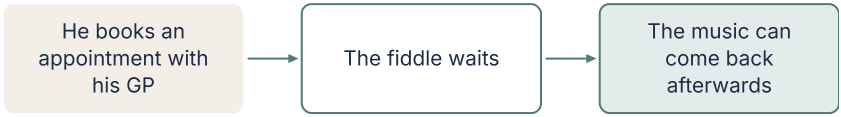
Before	After
His finest reels came in the dark winter	Saturday mornings begin with a tune he loves
Distress as fuel	A low week means no new tunes are expected



A fiddler and an accordion player laughing between tunes in a bright room.

Low weeks get a different plan. **When Hamish's mood stays flat for more than a week, he books an appointment with his GP**, and the fiddle waits. His GP can judge what a low week means, which a mood log never can. The appointment is about his health, and the music can come back afterwards.

When his mood stays flat for more than a week



A café owner can use the same thinking. **She keeps her menu-planning hour for mornings when the regulars are chatting and she feels lively**, and she leaves it alone on days when she is anxious about money. Those days go to the stock count. Her mood word goes on the order pad beside the date.

A café owner uses the same thinking

Her mood	The hour goes to
Lively, with the regulars chatting	Menu planning
Anxious about money	The stock count

At home a teenager writing songs can rewrite the story she has heard. **"Real songwriters have to be miserable" becomes "the evidence on that is mixed"**, written on the inside cover of her lyric book. She writes her next song on a sunny afternoon with her closest friend listening.

A teenager writing songs

- Real songwriters have to be miserable
- Becomes: the evidence on that is mixed
- Her next song on a sunny afternoon

The closing exercise moves from words to plans. **The starter rewrites a claim you have heard**, the middle level plans one session around a

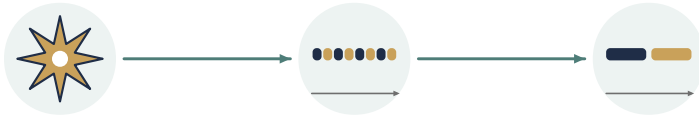
good mood and the advanced level shares the care path with someone you trust. Each level takes a few minutes, and none asks you to judge your own health.

Mood and the myth, at three levels



> Exercise:
>
> Mood and the myth.
>
> 1. Starter. **Rewrite one suffering-genius claim you have heard as "evidence mixed".**
> 2. Middle. Plan one session that aims for an engaged good mood, with no distress used as fuel.
> 3. Advanced. Share the care path. When distress rises, pause creative goals and seek help.

Distress is a reason to seek help



Lively good moods go with more creativity

The mad-genius evidence is mixed

Never a tool for better work

Key idea:

Lively good moods go with more creativity, sadness shows no link and fear goes with less, the mad-genius evidence is mixed and distress is a reason to seek help, never a tool for better work.

Quick check:

Which moods helped creativity most in the mood review? Answer: Positive, activating moods such as happiness. Did sadness help? Answer: No, it was not associated with creativity. What did the large study find for creative jobs? Answer: Except for bipolar disorder, no higher rate of the disorders studied. Where does distress belong? Answer: With a clinician, emergency services or a crisis line.

7.2 Curiosity, Motivation and Confidence

7.2.1 Keeping Questions Alive and Following Your Interests

Imagine Ingrid, a bicycle mechanic who restores old frames in the back of a busy repair shop. **A 1950s frame has come in with lugs cut by hand into the shape of leaves**, and she cannot stop looking at them. Lugs are the metal sleeves that join the tubes of a frame, and most she has seen are plain.

A 1950s frame in a busy repair shop

> - Lugs cut by hand into the shape of leaves
> - Lugs are the metal sleeves that join the tubes
> - Most she has seen are plain

This section is about keeping a question like hers alive and letting your interests steer your work. **I show you what a brain study found about curiosity and memory**, and what one theory says about the needs behind wanting to do things. Ingrid's week runs alongside, with three levels of practice at the end.



A bicycle mechanic in a repair shop holding an old steel frame up to the light.

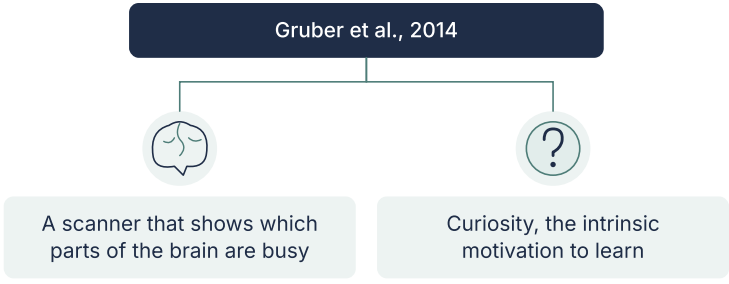
This section is about creative interest, and it is not medical or psychological advice. **If interest and pleasure have gone flat across your whole life, that can be a sign of something a professional should look at.** The curiosity steps here are no treatment for low mood, and seeking help is the right path.

If interest has gone flat

- [x] Interest gone flat across your whole life
- [x] The curiosity steps are no treatment for low mood
- [x] Seeking help is the right path

The study at the centre of this section began with a design. **"We used functional magnetic resonance imaging to investigate how curiosity (intrinsic motivation to learn) influences memory"** (Gruber et al., 2014). Functional magnetic resonance imaging is a scanner that shows which parts of the brain are busy, and intrinsic motivation has its own Key Concept (see 5.7.1).

A brain study on curiosity and memory



> **Key Concept:**
>
> Curiosity. **Curiosity is the wish to learn something for its own sake**, drawn by what is new or hard. A tram driver who reads old timetables on her day off to find out why one stop always has a queue is following curiosity.

A second team built a way to measure curiosity. **They wrote that "Curiosity was conceptualized as a positive emotional-motivational system associated with the recognition, pursuit, and self-regulation of novelty and challenge"** (Kashdan et al., 2004). In plain words, curiosity notices something new or hard, goes after it and keeps itself on track.

Curiosity in plain words



That team said they worked "In an effort to expand research on curiosity" (Kashdan et al., 2004). **"Using 5 independent samples, we developed the Curiosity and Exploration Inventory (CEI)"**, a questionnaire about how people seek out the new. A sample is one group of people taking part, so five groups helped shape it.

A way to measure curiosity (Kashdan et al., 2004)

- 5 independent samples
- The Curiosity and Exploration Inventory (CEI)
- A questionnaire about how people seek out the new

Her question is simple, and it pulls at her. **She wants to know why anyone would spend hours cutting leaves into a joint that paint would cover.** She writes that question on a tag and ties it to the frame on Monday evening.

A question on a tag



She gives it twelve minutes after the shop closes and works only on what she still wants to know. **She looks under the bottom bracket, where makers sometimes stamp a number, and finds a worn mark she cannot read.** When the timer goes she copies the worn mark onto the tag and hangs the frame back on its hook.

Twelve minutes after the shop closes



> Exercise:
>
> Try it. Pick one unanswered question in your project. **Spend 12 minutes only on what you still want to know.**

The brain study gives a reason to keep a question like Ingrid's open. **Its team tested memory twice, once straight away and once a day**

later. Each test looked at two kinds of material, the things people were curious about and the things that came along beside them.

The brain study tested memory twice

Test	Material
Straight away	The things people were curious about
A day later	The things that came along beside them

Think of a curious question as a lamp clamped to a workbench. **It lights the part you are working on, and it lights whatever lies next to it.** The study measured both, the part under the lamp and the things at its edge.

A lamp clamped to a workbench



It lights the part you are working on



And whatever lies next to it



The study measured both

> **Science Says:**
>
> "In both immediate and one-day-delayed memory tests, participants showed improved memory for information that they were curious about and for incidental material learned during states of high curiosity" (Gruber et al., 2014). **People remembered more of what they wanted to know, and more of what sat beside it.**

The second half of that finding is the surprise. **Material nobody asked people to learn was remembered better when it came during high curiosity**, so a curious moment went with better memory for more

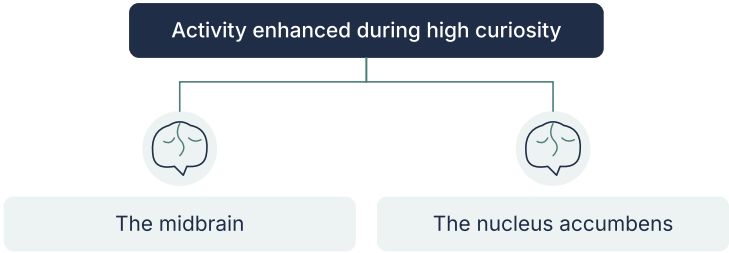
than its own answer. This is a learning study, so it shows memory, and it makes no claim about creative work.

The second half of the finding is the surprise

- Material nobody asked people to learn
- Remembered better during high curiosity
- A learning study, with no claim about creative work

The scans showed where the change happened. “Functional magnetic resonance imaging results revealed that activity in the midbrain and the nucleus accumbens was enhanced during states of high curiosity” (Gruber et al., 2014). The midbrain and the nucleus accumbens are two areas deep in the brain. **The finding describes activity there and promises no change to anyone’s brain.**

The scans showed where the change happened



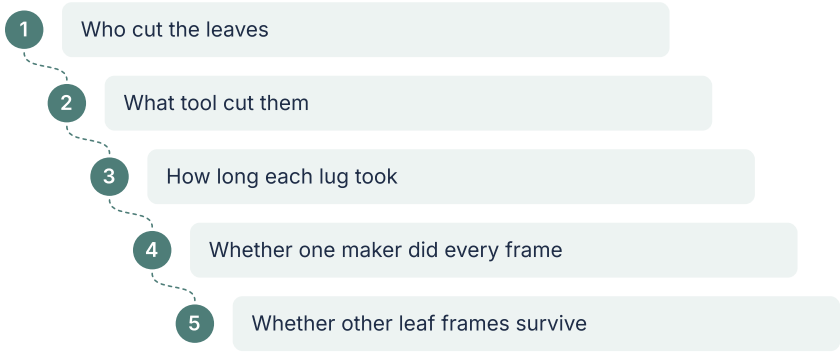
Key Concept:

Incidental learning. **Incidental learning is knowledge gained as a side effect of chasing something else.** A tour guide who looks up why a church bell is cracked, and later remembers the name of the foundry that cast it, has had incidental learning.

The authors drew one lesson for teachers. **Their results "highlight the importance of stimulating curiosity to create more effective learning experiences"** (Gruber et al., 2014). For a maker, a live question is one way to keep learning about the craft.

On Tuesday Ingrid turns her one question into five. **She asks who cut the leaves, what tool cut them, how long each lug took, whether one maker did every frame and whether other leaf frames survive.** She ranks them by how much each one pulls at her, and the tool comes first.

One question turns into five



The shop owner has other ideas. **He asks her to spend the evening finding out what the frame might sell for**, since a customer has asked. Ingrid says she will look at the price on Thursday and keeps Tuesday's twelve minutes for the tool.

The shop owner has other ideas

Before	After
The evening on what the frame might sell for	The price on Thursday Tuesday's twelve minutes for the tool

A well-known theory explains why that choice matters to her. **It names three needs people are born with, which are competence, autonomy and relatedness** (Ryan & Deci, 2000). Competence is feeling able, and relatedness is feeling connected to others.

Three needs people are born with (Ryan & Deci, 2000)



Competence: feeling able



Autonomy: having a say



Relatedness: feeling connected to others

> **Science Says:**
>
> According to the theory, these needs are those "which when satisfied yield enhanced self-motivation and mental health" (Ryan & Deci, 2000). **When people feel able, have a say and feel connected, they are more driven from within.** Self-motivation is drive that comes from inside a person, and the authors tied the same three needs to mental health.

The same authors wrote that "Human beings can be proactive and engaged or, alternatively, passive and alienated, largely as a function of the social conditions in which they develop and function" (Ryan &

Deci, 2000). **The setting people work in helps decide whether they take part or switch off.** Ingrid's setting leaves her evening mostly hers.

The setting helps decide

Proactive and engaged	Passive and alienated
⊕ People take part	⊖ People switch off

Choosing the next question herself is a small piece of autonomy. **She protects that cue by writing the next question on the tag before she leaves each night**, so nobody else sets it. The price question still gets done on Thursday, in the shop's time, and relatedness comes when she shares what she finds with the owner.

She protects one autonomy cue

- The next question on the tag before she leaves
- Nobody else sets it
- The price question still gets done on Thursday

> 🗝 **Key Concept:**
>
> Autonomy. **Autonomy is the sense that your actions come from your own choice.** A school cook who picks which new recipe to trial each Friday has autonomy over that part of her week.

On Wednesday the tool question leads her to an old catalogue in a box under the workbench. **Tiny drawings show a fret saw and a set of fine files beside a leaf lug.** She now thinks the leaves were cut by hand with a fine saw and finished with files.

An old catalogue under the workbench



A fret saw



A set of fine files



Beside a leaf lug

On the same page, in small print, is a name, Albert Thorne of Leicester. **She was hunting for the tool, and the maker's name came with it.** On Thursday she remembers it without looking, which is the kind of by-the-way fact the brain study measured.

She was hunting for the tool



The tool question

The maker's name came with it

Remembered on Thursday without looking

Thursday's price question takes her twenty minutes. **The worn stamp under the bottom bracket now makes sense to her, because the catalogue lists the same maker's mark.** She tells the owner a fair price and the maker's name, and pins the leaf lug drawing above her bench.

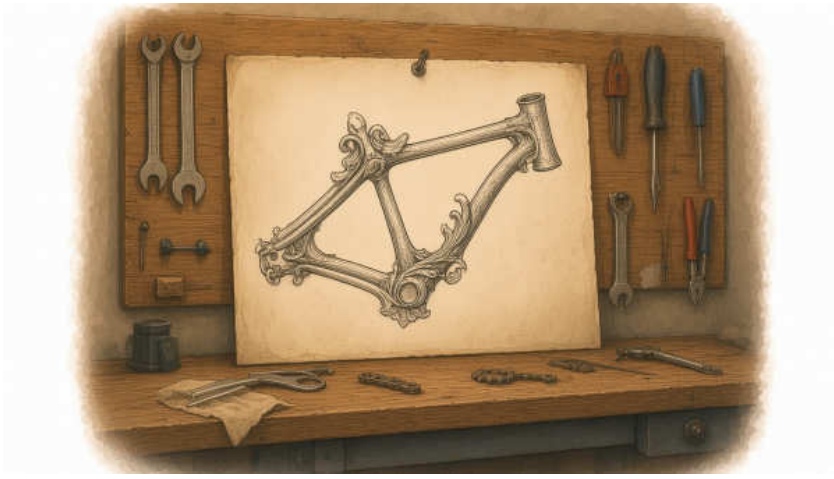
Thursday's price question

- Twenty minutes
- The catalogue lists the same maker's mark
- A fair price and the maker's name

Her week fits the description of curiosity from the second team. **She noticed something new in the leaves, went after it with the tool question and kept herself on track with twelve minutes a night.** The challenge was the worn stamp, and it gave way on Thursday.

Her week fits the description of curiosity

Curiosity	Her week
Noticed something new	The leaves
Went after it	The tool question
Kept itself on track	Twelve minutes a night



A drawing of a leaf-shaped lug pinned to a pegboard above a bicycle workbench.

Curiosity works the same way in an office. **A claims handler at an insurance firm wonders why claims from one street rise every spring**, and spends ten minutes a week on that question alone. Along the way he learns the name of the river that runs under the road.

A claims handler at an insurance firm



Claims from one street rise every spring



Ten minutes a week on that question alone



He learns the name of the river

At home a man notices a blackbird singing at night outside his window. **He gives the question a few minutes after dinner and writes down two more questions it raises.** He picks which one to chase himself, and on the way he learns which streetlight on his road stays on all night.

A blackbird singing at night

- A few minutes after dinner
- Two more questions it raises
- He picks which one to chase himself

Three levels close this section, each a step on from the last. **The starter turns one question into five and ranks them by pull.** The middle level protects one autonomy cue, your say over the next question, and the advanced level pairs a curious question with one fact to learn beside it.

Keep the question alive, at three levels



The starter ranks five questions by pull

The middle protects one autonomy cue

The advanced pairs a question with one fact

Exercise:

Keep the question alive.

1. Starter. Write 5 follow-up questions from your one question, and **rank them by pull**, leaving usefulness out of the ranking.
2. Middle. For this session, **protect one autonomy cue** by choosing the next question yourself.
3. Advanced. Pair a high-curiosity question with **one incidental fact to learn beside it**.

Give a live question a little protected time



Curious moments helped people remember

Both what they wanted to know and what sat beside it

Your own say feeds the drive

Key idea:

Give a live question a little protected time, because curious moments helped people remember both what they wanted to know and what sat beside it, and having your own say feeds the drive to keep going.

Quick check:

What is curiosity? Answer: The wish to learn something for its own sake. What else did curious people remember better? Answer: Incidental material learned at the same time. What are the three needs in the theory? Answer: Competence, autonomy and relatedness.

7.2.2 Play, Enjoyment and Personal Reasons to Create

Imagine Teodor, a tax accountant, sitting at his upright piano on a Sunday afternoon. **For two months every minute at the keys has gone to two goals**, a Grade 6 exam in March and his cousin Ana's wedding in June, where he has promised to play. He opens the exam book at the scales page and starts the metronome.

Two months, two goals

- A Grade 6 exam in March
- His cousin Ana's wedding in June
- The exam book open at the scales page

Teodor once played for the fun of it, and lately the fun has gone quiet. **This section looks at what happens to creative work when the reasons for it move outside the task**, and at small playful changes that bring personal reasons back. I follow Teodor through one week, from a list of reasons to two private recordings.



A man at an upright piano with an exam book open and a metronome ticking on the lid.

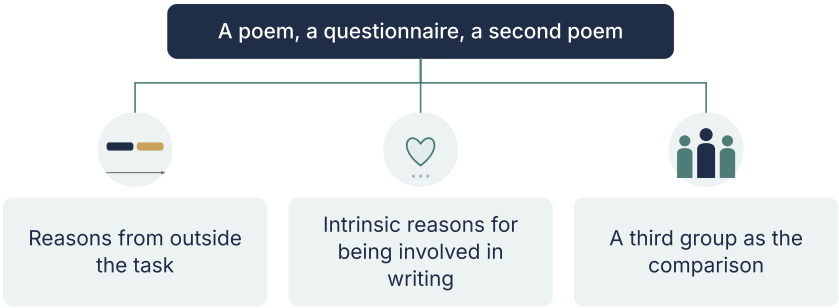
This section is about everyday creative practice, and it is not medical or psychological advice. **Play here means playful changes to an adult's own task**, such as a silly rule or a score-free improvisation. Each rule comes on its own and takes only a few minutes, inside a project you already have.

Play here means playful changes

- [x] A silly rule
- [x] A score-free improvisation
- [x] A few minutes, inside a project you already have

A lab study put the question about reasons to the test. **"This study directly tested the hypothesis that intrinsic motivation is conducive to creativity and extrinsic motivation is detrimental"** (Amabile, 1985). The people taking part wrote a poem, answered a questionnaire and then wrote a second poem.

A lab study put the question to the test (Amabile, 1985)



The questionnaire was the heart of the study. **Some people answered questions that pointed them at reasons from outside the task**, while "subjects in an intrinsic orientation condition completed a questionnaire that focused on intrinsic reasons for being involved in

writing" (Amabile, 1985). A third group served as the comparison, and the second poems from all three groups were judged.

> **Key Concept:**
>
> Extrinsic orientation. **An extrinsic orientation is a frame of mind focused on reasons outside the task**, such as marks, money, praise or status. A baker who spends the whole bake thinking about the prize at the village show, and none of it about the cake, has an extrinsic orientation.

Reasons outside the task



> **Science Says:**
>
> "Poems written under an extrinsic orientation were significantly less creative than those written in the other two conditions" (Amabile, 1985). **The groups started level**, since "there were no initial differences between conditions on prior involvement in writing or on creativity of the first poems written" (Amabile, 1985). This is one writing lab study, with poems as the only task.

The level start matters. **With no differences in the first poems, the later gap points to the reasons the writers had just been thinking about.** The study reports "significant differences in the creativity of the poems written after the experimental manipulations" (Amabile, 1985).

An earlier framework counts task motivation among the parts creativity needs (Amabile, 1983).

The groups started level

Before	After
No differences in the first poems	Significant differences after the manipulations Extrinsic poems significantly less creative

So the reasons in your head while you work are worth a look. **A list of reasons takes two minutes to write**, and it shows at once which ones belong to the task and which belong to marks, money or other people. The Try it below asks you to write only the first kind.

A list of reasons takes two minutes to write

- Some reasons belong to the task
- Others belong to marks, money or other people
- Write only the first kind

On Monday evening Teodor writes down why he plays. **His first list has four lines**, passing Grade 6, keeping his promise to Ana, his teacher's praise and the certificate on the wall. Every line is about something outside the music, and reading it back he feels tired.

His first list has four lines



Passing Grade 6



Keeping his promise to Ana



His teacher's praise and the certificate

He tears off the page and starts again with personal reasons only. **The new list says chords that clash and then settle make him grin**, and finding a tune by ear feels like solving a puzzle. He leaves the exam book closed for twenty minutes and plays for those reasons alone.

A new list with personal reasons only



Chords that clash and then settle



Finding a tune by ear, like a puzzle



The exam book closed for twenty minutes

> Exercise:
>
> Try it. **Rewrite today's brief with only personal reasons.** Hide every reward and status reason for 20 minutes, then work.

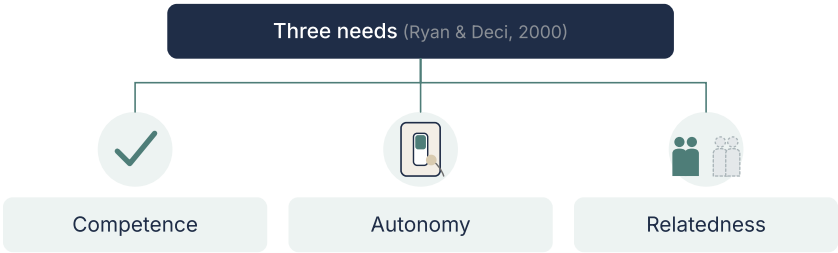
Writing your own reasons is a small way of running the task yourself. **The playing becomes Teodor's again**, even while the exam stays booked and the wedding date stays fixed. The marks still matter to him, and for twenty minutes they simply wait outside the room.

The playing becomes Teodor's again

- The exam stays booked
- The wedding date stays fixed
- For twenty minutes the marks wait outside the room

Personal reasons sit inside a bigger theory of motivation. **It names three needs, competence, autonomy and relatedness**, which help self-motivation and mental health when they are met (Ryan & Deci, 2000). The three needs come up in full in 7.2.1, and here one of them, competence, does most of the work.

Personal reasons sit inside a bigger theory



Key Concept:

Competence need. **The competence need is the need to feel able to do a thing well.** A beginner climber who picks a wall she can reach the top of, and rings the bell, meets her competence need. A wall far beyond her reach leaves that need unmet.

The same researchers point at the setting around a person. **Their work looks at "the social-contextual conditions that facilitate versus forestall the natural processes of self-motivation"** (Ryan & Deci,

2000). An exam room facing a panel and a quiet front room on a Sunday are two very different settings for the same piece of music.

Two very different settings

An exam room	A quiet front room
⊕ Facing a panel	⊖ On a Sunday

On Tuesday Teodor tries a playful rule. **For ten minutes his left hand plays in the wrong key**, a tone below the right hand, and nobody marks the result. The clashes make him laugh out loud, and two of them sound good enough to keep. He jots them on the back of the exam book.

A playful rule on Tuesday



His left hand plays in the wrong key



Nobody marks the result



Two clashes good enough to keep

> 🗝 **Key Concept:**
>
> Playful rule. **A playful rule is a small, silly limit added to a task for the fun of it**, with no score attached. A gardener who plants one bed using only things in shades of orange is following a playful rule. The rule changes how the task feels, while the task itself stays the same.

The play research in this section looks at pretend play in children (Russ, 2016). **That research links pretend play with creativity**, and

“There is some evidence from longitudinal studies that this association is stable over time” (Russ, 2016).

The play research looks at children

- Pretend play in children (Russ, 2016)
- Linked with creativity
- Stable over time in longitudinal studies

An earlier paper by the same author carries the title “Play, creativity, and adaptive functioning” (Russ, 1998). **That paper looks toward play interventions for children**, a field for trained specialists. The playful rules in this section are far smaller, a game inside an adult’s own task that anyone can try at home.

Two kinds of play

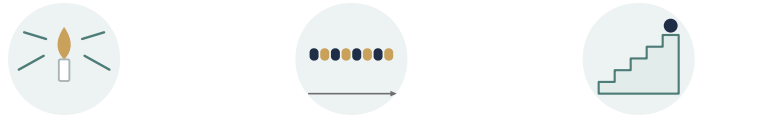
Play	Who it is for
Play interventions for children	Trained specialists
Playful rules in this section	Anyone at home

Science Says:

“There is strong evidence that processes expressed in pretend play are associated with measures of creativity, especially with divergent thinking” (Russ, 2016). **The cause is still open**, since “there is a lack of consensus in the field as to whether engaging in pretend play actually facilitates creative thinking” (Russ, 2016). The evidence on play as a cause is mixed.

A link is different from a cause (see 1.2.2). **The same review says "many other variables (opportunity, tolerance for failure, motivation, work ethic, etc.) determine whether children with creative potential are actually creative in adulthood"** (Russ, 2016). It adds that "Converging evidence suggests that cognitive and affective processes in pretend play are involved in adult creative production" (Russ, 2016).

A link is different from a cause



On Wednesday Teodor picks a piece he can finish that evening. **He sets himself sixteen bars of a waltz in the wrong-key style**, short enough to finish before ten o'clock. At a quarter to ten he plays it through twice, start to end, and writes the title "Tax Waltz" at the top of the page.

Sixteen bars of a waltz



Finishing protects his competence need. **A small finished piece tells him he can still make music**, where a half-built big piece would leave that question hanging. The exam pieces still get their practice on Thursday and Friday, and the wedding list gets a run on Saturday.

Finishing protects his competence need

- A small finished piece: he can still make music
- A half-built big piece leaves the question hanging
- Exam pieces on Thursday and Friday

On Sunday Teodor compares two runs on the same tune. **The first fifteen minutes put enjoyment first**, with no thought of marks, and the second fifteen put evaluation first, as if the examiner were in the room. He records both on his phone and plays them to nobody.

Sunday: two runs on the same tune



Enjoyment first



Evaluation first, as if the examiner were in the room



Recorded on his phone, played to nobody

The enjoyment-first run gives him a tune he hums all evening. **The evaluation-first run gives clean scales and nothing new.** Teodor keeps both recordings private, and the exam and the wedding stay in his diary, with play now booked beside them.

What each run gives him

Run	Comes first	Gives him
The first fifteen minutes	Enjoyment	A tune he hums all evening
The second fifteen	Evaluation	Clean scales and nothing new

A nurse who knits on her days off can use the same steps. **She writes why she knits with only her own reasons**, adds a rule to use two colours that clash, and finishes a small coaster in one sitting. The jumper for her niece's birthday waits for another day.

A nurse who knits on her days off

- [x] Her own reasons only
- [x] Two colours that clash
- [x] A small coaster in one sitting



A knitted coaster in two clashing colours beside a ball of wool.

Each finding here has limits. **The poem result comes from one lab study, and the play research shows a link with the cause unsettled.** The exercises below are practice built on those findings, and Teodor's week shows one way they can sit around real goals like an exam and a wedding.

Each finding here has limits

Finding	Limit
The poem result	One lab study
The play research	A link, with the cause unsettled

The closing exercise grows from one rule to a comparison. **The starter adds a playful rule, the middle level picks a small piece you can finish today and the advanced level compares two runs**, with the results kept to yourself. Each level fits into one short session.

Play and personal reasons, at three levels



The starter adds a playful rule

The middle picks a small piece you can finish today

The advanced compares two runs

Exercise:

Play and personal reasons.

1. Starter. **Add one playful rule only**, a silly constraint or score-free improvising, for 10 minutes.
2. Middle. Protect your competence by picking a small playful version you can finish today.
3. Advanced. Compare two 15-minute runs, one enjoyment first and one evaluation first, and keep the product private.

Personal reasons and small playful rules



Reasons outside the task went with less creative poems

Personal reasons first

Small playful rules as practice

Key idea:

In one writing study, reasons outside the task went with less creative poems, and personal reasons and small playful rules are practice built on that finding and on the play research.

Quick check:

What happened to poems written after an extrinsic orientation? Answer: They were judged significantly less creative. Did the groups differ at the start? Answer: No, the first poems showed no differences. Does pretend play cause creativity? Answer: There is a lack of consensus on cause, though the link is strong. What is the competence need? Answer: The need to feel able to do a thing well.

7.2.3 Moving Beyond “I Am Not a Creative Person”

Imagine Siobhan, a hospital porter who pushes beds and trolleys between wards all day. **She has worked out short routes through the corridors that the whole porters’ team now follows**, yet she still says “I’m not a creative person.” On Monday the ward sister on the children’s ward tells her the routes are creative, and Siobhan laughs it off.

Short routes through the corridors

> - The whole porters’ team now follows them
> - Yet she still says she is not a creative person
> - The ward sister tells her the routes are creative

This section is about the sentence Siobhan keeps saying, and how belief in your own creativity can grow. **I show you what a large review found about creative belief and creative scores**, and how researchers describe beliefs about where creativity comes from. Her week runs alongside, with three levels of practice to finish.



A hospital porter pushing an empty bed along a long corridor, with ward signs overhead.

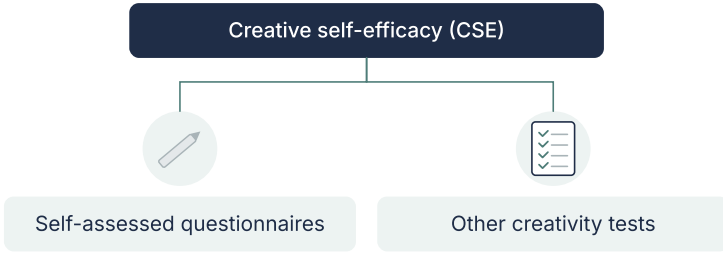
This section is about belief in your creative work, and it is not medical or psychological advice. **A sentence like "I'm not creative" is a belief that can change, and it is never a diagnosis.** Low belief is common in ordinary working lives, and nothing here treats it as something wrong with you.

A belief that can change

- [x] It is never a diagnosis
- [x] Low belief is common in ordinary working lives
- [x] Nothing here treats it as something wrong with you

A 2018 review asked how creative self-efficacy (see 1.3.1) lines up with creative scores. Its opening sentence gave the aim. "This meta-analysis investigated the relations between creative self-efficacy (CSE) and creativity measures and hypothesized that self-assessed questionnaires would have a different relation to self-efficacy beliefs compared to other creativity tests" (Haase et al., 2018).

A 2018 review (Haase et al., 2018)



> **Key Concept:**
>
> Creative self-rating. **A creative self-rating is your own score of how creative you are**, kept apart from how good the work is. A retired bus conductor who gives herself 2 out of 5 for creativity while her birdboxes sell out at the church fair has a low creative self-rating.

The review's numbers are correlations, written r. **The r figures in the box below are correlations of this kind**, and CSE is the review's short form for creative self-efficacy.

Think of a rain gauge and a windsock in the same garden. **Both measure the weather, but a reading on one tells you only a little about a reading on the other.** Belief, self-rating and test scores are like separate instruments, and the review asked how closely their readings agree.

Separate instruments in the same garden



A rain gauge



A windsock



One reading tells you only a little about the other

> **Science Says:**
>
> The review "synthesized 60 effect sizes from 41 papers (overall N = 17226)" and found that "the relation between CSE and creativity measures was of medium size (r = .39)." Further, "self-rated creativity correlated higher with self-efficacy (r = .53). The relation with divergent thinking (DT) tests was weak (r = .23)" (Haase et al., 2018). **Belief went most closely with how people rated themselves.**

Sixty results from forty-one papers means some papers gave more than one. **The gap between .53 and .23 is the different relation the review set out to test**, between self-assessed questionnaires and other creativity tests. It is the reason the advanced level keeps the self-rating and the product score in separate columns.

How closely the readings agree (Haase et al., 2018)

CSE and	r
Creativity measures overall	.39
Self-rated creativity	.53
Divergent thinking (DT) tests	.23

The review also split creativity measures into three kinds. **"In a comparison between measures focusing on the creative person (r = .47), the creative product (r = .32), and the creative process (r = .27), the person aspect was most strongly linked to CSE"** (Haase et al., 2018).

Three kinds of creativity measures

Focusing on	r
The creative person	.47
The creative product	.32
The creative process	.27

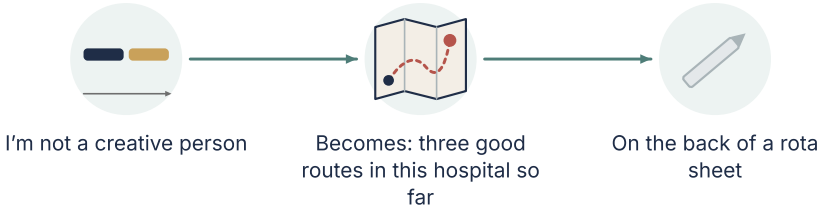
A product is a thing made, such as Siobhan's routes, and a process is the way of making it. **Her belief and her self-rating sit together at the bottom, while the product is in daily use.** How she rates herself and how good her work is are two different readings.

Two different readings



On Monday evening she rewrites the sentence on the back of a rota sheet. **"I'm not a creative person" becomes "I have worked out three good routes in this hospital so far."** The new line is about the task in front of her, and it counts what she has already built.

She rewrites the sentence



> **Exercise:**
>
> Try it. Rewrite "I am not creative" as **a line about the efficacy you have built so far in this task**.

Researchers have a name for beliefs about where creativity comes from. **Creative mindsets are "beliefs about the stable-versus-malleable character and the nature of creativity"** (Karwowski, 2014, as cited in Zhou et al., 2020). Stable means fixed, and malleable means able to be shaped. Siobhan's sentence is a fixed one, because it treats creativity as something she was born without.

Beliefs about where creativity comes from

Stable	Malleable
⊕ Fixed	⊖ Able to be shaped
⊕ Something she was born without	⊖ Can grow

A 2020 paper put it this way. **"Creative mindsets reflect the implicit beliefs individuals hold regarding the nature of creativity as innate (i.e., fixed mindset) or malleable (i.e., growth mindset)"** (Zhou et al., 2020). The paper adds that the Creative Mindsets Scale measures "fixed and growth creative mindsets" with "five items" each (Zhou et al., 2020).

The Creative Mindsets Scale (Zhou et al., 2020)

> - Fixed mindset: creativity as innate
> - Growth mindset: creativity as malleable
> - Five items each

> **Key Concept:**
> Creative mindset. **A creative mindset is a belief about whether creativity is fixed at birth or can grow.** A diving coach who thinks some swimmers are simply born able to invent new dives, and that the rest never will, holds a fixed creative mindset.

Siobhan's routes also count as mini-c creativity (see 1.1.3). **Each shortcut she found was new to her first**, which is what the ward sister saw. Traits linked with creative people are averages across groups (Feist, 1998), so none of them decides who she can become.

Her routes count as mini-c creativity



Each shortcut she found was new to her first



Traits are averages across groups (Feist, 1998)



None of them decides who she can become

On Tuesday she takes the starter step. **She spends fifteen minutes on a rota puzzle, a field where she already feels able**, working out how four porters can cover the morning discharges between eight and ten. She finds an answer that frees one porter by nine o'clock.

The starter step on Tuesday



Fifteen minutes on a rota puzzle



Four porters, the morning discharges



One porter freed by nine o'clock

On Wednesday she raises one step of difficulty inside the same kind of puzzle. **She plans the morning again with the main lift out of service**, which makes the puzzle harder in one way and leaves the rest the same. Afterwards she rates her belief that she can solve such puzzles, and gives it 3 out of 5.

One step of difficulty on Wednesday

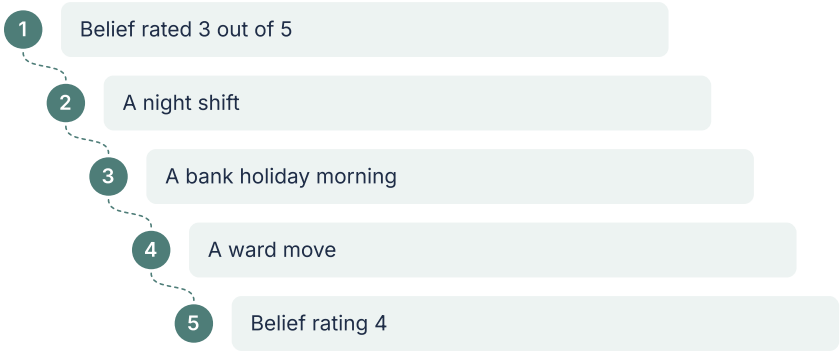
- The main lift out of service
- Harder in one way, the rest the same
- Her belief rated 3 out of 5

Job complexity is one of the things linked to creative belief (Tierney & Farmer, 2002). **Siobhan’s step is small and stays inside work she knows**, which keeps the new puzzle finishable. Her rating is about her belief, and the ward sister’s view of the plan is a separate matter.

> **Key Concept:**
> Mastery step. **A mastery step is one small rise in the difficulty of a task you already handle well.** A dry-stone waller who can build a straight run takes a mastery step when he tries his first curved corner.

On Thursday she tries the advanced level. **Before three short trials she rates her belief 3 out of 5**, then plans a night shift, a bank holiday morning and a ward move. Each trial is one plan she can finish in ten minutes. After the third trial her belief rating is 4.

Three short trials on Thursday



She keeps two columns on the rota sheet. **One holds her belief rating, and the other holds whether each plan worked.** The night shift and the ward move worked, and the bank holiday plan left a gap at eight o'clock.

Two columns on the rota sheet

Trial	Whether the plan worked
The night shift	Worked
The ward move	Worked
The bank holiday plan	A gap at eight o'clock

The failed plan goes in the second column only. **Her belief rating still reads 4**, because it measures how able she feels at this kind of puzzle, and one gap at eight o'clock is a fact about one plan. On Friday she tells the ward sister about the routes without laughing.

The failed plan goes in the second column only

- Her belief rating still reads 4
- One gap is a fact about one plan
- She tells the ward sister without laughing

The same steps fit an office. **A payroll clerk who says she has no ideas rewrites that line as “I have fixed two awkward pay runs this year.”** She then tries one harder pay run and rates her belief before and after. The harder run balances at the first attempt, and her belief rises by one point.

A payroll clerk who says she has no ideas



Two awkward pay runs fixed this year



One harder pay run



Her belief rises by one point

At home a grandfather who says he has no imagination makes up a card game with his grandsons. **He rates his belief in his game-making 1 out of 5 on Saturday and 2 on Sunday**, after two rounds where the rules held up. The game’s quality goes in a separate note.

A grandfather makes up a card game

Day	Belief in his game-making
Saturday	1 out of 5
Sunday	2

A low rating on the first day is a starting reading. **It describes a belief at one moment**, and the steps give that belief new evidence to weigh. Each new reading goes beside the old one, so the belief can be seen to move.



A grandfather and two boys around a kitchen table with a deck of cards and a scribbled rule sheet.

The next step for Siobhan is already on the rota sheet. **The following week she will plan a weekend with two porters off sick, one more mastery step inside the same kind of puzzle.** Her belief column starts the week at 4.

The next step is already on the rota sheet

- A weekend with two porters off sick
- One more mastery step
- Her belief column starts the week at 4

Three levels close this section, and each builds on the last. **The starter keeps you in a field where you already feel able.** The middle level adds one mastery step and a belief rating, and the advanced level tracks belief across three trials while keeping it apart from product quality.

Belief built in steps, at three levels



The starter keeps you where you feel able

The middle adds one mastery step

The advanced tracks belief across three trials

Exercise:

Belief built in steps.

1. Starter. Do **one 15-minute task** in a field where you already feel able to do the job.
2. Middle. Raise **one job-complexity or mastery step** inside a familiar task, and note your belief 1 to 5 after.
3. Advanced. Rate your belief 1 to 5 before and after **three short trials you can finish**, keeping self-rating apart from product quality.

Treat I'm not creative as a belief that can change



Key idea:

Treat "I'm not creative" as a belief that can change, because creative belief travels most closely with how you rate yourself, and small steps in work you know give you something to rate.

Quick check:

What is a creative self-rating? Answer: Your own score of how creative you are. Which kind of measure was most strongly linked to creative belief in the review? Answer: Measures of the creative person. What is a mastery step? Answer: One small rise in the difficulty of a task you already handle well. What does a creative mindset describe? Answer: A belief about whether creativity is fixed or can grow.

7.3.1 Fixation: Returning to the Same Idea Again and Again

Imagine Callum, a kitchen fitter, kneeling in Mrs Byrne's half-built kitchen with a pencil behind his ear. **The corner cupboard is the last tricky job**, a deep L-shaped space that hands can barely reach. Last week he offered her a swing-out carousel, and she turned it down. His third sketch this morning is another carousel.

The last tricky job

> - A deep L-shaped corner cupboard
> - She turned down a swing-out carousel last week
> - His third sketch this morning is another carousel

Most of us know this loop, the one idea that keeps coming back however hard we push. **This section looks at fixation, what the research says about stepping away and how to come back fresh**, with three short drills built on that research. I follow Callum through one day on the job.



A kitchen fitter kneeling in front of an empty corner cupboard space with a sketch pad on his knee.

This section is about getting unstuck in creative work, and it is not medical or psychological advice. **The drills are short and ordinary**, a pause, a change of drawing and a ban on one idea. They suit anyone working on a design, a plan or a piece of writing, at home or at work.

The drills are short and ordinary

- [x] A pause
- [x] A change of drawing
- [x] A ban on one idea

One research team put the loop into a single sentence. **"We hypothesize that fixation, a block to successful problem solving, may develop during initial solution attempts and persist, interfering with immediate extra work more than with delayed extra work"** (Smith & Blankenship, 1991). Put simply, a first answer can stick and get in the way.

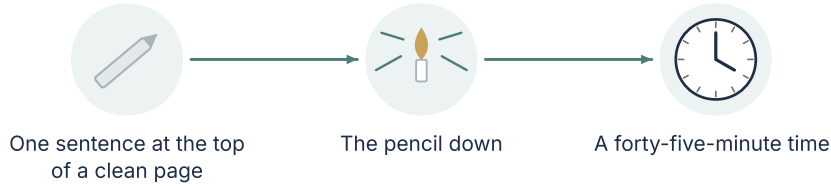
A first answer can stick (Smith & Blankenship, 1991)



Copying a sample is one way to get stuck, and design fixation has its own home (see 2.1.3). **Callum's loop is different, since the idea that keeps returning is his own earlier answer.** Nobody showed him a carousel today, and still his pencil draws one every time he starts.

Callum stops and names the loop. **He writes one sentence at the top of a clean page, "I keep drawing the carousel Mrs Byrne said no to."** Then he puts the pencil down and sets a forty-five-minute timer before the next attempt. The sentence feels a little silly to him, and it makes the loop easy to see.

Callum stops and names the loop



> Exercise:
>
> Try it. **Name the idea you keep returning to in one sentence.** Stop, and set a timed delay before your next attempt.

The research team ran "Five experiments" on this kind of block (Smith & Blankenship, 1991). **They used word puzzles from the Remote Associates Test, where three words share one hidden link word**, and "fixation was induced to prevent optimal performance on the initial

test" (Smith & Blankenship, 1991). The puzzles were a lab task, far simpler than a kitchen.

Five experiments with word puzzles

- The Remote Associates Test
- Three words share one hidden link word
- Fixation induced on the initial test

The team then compared two ways of going back to an unsolved puzzle. **Some people tried again straight away, and others came back after a gap.** Callum's timer sets up the second of these, a gap with a fixed end, so the return happens on purpose and at a known time.

Two ways of going back to an unsolved puzzle

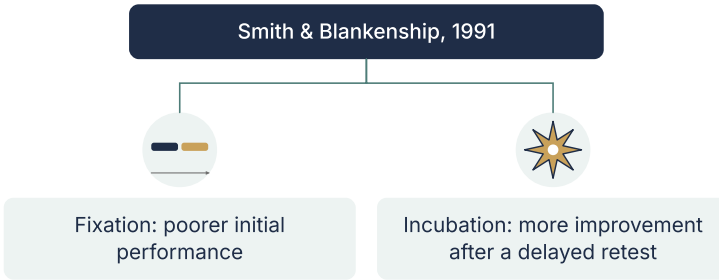
Return	When
Immediate retest	Straight away
Delayed retest	After a gap

> Science Says:
> "Both fixation (poorer initial problem-solving performance) and incubation (more improvement after a delayed retest than an immediate retest) were found in all the experiments which tested for the effects" (Smith & Blankenship, 1991). **The block was real, and so was the gain from waiting.** These were lab word puzzles, and design work has many more parts.

Incubation is the resting stage between hard work and a fresh look (see 1.3.2). **Here it has a narrow meaning**, the extra improvement that

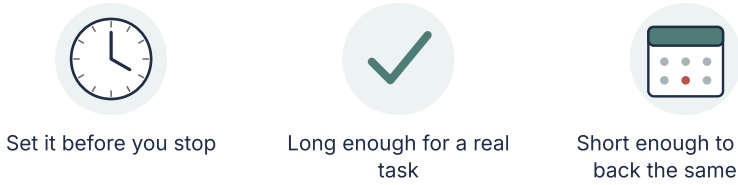
comes when a second try is delayed. The team put it plainly, “Such a result constitutes incubation in problem solving” (Smith & Blankenship, 1991).

Found in all the experiments



Picking the length of the gap is a practical choice. **Set it before you stop**, long enough for a real task and short enough that you come back the same day. No study in this section names an ideal length, so treat the length you choose as practice.

Picking the length of the gap



> **Key Concept:**
>
> Delayed return. **A delayed return is a second attempt at a stuck problem made after a set gap**, with no work on it in between. A crossword solver who leaves one clue, makes a pot of tea and then reads the clue again is making a delayed return.

During the gap Callum tiles Mrs Byrne's splashback. **Tiling is steady, low-demand work for him**, with spacers, adhesive and a level, and it has nothing to do with cupboards. He works through the full forty-five minutes and keeps his eyes off the corner. When the timer goes, he wipes his hands and goes back to the corner once.

During the gap Callum tiles the splashback



Spacers, adhesive and a level



Nothing to do with cupboards



The full forty-five minutes

The splashback suits the gap for a plain reason. **A large review found that gaps filled with demanding mental work gave a smaller incubation effect** (Sio & Ormerod, 2009). Tiling asks little of Callum's thinking after years of practice, and a tense phone call about a late delivery would make a poorer gap.

The splashback suits the gap

- Demanding mental work gave a smaller incubation effect (Sio & Ormerod, 2009)
- Tiling asks little of his thinking
- A tense phone call would make a poorer gap

A low-demand task is one you can do with little thought, such as watering plants, sweeping a floor or sorting screws. **Pick one with no link to the stuck problem**, and keep it light enough that you finish the gap rested. A hard puzzle, a tax form, an argument or a second tricky design job would count as demanding.

Low-demand or demanding

Low-demand	Demanding
Watering plants	A hard puzzle
Sweeping a floor	A tax form
Sorting screws	An argument

> Science Says:
>
> Coming back later could give people more progress on the puzzles they had left unsolved, compared with trying again at once (Smith & Blankenship, 1991). **The team added that "Unconscious work" on a problem, "commonly assumed to be responsible for incubation effects, may not be necessary to observe the phenomenon"** (Smith & Blankenship, 1991).

The gap helps Callum, and it leaves part of the loop in place. **His pencil still drifts toward curves**, as if the carousel were waiting just off the page. A delay is the first step in this section, and the next two work on the idea itself.

Part of the loop stays in place



His pencil still drifts toward curves



A delay is the first step



The next two work on the idea itself

Back at the corner, Callum's first new attempt still leans toward a round shelf. **So he changes how he holds the idea.** He makes one quick sketch of the corner as it is, then turns the page and lists in words what

Mrs Byrne needs, such as reaching the back, storing heavy pans and keeping the door narrow.

He changes how he holds the idea



> **Key Concept:**
>
> Representation switch. **A representation switch is a change in the form an idea is held in**, such as moving from a drawing to a written list. A wedding planner who turns her seating chart into a list of who must sit near whom is making a representation switch. The idea stays the same, and only its form changes.

A list asks different questions from a drawing. **A sketch shows shapes, and a list of needs shows what the shapes are for**, such as reach, weight and space. Callum's carousel was a shape he liked, and the list holds Mrs Byrne's reasons for the cupboard.

A list asks different questions from a drawing

A sketch	A list of needs
⊕ Shows shapes	⊖ Shows what the shapes are for

The word list shows him something the drawings hid. **None of Mrs Byrne's needs mentions spinning.** Each one names something the cupboard must do for her. Callum stops there, as the middle drill asks, and leaves the list on the worktop for an hour while he fits the cupboard doors along the far wall.

The word list shows what the drawings hid



Reaching the back



Storing heavy pans



Keeping the door narrow

After lunch Callum tries one more step. **He bans the carousel for ten minutes**, writes “no carousel” at the top of the page and draws only other answers. By the end of the ten minutes he has four, corner drawers, open shelves, a pull-out unit and a wider diagonal door.

Ten minutes with a ban on the carousel



> **Key Concept:**
>
> Idea ban. **An idea ban is a short, timed rule that forbids one named idea**, so every attempt has to go somewhere new. A cook who bans tomato from a pasta sauce for one evening is running an idea ban. The ban ends when the time runs out, and the idea is free to return.

The ban targets Callum’s own repeat, the answer his hand keeps drawing. **It aims at the persistence the fixation research describes**, a first answer that keeps returning during later attempts. Ten minutes is

short enough to feel like a game, and long enough to fill a page with other shapes.

The ban targets his own repeat

> - The persistence the fixation research describes
> - Short enough to feel like a game
> - Long enough to fill a page with other shapes

When Mrs Byrne comes home, she looks at the four sketches. **She picks the corner drawers**, since she can pull the heavy pans straight out. She found a carousel fiddly in her last kitchen. Callum's carousel sketches stay in the back of his pad, and the drawers go on his order list for Friday.



A sketch pad open at a drawing of deep corner drawers, with a customer pointing at it.

A student writing a short story can use the same steps. **Her plot keeps ending with the hero waking from a dream**, so she names that

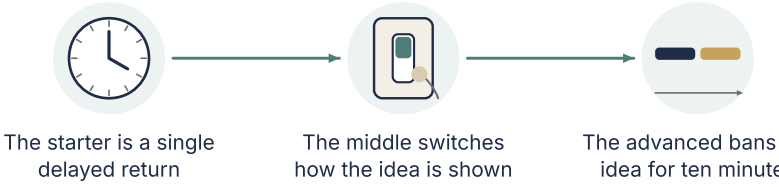
ending, leaves it for an hour while she sorts her laundry and then lists her story's events in words. On return she bans the dream ending for ten minutes.

A student writing a short story

Step	Her story
Name the ending	The hero waking from a dream
Leave it for an hour	She sorts her laundry
Ban it for ten minutes	No dream ending

The closing exercise follows Callum's day in order. **The starter is a single delayed return, the middle level switches how the idea is shown and the advanced level bans the idea for ten minutes**, each one a step further from the loop. Pick the level that matches how stuck you feel today.

Leaving the loop, at three levels



Exercise:

Leaving the loop.

1. Starter. **After your first stuck attempt, do a low-demand, unrelated activity**, then return once.

2. Middle. Once you have named the idea you keep returning to, change only the representation, a sketch and then a verbal list, then stop.
3. Advanced. On your return, forbid the named idea for 10 minutes and generate only alternatives.

A first answer can stick and block better ones



A delayed second try did better | A change of form | A short ban on the idea

Key idea:

A first answer can stick and block better ones, and in lab word puzzles a delayed second try did better, while a change of form and a short ban on the idea are practice for leaving the loop.

Quick check:

What is fixation? Answer: A block to problem solving that can persist after first attempts. What did the five experiments find? Answer: Both fixation and incubation. What kind of gap gave a smaller incubation effect? Answer: One filled with demanding mental work. What does an idea ban forbid? Answer: One named idea, for a set time.

7.3.2 Perfectionism, Fear of Judgement and Comparison

Imagine Leonie, a wedding photographer who has not shared any new work in five months. **Other photographers' pages look better to her, so each album she finishes stays private, and she re-edits every one until the deadline.** On Monday she has three albums open on her screen and a couple waiting for theirs.

No new work shared in five months

- Other photographers' pages look better to her
- Each album she finishes stays private
- She re-edits every one until the deadline

This section is about high standards, the fear of being judged and the habit of comparing yourself with others. **I show you what research says about two kinds of perfectionism and about comparing upwards**, with care, because the evidence is mixed. Leonie's week runs alongside, with three levels of practice to finish.



A wedding photographer at a desk with three photo albums open on a wide screen.

This section is about creative standards, and it is not medical or psychological advice. **If perfectionism brings severe distress, stops you working or harms how you eat or sleep, a clinician can help.** If you feel unsafe, call the emergency services or a crisis line straight away.

When perfectionism brings severe distress

- [x] Severe distress: a clinician can help
- [x] Harm to how you eat or sleep: the same
- [x] If you feel unsafe, call the emergency services or a crisis line

Researchers split perfectionism into parts. **One team began, "We describe three dimensions of perfectionism: self-oriented perfectionism, other-oriented perfectionism, and socially prescribed perfectionism"** (Hewitt & Flett, 1991). Self-oriented means the standards you set for yourself, and other-oriented means the standards you set for other people.

Three dimensions of perfectionism (Hewitt & Flett, 1991)



> **Key Concept:**
>
> Socially prescribed perfectionism. **Socially prescribed perfectionism is believing that other people demand perfection from you.** A trainee choreographer who is sure the company director expects every step to be flawless, though nobody has said so, shows socially prescribed perfectionism.

Leonie's standards come in more than one kind. **Some are her own, such as true skin tones in every print**, and some are borrowed from the people she imagines watching. Her sentences give her away, because many begin with "they will think". Of the seven checks she runs on each album, four come from those imagined watchers.

Her standards come in more than one kind



A later team asked how perfectionism relates to creativity. **They split it into an adaptive kind and a maladaptive kind** (Wigert et al., 2012). The adaptive kind holds a high bar and can live with a mistake, while the maladaptive kind is driven by fear of one and is never satisfied.

Two kinds of perfectionism (Wigert et al., 2012)

Adaptive	Maladaptive
⊕ Holds a high bar	⊖ Driven by fear of one
⊕ Can live with a mistake	⊖ Never satisfied

> **Science Says:**
> The study found that "Adaptive perfectionism was weakly positively related to creativity, whereas maladaptive perfectionism was unrelated to creativity across five of the six measures." Overall, "adaptive perfectionism was consistently, albeit weakly, related to creativity across various types of measures, whereas maladaptive perfectionism was not related to creativity" (Wigert et al., 2012). **The evidence on perfectionism and creativity is mixed, and the helpful link was weak.**

Weakly related means the link was small, so adaptive perfectionism went with only a little more creativity. **The fearful kind showed no link either way on most measures.** This is one study, and it gives no reason to push your standards harder.

The same study looked closer at solutions to everyday problems. **It found "adaptive perfectionism was related to higher quality but not originality of solutions"** (Wigert et al., 2012). Quality and originality are two goals, and adaptive perfectionism went with the first one only. For a maker, that link sat with polish more than with novelty.

Two goals for everyday problems

Goal	Adaptive perfectionism
Quality	Related to higher quality
Originality	Not related

> Exercise:
>
> Try it. Split your standards into **one quality goal and one originality goal**. Keep them apart for 20 minutes.

On Monday afternoon Leonie writes two goals on a sticky note. **Her quality goal is true skin tones in the Morgan album, and her originality goal is one new way to show the first dance.** She gives each goal its own twenty minutes and refuses to mix them.

Two goals on a sticky note



Quality: true skin tones in the Morgan album



Originality: one new way to show the first dance



Twenty minutes each, never mixed

By the end of the forty minutes she has true skin tones on twelve pages and three new ideas for the first dance. **One idea is to shoot the dance from the hotel staircase, looking down through the fairy lights.** Neither goal waited for the other, and neither had to give way.

By the end of the forty minutes



True skin tones on twelve pages



Three new ideas for the first dance



The dance from the hotel staircase

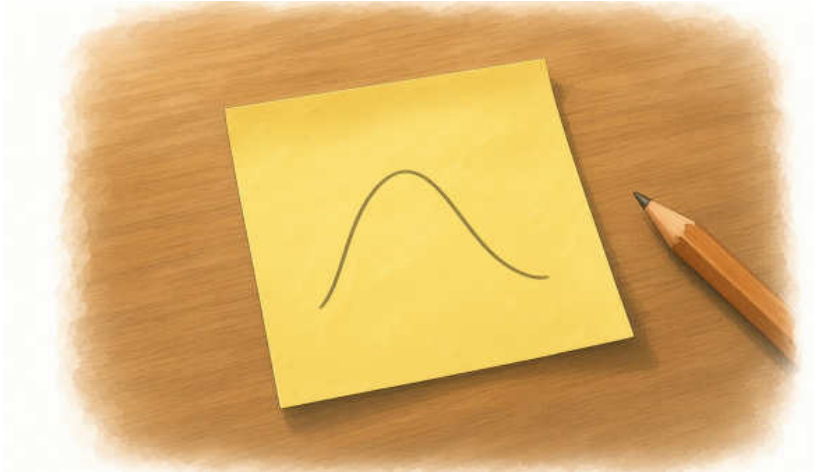
> **Key Concept:**
> Standards split. **A standards split is keeping a quality goal and an originality goal apart for a set time.** A luthier who spends one hour on a clean varnish finish and a separate hour sketching an unusual soundhole shape is using a standards split.

On Tuesday she takes the starter step. **She sets a timer for forty-five minutes on the Morgan album and stops when it rings, with two pages still rough.** The rough pages wait for the next session, and the timer decides when she stops, whatever the urge to redo. She has saved about two hours on her usual Tuesday.

On Tuesday she stops at the timer

- A timer for forty-five minutes
- Two pages still rough
- About two hours saved

The study found a limit to high standards as well. **It reported that "a curvilinear relationship in the shape of an inverted 'U' occurred between adaptive perfectionism and four of eight creativity measures"** (Wigert et al., 2012). An inverted U rises and then falls, so on those measures creativity climbed with standards up to a point and then dropped.



A hand-drawn curve on a sticky note, rising to a peak and falling away again.

Her standards have risen three times this year, each time after a look at someone else's page. **She now checks every face in every frame at full size**, and no album has gone out early since spring. She sees her own week in the shape of that curve, with the bar still rising and nothing new going out.

Her standards have risen three times this year



Each time after a look at someone else's page



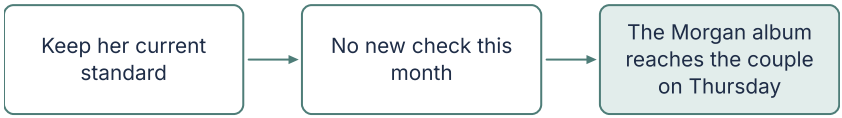
Every face in every frame at full size



Nothing new going out

Her advanced step is to stop raising the bar for a while. **She keeps her current standard, true skin tones and sharp eyes, and adds no new check this month.** The rough pages from Tuesday now have a finish line, and the Morgan album will reach the couple on Thursday, three days before the deadline.

Her advanced step



> **Science Says:**
>
> The first team wrote that “these components contribute to severe levels of psychopathology” and that “A multidimensional approach to the study of perfectionism is warranted, particularly in terms of the association between perfectionism and maladjustment” (Hewitt & Flett, 1991). **Perfectionism has several parts, and some of them are linked to serious distress.**

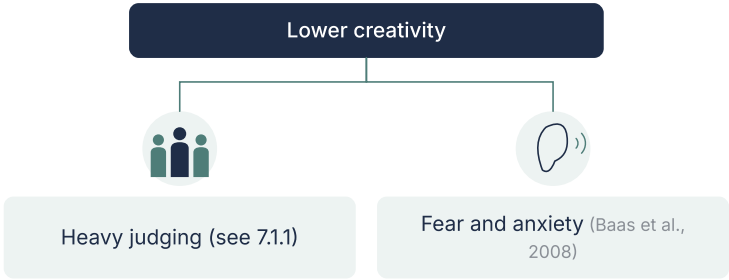
Psychopathology means mental illness, and maladjustment means trouble coping with life. **These words describe what some forms of perfectionism were linked to in research**, and they are a reason for care. They are no label for Leonie or for you.

Words that call for care

> - Psychopathology means mental illness
> - Maladjustment means trouble coping with life
> - No label for Leonie or for you

Fear of judgement is a close cousin of perfectionism. **Heavy judging went with worse creative work in the research on pressure (see 7.1.1)**, and fear and anxiety went with lower creativity in a large mood review (Baas et al., 2008). Leonie’s imagined watchers bring that judging into her studio.

Fear of judgement is a close cousin



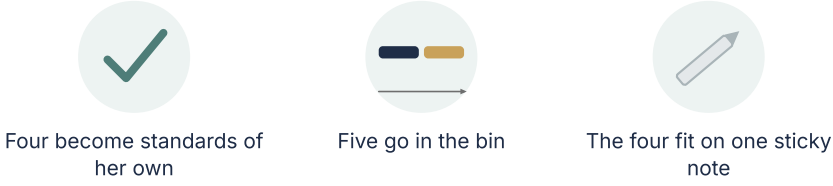
On Wednesday she catches her "they will think" sentences. **"They will think my colours are flat" becomes "I want the colours to match what I saw on the day."** "They will think I copy other photographers" she drops, because it holds no standard of her own.

She catches her they will think sentences



By Wednesday lunchtime she has found nine "they will think" lines in her notes. **Four become standards of her own, and five go in the bin.** The four that stay are short enough to fit on one sticky note above the screen.

Nine they will think lines



> **Key Concept:**
> Benign envy. **Benign envy is wanting what someone else has achieved, with no wish to take it from them.** A young baker who sees a rival's perfect sourdough and goes home to practise her own crust is feeling benign envy.

Comparison is the third pressure in Leonie's week. **The last of four lab studies in one paper found that "an upward social comparison triggered benign envy and subsequent better performance only when people thought self-improvement was attainable"** (van de Ven et al., 2011). Upward comparison means measuring yourself against someone who seems better.

When improvement seemed hard, the result went the other way. **"When participants thought self-improvement was hard, an upward social comparison led to more admiration and no motivation to do better"** (van de Ven et al., 2011). Two earlier studies in the paper measured performance on the Remote Associates Task, "which measures intelligence and creativity", in the authors' words.

Upward comparison (van de Ven et al., 2011)

When self-improvement seemed	Upward comparison led to
Attainable	Benign envy and better performance
Hard	More admiration and no motivation to do better

On Wednesday evening Leonie looks at a rival's page and feels benign envy. **She picks one thing she could learn, the soft window light**

in a bridal portrait, a step within her reach. She books an hour on Saturday to practise it.

One thing she could learn



A rival's page and benign envy



Soft window light in a bridal portrait



An hour on Saturday to practise it

The same steps fit an office. **A council press officer who rewrites every statement eight times splits her goals into one for accuracy and one for a fresh opening line.** She stops at a timer and sends the statement after the fourth draft. Her manager, who once waited two days for a statement, has it before lunch.

A council press officer

Before	After
Eight rewrites of every statement	Sent after the fourth draft
Her manager once waited two days	Has it before lunch

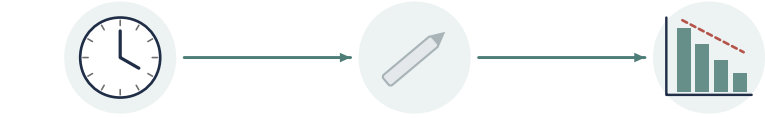
At home a man icing a christening cake for his niece keeps scraping the top off. **He catches the thought "the family will think it looks shop-bought" and drops it.** He keeps one standard, smooth sides, and finishes the cake that evening. At the christening it is cut within ten minutes, scraped top and all.

A man icing a christening cake

- The family will think it looks shop-bought: dropped
- One standard, smooth sides
- Cut within ten minutes

Three levels close this section, and each builds on the last. **The starter stops a draft at the timer even if it is imperfect.** The middle level rewrites "they will think" lines, and the advanced level watches for the inverted U and pauses raising the bar.

Standards that keep work moving, at three levels



The starter stops at the timer

The middle rewrites they will think lines

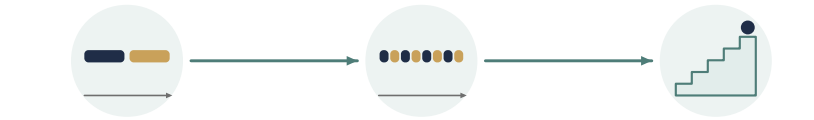
The advanced pauses raising the bar

Exercise:

Standards that keep work moving.

1. Starter. Time-box a deliberately unfinished draft, and **stop at the timer even if it is imperfect**.
2. Middle. Spot socially prescribed lines such as "they will think", and **rewrite each as a self-standard or drop it**.
3. Advanced. Watch for the inverted U. If standards keep rising with no new drafts, **pause raising the bar**.

Keep standards that move work forward



Drop the ones borrowed from imagined watchers

The helpful link is weak

Standards can rise past the point where they help

Key idea:

Keep high standards that move work forward and drop the ones borrowed from imagined watchers, because the evidence is mixed, the helpful link is weak and standards can rise past the point where they help.

Quick check:

What is socially prescribed perfectionism? Answer: Believing that other people demand perfection from you. What did adaptive perfectionism go with in everyday problems? Answer: Higher quality of solutions. When did upward comparison help performance? Answer: Only when people thought self-improvement was attainable.

7.3.3 Changing the Task, the Materials, the Setting or the Pace

Imagine Oskar, a composer, at his studio desk with headphones round his neck. **A cycle shop wants a 20-second tune for a radio advert about its spring sale**, and the brief says only “cheerful and catchy”. He has been at it for four days. Every version he plays back sounds like the last advert he wrote.

A 20-second tune for a radio advert

> - A cycle shop and its spring sale
> - The brief says only cheerful and catchy
> - Every version sounds like the last advert he wrote

Getting stuck at the same desk with the same tools is a common place to be. **This section looks at four simple changes you can make, to the task, the setting, the materials and the pace**, and at what the research says about unusual experiences and ideas. I follow Oskar through the week he finishes the tune.

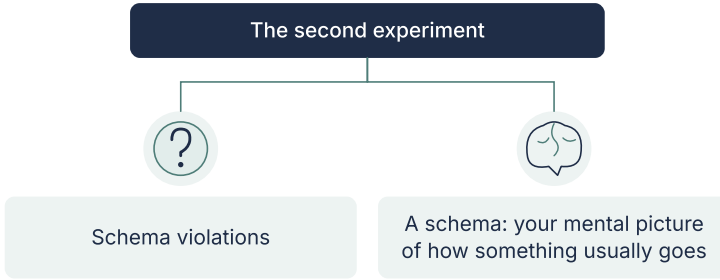
This section is about creative practice, and it is not medical or psychological advice. **Every change here is small, safe and your own choice**, such as a new sentence, a new room or a new instrument. If a change feels unsafe or unwelcome for you, leave it out and pick another one from the list.

Every change here is small, safe and your own choice

- [x] A new sentence
- [x] A new room
- [x] A new instrument

One research team studied unusual experiences and their link with ideas. **One sentence from their paper sets out the second experiment**, “In the second experiment, participants were confronted with schema-violations” (Ritter et al., 2012). A schema is your mental picture of how something usually goes. Schema violations were one kind of unusual event in the study.

Unusual experiences and ideas (Ritter et al., 2012)



> **Key Concept:**
>
> Schema violation. **A schema violation is an event that breaks your picture of how something usually goes.** A diner who orders breakfast and is served the meal in reverse order, with coffee first and cereal at the end, meets a schema violation. Each item on the plate is normal, and only the order breaks the picture.

Oskar's schema for an advert tune is fixed after years of work. **Bright major key, bouncy bass, four bars and a rising finish**, all played at the same desk on the same keyboard. The tunes come out tidy and alike, and the cycle shop's two-word brief gives him nothing to push against.

His schema for an advert tune



The first change he makes is to the task itself. **He rewrites the brief in one new sentence, "Twenty seconds that sound like the first**

warm Saturday of the year, when everyone gets their bike out of the shed." The new sentence gives the tune a scene and a feeling, where the old brief gave two adjectives.

The first change is to the task itself

The old brief	The new sentence
⊕ Cheerful and catchy	⊖ The first warm Saturday of the year
⊕ Two adjectives	⊖ A scene and a feeling

> Exercise:
>
> Try it. **Change only how the task is framed.** Rewrite the prompt in one new sentence, then work on it for 15 minutes.

The new sentence changes what Oskar listens for. **He stops chasing "catchy" and hums what a warm Saturday might sound like**, a squeak of brakes, a laugh, a gate swinging open. Fifteen minutes later he has no tune yet, and he has three sounds he wants to hear in one.

Three sounds he wants to hear in one



A squeak of brakes



A laugh

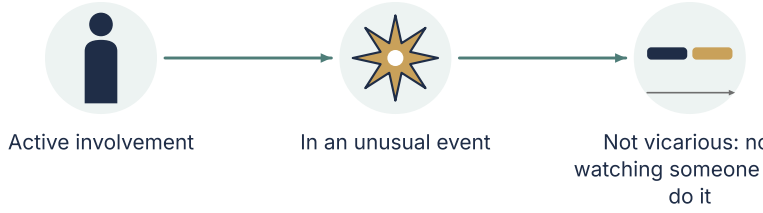


A gate swinging open

The study at the heart of this section looked at what its authors called a diversifying experience. **The team gave this a careful meaning, "defined as the active (but not vicarious) involvement in an**

unusual event" (Ritter et al., 2012). Vicarious means watching someone else do it.

A diversifying experience



> **Science Says:**
>
> Ritter's team compared people who took an active part in an unusual event with people who took part in normal experiences, either actively or by watching (Ritter et al., 2012). **Active involvement in the unusual event went with better results on the idea task**, and the team linked the outcome to creative thinking. This was a lab study, and the result concerns idea creativity on that task alone.

> **Key Concept:**
>
> Active involvement. **Active involvement means taking part in an event with your own hands and choices.** The difference from watching is who makes the choices. A child who helps bake bread is actively involved, and her brother watching from the doorway is a spectator.

A schema violation in daily work can be small. **Swap one usual tool, break one habit of order or start a piece from its end**, and your

picture of how the job goes no longer fits. The study's violations were set up in a lab, so treat these everyday versions as practice.

A schema violation in daily work can be small

- [x] Swap one usual tool
- [x] Break one habit of order
- [x] Start a piece from its end

On Tuesday Oskar moves his work out of the studio. **He sets up a small keyboard on the dining room sideboard**, with the window behind him and the garden in view, and keeps working on the same tune with the same brief. Nothing else changes, and he gives it fifteen minutes on the clock.



A small keyboard on a dining room sideboard with a garden visible through the window.

The new room gives him one useful thing. **Standing at the sideboard, he plays a little faster and a little lighter**, and a two-note figure

from the bass line sounds like a bicycle bell. He writes it down before the fifteen minutes are up and carries it back to the studio.

The new room gives him one useful thing



A little faster and a little lighter



A two-note figure like a bicycle bell



Carried back to the studio

A setting change keeps the work going, and only the surroundings move. **The problem stays in front of you the whole time**, the same brief and the same tune in a new place. Tidy the new spot first, so the move itself takes only a few minutes.

A setting change keeps the work going

- The same brief and the same tune
- Only the surroundings move
- Tidy the new spot first

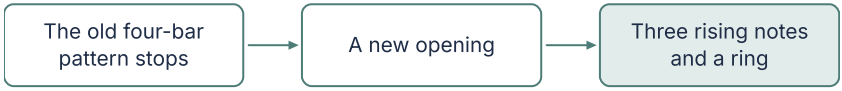


A child’s glockenspiel on a desk with a wooden beater resting across the metal bars.

On Wednesday Oskar borrows his daughter Liv's glockenspiel, a toy he has never used in a session. **He plays the bicycle-bell figure on the metal bars with a wooden beater**, and the bright, ringing notes break his usual sound. The bars sit in a single line, so he has to find each note again.

The glockenspiel works like a small schema violation. **His hands expect keys and get bars**, so the old four-bar pattern stops coming out on its own. By the end he has a new opening, three rising notes and a ring, that sounds nothing like his last advert. The middle drill aims for this kind of small, safe change.

His hands expect keys and get bars



Picking the new tool takes a little care. **Choose one that is safe, cheap and close to hand**, such as a child's instrument, a different pen or an app you have never opened, and use it on the real task. Skip any tool that needs a manual or a shop trip.

Picking the new tool

Choose	Skip
Safe, cheap and close to hand	Any tool that needs a manual
A child's instrument or a different pen	A shop trip

On Thursday Oskar changes only the pace. **He plays the tune at half speed for a careful twenty-minute pass**, checking every note. Then, on the same prompt, he sets a timer for a five-minute burst and plays as

many quick versions as he can. He keeps the same brief and the same keyboard for both runs.

On Thursday only the pace changes

Run	Speed	Timer
A careful pass	Half speed	Twenty minutes
A burst	As many quick versions as he can	Five minutes

> **Key Concept:**
>
> Pace change. **A pace change is a switch in working speed on the same task**, such as a slow, careful pass and then a fast, timed burst. A potter who throws one bowl slowly and with care, then five quick bowls in five minutes, is making a pace change. The switch between speeds is the point of the drill.

Pace is a lever you can pull on any task, from a sketch to a page of notes. **Write both timings down before you start**, so the slow pass stays slow and the burst stays short. A large review of breaks found a positive incubation effect overall, though earlier studies were mixed (Sio & Ormerod, 2009).

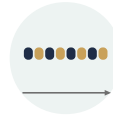
Write both timings down before you start



The slow pass stays slow



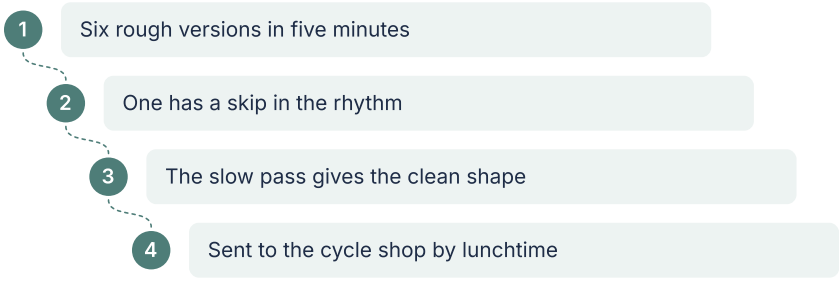
The burst stays short



A positive incubation effect overall (Sio & Ormerod, 2009)

The burst gives Oskar six rough versions in five minutes, and one has a skip in the rhythm he likes. **The slow pass gives him the clean shape to hold it.** He joins the two, records the tune on Friday morning and sends it to the cycle shop by lunchtime.

From burst to finished tune



Delay is a fifth change, with its own drill of a timed gap (see 7.3.1). **This section keeps to the four changes you can make while you stay at the task**, and incubation as a stage of creative work belongs to 1.3.2. Reach for a delay when a new room or a new tool leaves the problem stuck.

Delay is a fifth change



A school librarian planning a reading display can use the same moves. **She rewrites her brief as "a shelf that makes a ten-year-old stop walking"**, moves her planning to the staff room and builds the mock-up from coloured paper she never uses. Then she tries one slow

plan and one five-minute burst. The display goes up the following Monday.

A school librarian planning a reading display

Change	Her move
The task	A shelf that makes a ten-year-old stop walking
The setting	The staff room
The materials	Coloured paper she never uses
The pace	One slow plan and one five-minute burst

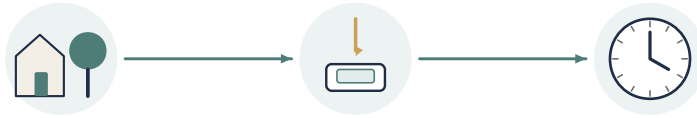
No study in this section tests these changes one by one, so treat each change as a short test on your own work, and a dud costs little. Notice which change moved the work, and keep that one ready for the next stuck day. Jot the change and what happened in one line, so you can compare across weeks.

No study tests these changes one by one

Day	1	2	3	4	5	6	7
A short test on your own work	☐	☐	☐	☐	☐	☐	☐
Notice which change moved the work	☐	☐	☐	☐	☐	☐	☐
Jot the change in one line	☐	☐	☐	☐	☐	☐	☐

The closing exercise takes one change at each level. **The starter moves only the room or the desk, the middle level brings in a new tool and the advanced level changes the pace**, all on the same problem, so the effect of each change stays easy to see. If this is new to you, begin with the starter.

Change one thing, at three levels



The starter moves only the room or the desk

The middle brings in a new tool

The advanced changes the pace

Exercise:

Change one thing.

1. Starter. **Change the room or desk setup only**, and keep the same problem for 15 minutes.
2. Middle. Use a tool or material you never use for this task.
3. Advanced. Change pace only, with a half-speed careful pass and then a timed burst on the same prompt.

Change one thing at a time



The task, the setting, the materials or the pace

Take an active part in the change

The evidence on any single change is mixed

Key idea:

Change one thing at a time, the task, the setting, the materials or the pace, as practice, and take an active part in the change, since active involvement in unusual events went with better idea results in one lab study, while the evidence on any single change is mixed.

Quick check:

What is a schema violation? Answer: An event that breaks your picture of how something usually goes. What does vicarious mean? Answer: Watching someone else do it. What is a pace change? Answer: A switch in working speed on the same task. Which group did better on the idea task in the study? Answer: People actively involved in an unusual event.

7.4 Building a Life That Includes Creation

7.4.1 Protecting Time and Making a Place to Work

Imagine Precious, a midwife on night shifts who makes quilts in her spare time. **Her sewing table doubles as the family's pile for post and homework**, and the quilt for her sister's new baby has not moved in two months. She means to sew most afternoons, and most afternoons the pile wins.

Her sewing table doubles as the family's pile

> - Post and homework
> - The baby quilt has not moved in two months
> - Most afternoons the pile wins

This section is about protecting a time and a place for creative work. **I show you what a habit study found about repeating something in the same setting**, and why the setting around you matters to creativity at all. Precious tries it over a fortnight, with three levels of practice at the end.

This section is about routines for creative work, and it is not medical or psychological advice. **The habit research here studied eating, drinking and activity habits, so it promises nothing about how good your art becomes or by which day.** Night work brings its own sleep questions, and those belong with your doctor.

Routines for creative work, not medical advice

- [x] The habit research studied eating, drinking and activity habits
- [x] It promises nothing about your art
- [x] Night work sleep questions belong with your doctor

One early paper on creativity looked beyond the person, and its "discussion emphasizes the previously neglected social factors and highlights the contributions that a social psychology of creativity can make" (Amabile, 1983). Social psychology studies how the people and settings around us shape what we do. A sewing table under a pile of post is part of that setting.

Looking beyond the person (Amabile, 1983)



The previously neglected social factors



The people and settings around us



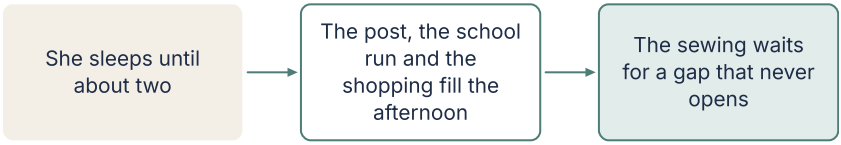
A sewing table under a pile of post

> **Key Concept:**
>
> Protected block. **A protected block is a set time kept for creative work and guarded from other demands.** A calligrapher who keeps the first hour of every Sunday for lettering, with the door shut and the radio off, has a protected block. Visitors who ring during that hour are called back after it.

Precious sleeps until about two after a night shift. **Then the post, the school run at quarter past three and the shopping fill the afternoon**, and the sewing waits for a gap that never opens. She has

time on most days, but no single time belongs to the quilt. By evening she is getting ready for the next shift.

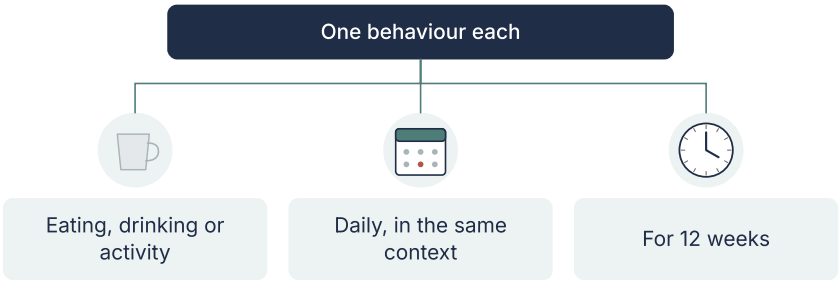
An afternoon after a night shift



Earlier in the book you met a habit study and its median of 66 days (see 4.12.6). **This section uses other parts of that study**, about who took part and what went with smoother habit curves. None of it sets a deadline for a habit, creative or otherwise.

The study began with ordinary volunteers and ordinary habits. **"96 volunteers chose an eating, drinking or activity behaviour to carry out daily in the same context (for example 'after breakfast') for 12 weeks"** (Lally et al., 2010). A context is the place or moment in which something is done, such as after breakfast or at the same desk.

The study began with ordinary volunteers (Lally et al., 2010)



The records were kept daily. **"The majority (82) of participants provided sufficient data for analysis"** (Lally et al., 2010), so fourteen of the 96 gave too little to study. The findings rest on those 82 people.

Who gave the findings (Lally et al., 2010)



> Exercise:
>
> Try it. Pick one cue, the same seat or the same time after something. **Do a 20-minute create block today.**

On a Monday, Precious picks her cue. **Straight after her post-shift sleep, with her first cup of tea, she sits in the same chair at the sewing table.** That gives her one place and one moment, the two parts of a context. She props a card reading “tea, chair, sew” against the machine.

Precious picks her cue



On that first Monday she sews for twenty minutes and stops. **She pieces four squares of the baby quilt, the first new squares since the summer.** The quilt needs thirty-six, so four is a small start. The pile is still on the table, pushed to one side, and she knows it will need moving.

Twenty minutes on that first Monday



Four squares of the baby quilt



The quilt needs thirty-six



The pile pushed to one side

> **Science Says:**
>
> The study found that "With repetition of a behaviour in a consistent context, automaticity increases following an asymptotic curve which can be modelled at the individual level." It added that "Performing the behaviour more consistently was associated with better model fit" (Lally et al., 2010). **Repeating something in the same setting made it feel more automatic, rising quickly at first and then levelling off.** Steadier repetition was associated with curves that fitted each person better.

Automaticity means how automatic a behaviour feels. **Model fit is how well a smooth curve matched each person's own scores.** The fit describes the curve and says nothing about how well anything was made. The short, regular blocks in this section are practice advice, with no study behind any set length.

Two words from the study

- Automaticity: how automatic a behaviour feels
- Model fit: how well a smooth curve matched each person's scores
- The fit says nothing about how well anything was made

The same study found that a single missed day did little harm (Lally et al., 2010). **On Wednesday Precious is called in for an extra shift and misses her block.** On Thursday she sits down after her sleep and tea as before, and the cue still works. The missed Wednesday goes in her notes as a shift.

A single missed day did little harm

Wednesday	Thursday
⊕ An extra shift	⊖ Sleep and tea as before
⊕ No block	⊖ The cue still works

> 🔑 **Key Concept:**
>
> Context cue. **A context cue is the same place or moment that starts a habit.** A bus-station cleaner who learns one Welsh word each time she sits on the same bench with her tea is using a context cue.

On Tuesday evening she takes the starter step. **She moves the post into a box on the hall shelf, takes the homework to the kitchen table, threads the machine and leaves her phone in the bedroom.** All of it happens before the cue, so the block starts with sewing. The whole job takes about ten minutes.

The starter step on Tuesday evening

Before the cue	Where it goes
The post	A box on the hall shelf
The homework	The kitchen table
Her phone	The bedroom

A cleared table gives her more say over the block. **Less say went with worse creative work in the research on pressure** (Byron et al., 2010), and a pile that can spill onto the fabric takes some say away. With the table cleared, the twenty minutes are hers from the first stitch, and none of them goes on moving letters.

A cleared table gives her more say

- Less say went with worse creative work (Byron et al., 2010)
- A pile can spill onto the fabric
- The twenty minutes are hers from the first stitch



A cleared sewing table with a threaded machine, pinned quilt squares and a cup of tea.

On Friday her daughter suggests she finish the binding round the edge. **Precious chooses the appliqué hare for the centre square herself**, because the hare is the part she wants to sew. The binding can wait for another week. Having the say over what you do is one of the needs behind self-motivation (Ryan & Deci, 2000).

Precious chooses the appliqué hare herself



Her daughter suggests the binding



The hare is the part she wants to sew



Having the say over what you do

Her reasons stay her own while she sews. **In one study, thinking about rewards before writing went with less creative poems** (Amabile, 1985). Precious keeps the quilt about her sister's baby and leaves the craft fair out of her mind. That study used poems, so for a quilt it is a hint and no more.

Her reasons stay her own

- Thinking about rewards went with less creative poems (Amabile, 1985)
- The quilt stays about her sister's baby
- For a quilt it is a hint and no more

Key Concept:

Ready place. **A ready place is a work spot set up before the time begins.** A watch repairer who lays out tweezers, a loupe and a clean cloth the night before has a ready place waiting in the morning, with nothing to fetch before the first repair.

For the advanced level she keeps a log for fourteen days. **Each day gets a tick if she kept the cue and a score from 1 to 5 for how automatic the start felt.** Nothing in the log rates the quilt, because the log tracks the habit and the quality of the sewing is a separate matter.

A log for fourteen days

Each day gets	Nothing in the log rates
A tick if she kept the cue	Any rating of the quilt
A score from 1 to 5 for how automatic the start felt	The quality of the sewing

After fourteen days the log shows eleven ticks. **She missed the extra shift on Wednesday, one afternoon when she slept late and one Sunday family lunch.** Her automatic score rose from 1 on the first Monday to 3 by the second Friday. The log cannot show where her curve will flatten.

After fourteen days the log shows eleven ticks



The extra shift on Wednesday



One afternoon when she slept late



One Sunday family lunch

Because the study modelled each person separately, **your own earlier days are the fair comparison for your log**, and someone else's fortnight a poor one. Precious compares her second week with her first, and her second week starts more easily. She scores the automatic feel in the first minute, before the sewing itself can sway the number.

Your own earlier days are the fair comparison

- The study modelled each person separately
- Her second week starts more easily
- She scores the automatic feel in the first minute

The same steps fit a working day. **An airport baggage handler who sketches aeroplanes uses the first ten minutes of each break, in the same canteen seat, as his cue.** He keeps his pencils in his locker, ready, and logs the breaks he keeps for two weeks. By the second week he reaches for the sketchbook as he sits down.

An airport baggage handler who sketches aeroplanes



The first ten minutes of each break



The same canteen seat



Pencils ready in his locker



A staff canteen table by a window at an airport, with a sketchbook and pencils beside a mug of tea.

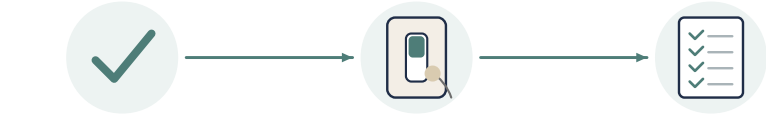
At home a grandmother who writes poems sits at the kitchen window straight after the washing-up. **Her notebook and pen live on the windowsill, so the place is ready before she is.** She chooses each evening's poem herself and ticks the evenings she keeps. On late evenings she still sits down for five minutes, so the cue stays alive.

A grandmother who writes poems

- Straight after the washing-up, at the kitchen window
- Notebook and pen live on the windowsill
- Five minutes on late evenings

Three levels close this section, and each builds on the last. **The starter prepares the place once, before the cue.** The middle level gives you the say over the task inside the block, and the advanced level logs the cue for fourteen days with nothing on product quality. Every level keeps the same cue and the same place.

A time and a place, at three levels



The starter prepares the place once

The middle gives you the say over the task

The advanced logs the cue for fourteen days

Exercise:

A time and a place.

1. Starter. Prepare the place once, with **a clear surface, tools ready and the phone out of reach** before the cue.
2. Middle. Raise your autonomy by **choosing the task inside the protected block yourself**.
3. Advanced. **Log cue adherence for 14 days**, and note how automatic it feels, with nothing on product quality.

Give creative work one cue and one ready place



The same place or moment

A work spot set up before the time begins

Steadier repetition, better model fit

Key idea:

Give creative work one cue and one ready place, because repeating something in a consistent setting made it feel more automatic in a health habit study, and steadier repetition was associated with better model fit.

Quick check:

What is a context cue? Answer: The same place or moment that starts a habit. What kind of habits did the study use? Answer: Eating, drinking and activity habits, done daily in the same context. What was linked to better model fit? Answer: Performing the behaviour more consistently. What does the advanced log leave out? Answer: Product quality, since the log tracks the habit alone.

7.4.2 New Experiences, Encouraging People and Honest Feedback

Imagine Fergus, a bus driver who writes short radio plays in his spare time. **He has just joined a writers' group at the town library, where one member, Gwen, gives every script a mark out of ten.** His first script got a four, and he has written nothing new since.

A writers' group at the town library

- Gwen gives every script a mark out of ten
- His first script got a four
- He has written nothing new since

This section is about the people and experiences that keep creative work moving. **I show you what two studies found about feedback, creative colleagues and being watched closely**, and how new experiences fit alongside them. Fergus's month runs through it, with three levels of practice at the end.

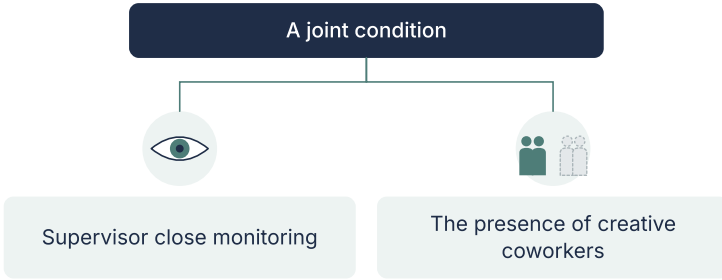
This section is about creative feedback and new experiences, and it is not medical or psychological advice. **Every new experience here is safe and chosen freely**, such as a new route, a new tool or a new task with someone else. Nothing here asks you to seek out hardship or harm for the sake of ideas.

Every new experience here is safe and chosen freely

- [x] A new route
- [x] A new tool
- [x] A new task with someone else

A field study of workplaces set out to look at two things together. **"Study 1 was conducted to examine the contribution of the joint condition of supervisor close monitoring and the presence of creative coworkers to employees' creativity"** (Zhou, 2003). A joint condition means two things happening at once, here a watchful boss and creative colleagues.

A field study of workplaces (Zhou, 2003)



> **Key Concept:**
>
> Close monitoring. **Close monitoring is a supervisor checking work at every step.** A trainee plasterer whose foreman inspects each square metre before the next can be started is working under close monitoring.

Fergus's group has its own version of close watching. **Gwen reads each script as it is written and marks it in front of everyone.** He has started to write with her pen in mind, and his new opening has been crossed out three times.

His group has its own close watching



New experiences come first in his month. **Taking part yourself in something out of the ordinary, more than looking on, is the idea met earlier (see 7.3.3).** So Fergus looks for something to do, more than something to watch.

On his night off he rides the last loop of his own route as a passenger. **For the first time in years he sits upstairs at the back and notices how people talk at midnight.** He writes down the rhythm of the talk in his notebook and leaves out names and faces.

The last loop of his own route



The ride is an active experience tied to his project. **He chose it, it is safe and it gives his play a setting he has never sat in.** By the end of the loop he has a new opening scene, two strangers sharing the back seat.

An active experience tied to his project

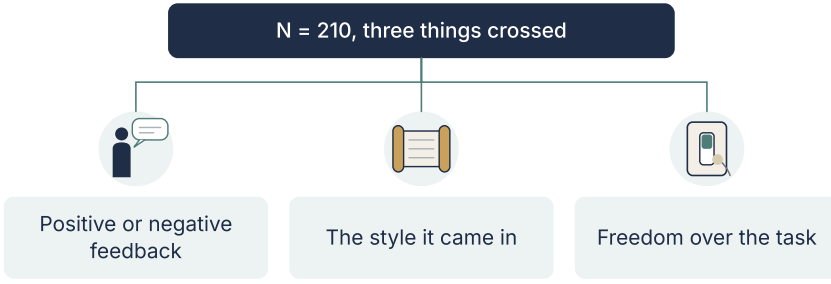
- [x] He chose it
- [x] It is safe
- [x] A setting he has never sat in

> **Exercise:**
>
> Try it. Take part in **one active new experience tied to your project**, more than watching.

Openness to new experience is linked with creative people (Feist, 1998). **Fergus's ride is a small, safe taste of it**, on a route he already knows.

An earlier study by the same author looked at feedback in a laboratory role-play (Zhou, 1998). **It reported "N = 210" for its role-play.** The design crossed three things, whether feedback was positive or negative, the style it came in and how much freedom people had over their task.

A laboratory role-play (Zhou, 1998)



Science Says:

The study found that "individuals who received positive feedback delivered in an informational style, and who worked in a high task autonomy work environment, generated the most creative ideas." Further, "This 3-way interaction held regardless of the participants' differences in achievement orientation" (Zhou, 1998). **Encouraging, informative feedback together with freedom over the task went with the most creative ideas.**

An informational style offers feedback as information for the person to use, with no pressure attached. **A 3-way interaction means the three conditions worked together**, with high task autonomy as the third. Achievement orientation is how strongly someone is driven to succeed, and the result held whatever that drive.

The three conditions worked together

- Positive feedback in an informational style
- High task autonomy
- The result held whatever the achievement orientation

This is one laboratory study. **It shows what happened in one role-play**, and it gives a template for feedback more than a law. Heavy judging went with worse creative work in the research on pressure (Byron et al., 2010), so honest feedback and a mark in front of a room are two different things.

Two different things

Honest feedback	A mark in front of a room
A template for feedback	Heavy judging
From one role-play	Worse creative work (Byron et al., 2010)

Key Concept:

Informational feedback. **Informational feedback is a comment that says what to try next, with no score or ranking.** A pottery tutor who tells a student "a thinner rim would let the glaze pool here" has given informational feedback.

At the next meeting Fergus takes the starter step. **He asks Agnes, a retired teacher in the group, what he should try next with his new opening, and asks for no mark.** She says the two strangers could each want something from the other.

The starter step at the next meeting



He asks Agnes what to try next



He asks for no mark



The two strangers could each want something

That is a single, useful idea. **It points at the scene and leaves the choosing to him**, which fits the informational style in the study. He goes home and gives the first stranger a reason to start talking.

Back in workplaces, Zhou's 2003 study found that **"when creative coworkers were present, the less supervisors engaged in close monitoring, the more employees exhibited creativity"** (Zhou, 2003). Creative people nearby went with more creativity when nobody was hovering over the work.

In Fergus's group, Gwen's marks work like close monitoring, and Agnes is a creative colleague. **He asks Gwen whether she would hold her marks for one meeting.** She agrees to give each writer one idea that night and no number.

Fergus's group

Gwen	Agnes
⊕ Her marks work like close monitoring	⊖ A creative colleague
⊕ One idea that night and no number	⊖ A retired teacher

> **Science Says:**
>
> For creative coworkers with less close monitoring, the 2003 study found that "the contribution of this joint condition was stronger for employees with less creative personalities." In a separate finding, "when creative coworkers were present, the more supervisors provided developmental feedback, the more employees exhibited creativity" (Zhou, 2003). **The coworker and monitoring link was stronger for people lower on a creative personality measure, and the feedback link was separate.**

The night without marks feels different to Fergus. **Three writers read new pages aloud, where most weeks only one does.** Gwen's single idea for him, to cut the first line of his scene, is the most useful note she has given him.

A night without marks



Three writers read new pages aloud



Most weeks only one does



Cut the first line of his scene

Supervisor behaviour is linked to creative belief as well (Tierney & Farmer, 2002). Treat the feedback steps in this section as practice for your own group.

> **Key Concept:**
>
> Developmental feedback. **Developmental feedback is a note aimed at helping someone learn and grow over time.** A head chef who tells a new cook "next month, try seasoning each stage and tasting as you go" is giving developmental feedback.

For the middle level Fergus finds a creative colleague of his own. **Hywel, a playwright he met in the library queue, writes at the café on the high street on Saturday mornings.** They sit at the same table for two hours, each on his own script, and neither reads the other's pages.

A creative colleague of his own



Hywel, a playwright from the library queue



Saturday mornings at the café



Two hours, each on his own script

Nobody checks Fergus's pages that morning. **He writes six pages of the new play, more than in the whole month before.** Hywel's steady typing across the table keeps him at it without a word about the script.



Two men writing at a small café table, one on a laptop and one in a notebook.

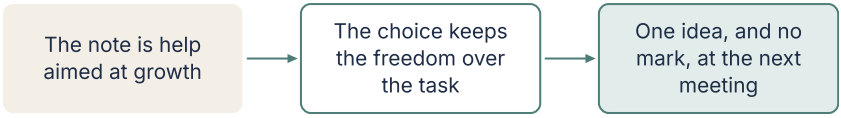
Before he leaves, Hywel offers one developmental note. **“Over the next few scenes, let the bus itself make a sound the audience starts to wait for.”** Fergus decides how to use it, and he keeps the note for scene four, where the bus stops for too long.

One developmental note

- Let the bus make a sound the audience starts to wait for
- Fergus decides how to use it
- He keeps the note for scene four

Choosing how to use a note is the advanced level. **The note is help aimed at growth, and the choice keeps the freedom over the task that went with more creative ideas in Zhou’s 1998 study.** At the next group meeting Fergus reads his new scene aloud and asks for one idea, and no mark.

Choosing how to use a note



The same steps fit a working day. **A scaffolder who wants better ways to rig awkward jobs spends a morning on a site where a different crew works, and asks their foreman for one thing to try.** He picks which idea to use on his own next job.

The same steps fit a working day

Step	A scaffolder
A new experience	A morning on a site where a different crew works
Informational feedback	One thing to try from their foreman
Autonomy	He picks which idea to use

At home a woman learning to make garden mosaics works on a stepping stone alongside a more skilled friend. **She asks her friend what to try next, and her friend leaves her to work without hovering.** She chooses which of her friend's notes to use on the second stone.



Two mosaic stepping stones drying on a garden table beside tile nippers and broken china.

Three levels close this section, and each builds on the last. **The starter asks one peer for informational feedback with no score.** The middle level works near a creative peer with less close monitoring, and the advanced level chooses how to use a developmental note.

People and feedback, at three levels



The starter asks one peer, with no score

The middle works near a creative peer

The advanced chooses how to use a developmental note

At the end of the month Fergus finishes the play, with the bus sound in scene four and the two strangers at the back. **He enters it for a local radio station's open call for new writing.** Hywel reads it first, and the only note Fergus asks for is what to try next.

> Exercise:
>
> People and feedback.
>
> 1. Starter. Ask one peer for **informational feedback on what to try next**, with no score.
> 2. Middle. Work near a creative peer and **reduce close monitoring for one session**.
> 3. Advanced. Pair developmental feedback with autonomy by **choosing how to use the note** yourself.

Seek new experiences and creative company



Key idea:

Seek active new experiences, informative feedback and creative company without hovering, because informational feedback with freedom went with the most creative ideas in one lab study, and creative coworkers went with more creativity alongside less close monitoring or more developmental feedback.

Quick check:

What is informational feedback? Answer: A comment that says what to try next, with no score or ranking. When did creative coworkers go with more creativity in the 2003 study? Answer: With less close monitoring, and separately with more developmental feedback. For whom was the coworker and monitoring link stronger? Answer: Employees with less creative personalities. What is close monitoring? Answer: A supervisor checking work at every step.

7.4.3 Returning After a Break, a Setback or a Major Life Change

Imagine Dilys, 58, who closed her florist's shop in March after twenty years behind the counter. **She has not painted since her watercolour class stopped three years ago**, and her paints sit in a biscuit tin on top of the wardrobe. Most mornings are now her own, and she has no idea where to start.

Twenty years behind the counter

- She closed her florist's shop in March
- No painting since her class stopped three years ago
- Her paints sit in a biscuit tin on top of the wardrobe

This section is about coming back to creative work after a busy year, a setback or a big change in your life. **I show you what a large review found about hands-on skills that go unused**, and how to make a first return small and kind. Her first fortnight back runs alongside, with three levels to finish.



A biscuit tin of watercolour paints and brushes on a bed, beside a pad of paper with a few faded pages.

This section is about creative routines, and it is not medical or psychological advice. **A major life change, grief, trauma or a mental health crisis needs professional support from your doctor or a counsellor.** If you feel unsafe, call the emergency services or a crisis line straight away, because creative practice is no treatment.

When a life change needs professional support

- [x] Grief, trauma or a mental health crisis needs professional support
- [x] From your doctor or a counsellor
- [x] If you feel unsafe, call the emergency services or a crisis line

A hard time is no creative method either. **The belief that suffering makes great art has its own section (see 7.1.2)**, and this one takes the gentler road. Dilys's gap came from a busy shop and a closed class, and she needs no story about pain to start again.

A hard time is no creative method



The suffering belief has its own section (see 7.1.2)



A busy shop and a closed class



No story about pain needed

> **Key Concept:**
>
> Creative thread. **A creative thread is one strand of past creative work that can carry on into a changed life.** A woman who once darned her children's socks and now darns bright visible patches on her own jeans has kept a creative thread.

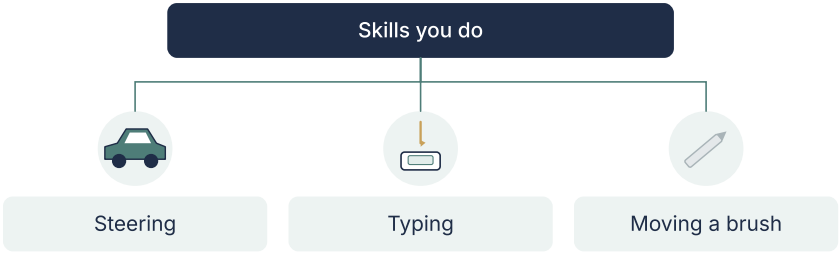
Earlier reviews of fading skills "were based on a modest number of studies, most with short retention intervals." **So the authors wrote, "We report a meta-analysis of skill retention that aims to address these gaps"** (Tatel & Ackerman, 2025). A retention interval is the time between learning a skill and being tested again.

A meta-analysis of skill retention (Tatel & Ackerman, 2025)

- Earlier reviews: a modest number of studies
- Most with short retention intervals
- A retention interval: the time between learning and testing again

The review covered "procedural skills involving motor components" (Tatel & Ackerman, 2025). **A procedural skill is one you do, such as steering, typing or moving a brush, and motor means it uses the body's movements.** The review says nothing about creativity, so it speaks only to the hands-on side of a craft.

Procedural skills involving motor components



The review measured skills in three ways. **Accuracy is how exactly a skill is done, speed is how fast, and mixed performance combines the two.** Watercolour leans on both, a steady hand for a clean edge and a quick one before a wash dries. Dilys will notice both in her first week.

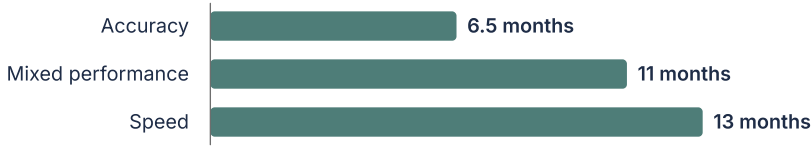
The review measured skills in three ways

Measure	Means
Accuracy	How exactly a skill is done
Speed	How fast
Mixed performance	Combines the two

> **Science Says:**
>
> The review drew on a large body of work. "A search led to the inclusion of 1,344 effect sizes from 457 reports." It found that "With lack of use, half of initial skill acquisition performance gains were lost after approximately 6.5 months for accuracy, 13 months for speed, and 11 months for mixed performance" (Tatel & Ackerman, 2025). **Hands-on skills faded with disuse, at different rates for accuracy and speed.**

Performance gains are the improvement people made while first learning a skill. **Accuracy faded fastest of the three measures**, and speed held on longest. These figures are averages across many studies and many kinds of task, and they give no forecast for any one person.

Half the gains lost after about (Tatel & Ackerman, 2025)



The authors also listed what might change the rate. **"Task type, task complexity, intermittent performance opportunities, and task instructions were identified as possible moderators of skill decay rates"** (Tatel & Ackerman, 2025). A moderator is something that

changes how strong an effect is, and “possible” means the authors held these loosely.

Possible moderators of skill decay rates



Task type and task complexity



Intermittent performance opportunities



Task instructions

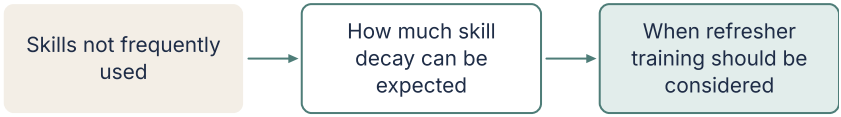
For Dilys this explains the first wobbly lines without judging her. **Three years without a brush is a long time for a hands-on skill**, so some of her control may have faded. That makes a small, private start the sensible first step. She expects the first pages to look rusty.

The first wobbly lines, without judging her

- Three years without a brush is a long time
- Some of her control may have faded
- A small, private start is the sensible first step

The authors ended on training. “Findings provide researchers with estimates of how much skill decay can be expected if skills are not frequently used and, therefore, when refresher training should be considered” (Tatel & Ackerman, 2025). Refresher training is a short burst of practice that brings a faded skill back up, and a few plain washes are a painter’s version.

The authors ended on training



> Exercise:
>
> Try it. In your first session after a break, **work for 15 minutes, in private, with no audience and no score**.

On a Monday morning Dilys takes the tin down and paints for fifteen minutes at the kitchen table. **Nobody sees the page, and she gives it no mark.** She paints three washes of blue to see how the water moves, then washes the brush and puts the tin on the dresser.

A page nobody sees



Light judging went with better creative work than none at all, and heavy judging with worse (Byron et al., 2010). That finding compares light judging with none, so it gives no backing to a session with no judging at all. The private first session is practice advice, and heavier judging, such as a show or a class critique, can wait.

What the research on judging compared (Byron et al., 2010)

Judging	Creative work
Light	Better than none at all
Heavy	Worse

> **Key Concept:**
>
> Low-stakes return. **A low-stakes return is a first session back with no audience and no score.** A harmonica player who returns after five years by playing one tune in his garden shed, with the door closed, has made a low-stakes return.

On Tuesday she takes the starter step. **She writes "stopped June 2023" and "restarted 9 November 2026" on the inside of the tin lid**, and under the dates she writes "a break". The gap gets a name and no verdict. The lid is the first thing she sees each morning.

Two dates inside the tin lid



Stopped June 2023



Restarted 9 November 2026



Under the dates: a break

A single missed day did little harm (Lally et al., 2010). **Beliefs about creativity can be fixed or open to growth** (Zhou et al., 2020), and "a break" keeps hers open. Her cue from now on is feeding the birds.

The gap gets a name and no verdict

- A single missed day did little harm (Lally et al., 2010)
- A break keeps her belief open to growth
- Her cue: feeding the birds

For the middle level she chooses a smaller re-entry scope. **She finds one unfinished painting from the class, a jug of anemones with the jug done and the flowers bare.** The other half-finished pages go in a folder for a week. In lab work on stuck problems, a delayed retest went with more improvement (Smith & Blankenship, 1991).

A smaller re-entry scope

Restart first	Park for a week
⊕ One unfinished painting	⊖ The other half-finished pages
⊕ A jug of anemones, the flowers bare	⊖ In a folder

Belief in your own creative ability goes with creative work (Tierney & Farmer, 2002; Haase et al., 2018), and finishing one small thing gives belief something to rest on. **The anemones take her three short sessions across the week.** On Friday the painting is finished, a little stiff at the edges and finished all the same.

Three short sessions across the week



Finishing one small thing



Belief gets something to rest on



Finished on Friday, a little stiff at the edges

> 🗝 **Key Concept:**
> Re-entry scope. **Re-entry scope is the small part of your old work you choose to restart first.** A man whose children have left home goes back to his model railway by building one small siding, and leaves the rest of the layout for later.

On the following Monday she takes the advanced step. **She writes one line about the change, "The shop gave me flowers every day, and now I have mornings and a garden."** That line points to the thread that still fits her new days. She reads it aloud once and pins it above the sink.

One line about the change

- The shop gave me flowers every day
- Now I have mornings and a garden
- She pins it above the sink

The thread is painting flowers, now from her own garden in the morning light. **She restarts only that, one flower a session, and leaves the landscapes from the class for later.** The shop's flowers and her new mornings meet on the same page. Notes aimed at growth went with more creativity among creative peers in one workplace study (Zhou, 2003).



A single watercolour of a garden rose on a kitchen table, with a cup of tea and a jam jar of water.

Her cue and her missed days follow the pattern met earlier (see 7.4.1). **By the second Friday she has painted four flowers, one each weekday except the Wednesday she spent with her sister.** That Wednesday goes on the lid as a visit, so the lid now holds two dates and one visit.

By the second Friday

Day	1	2	3	4	5	6	7
Four flowers, one each weekday	☐	☐	☐	☐	☐	☐	☐
The Wednesday she spent with her sister	☐	☐	☐	☐	☐	☐	☐
The lid holds two dates and one visit	☐	☐	☐	☐	☐	☐	☐

The same steps fit a working life. **A graphic designer back from a year's parental leave restarts with one leaflet for a local charity, made at home with nobody reviewing it.** She writes down the dates

of her leave and marks it as a break. Her first leaflet goes to the charity at the end of the month.

A graphic designer back from parental leave

Step	Her return
A low-stakes start	One leaflet, with nobody reviewing it
Naming the gap	The dates of her leave, marked as a break

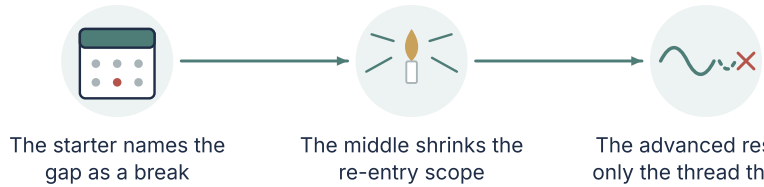
At home a man who has not sung since his choir folded hums one song while washing up. **He keeps it to a single song and a single room for a week.** Then he picks the thread that fits his new life, singing with his grandson at weekends. His grandson picks the songs.

A man whose choir folded

- One song while washing up
- A single song and a single room for a week
- Singing with his grandson at weekends

Three levels close this section, and each builds on the last. **The starter names the gap as a break with no verdict.** The middle level shrinks the re-entry scope to one unfinished piece, and the advanced level maps the change and restarts only the thread that fits.

A gentle return, at three levels

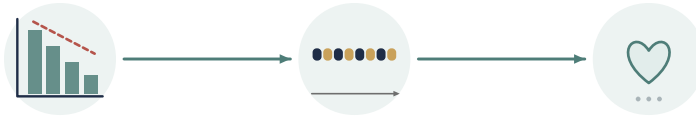


Exercise:

A gentle return.

1. Starter. Write the date you stopped and the date you restart, and **mark the gap as a break with no verdict**.
2. Middle. Choose **a smaller re-entry scope**, one unfinished piece only, and park the rest for a week.
3. Advanced. Map the life change in one line, pick **which creative thread still fits** and restart only that.

Come back small, private and kind



Hands-on skills fade with disuse

At rates that differ by task

A low-stakes return keeps the judging light

Key idea:

Come back small, private and kind, because hands-on skills fade with disuse at rates that differ by task, and a low-stakes return keeps the judging light while the skill comes back.

Quick check:

What is a low-stakes return? Answer: A first session back with no audience and no score. About how long did it take to lose half the accuracy gains? Answer: About 6.5 months, on average. Did the review measure creativity? Answer: No, it covered hands-on procedural skills. What is a creative thread? Answer: One strand of past creative work that can carry on into a changed life.



Module

8

Creativity at Different Ages

8.1 Childhood

8.1.1 Pretend Play, Stories, Drawing, Building and Questions With More Than One Answer

Imagine Tobias, a council gardener with a free Saturday and a six-year-old daughter called Ottilie. **By ten o'clock she has turned two kitchen chairs and a blanket into a submarine**, and she is drawing what she can see through the periscope. Tobias wants to help, and he can already see three ways to make the den sturdier.

A free Saturday and a submarine

- Two chairs and a blanket
- She draws what she can see through the periscope
- Tobias can see three ways to make the den sturdier

This section is about the play children make for themselves, in dens, stories, drawings and towers of bricks. **I show you what the research says about that play, and what a famous dip in test scores during the school years shows.** Ottilie and her dad try the steps over nine days, and three levels of practice close the section.

This section is about children's play at home, and it is not medical or psychological advice. **If a child's mood, sleep or behaviour worries you, a qualified clinician is the right person to ask**, and a teacher can help you find one. The steps here are ways of playing and asking, with no promise attached to any of them.

Children's play at home, not medical advice

- [x] If mood, sleep or behaviour worries you, ask a clinician
- [x] A teacher can help you find one
- [x] No promise attached to any step

One long study of children's creative thinking began with yearly testing. In the words of its author, "From September 1959 to May 1964 the children enrolled in a university and a public elementary school were tested each year with a battery of tests of creative thinking" (Torrance, 1968). The findings from those years come later in this section.

One long study of creative thinking (Torrance, 1968)



September 1959 to May 1964



A university and a public elementary school



Tested each year with a battery of tests

> **Key Concept:**
>
> Open-ended prompt. **An open-ended prompt is a question or task with more than one acceptable answer.** "Name a dish you could make from what is left in this fridge" is an open-ended prompt for a hotel kitchen team, because an omelette, a soup and a stir-fry would all count.

Ottilie's submarine needs no repairs from her dad. **Tobias gives her fifteen minutes of pretend play and offers no "better" way to build it**, even when the blanket slides off one chair. She fixes it with a

clothes peg, names the submarine Puffin, draws a fish at the window and sends him a message through a cardboard tube.

Fifteen minutes with no better way



Pretend play has been linked with creativity measures in children (Russ, 2016), and a large review weighed whether play causes those links (see 1.2.2). **For problem solving, that review found no strong sign that pretend play helped, or even went with it** (Lillard et al., 2013). Tobias keeps the fifteen minutes because Ottilie enjoys them.

What the play research says

Source	Finding
Russ, 2016	Pretend play linked with creativity measures
Lillard et al., 2013	No strong sign it helped problem solving



A father kneeling beside a blanket den, holding out a cardboard tube to a child inside.

> Exercise:
>
> Try it. Ask one open question with at least three acceptable answers. **Collect your child's answers without ranking them.**

At lunch Tobias holds up the cardboard tube and asks what else it could be. **Ottilie says a telescope, then a tunnel for a beetle, then a trumpet.** He writes each answer on an envelope in order, with no stars or favourites. Her sixth, a "sleeping bag for a worm", makes them both laugh.

What else could the tube be?



A telescope



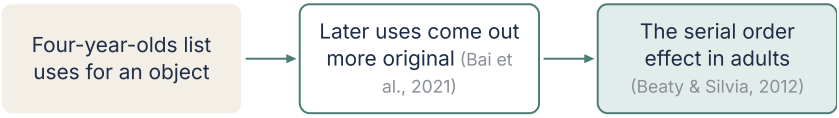
A tunnel for a beetle



A sleeping bag for a worm

In one study, four-year-olds gave more original uses for an object the later each use came in their list (Bai et al., 2021). The pattern matches the serial order effect in adults (Beaty & Silvia, 2012). So after the first few answers to an open question, wait a little longer.

After the first few answers, wait a little longer



> **Science Says:**
> Torrance reported that "when studied longitudinally, there are statistically significant slumps in fluency, flexibility, originality and elaboration", and that "from 45 to 61 percent of the subjects showed significant slumps" (Torrance, 1968). **Scores dipped for about half of the children, and a few rose.** He added that "there were a few who showed significant increases ranging from 11 percent on fluency to 38 percent on elaboration" (Torrance, 1968).

The same report described what came next. **"There is a general recovery trend in the fifth grade but from 16 to 29 percent show decreases"** (Torrance, 1968). The dip was common in that sample and partly reversed a year later. Of 350 children with fairly full records, Torrance analysed a random 100 (Torrance, 1968).

Torrance's figures (1968)

Finding	Share of the children
Significant slumps	From 45 to 61 percent
Significant increases	11 percent on fluency to 38 percent on elaboration
Decreases in the fifth grade	From 16 to 29 percent

That mix matters when a single word gets passed around. **"Slump" sounds like a law of childhood, yet the figures in one sample ranged from children who dipped to a few who rose.** The research on the slump is mixed, and it says nothing about Ottilie in particular. She is six, a few years short of the fourth grade.

Slump sounds like a law of childhood

- Children who dipped
- A few who rose
- Nothing about Ottilie in particular

Key Concept:

Fourth-grade slump. **A fourth-grade slump is a dip in creative-thinking scores around the fourth grade of school, found in some children in Torrance's sample.** A swimming club that times nine-year-olds each term and sees some times rise for a season faces the same puzzle, since a dip in one season says little about any single swimmer.

On Monday at the school gate another parent tells Tobias that children "lose their imagination" by about nine. **He goes home and notes the Torrance figures beside the claim**, the dip, the few who rose and the recovery the next year. Then he looks up the newer argument about a generation losing its creativity.

A claim at the school gate



Children lose their imagination by about nine



He notes the Torrance figures beside the claim



Then the newer argument

That newer argument came from test scores across decades. **One researcher wrote that "since 1990, even as IQ scores have risen, creative thinking scores have significantly decreased"** (Kim, 2011).

She added that "The decrease for kindergartners through third graders was the most significant" (Kim, 2011). Two critiques answered her, and the claim belongs beside them every time.

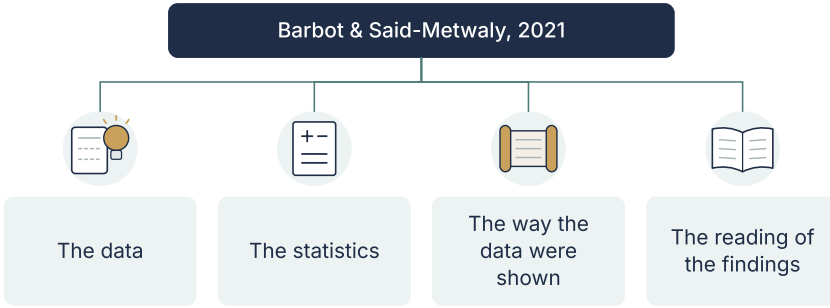
A generation losing its creativity?

The claim (Kim, 2011)	The critiques
⊕ Creative thinking scores decreased since 1990	⊖ TTCT scores lack validity (Baer, 2011)
⊕ Most for kindergartners through third graders	⊖ No evidence for a generational decline (Barbot & Said-Metwaly, 2021)

> **Science Says:**
>
> One critic argued that some tests are worth using, "but not ones that lack validity, which is the problem with TTCT scores" (Baer, 2011). A later re-analysis found "no evidence for the notion of a generational decline of creativity" (Barbot & Said-Metwaly, 2021). **The claimed decline is disputed**, and Baer's objection was to the tests used to measure it.

The re-analysis went further than a different result. **Its authors judged that the decline claim rested on problematic choices in the data, the statistics, the way the data were shown and the reading of the findings** (Barbot & Said-Metwaly, 2021). A score trend across decades, then, is an argument among researchers, and a weak guide to any one child.

Problematic choices behind the decline claim



So the middle step is a note with two sides. **When scores or "slump" talk come up, Tobias writes the Torrance variation and the Kim critiques side by side**, on one page. The page has three lines for the dip, the few who rose and the recovery, and two lines for the critiques of the decline claim.

A note with two sides

Day	1	2	3	4	5	6	7
Three lines: the dip, the few who rose, the recovery	☐	☐	☐	☐	☐	☐	☐
Two lines: the critiques of the decline claim	☐	☐	☐	☐	☐	☐	☐
All on one page	☐	☐	☐	☐	☐	☐	☐

> **Key Concept:**
>
> Creativity crisis. **A creativity crisis is the claim that creative-thinking scores across a whole generation have fallen.** A newspaper headline saying that today's teenagers write duller song lyrics than their grandparents did is making a creativity-crisis claim about songwriting.

The next Sunday Ottilie draws the submarine's inside and tells a story about a beetle who drives it. **Tobias maps one of her ideas as a piece of mini-c creativity** (Beghetto & Kaufman, 2007). He writes what the idea was, the beetle driver, and what she worked out by having it, that a small creature needs a small steering wheel.

One idea mapped as mini-c creativity



The idea: the beetle driver



What she worked out by having it



A small creature needs a small steering wheel

A map has two lines, the idea and what the child worked out by having it. Keep it to one card, write it the same day and use the child's own words where you can. The drawing goes on the fridge, with the map clipped behind it.

A map has two lines

- [x] The idea
- [x] What the child worked out by having it
- [x] One card, written the same day

The same steps fit other homes. **A grandmother looking after twins on a wet afternoon asks what a wooden spoon could be in a story**, and writes down a magic wand, a bridge for ants and an oar without picking a winner. The twins build a raft from cushions for fifteen minutes while she stays on the sofa.

The same steps fit other homes

Who	Step
A grandmother looking after twins	What could a wooden spoon be in a story?
An uncle who hears slump talk	The dip, the few who rose and the recovery on one card

An uncle who hears that his nephew's class "has hit the slump" writes the dip, the few who rose and the recovery the next year on one card, with the two critiques of the decline claim on the back. He keeps the card in his wallet. At the next family lunch he asks the boy about his latest Lego bridge.



A cushion raft on a living-room rug, with a wooden spoon for an oar and two toy animals aboard.

Three levels close this section, and each builds on the last. **The starter gives a child fifteen minutes of play with no adult fixes.** The middle level answers slump talk with the full picture, and the advanced level maps one idea on a card. All three keep the child's answers in charge and need only paper and a pen.

Play and many answers, at three levels



The starter: fifteen minutes with no adult fixes

The middle answers slump talk with the full picture

The advanced maps one idea on a card

For the starter, set a kitchen timer for fifteen minutes and keep your own hands busy with a cup of tea. Answer questions the child asks, and offer no fixes they did not ask for. If the den falls down, let the child decide whether to rebuild it or start something new. The child may play on after the timer.

> Exercise:
>
> Play and many answers.
>
> 1. Starter. Give **15 minutes to pretend play or building** in which no adult offers a "better" solution.
> 2. Middle. If scores or "slump" talk come up, **note the Torrance variation and the Kim critiques side by side**.
> 3. Advanced. **Map one child's idea as mini-c personal understanding**, leaving any TTCT score out of the map.

Give children open-ended play



Key idea:

Give children open-ended play, stories, drawings and questions with many answers, and read slump and decline claims with care, since Torrance found dips in many children but rises in a few and recovery the next year, and the decline claim is disputed.

Quick check:

What is an open-ended prompt? Answer: A question or task with more than one acceptable answer. What happened in Torrance's sample in the fifth grade? Answer: A general recovery trend, though from 16 to 29 percent showed decreases. What did the Barbot and Said-Metwaly re-analysis find? Answer: No evidence for a generational decline of creativity. What does the advanced map describe? Answer: One child's idea, written on one card with no test score.

8.1.2 Helping a Child Without Taking Over the Idea

Imagine Rhiannon, a lock-keeper on the canal, coming home on a Tuesday evening to find her son Wynn, aged nine, at the dining room table. **His papier-mache volcano for a school project leans badly to one side**, and it is due on Friday. The left slope has slumped into a soggy bulge. Wynn stares at it and says nothing.

A volcano due on Friday

> - It leans badly to one side
> - The left slope has slumped into a soggy bulge
> - Wynn stares at it and says nothing

The pull to fix a thing like that can be strong in a parent. **This section looks at how to help a child with a creative task while the idea stays in the child's hands**, and at what one study found about criticism that makes people give up. I follow Rhiannon through three days and one volcano.



A boy at a dining table looking at a papier-mache volcano that leans to one side.

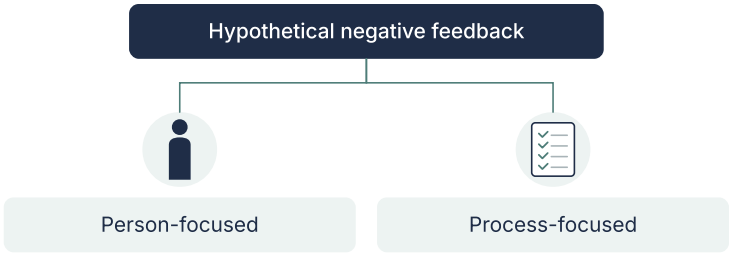
This section is about everyday help at home, and it is not medical or psychological advice. **The terms below come from psychology research and are never a diagnosis.** A child who stops making things after harsh words needs warm, steady adults around them, and lasting distress or worry is a matter for the child's doctor.

Everyday help at home, not medical advice

- [x] The terms below are never a diagnosis
- [x] A child who stops making things needs warm, steady adults
- [x] Lasting distress or worry is a matter for the child's doctor

One study set out to compare two kinds of criticism. **Its participants were "randomly assigned to 1 of 2 hypothetical negative feedback conditions (person-focused vs. process-focused)"** (Beghetto, 2014). Hypothetical here means the feedback was described in imagined situations.

Two kinds of criticism (Beghetto, 2014)



> **Key Concept:**
>
> Process-focused feedback. **Process-focused feedback comments on the steps someone took and the choices made along the way**, with no verdict on what kind of person made them. A swimming coach who says "your kick slowed after the turn, so try breathing every third stroke" is giving process-focused feedback.

Person-focused feedback lands on the maker. **"You're hopeless at this" and "you're just not a crafty child" are both about who the child is**, and neither says anything about paste, paper or drying time. The same setback can get either kind of comment, and the choice belongs to the adult speaking.

The same setback, two kinds of comment

Person-focused	Process-focused
⊕ You're hopeless at this	⊖ About paste, paper or drying time
⊕ About who the child is	⊖ About the steps and choices

Her hands itch to rebuild the cone. **She could have it standing straight in ten minutes**, with fresh strips and a cardboard collar inside. She sits on her hands instead, quite literally, and leaves the paste pot and the newspaper on Wynn's side of the table.

Her hands itch to rebuild the cone



Standing straight in ten minutes



She sits on her hands instead



Paste pot and newspaper on Wynn's side

The volcano is Wynn's mini-c work (Beghetto & Kaufman, 2007), and the learning in it is his (see 1.1.3). **If Rhiannon rebuilds it, the cone becomes her work.** An outside focus on marks or prizes went with less creative poems in one writing study (Amabile, 1985), and judgement-heavy settings went with lower creative performance (Byron et al., 2010).

The volcano is Wynn's mini-c work

> - If Rhiannon rebuilds it, the cone becomes her work
> - A focus on marks went with less creative poems (Amabile, 1985)
> - Judgement-heavy settings went with lower creative performance (Byron et al., 2010)

Keeping adult hands off takes a little planning. **Sit across the table from the child, so the work faces them**, and pass a tool only when they ask for it. If your hands start to move, fold them or hold a mug of tea, and let the child do every cut, fold and smear of paste.

Keeping adult hands off



Sit across the table, the work facing the child



Pass a tool only when they ask



Fold your hands or hold a mug of tea

She asks one question about the process. **"What did you try first?"** Wynn explains that he wrapped wet strips round a plastic bottle and stood it near the radiator to dry. While he talks, he points at the slumped side and says that part got the most paste.

What did you try first?



Wet strips round a plastic bottle

Stood near the radiator to dry

That part got the most paste

Good process questions start with what, how or which. **"Which part was hardest?" and "How did you stick the top on?" ask about steps**, and each one invites a longer answer than yes or no. Ask one, then wait for the whole answer before you speak again.

Good process questions

Start with	Example
What	What did you try first?
Which	Which part was hardest?
How	How did you stick the top on?

> Exercise:
>
> Try it. **When you help, ask one question about the process.** Give no verdict on the person.

His answer holds the clue to the sag. **The side with the most paste stayed wet longest and slumped**, and he worked that out himself while explaining what he did. Because he found the cause, the fix stays his to make. Rhiannon nods and says nothing more about the cone that evening.

He works out the cause himself



Criticism of a shared idea is common. **Beghetto's paper notes that "Most people have experienced some form of creative suppression"** (Beghetto, 2014). He then separates everyday knocks from the ones that go deeper, and the two boxes below give his names for each.

> **Key Concept:**
>
> Creative suppression. **Creative suppression is what happens on "sharing a unique and personally meaningful idea, insight, or product only to have it dismissed, ignored, or misunderstood"** (Beghetto, 2014). A teenager who reads out a poem at dinner while everyone keeps talking about the weather has met creative suppression.

> **Key Concept:**
>
> Creative mortification. **Creative mortification is the loss of the will to chase a creative aim after a setback**, in Beghetto's term (Beghetto, 2014). A man who stops singing in public for twenty years after a choir leader laughed at his solo has lived through creative mortification.

The two terms sit on one scale. **Beghetto writes that some forms of suppression "are more profound and can result in" mortification** (Beghetto, 2014). Shame is one of the negative self-conscious emotions

the study names, the painful feelings people have about themselves after a setback.

One scale (Beghetto, 2014)



At home, suppression can be as small as a parent glancing at a phone while a child explains a drawing. **The idea is shared**, and nobody takes it in.

Suppression can be small



> **Science Says:**
> In the study, "experiencing negative self-conscious emotions, shame in particular, and attributing negative outcomes to one's fixed creative ability served as unique, significant predictors of creative mortification" (Beghetto, 2014). **Shame and a belief in fixed ability went with giving up an aim.** This is one early, exploratory study.

A fixed-ability line runs through this family. **Wynn's grandad likes to say "he's not the arty one, that's his sister"**, and Wynn repeats it whenever a craft goes wrong. The line is person-focused, and it blames the boy's nature for a sagging slope.

A fixed-ability line in this family

- He's not the arty one, that's his sister
- Wynn repeats it whenever a craft goes wrong
- It blames the boy's nature

On Wednesday Rhiannon swaps the family line for a new one. **When Wynn says "I'm not the arty one", she answers "you worked out why the side sagged, so you can make the next layer stronger".** The new line keeps the setback about the volcano. She asks Grandad to try the same kind of line next time.

Rhiannon swaps the family line

Before	After
I'm not the arty one	You worked out why the side sagged You can make the next layer stronger

An improvement line has two parts. **The first names one thing the child did**, such as "you tried a bottle for the middle", and the second points at one next step they could take. Keep it short enough for a nine-year-old to repeat, and say it in the same calm voice you use for homework.

An improvement line has two parts

- [x] One thing the child did
- [x] One next step they could take
- [x] Short enough for a nine-year-old to repeat

> **Science Says:**
> "Mortifying experiences were associated with a younger age of occurrence, negative self-conscious emotions, a desire to avoid reoccurrence of the experience, and fixed ability beliefs" (Beghetto, 2014). **Motivating experiences went with "an older age of occurrence, a feeling of being wronged, a desire to confute, and a belief that improvement was possible"** (Beghetto, 2014). These are associations from one exploratory study.

To confute means to prove someone wrong. **A child who wants to avoid a repeat may quietly stop going near the craft box**, which is the avoidance side of the pattern. Wynn is nine, and his habit of repeating Grandad's line makes the hopeful side worth building.

Two kinds of experience (Beghetto, 2014)

Went with	Mortifying	Motivating
Age of occurrence	Younger	Older
Feeling	Negative self-conscious emotions	Being wronged
Belief	Fixed ability	Improvement was possible

Some children meet a setback with fire and a wish to show what they can do. **That drive belongs to the child**, and an adult can let it run without adding pressure or prizes. Rhiannon notices a flash of it when Wynn mutters that the next layer will be the strongest one in his class.

That drive belongs to the child



Fire and a wish to show what they can do



No pressure or prizes added



The strongest layer in his class

On Thursday, two days after the sag, she checks in. **She asks Wynn whether he still wants to finish the volcano**, and makes clear that both answers are fine. He says yes, and he wants to paint lava down the side that sagged so it looks as if it erupted there.

On Thursday she checks in



Does he still want to finish the volcano?



Both answers are fine



Lava down the side that sagged

The check asks about the wish itself. **A child can hand in a finished project and still lose the wish to make another one**. Ask once, in a quiet moment, and accept the answer you get. If it is no, leave the materials where the child can reach them, and keep it a chat, never a health test.

The check asks about the wish itself

- [x] Ask once, in a quiet moment
- [x] Accept the answer you get
- [x] Keep it a chat, never a health test



A grandmother and a young girl on a sofa with an exercise book open between them.

A grandmother helping her granddaughter with a story can use the same steps. **She leaves the pencil with the girl, asks what happened in the first draft and says a muddled ending can be fixed.** Her own red pen stays in her handbag. Two days later she asks whether the girl still wants to finish the story.

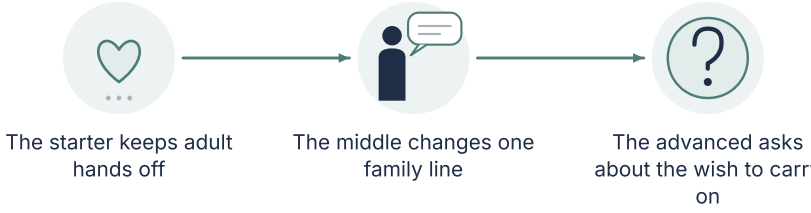
A grandmother helping with a story

Step	What she does
Hands off	Leaves the pencil with the girl
Process	Asks what happened in the first draft
A later check	Asks whether the girl still wants to finish

The closing exercise grows from hands to words to a later check. **The starter keeps adult hands off the work, the middle level changes one family line and the advanced level asks the child about their**

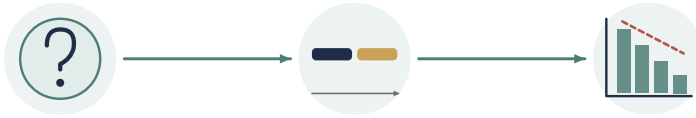
wish to carry on, once the feedback has been given. Each step fits into an ordinary evening of homework.

Helping without taking over, at three levels



> Exercise:
>
> Helping without taking over.
>
> 1. Starter. **Leave the materials in the child's hands**, and keep adult hands off the product.
> 2. Middle. Replace "you're not artistic" with one line saying improvement is possible.
> 3. Advanced. After feedback, check whether the child still wants to keep going with that aim.

Leave the work in the child's hands



Questions about the process

Shame went with giving up

So did fixed-ability beliefs

Key idea:

Help with questions about the process and leave the work in the child's hands, as practice, since in one exploratory study shame and fixed-ability beliefs went with giving up a creative aim.

Quick check:

What is creative mortification? Answer: The loss of the will to chase a creative aim after a setback. Which two things went with it in the study? Answer: Shame and a belief in fixed ability. What went with motivating experiences? Answer: An older age and a belief that improvement was possible. Which two kinds of feedback did the study compare? Answer: Person-focused and process-focused.

8.2.1 Interests, Skills and Personal Projects

Imagine Zainab, fifteen, who makes stop-motion films with plasticine figures on her phone. **On Saturdays she works at her aunt's dry cleaner's, and on most other days her films stay half made.** She has four unfinished scenes of a snail detective on a shoebox set. She opens the app when bored and closes it when her phone buzzes.

Four unfinished scenes of a snail detective

- Saturdays at her aunt's dry cleaner's
- A shoebox set and plasticine figures
- She closes the app when her phone buzzes

This section is about interests, skills and personal projects in the teenage years. **I show you what studies comparing teenagers and young adults found about different kinds of creative thinking**, and how one team set up a training study. Zainab tries the steps across one week, from Sunday to Friday, with three levels of practice at the end.



A phone on a small stand facing a shoebox set, with a plasticine snail in a tiny hat.

This section is about hobbies and practice, and it is not medical or psychological advice. **A personal project is no treatment for low mood or anxiety, and high distress in a young person needs a qualified clinician.** A parent, teacher or school nurse can help find one. Nothing here asks a teenager to push through feeling unwell.

Hobbies and practice, not medical advice

- [x] A personal project is no treatment for low mood or anxiety
- [x] High distress in a young person needs a qualified clinician
- [x] A parent, teacher or school nurse can help find one

One research team opened a paper on idea generation in teenagers and adults with a wide view. They wrote, “Creativity is considered key to human prosperity, yet the neurocognitive principles underlying creative performance, and their development, are still poorly understood” (Kleibeuker, Koolschijn, Jolles, De Dreu, et al., 2013). This section stays with what the age-group studies found on paper tasks.

Idea generation in teenagers and adults



Key to human prosperity



The neurocognitive principles still poorly understood

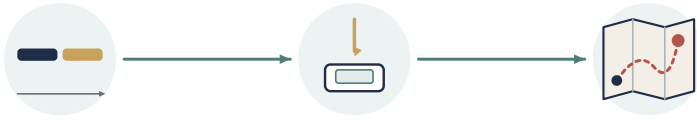


Age-group studies on paper tasks

> **Key Concept:**
>
> Developmental trajectory. **A developmental trajectory is the path a skill takes across the years, which can differ from one task to another.** A rowing coach who logs a junior crew each spring, and notes that their starts improve every season while their steering stays level, is looking at two trajectories in the same boat.

On Sunday afternoon Zainab picks the snail detective as her one interest. **She sets her phone timer for twenty minutes and films with no mark, grade or audience in mind.** She gets eleven frames of the snail creeping towards a dropped glove. The scene is rough, and nobody is going to score it.

A twenty-minute block on Sunday



No mark, grade or audience | Eleven frames | The snail creeping towards a dropped glove

Keeping a project free of grades matches what one study of poems found, where thinking about rewards before writing went with less creative work (Amabile, 1985). A film made for its own sake can still be a piece of mini-c creativity (Beghetto & Kaufman, 2007). Zainab's eleven frames are hers alone.

Free of grades

- Thinking about rewards went with less creative poems (Amabile, 1985)
- A film made for its own sake is mini-c creativity
- Zainab's eleven frames are hers alone

> Exercise:
>
> Try it. Pick one interest. **Give it a 20-minute personal project block with no grade.**

On Monday after school Zainab names one skill to practise inside that interest this week. **She chooses walking movement, because her snail glides in jerks and her human figures slide like skaters.** She writes "smooth walks" on a sticky note and sticks it on the shoebox, where she will see it every time she films.

One skill for the week: smooth walks



Her snail glides in jerks



Her human figures slide like skaters



A sticky note on the shoebox

Earlier in the book you met belief in your own creative ability (see 7.2.3). **That belief went with creative work in the studies there** (Tierney & Farmer, 2002; Haase et al., 2018), and a named skill gives it something to rest on. Zainab's note keeps the skill small enough to practise in one week.

> **Science Says:**
>
> In one study, "The two older age groups outperformed the two younger age groups on insight tasks" (Kleibeuker, De Dreu, & Crone, 2013). Visual idea tasks went another way, since "only 15/16-year-olds outperformed 12/13-year-olds; a model with peak performance for 15/16-years-old showed the best fit" (Kleibeuker, De Dreu, & Crone, 2013). **Different kinds of creative thinking peaked at different ages.** The study compared four age groups, from 12/13-year-olds to 25-30-year-olds.

Word tasks showed a third pattern. **"The 25-30-year-olds outperformed the two youngest age groups on the originality measure of verbal divergent thinking"** (Kleibeuker, De Dreu, & Crone, 2013). The same paper found that "No age-group differences were observed for verbal divergent thinking fluency and flexibility" (Kleibeuker, De Dreu, & Crone, 2013).

Different tasks, different peaks (Kleibeuker, De Dreu, & Crone, 2013)

Task	Finding
Insight tasks	The two older age groups did better
Visual idea tasks	Peak performance at 15/16 years
Verbal originality	25-30-year-olds over the two youngest
Verbal fluency and flexibility	No age-group differences

So age went with some scores and showed no link with others. **The findings compare age groups on average, and they say nothing fixed about any one teenager.** Zainab is fifteen, and the study cannot tell her whether her films will improve this year or in ten years' time. Her weekly frames are the record she can use.

Age groups on average

- Age went with some scores
- Others showed no link
- Nothing fixed about any one teenager

Key Concept:

Originality goal. **An originality goal is a target set on how unusual ideas are, kept apart from how many ideas there are.** A pastry student who aims for one filling the tutor has never tasted, and pays no attention to how many flavours the rest of the class try, is working to an originality goal.

On Wednesday Zainab tries the middle step and compares two goals once. **For ten minutes she aims for fluency and lists ten things that could happen next to the snail.** For the next ten she aims for originality and looks for one ending nobody would expect. The list fills a page, and the single ending fills two lines.

Two goals, compared once

Goal	For ten minutes	Fills
Fluency	Ten things that could happen next	A page
Originality	One ending nobody would expect	Two lines

The comparison needs only a page and a timer. **Write the goal at the top before you start, so you know which kind of score you are chasing.** Afterwards, circle the ideas you would film. Zainab circles

three from the fluency list and keeps her one odd ending, where the snail detective turns out to be the thief.

The comparison needs only a page and a timer



Write the goal at the top



Circle the ideas you would film



The snail detective turns out to be the thief

> **Science Says:**
>
> A training study's authors wrote, "We examined the effectiveness of creative ideation training in adolescents (13-16 years, N = 71) and adults (23-30 years, N = 61)" (Stevenson et al., 2014). **The team set teenagers and young adults side by side to test practice in idea generation.** They noted that "Prior research, although inconsistent, generally indicates that adults perform better than adolescents on the alternative uses task (AUT)" (Stevenson et al., 2014).

A training study is a test of one programme in one sample (Stevenson et al., 2014). It gives no guarantee that a short practice session will lift anyone's films, and the advanced step treats it as practice.

A training study (Stevenson et al., 2014)



For the advanced step, pick a plain object and set a timer for ten minutes. List uses for it without judging any of them, then turn the list

face down. Go straight back to the project and see whether anything from the list wants to come along. One session a week is enough to start.

The advanced step



> **Key Concept:**
> Ideation training. **Ideation training is short, guided practice in producing ideas for a set task.** A youth radio club that spends the first ten minutes of each weekly meeting listing possible names for a new show segment, before anyone records a word, is running a small piece of ideation training.

On Friday Zainab tries the advanced step. **She spends ten minutes listing uses for a lump of plasticine, from a doorstop to a stamp for printing snail tracks.** Then she puts the list away and goes back to the film. The stamp idea turns into a trail of tiny prints behind the snail, and she films eight more frames.

Uses for a lump of plasticine



A doorstop



A stamp for printing snail tracks



Eight more frames

The practice session sits beside the project and leaves the project in charge. The list was a warm-up, and the film is still the thing she cares about. Openness to new experiences has gone with creative achievement in studies of personality (Feist, 1998), and a new kind of list is one small, cheap experience.

The project stays in charge

- The list was a warm-up
- The film is still the thing she cares about
- Openness went with creative achievement (Feist, 1998)



A row of tiny stamped snail tracks across a cardboard pavement behind a plasticine snail.

The same steps fit other interests. **A fourteen-year-old who designs football kits on squared paper gives the hobby twenty minutes after tea**, with no marks from anyone. He names one skill for the week, drawing collars that sit right, and tries one ten-minute list of badge ideas before going back to the kit.

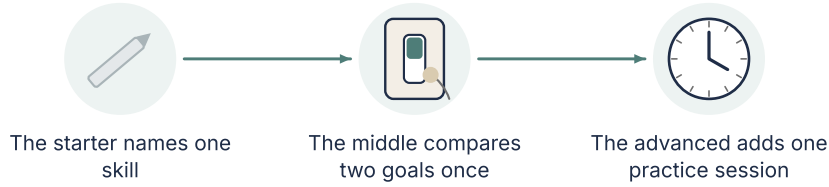
The same steps fit other interests

Teenager	Step
A fourteen-year-old who designs football kits	Twenty minutes after tea, collars that sit right
A sixteen-year-old who writes short songs	An originality goal for one chorus line

A sixteen-year-old who writes short songs on a borrowed keyboard sets an originality goal for one chorus line and a fluency goal for ten rhymes, and compares them once. On Saturday she spends ten minutes listing uses for a kitchen whisk as a warm-up, then works on the song. She keeps the chorus line that surprised her.

Three levels close this section, and each builds on the last. **The starter names one skill inside the interest for the week.** The middle level compares an originality goal with a fluency goal once, and the advanced level adds one short practice session before going back to the project. Every level keeps the project itself free of grades.

Interests and skills, at three levels



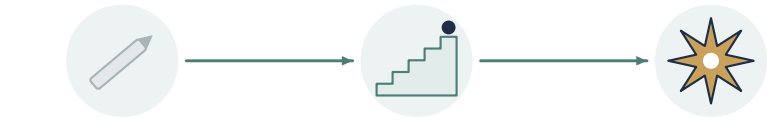
For the starter, write the skill as two or three words on a note you will see. Practise it inside the project, in the same twenty-minute blocks, and leave other skills for later weeks. At the end of the week, look at one before and one after, side by side. Keep both in one folder.

A note you will see

- [x] The skill in two or three words
- [x] Practise it inside the project
- [x] Keep both in one folder

> Exercise:
>
> Interests and skills.
>
> 1. Starter. **Name one skill to practise** inside that interest this week.
> 2. Middle. **Compare an originality goal with a fluency goal once**, since peaks differ by task.
> 3. Advanced. **Try one short ideation practice session**, then go back to the personal project.

Give a personal project its own ungraded time



Key idea:

Give a personal project its own ungraded time and practise one skill inside it, since studies comparing age groups found that different kinds of creative thinking peaked at different ages, and a training study treated the teenage years as a time worth testing practice.

Quick check:

What is an originality goal? Answer: A target set on how unusual ideas are, kept apart from how many there are. Which group did better on verbal originality? Answer: The 25 to 30-year-olds, compared with the two youngest groups. How did the training study's authors describe earlier research? Answer: As inconsistent, though it generally favoured adults on the alternative uses task. What does the advanced step do after the practice session? Answer: It goes straight back to the personal project.

8.2.2 Peer Judgement, Online Comparison and Finding Your Own Direction

Imagine Hollis, sixteen, who draws a weekly comic strip about a pigeon who delivers post across a busy city. **Every Thursday he posts the new strip online, and every Thursday he checks a classmate's strip first.** Last week hers had 400 likes and his had 12. By Friday he had deleted his half-drawn next strip.



This section is about peer judgement, comparing yourself with others online and finding your own direction. **I show you one study of teenagers' online comparison and mood**, and practical steps for keeping your own work in sight. Hollis tries them over two weeks, and three levels of practice close the section.

This section is about creative habits, and it is not medical or psychological advice. **Low mood that lasts needs a qualified clinician, and a parent or teacher can help a young person find one.** The study below found links with mood, and nothing here claims that phones are ruining anyone's creativity.

Creative habits, not medical advice

- [x] Low mood that lasts needs a qualified clinician
- [x] A parent or teacher can help a young person find one
- [x] Nothing here claims phones are ruining anyone's creativity

One team set out to look at teenagers' screen habits alongside their mood. In their words, "This study examined specific technology-based behaviors (social comparison and interpersonal feedback-seeking) that may interact with offline individual characteristics to predict concurrent depressive symptoms among adolescents" (Nesi & Prinstein, 2015). Their findings come later in this section.

Screen habits and mood (Nesi & Prinstein, 2015)



> **Key Concept:**
>
> Technology-based social comparison. **Technology-based social comparison is measuring your own work or life against what other people show on screens.** A retired man who checks how many miles his cycling club friends logged on an app before he records his own ride is making a technology-based social comparison.

On the second Thursday Hollis posts his strip at seven. **By half past seven he has refreshed his classmate's page five times and his own page ten times.** His pigeon looks clumsy next to her neat robots. He closes the sketchbook without starting the next strip.

The second Thursday



His classmate's page refreshed five times



His own page ten times



He closes the sketchbook

Earlier in the book you met comparison and the fear of judgement in adults (see 7.3.2). **For a teenager, the comparison arrives as a number under every post.** Hollis knows the numbers are about attention, and he still feels them. The steps in this section keep the numbers out of the room while he draws.

For a teenager the comparison is a number

- A number under every post
- The numbers are about attention
- Keep them out of the room while he draws

Choose the hour in advance and give it a start and an end. If the app has a setting that hides like counts, switch it on before the hour begins. If it has none, leave the phone in another room. Draw, write or film as usual, and look at any numbers only after the hour ends.

One hour with the metrics hidden

1. Choose the hour in advance
2. Switch on the setting that hides like counts
3. Or leave the phone in another room
4. Look at any numbers after the hour ends

> Exercise:
>
> Try it. **Spend one creative hour with the metrics hidden**, with no view of likes.

On Saturday morning Hollis switches off the like counts in the app settings. **For one hour he draws with the phone in the kitchen, and he finishes three panels of the pigeon getting lost in fog.** Nobody sees them yet. He notices that he redraws the pigeon less when no number is waiting.

Saturday morning, like counts off



The phone in another room



Three panels of the pigeon lost in fog



He redraws the pigeon less

Highly evaluative settings went with lower creative performance in studies of pressure (Byron et al., 2010). **A like count turns every post into an evaluation, so hiding it for an hour removes one source of**

judging. Thinking about rewards before writing went with less creative poems in one study (Amabile, 1985), and likes are a kind of reward.

A like count turns every post into an evaluation



> **Science Says:**
>
> In one self-report study of "A total of 619 students (57 % female; mean age 14.6)", the students "completed self-report questionnaires at 2 time points", with depressive symptoms measured "at baseline, and 1 year later" (Nesi & Prinstein, 2015). **"Consistent with hypotheses, technology-based social comparison and feedback-seeking were associated with depressive symptoms."** The authors added that "the association was particularly strong among females and adolescents low in popularity" (Nesi & Prinstein, 2015).

That is one study, and it found an association. **It measured mood and screen habits, and it measured no creativity at all.** It gives no number for how many teenagers anywhere are harmed. This section uses it to take comparison seriously, without alarm.

One study, one association

- It measured mood and screen habits
- It measured no creativity at all
- No number for how many teenagers are harmed

The study looked at several habits side by side. **The team measured "frequency of technology use (cell phones, Facebook, and Instagram), excessive reassurance-seeking, and technology-based social comparison and feedback-seeking"** (Nesi & Prinstein, 2015).



A sketchbook page showing a pigeon with a satchel flying through grey pencil fog.

Hollis notices that the fear arrives before he posts. Fear and anxiety went with lower creativity in research on mood (Baas et al., 2008). His stomach tightens each Thursday before seven, so he moves his drawing to Saturdays and keeps posting on Thursdays. The drawing and the judging now happen on different days.

The drawing and the judging on different days

Before	After
Drawing and posting on Thursday	Drawing on Saturdays
His stomach tightens before seven	Posting still on Thursdays

He spots a second habit in the study's list, asking for reassurance. After each post he messages two friends to ask whether the strip is any good, and the answers never settle him for long. He keeps the friends and drops the question, and he waits until Sunday to look at the week's comments in one sitting.

A second habit: asking for reassurance



He messages two friends after each post



He keeps the friends and drops the question



The week's comments on Sunday, in one sitting

> 🗝 **Key Concept:**
>
> Feedback-seeking. **Feedback-seeking is looking to other people's reactions to judge how well you are doing.** A new barista who glances at every customer's face after the first sip, to decide whether the coffee was any good, is feedback-seeking.

On Monday Hollis sees his classmate's new robot strip. **He takes the starter step and writes his own next step on a sticky note**, leaving ranks out of it. The note says "pigeon finds the lighthouse", the next scene in his own story. He sticks it on the sketchbook cover.

The next step points at your project, and a rank points at someone else's. Write the step as a scene, a panel or a skill, in five words or fewer. Your own small discoveries count as mini-c creativity (Beghetto & Kaufman, 2007), whatever a feed makes of them. Hollis draws the lighthouse panel that evening.

The next step points at your project

- [x] A scene, a panel or a skill
- [x] Five words or fewer
- [x] Pigeon finds the lighthouse

When Hollis does want an opinion, he asks his cousin one question about the work. He asks whether the fog panel makes sense, and he gets an answer about the panel. In one lab study, positive informational feedback went with the most creative ideas when people also had high task autonomy (Zhou, 1998).

When Hollis wants an opinion

Ask	Leave out
⊕ One question about the work	⊖ Is the strip any good?
⊕ Does the fog panel make sense?	⊖ Ranks and likes

A comparison spike announces itself through an urge. You catch yourself refreshing someone else's page, or you want to delete your own work. That is the signal for the middle step. Start the fifteen-minute timer before you close the app, so the private draft begins while the feeling is still fresh.

A comparison spike announces itself

> - Refreshing someone else's page
> - Wanting to delete your own work
> - Start the fifteen-minute timer before you close the app

> **Key Concept:**
>
> Private direction draft. **A private direction draft is a short piece of work made for no audience, to decide where your own project goes next.** A novelist who writes a page of a possible ending in a notebook that nobody else will read, to see whether the story wants it, is writing a private direction draft.

On Wednesday a famous comic artist reposts Hollis's classmate. **Hollis feels the comparison spike, so he switches to the middle step.** He sets a timer for fifteen minutes and draws three rough endings for the pigeon story in a notebook he never posts from. By the end he knows the pigeon will get home by following the lighthouse beam.

Fifteen private minutes on Wednesday



A draft with no audience is a practice choice that keeps judging out of the session. It gives Hollis information about his own story, with nobody else's numbers mixed in. Tomorrow's draft can start from the best of his three endings.

On Friday a stranger comments that his strip is "cringe". **The shame hits hard, and he wants to give up comics.** Moments like this are where creative mortification can follow (Beghetto, 2014), a term you met in the section on helping children (see 8.1.2). Hollis takes the advanced step, pauses public sharing and keeps working in his private notebook.



Shame went with creative mortification in that research (Beghetto, 2014), so the private notebook keeps the work going while the shame settles. Hollis keeps drawing privately for the next week. When his low mood lasts beyond those days, his mum helps him find a qualified clinician to talk to, and he keeps the notebook going alongside that help.

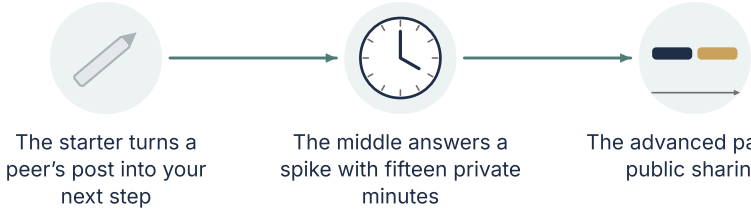


A mother and her teenage son sitting on a living-room sofa with two mugs and a closed laptop.

The same steps fit other young people. **A seventeen-year-old who posts dance videos hides her view counts for one hour of practice each Sunday**, and writes her next step, a new turn sequence, after seeing a friend's video. When a comparison spike hits, she films fifteen minutes for her own eyes only.

Three levels close this section, and each builds on the last. **The starter turns a peer's post into your own next step.** The middle level answers a comparison spike with fifteen private minutes, and the advanced level pauses public sharing when shame spikes. Each level moves the work away from the audience and back to you.

Your own direction, at three levels



> Exercise:
>
> Your own direction.
>
> 1. Starter. After seeing a peer's post, **write your next step for your own project**, with ranks left out.
> 2. Middle. After a comparison spike, **switch to a private 15-minute direction draft** with no audience.
> 3. Advanced. If shame spikes after critique, **pause public sharing and keep a private mini-c draft**.

Hide the numbers while you make creative work



Online comparison went with depressive symptoms

So did feedback-seeking

Evaluative settings went with lower performance

Key idea:

Hide the numbers while you make creative work, since one study of 619 teenagers found that online comparison and feedback-seeking went with depressive symptoms, and highly evaluative settings went with lower creative performance in studies of pressure.

Quick check:

What is feedback-seeking? Answer: Looking to other people's reactions to judge how well you are doing. Did the Nesi and Prinstein study measure creativity? Answer: No, it measured screen habits and depressive symptoms. What does the middle step do after a comparison spike? Answer: It switches to a private 15-minute direction draft with no audience.

8.3.1 Creating Alongside Work, Family and Limited Time

Imagine Gabriela, a community pharmacist with a three-year-old and a six-year-old at home. **She builds small dioramas of old shopfronts, and the last one, a 1930s bakery, has sat half painted on a shelf since spring.** Between the pharmacy counter, the school run and bedtime, her evenings vanish. She keeps meaning to start again "when things calm down".

A 1930s bakery, half painted since spring

> - A community pharmacist with two small children
> - The pharmacy counter, the school run and bedtime
> - She keeps meaning to start again when things calm down

This section is about making room for creative work alongside a job, a family and very little spare time. **I show you how to fix one short block to a moment that already happens every day**, how to restart after an interruption and how to trade one obligation for making time. Treat these steps as practice.

This section is about routines, and it is not medical, psychological or workplace advice. **If work and family strain become severe, or you feel burnt out, a qualified clinician is the right person to see**, and problems at work belong with your manager or HR. A short creative block is no substitute for that help.

Routines, not medical or workplace advice

- [x] Severe strain or burnt out: a qualified clinician
- [x] Problems at work: your manager or HR
- [x] A short creative block is no substitute for that help

The steps here grew from two strands of research. One strand looked at how habits form when people repeat something in everyday settings. The other looked at what helps and what blocks creativity at work. This section fits both to an ordinary week with children, pharmacy shifts and a shared family calendar.

Two strands of research

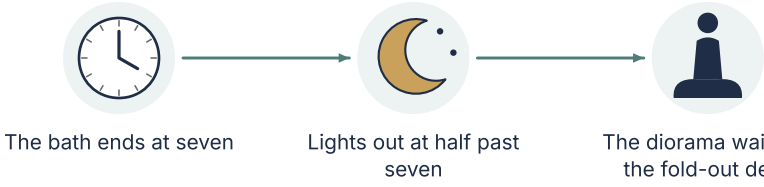


> **Key Concept:**
> Time trade. **A time trade is swapping one regular obligation slot for creative work, agreed with the people it affects.** A hospital radiographer who hands her Tuesday ironing to her flatmate in return for doing his Saturday bins, so that she has a free Tuesday evening hour for her violin practice, has made a time trade.

Gabriela's day already has fixed points. **The children's bath ends at seven every evening, and at half past seven the lights go out.** Lights out is the one moment that repeats on workdays, days off and

school holidays alike. She picks it as her cue, with the bakery diorama waiting on the fold-out desk on the landing.

Her day already has fixed points



Repeating something in the same setting made it feel more automatic in a habit study, as you saw in the section on protecting time (Lally et al., 2010; see 7.4.1). **That study used health habits, so for dioramas it is a guide and no promise.** It still points Gabriela towards a cue she can count on every day.



A children's bedroom door left ajar, with a night light glowing and a landing clock reading half past seven.

A good cue is something that already happens daily, at roughly the same time, whatever else the day holds. Bath time, the last

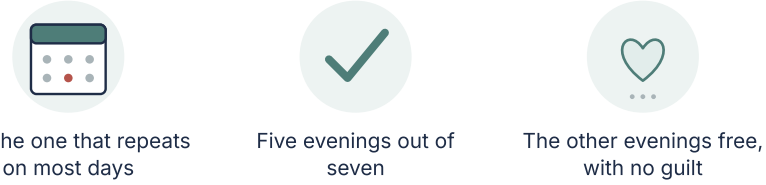
school pickup or the kettle after the evening meal all work. Write the cue and the block length on a card, such as “after lights out, 25 minutes”, and keep the card where the work sits.

A good cue

- [x] Something that already happens daily
- [x] At roughly the same time
- [x] Written on a card where the work sits

If no single moment repeats every day, pick the one that repeats on most days. A cue that holds five evenings out of seven still gives the block a home. Leave the other evenings free, with no guilt attached. The aim is one block you can keep, and an ambitious plan that collapses by Wednesday helps nobody.

If no single moment repeats every day



> Exercise:
>
> Try it. **Book one 25-minute create block** straight after a fixed daily cue.

On Monday the lights go out at half past seven, and Gabriela sits down with the bakery. **She sets a timer for twenty-five minutes and paints the window frame a deep green.** When the timer rings, she

rinses the brush and leaves the paint lid off to dry. The block is done before her own tea has gone cold.

Monday after lights out



Twenty-five minutes on a timer



The window frame painted a deep green



Done before her tea has gone cold

Set the block up before the cue, so the minutes go on making. Gabriela lays out the brushes, the green paint and a jar of water at bath time. Twenty-five minutes is a practice length chosen to fit an evening, with no study behind it. Stop when the timer rings, even mid-stroke, so tomorrow's block has somewhere to start.

Set the block up before the cue

- [x] Brushes, green paint and a jar of water
- [x] Stop when the timer rings, even mid-stroke
- [x] Twenty-five minutes is a practice length



A fold-out desk on a landing laid with fine brushes, a jar of water and a tiny shopfront under a desk lamp.

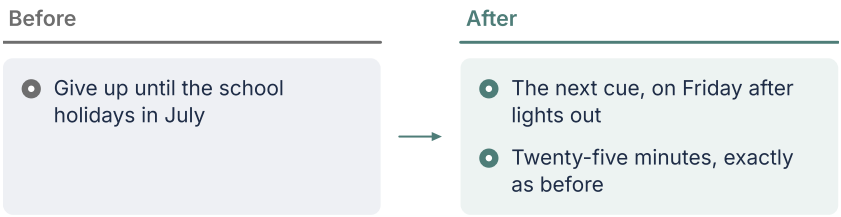
On Wednesday night her younger child wakes with a fever at nine and again at midnight. **On Thursday evening Gabriela is too tired to paint, and the block does not happen.** Her phone's habit app shows the streak back at zero. She is tempted to give up the whole idea until the school holidays in July.

A night with a fever



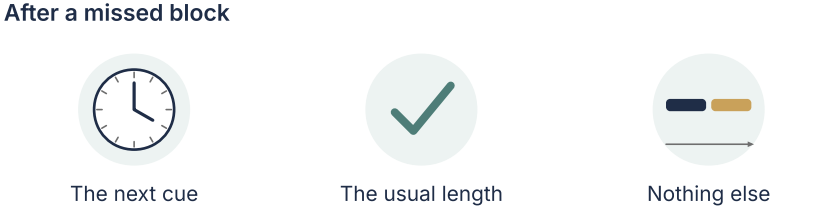
A single missed day did little harm to habit progress in the same study (Lally et al., 2010). So Gabriela leaves the zero alone and sits down at the next cue, on Friday after lights out. She paints the bakery's sign board for twenty-five minutes, exactly as before, with no extra time to make up for Thursday.

She leaves the zero alone



> **Key Concept:**
> Interruption restart. **An interruption restart is picking up at the next planned slot after a missed one, with no make-up session.** A choir member who misses one Wednesday rehearsal with a cold, and turns up the next Wednesday at the usual time without booking any extra practice to catch up, has made an interruption restart.

For the starter, decide in advance what happens after a missed block. The answer is the next cue, at the usual length, and nothing else. Doubling the next session turns a short habit into a debt. If a whole week goes, the same rule holds, and the first block back is the usual twenty-five minutes.



A streak counter rewards an unbroken run. **Gabriela switches the counter off and keeps a plain tally on the back of her card.** By the end of the second week the tally shows nine blocks out of fourteen evenings, with every gap followed by a restart.

A plain tally in place of a streak

Day	1	2	3	4	5	6	7
The streak counter switched off	☐	☐	☐	☐	☐	☐	☐
Nine blocks out of fourteen evenings	☐	☐	☐	☐	☐	☐	☐
Every gap followed by a restart	☐	☐	☐	☐	☐	☐	☐

On Sunday Gabriela takes the middle step with her partner. **They trade one obligation block, her Thursday laundry for his Saturday-morning swimming run with the children.** The trade is said out loud, written on the family calendar and agreed for one month, with a review on the last Sunday. Her Thursday evening now holds a second create block.

A trade agreed for one month

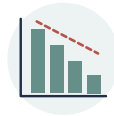
Who	Takes on
Her partner	Her Thursday laundry
Gabriela	His Saturday-morning swimming run with the children

Having the say over what you do is one of the needs behind self-motivation (Ryan & Deci, 2000). **Less control went with worse creative work in research on pressure** (Byron et al., 2010), so a block that can be taken away at any moment loses some of its value. A clear agreement keeps the Thursday block hers.

A clear agreement keeps the block hers



Having the say over what you do (Ryan & Deci, 2000)



Less control went with worse creative work (Byron et al., 2010)



Written on the family calendar

> **Key Concept:**
>
> Streak myth. **The streak myth is the belief that one missed day wipes out a habit's progress.** A man learning Welsh who abandons the language for good after his app shows a broken 100-day streak, on the day of his father's funeral in another town, has been caught by the streak myth.

For the middle step, keep the trade small, specific and fair. Name the slot you give up, the slot you take and the date you will review it. Agree it with everyone it touches, at home or at work, and write it where they will see it. If the trade stops working for someone, change it together.

Keep the trade small, specific and fair

1. Name the slot you give up
2. Name the slot you take
3. Set the date you will review it
4. Agree it with everyone it touches

At the pharmacy on Monday she tries the advanced step. **She lists one workplace stimulant and one obstacle to creativity that she noticed that week.** The stimulant is the quiet quarter hour before opening, when she rearranges the window display. The obstacle is being called to the counter every few minutes while she plans the flu-clinic poster.

One stimulant, one obstacle

Stimulant	Obstacle
⊕ The quiet quarter hour before opening	⊖ Called to the counter every few minutes
⊕ Rearranging the window display	⊖ While she plans the flu-clinic poster

Her two lines echo a workplace survey of stimulants and obstacles to creativity that you met earlier in the book (Amabile et al., 1996; see 5.6.1). **That survey assesses whole organisations, and her list is one person's notes from one week.** She keeps the list in her bag and adds a new pair each week for a month.

Her list and the survey

- The survey assesses whole organisations (Amabile et al., 1996)
- Her list is one person's notes from one week
- A new pair each week for a month

For the advanced step, write the pair on a Friday, while the week is fresh. Keep each line to one sentence and stick to things you saw or felt. If a stimulant can be copied at home, copy it, and if an obstacle can be raised with your manager, raise it calmly.

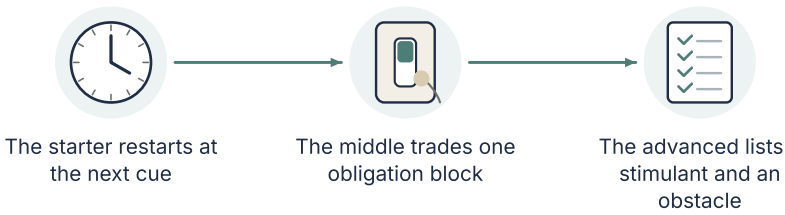
Write the pair on a Friday

- [x] One sentence per line
- [x] Copy a stimulant at home
- [x] Raise an obstacle calmly with your manager

Creative careers take many shapes over a lifetime and differ from one field to another (Simonton, 1988; Simonton, 1997). **Gabriela's bakery is part of a long hobby, and a busy decade with small children is one stretch of it.** She keeps her reasons her own, since thinking about rewards went with less creative poems in one study (Amabile, 1985).

Three levels close this section, and each builds on the last. **The starter restarts at the next cue after any interruption.** The middle level trades one obligation block with clear agreements, and the advanced level lists one workplace stimulant and one obstacle each week. All three keep the daily block short, so that it survives a busy week.

Time you can keep, at three levels



> **Exercise:**
>
> Time you can keep.
>
> 1. Starter. If interrupted once, **resume at the next cue** and leave the streak myth behind.

2. Middle. **Trade one obligation block for a create block** this week, keeping family and work agreements clear.
3. Advanced. **List one workplace stimulant and one obstacle** to creativity this week.

Tie one short block to a daily moment



Key idea:

Tie one short creative block to a moment that already happens every day, restart at the next cue after a missed day, and trade time only with clear agreements, since repetition in a consistent setting made behaviour more automatic in a habit study and a single missed day did little harm.

Quick check:

What is a time trade? Answer: Swapping one regular obligation slot for creative work, agreed with the people it affects. What happens after a missed block? Answer: You resume at the next cue, at the usual length, with no make-up session. What does the advanced step list? Answer: One workplace stimulant and one obstacle to creativity that week. What is the streak myth? Answer: The belief that one missed day wipes out a habit's progress.

8.3.2 Using Experience Without Becoming Trapped by Familiar Solutions

Imagine Bernard, a stonemason of 56, in his yard on a Monday morning beside a block of sandstone. **The council has asked him for a new finial to top a park gatepost**, and he has carved stone for 35 years. He picks up a pencil. His hand draws an acanthus leaf before he has thought about the park at all.

A new finial for a park gatepost

> - A stonemason of 56, carving stone for 35 years
> - A block of sandstone in his yard
> - His hand draws an acanthus leaf first

Long experience is a gift, and it can carry habits of its own. **This section looks at how an expert can keep the skill and still find a fresh answer**, with research on why experts can turn closed-minded and four steps that open the door again. I follow Bernard through three days and one finial, from first sketch to carving.

This section is about creative practice at work, and it is not medical or psychological advice. **Expertise is valuable**, and every step below keeps Bernard's skill in use. The trouble this section deals with is narrower, the moments when experience settles into a groove and stops looking at the problem in front of it.

Expertise is valuable

- [x] Not medical or psychological advice
- [x] Every step keeps Bernard's skill in use
- [x] The trouble: experience settling into a groove

Researchers have studied how expertise can change the way people think. **One team set out their starting idea in a single sentence, "According to the Earned Dogmatism Hypothesis, social norms dictate that experts are entitled to adopt a relatively dogmatic, closed-minded orientation"** (Ottati et al., 2015). Dogmatic means holding fixed views and brushing other views aside.

The Earned Dogmatism Hypothesis (Ottati et al., 2015)



Experts are entitled to a closed-minded orientation



Social norms dictate it



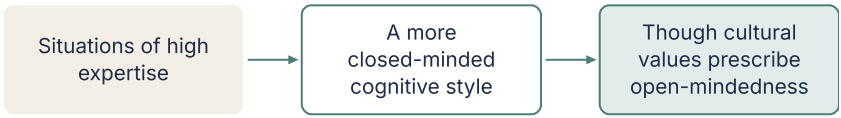
Dogmatic: fixed views, other views brushed aside

> **Key Concept:**
>
> Earned dogmatism. **Earned dogmatism is Ottati's term for the sense that being an expert gives you the right to a more closed-minded style.** A head chef who waves away every suggestion from a new cook because she has run kitchens for years is showing earned dogmatism.

The team took the idea a step further. **They wrote that "situations that engender self-perceptions of high expertise elicit a more closed-minded cognitive style"** (Ottati et al., 2015). Their paper begins from a wider point, that "cultural values generally prescribe

open-mindedness" (Ottati et al., 2015). To prescribe here is to lay something down as a rule.

Feeling expert and thinking style

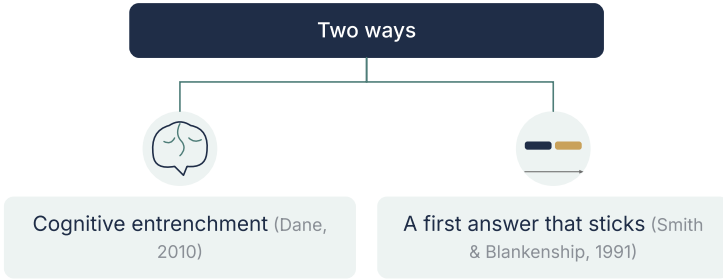


Moments of feeling expert are easy to spot once you look for them. **Notice when you feel most like the expert in the room**, such as when a client defers to you, a junior asks you for the answer or someone thanks you for your years in the trade. That is a good moment to ask one more question before you reply.

> **Science Says:**
> Ottati's team reported that "These predictions are confirmed in six experiments" (Ottati et al., 2015). **Across those experiments, feeling expert went with a more closed-minded style.** The finding concerns how people think when they feel expert, and it leaves the value of their skill untouched. These were studies of thinking style, so the steps below are practice.

Experience can narrow thinking in a second way, through cognitive entrenchment (Dane, 2010; see 2.1.3). **It helps explain why Bernard's hand keeps finding the same leaf** in every sketch. A first answer may also stick from the early tries onward (Smith & Blankenship, 1991). Before a new job, list the answer your last three similar jobs shared.

Experience can narrow thinking



Bernard knows the acanthus better than his own signature. **He has carved it on church capitals, on a bank doorway and on four other gateposts**, and clients have always liked it. Over the years it has become automatic, and this morning it arrived on the page while he was still thinking about his coffee.

The acanthus leaf, carved many times

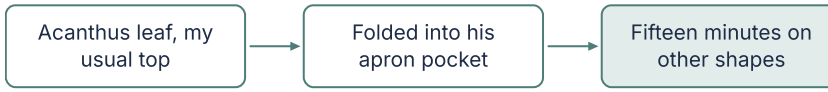


> **Key Concept:**
>
> Default solution. **A default solution is the answer an experienced person reaches for first, out of habit, before studying the problem at hand.** A plumber who fits the same brand of tap in every house, whatever the sink, is using a default solution.

So Bernard names his. **On a scrap of paper he writes "acanthus leaf, my usual top"**, folds it and puts it in his apron pocket. Then he sets the

leaf aside for fifteen minutes and lets himself look at other shapes, with the note kept out of sight.

Bernard names his default



Design fixation can hold designers to a sample they have seen (Jansson & Smith, 1991). **Naming the default gives it a label he can put down.** The label is a practice step built on that research.

> Exercise:
>
> Try it. **Name your default expert solution in one line.** Then set it aside for 15 minutes.

The fifteen minutes give him a list of three shapes, a ball, a pine cone and a plain stepped cap. **None of them feels right for this park**, and he notices he still knows almost nothing about it. He decides to ask someone who walks past that gatepost every day of the week.

Three shapes in fifteen minutes



A ball



A pine cone



A plain stepped cap

The woman who runs the café next to his yard has never carved a stone. **Bernard asks her one question, "What do people in that park notice?"** She laughs and says the children spend every autumn

collecting conkers under the chestnut trees by the gate. He writes "conkers" under his list of three shapes.

One outsider question

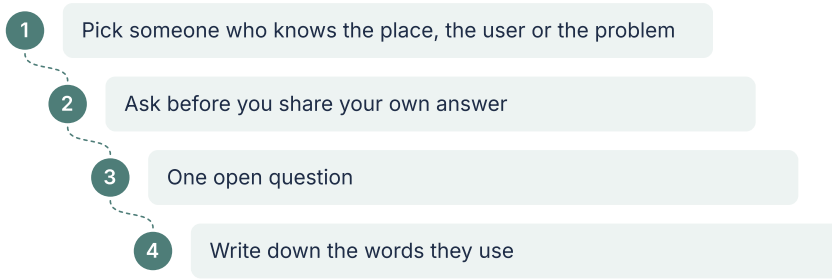
- What do people in that park notice?
- The children collect conkers every autumn
- He writes conkers under his list

> **Key Concept:**
> Outsider question. **An outsider question is a question about a problem put to someone who works outside your field.** An architect who asks a school cleaner which corridors get muddiest before drawing a new entrance is asking an outsider question.

The café owner had no stake in acanthus leaves. **Her answer came from the park itself, where the finial will live**, and it pointed Bernard at a shape his trade had never handed him. Openness to new experiences is a trait linked with creative people (Feist, 1998), and a question like this is a small, deliberate act of openness.

Asking well takes a little care. **Pick someone who knows the place, the user or the problem, and ask before you share your own answer**, so your idea stays out of theirs. Keep it to one open question, listen to the whole reply and write down the words they use. Thank them, even when the answer seems off the point.

Asking well



On Tuesday Bernard changes where and how he works. **He takes a lump of modelling clay out to the picnic bench in the yard**, a material unused since his apprenticeship, and shapes small models by hand. The clay lets him turn each shape round and look at it from below, as people in the park will.

A change of material and setting

Before	After
Pencil and stone at the workbench	Modelling clay at the picnic bench in the yard Each shape turned round and seen from below

Changing the setting or the tool is one way to shift the task environment. **Active involvement in an unusual event went with better idea results in one lab study** (Ritter et al., 2012), and Bernard's hands are busy in the clay the whole time. The step is practice, and its research support concerns ideas alone. Make one change per session.



Small clay models of round seed cases lined up on a wooden picnic bench.

By mid-afternoon he has six clay models of a conker case, spiky and round. **The body of the finial comes easily, and the top will not settle.** Every version he tries for the crown looks either fussy or flat, and after an hour his fingers start drifting back toward a curled leaf.

Six clay models of a conker case



He stops for the day and covers the clay with a damp cloth. **That evening he takes the dog for a long, slow walk along the river**, a task that asks little of his thinking. A delayed return has its own drill (see 7.3.1), and a break filled with light activity fits the research on incubation (Sio & Ormerod, 2009).

He stops for the day



The clay under a damp cloth



A long, slow walk along the river



A break with light activity
(Sio & Ormerod, 2009)

On Wednesday morning he looks again. **The crown comes as a conker case split open, with the smooth nut just showing at the top**, and he sketches it once in pencil before he picks up the chisel. The acanthus note stays folded in his apron pocket, and the leaf itself waits for the next job that suits it.

The crown comes on Wednesday

- A conker case split open
- The smooth nut just showing at the top
- The acanthus note stays folded



A carved sandstone finial shaped like a split conker case, standing on a gatepost in a park.

An experienced nurse planning a new ward routine can use the same moves. **She names her usual answer, asks a porter one question about the ward, sketches the plan in a different colour on a fresh sheet and sleeps on the hardest part.** Her experience still decides which plans are safe for patients, and the new routine rests on it.

The closing exercise climbs in the same order as Bernard's week. **The starter asks one outsider question, the middle level changes the tool or setting once and the advanced level delays rework on a stuck problem**, with a low-demand break in between. Each level keeps your expertise at the centre. Try the starter on your next routine job.

Experience without the groove, at three levels



> **Exercise:**
>
> Experience without the groove.
>
> 1. Starter. **Ask a non-expert one question about the problem** before you answer it yourself.
> 2. Middle. Change the task environment once, with a new tool or a new setting.
> 3. Advanced. Delay rework on a stuck expert problem, and take a low-demand break in between.

Expertise is worth keeping



Feeling expert went with a closed-minded style

In six experiments

Practice for keeping an expert mind open

Key idea:

Expertise is worth keeping, and in six experiments feeling expert went with a more closed-minded style, so the steps here are practice for keeping an expert mind open.

Quick check:

What is earned dogmatism? Answer: The sense that being an expert gives you the right to a more closed-minded style. In how many experiments were the predictions confirmed? Answer: Six. What is an outsider question? Answer: A question about a problem put to someone outside your field. What kind of break suits a stuck expert problem? Answer: A low-demand one, such as a walk.

8.4 Later Life

8.4.1 Drawing on a Lifetime of Experience and Learning New Forms

IMAGINE EAMON, seventy-two, a retired land surveyor who spent forty years walking hills with a measuring staff. **His daughter gave him a lino-printing kit for his birthday, and it is still in its box on the spare-room shelf.** He knows maps inside out and has never cut a print. He wonders whether it is too late to start.

A lino-printing kit, still in its box

- A retired land surveyor of seventy-two
- Forty years walking hills with a measuring staff
- He knows maps inside out and has never cut a print

This section is about creating in later life, drawing on what you already know and learning new forms. **I show you a study of older adults who joined a professionally led choir, and what a review of creativity in older adults said about process.** Eamon tries the steps over four weeks, and three levels of practice close the section.

This section is about creative activity, and it is not medical advice. **Arts programmes are no cure for any illness, and anyone with a health condition should talk to a qualified clinician about it.** The studies below looked at particular groups of older adults, and their findings are associations and reports from those groups.

Arts activity, no cure for illness

- [x] Not medical advice
- [x] A health condition belongs with a qualified clinician
- [x] Findings are associations from particular groups

One team set out to "measure the impact of professionally conducted community-based cultural programs on the physical health, mental health, and social activities of individuals aged 65 and older" (Cohen et al., 2006). The programme they chose was a choir run by professional artists. What they found comes later in this section.

A choir run by professional artists (Cohen et al., 2006)



Physical health



Mental health



Social activities, aged 65 and older

> **Key Concept:**
>
> Second medium. **A second medium is a new form of making that carries skills built up in another field.** A retired upholsterer who starts making felt pictures, using her eye for how fabric stretches over a frame, has found a second medium.

On a Monday morning Eamon opens the kit at last. **He lays out the lino, the roller, the ink and five small cutting tools on the spare-room desk**, and next to them a map of the hills above his town. Forty years of contour lines are in his head and his hands. He decides they are the place to start.

Monday morning on the spare-room desk



The lino and the roller



The ink and five small cutting tools



A map of the hills above his town

Creative careers take many shapes, and the age patterns differ across fields (Simonton, 1988; Simonton, 1997), as you saw earlier in the book (see 1.3.1). **For Eamon the question is simpler, what his own long experience can carry into a new form.** His answer is the contour line.



An old map spread on a spare-room desk, with a pencil tracing of contour lines on tracing paper beside it.

> Exercise:
>
> Try it. Name one lifetime skill. **Invent one new form that uses it, for 20 minutes.**

Eamon names his skill as “reading the shape of land from lines”. **For twenty minutes he traces the contours of one hill onto a square of tracing paper and turns them into a pattern of rings for a print.** He has made no print yet. The sketch already looks like nothing he has ever drawn.

From a lifetime skill to a new form



Write the skill as a short phrase, then ask what else could use it. A cook’s sense of timing and a mechanic’s feel for parts that fit both

travel. Your first attempts count as mini-c creativity (Beghetto & Kaufman, 2007), whatever anyone makes of them. Twenty minutes is long enough for a first sketch.

> **Science Says:**
>
> Cohen's team recruited "166 healthy, ambulatory older adults" and assigned them "to either an intervention (chorale) or comparison (usual activity) group and assessed them at baseline and after 12 months" (Cohen et al., 2006). **"The intervention group also evidenced better morale and less loneliness than the comparison group"** (Cohen et al., 2006).

The choir study (Cohen et al., 2006)

166	12 months
Healthy, ambulatory older adults	Assessed at baseline and after 12 months

The same report listed the health differences. **The choir group "reported a higher overall rating of physical health, fewer doctor visits, less medication use, fewer instances of falls, and fewer other health problems than the comparison group"** (Cohen et al., 2006). These were healthy, mobile people in one study, measured on health and social outcomes only.

The choir group reported

- [x] A higher overall rating of physical health
- [x] Fewer doctor visits and less medication use
- [x] Fewer instances of falls

So the study links a professionally led arts group with better health and morale reports in later life. **It makes no promise that singing, or printing, will keep anyone well.** Eamon reads it as a reason to try a class, and he keeps his doctor for his doctor's questions.

On Thursday Eamon takes the starter step. **He books one professionally led taster session in relief printing at the town arts centre**, two hours on a weekday afternoon for six people. The tutor shows the group how to hold a gouge so that it cuts away from the hand. Eamon prints his ring pattern three times, each a little cleaner.

A taster session in relief printing



Two hours on a weekday afternoon



Six people and one tutor



His ring pattern printed three times

> **Key Concept:**
>
> Professionally led programme. **A professionally led programme is an arts activity run by a trained artist or teacher.** A weekly watercolour class at a care home, run by a painter who sets a subject and shows one technique each time, is a professionally led programme.

One article set out the methods of a theatre programme for older adults (Noice et al., 2015). It described a "theatrical intervention designed to enhance the mental/emotional health and psychological well-being of older adults" (Noice et al., 2015).

A theatre programme for older adults (Noice et al., 2015)

- A theatrical intervention
- Designed to enhance mental/emotional health
- Results from the authors' earlier research

The improvements it mentions came from the authors' earlier supporting research, which reported "significant improvements in performance of activities of daily living, as well as on standard measures of memory, comprehension, problem-solving ability, and personal growth" (Noice et al., 2015). Theatre is a long way from lino, and those results belong to that one programme.



A tutor's hands guiding an older man's hands as he cuts a curve into a block of lino.

The next week Eamon takes the middle step and learns one unfamiliar tool for a familiar theme. **The tool is the V-gouge, which cuts fine lines, and the theme is the river that runs below his hills.** He

spends two afternoons practising lines on an offcut before cutting the river's bends into a fresh block.

One unfamiliar tool for a familiar theme



The V-gouge, which cuts fine lines



The river below his hills



Two afternoons on an offcut

Pick the tool or medium first, then hand it a subject you know well. A familiar subject leaves your attention free for the new tool. Active involvement in unusual events went with more creative ideas in one study (Ritter et al., 2012), and openness to new experience has gone with creative achievement (Feist, 1998).

Pick the tool or medium first

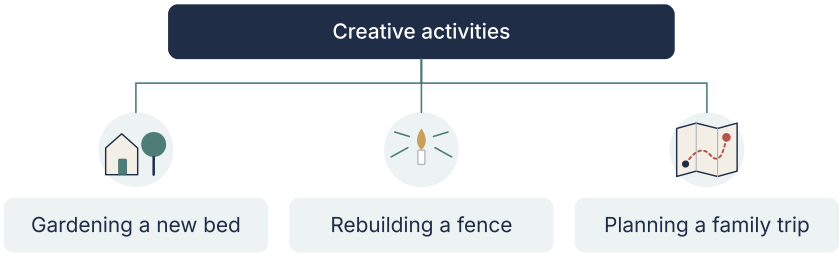
- Then hand it a subject you know well
- Active involvement in unusual events (Ritter et al., 2012)
- Openness to new experience (Feist, 1998)

Science Says:

A review of creativity in older adults found that "Creativity interventions have been shown to positively affect mental and physiological health indicators" (Flood & Phillips, 2007). **The authors gave more weight to making than to the finished piece.** They wrote that "The process of creating and one's attitude toward life may be more important than the actual product or tangible outcome" (Flood & Phillips, 2007).

The same review widened what counts as creative. **The authors noted that “there are also a number of useful interventions that are not traditionally identified as creative ones, but that are, in fact, creative activities”** (Flood & Phillips, 2007). Gardening a new bed, rebuilding a fence or planning a family trip can all hold creative work.

Not traditionally identified as creative



For the advanced step, starting in week three, Eamon keeps two scores a day for two weeks. After each printing session he scores how much he enjoyed the process from 1 to 5, and separately how polished the print came out. He writes the two numbers in different columns so that one cannot nudge the other.

Two scores in different columns

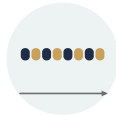
Score	When
How much he enjoyed the process, from 1 to 5	Straight after the session
How polished the print came out	Later, when the print is dry

After fourteen days the columns tell different stories. **His enjoyment scores sit at 4 or 5 on eleven of the twelve days he printed, while his polish scores wander from 1 to 4.** The worst print, a smudged river, came from one of his happiest sessions. He pins it up on the spare-room wall.

After fourteen days



Enjoyment at 4 or 5 on eleven of the twelve days



Polish wanders from 1 to 4



The smudged river pinned up

> **Key Concept:**
>
> Process over product. **Process over product means judging a session by how the making went, apart from the finished piece.** A retired engineer who rates each evening of model-boat building by how absorbed she felt, and notes the paint finish separately, is putting process over product.

Fill in the enjoyment score first, straight after the session. Score the polish later, when the print is dry. At the end of two weeks, read each column on its own. A high enjoyment column is worth keeping even when the polish column stays low.

At the end of four weeks Eamon decides what to keep. He keeps the contour rings, the V-gouge and the two columns, and he books the arts centre's six-week course for the spring. The empty kit box goes out with the recycling. The lino now lives on the spare-room desk, next to the maps.

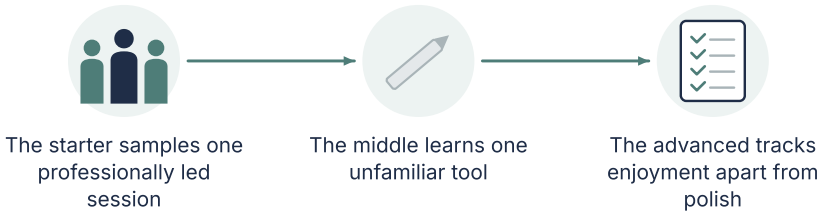
What Eamon keeps

- [x] The contour rings
- [x] The V-gouge and the two columns
- [x] The arts centre's six-week course

The same steps fit other lives. **A retired electrician who spent decades tracing circuits learns to make paper lanterns**, using his feel for neat connections. He joins a lantern workshop run by a local artist before the winter festival, and keeps two scores for each evening he works.

Three levels close this section, and each builds on the last. **The starter samples one professionally led session.** The middle level learns one unfamiliar tool for a familiar theme, and the advanced level tracks process enjoyment apart from product polish. Each level draws on what you already know.

New forms in later life, at three levels



Exercise:

New forms in later life.

1. Starter. **Join or sample one professionally led arts session** if one is available.
2. Middle. **Learn one unfamiliar tool or medium** for a familiar theme.
3. Advanced. **Track process enjoyment apart from product polish** for 2 weeks.

Carry a lifetime skill into a new form



Key idea:

Carry a lifetime skill into a new form and judge the making by how it feels, since older adults in a professionally led choir reported better health and morale than a comparison group, and a review suggested that the process of creating may matter more than the product.

Quick check:

What is a second medium? Answer: A new form of making that carries skills built up in another field. Who took part in the choir study? Answer: 166 healthy, ambulatory older adults, assessed at baseline and after 12 months. What did Flood and Phillips say may matter more than the product? Answer: The process of creating and one's attitude toward life.

8.4.2 Adapting Tools and Pace, and Creating With Others

Imagine Ivor, eighty-one, a retired cobbler with arthritis in both hands. **He has joined a rag-rug group that meets every other Tuesday at the village hall**, and the thin metal hook makes his fingers ache after ten minutes. The others work quickly, and he worries that he is holding the table back. He nearly stays home for the second session.

A rag-rug group every other Tuesday

> - A retired cobbler of eighty-one
> - The thin metal hook makes his fingers ache
> - He worries that he is holding the table back

This section is about adapting tools and pace, and about making things alongside other people. **I show you a theatre programme for older adults that came with a plan for others to run it**, and practical steps for sharing work and setting your own pace. Ivor tries them over three months, and three levels of practice close the section.

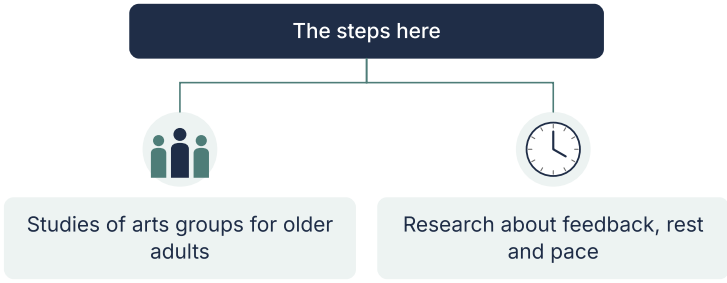
This section is about creative activity, and it is not medical advice. **Adaptations are personal, so the person doing the making chooses them, and any health need goes to a qualified clinician.** Nothing here assumes that age brings a deficit. Ivor's hands are his to describe, and the group leader asks before she suggests anything.

Adaptations are personal

- [x] Not medical advice
- [x] The person doing the making chooses them
- [x] Any health need goes to a qualified clinician

The steps here draw on studies of arts groups for older adults and on research about feedback, rest and pace. None of that research looked at rag rugs or at Ivor's village hall. The steps below are practice, fitted to one group that meets every fortnight.

Where the steps come from



> **Key Concept:**
> Co-creation. **Co-creation is making one piece together with another person, each adding to it.** Two neighbours who build a single wooden bird table across a summer of weekends, one cutting the roof and the other fixing the posts, are engaged in co-creation.

At the second session Ivor sits beside a former school secretary who has made rugs for years. **She suggests they work on the same corner of one rug, from opposite sides of the frame.** That way neither of them is racing the other, and each can see the other's loops. Ivor agrees to try it for twenty minutes.

The same corner of one rug



Opposite sides of the frame



Each can see the other's loops



Twenty minutes to try it

A choir study of older adults appeared in the previous section (Cohen et al., 2006; see 8.4.1). **It studied a professionally run group, and this section looks at what happens inside any group like that**, from the tools on the table to the way people talk about each other's work.

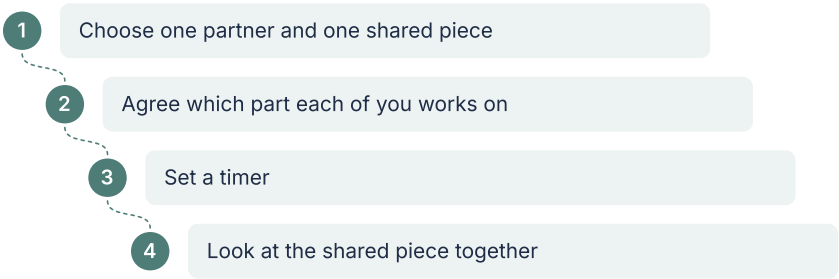


Two pairs of hands, one older and knotted, pushing strips of fabric into the same piece of hessian.

Choose one partner and one shared piece before the twenty minutes start. Agree which part each of you works on, sit where you can both reach it comfortably and set a timer. When it rings, stop and

look at the shared piece together for a minute. Then go back to your own work or carry on, as you both prefer.

Before the twenty minutes start



> Exercise:
>
> Try it. **Create with one other person for 20 minutes.** Share informational comments only.

For twenty minutes Ivor and his partner work the corner together. **Their comments stay on the work, such as "that loop sits higher than its neighbours" and "the blue looks good next to the grey".** Nobody says who is better or faster. By the end the corner has a band of blue running into grey from both sides.

Comments in the twenty minutes

Keep	Leave out
⊕ That loop sits higher than its neighbours	⊖ Who is better
⊕ The blue looks good next to the grey	⊖ Who is faster

An informational comment describes what is on the frame and leaves the person out of it. In one lab study, positive informational feedback went with the most creative ideas when people also had high task autonomy (Zhou, 1998). Name what you see and what you would try next. Keep praise of a person out of the twenty minutes.

An informational comment

- Describes what is on the frame
- Leaves the person out of it
- Positive informational feedback and high task autonomy (Zhou, 1998)

Science Says:

The authors of a theatre programme for older adults wrote that "a step-by-step plan is offered for health care professionals and activity directors who might wish to carry out this program in their own facilities" (Noice et al., 2015). **The programme was written down so that other leaders could run it in their own settings.**

A written plan matters for a small community group like Ivor's. **The rag-rug group has no published plan, and its leader writes her own one-page outline for each fortnight.** Hers lists the start time, the task and the tea break.

The leader's one-page outline



The start time



The task



The tea break

At the third session Ivor takes the starter step and adapts one tool. **He swaps the thin hook for one with a thick cork handle and works sitting down at the end of the table.** He also splits his work into fifteen-minute bouts with a cup of tea between them. His fingers ache less by the end of the afternoon.

Ivor adapts one tool

Before	After
The thin hook	A thick cork handle
Standing	Sitting down at the end of the table

Before any swap, the leader asks Ivor what would help, and he answers in his own words. He says the thin grip is the trouble, and standing tires his knees. She brings the cork-handled hook from her own box and moves a chair to the end of the table. Every change that afternoon is one he chose.

For the starter, change one thing, then see how the next session feels. Larger print on a pattern, a seated option or a shorter bout are all small changes. Ask the person before offering anything. The process of making comes first in this group (Flood & Phillips, 2007), so the tool serves the making.

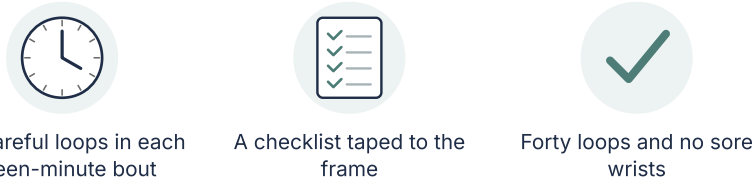
Small changes for the starter

- [x] Larger print on a pattern
- [x] A seated option
- [x] A shorter bout

> **Key Concept:**
>
> Adapted tool. **An adapted tool is a tool changed in size, grip or print so that the maker can keep working.** A gardener who wraps foam tubing round the handle of her trowel so that she can grip it through a wet spring is using an adapted tool.

At the fourth session Ivor tries the middle step and sets a slower pace goal. **His goal is ten careful loops in each fifteen-minute bout, with a checklist taped to the frame**, hook in, catch the strip, pull through and check the height. By the end of the afternoon he has forty loops and no sore wrists.

A slower pace goal



Ten careful loops in each fifteen-minute bout

A checklist taped to the frame

Forty loops and no sore wrists

Filling a break with demanding tasks went with a smaller incubation effect in one large review (Sio & Ormerod, 2009). **A cup of tea and a chat are low-demand breaks, which suits Ivor's pace.** His checklist keeps his attention on how each loop is made, with nobody's speed in view.

Low-demand breaks

- A cup of tea and a chat
- Demanding tasks went with a smaller incubation effect (Sio & Ormerod, 2009)
- Attention on how each loop is made

Two paces can share one frame. Ivor's partner keeps working at her usual speed on her side of the corner, and he keeps his ten loops a bout on his. Their halves meet in the middle a little unevenly, and they decide the uneven line looks like a shoreline. Neither pace has to change for the rug to grow.

Two paces can share one frame

Who	Pace
Ivor	Ten loops a bout
His partner	Her usual speed

For the middle step, write the checklist in four steps or fewer and use large letters. Set the pace as a small number for each bout and keep it for a month. Read the checklist aloud as each bout starts. Count steps done well, and leave the speed of the rest of the table out of the count.

Key Concept:

Pace goal. **A pace goal is a target for how slowly or steadily to work, set before the session begins.** A woman learning the cello who aims for eight slow bars played cleanly in each practice, however long that takes, has set a pace goal.

In the second month Ivor misses a session for a hospital appointment. **He takes the advanced step and simply returns at the next scheduled group**, two weeks later, with no "catch-up grind" at home in between. The group has moved the rug on, and his corner is waiting for him.

A missed session



A hospital appointment



Back at the next scheduled group



No catch-up grind at home

Missing one opportunity did little harm to habit progress in a habit study (Lally et al., 2010). **The leader welcomes him back and leaves him to it.** Less close monitoring went with more creativity in one workplace study with creative coworkers present (Zhou, 2003), and Ivor works better with nobody watching his hands.

The leader welcomes him back

- Missing one opportunity did little harm (Lally et al., 2010)
- Less close monitoring went with more creativity (Zhou, 2003)
- Nobody watching his hands

For the advanced step, decide before a missed session what you will do afterwards. The answer is the next group, at the usual pace and in the usual seat, with nothing extra to make up. Tell the leader if you need the same seat or tool kept ready. A missed session is part of a long stretch of making.

Decide before a missed session



The next group



The usual pace and the usual seat



Nothing extra to make up

By the end of the third month the rug is finished. **It lies in the entrance of the village hall, with Ivor's blue-and-grey corner nearest the door.** He has kept the cork-handled hook, the seat at the end of the table and the checklist. He and his partner have started a second rug together.

The rug is finished

- In the entrance of the village hall
- His blue-and-grey corner nearest the door
- A second rug started together

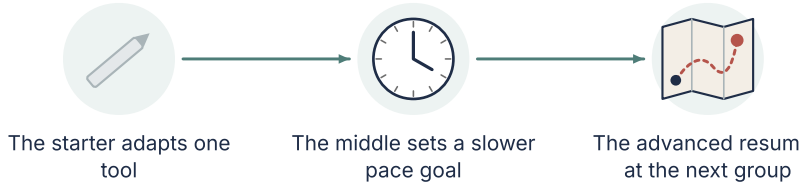


An older man at a community table, sitting down and smiling as he pulls a strip of red fabric through hessian.

The same steps fit other groups. **A woman of seventy-eight with poor eyesight joins a library writing circle and asks for the pages in large print.** She sets a goal of one short paragraph a meeting, shares a story with one other member and gets comments on the words alone. When she misses a meeting, she returns at the next.

Three levels close this section, and each builds on the last. **The starter adapts one tool.** The middle level sets a slower pace goal with a process checklist, and the advanced level resumes at the next group after a missed session. Every level is chosen with the person doing the making.

Tools, pace and company, at three levels



Exercise:

Tools, pace and company.

1. Starter. **Adapt one tool**, such as larger print, a seated option or a shorter bout.
2. Middle. **Set a slower pace goal** with a process checklist, leaving product ranking out.
3. Advanced. If a session is missed, **resume at the next scheduled group** with no “catch-up grind”.

Adapt the tools and the pace to the person



Key idea:

Adapt the tools and the pace to the person, and make things alongside others with comments about the work, since a theatre programme for older adults came with a step-by-step plan for other leaders, and positive informational feedback went with the most creative ideas when people also had high task autonomy.

Quick check:

What is an adapted tool? Answer: A tool changed in size, grip or print so that the maker can keep working. Who was the theatre programme's step-by-step plan offered to? Answer: Health care professionals and activity directors. What does the advanced step do after a missed session? Answer: It resumes at the next scheduled group, with no catch-up grind.

8.5.1 Adapting Creative Practice to Different Strengths and Needs

Imagine Declan, thirty-four, a tree surgeon who has ADHD and turns wooden bowls on a lathe in his shed. **He has a crate of thirty rough bowl shapes and three finished bowls.** Friends keep telling him that ADHD makes people "naturally creative", as if the crate should be full of finished work. He finds the claim flattering and unhelpful.

Thirty rough shapes, three finished bowls

- A tree surgeon of thirty-four who has ADHD
- Wooden bowls turned on a lathe in his shed
- Friends say ADHD makes people naturally creative

This section is about fitting creative practice to a person's strengths and needs. **I show you what research on adults with ADHD and on dyslexia has found, and why the popular claims need care.** Declan tries the steps over a month, with his woodwork club's help, and three levels of practice close the section.



A wooden crate full of rough-turned bowl blanks beside a small lathe in a garden shed.

This section is about creative practice, and it is not medical or psychological advice. **ADHD and dyslexia are clinical diagnoses, and a qualified clinician is the right person for questions about assessment or treatment.** No creativity finding is a reason to skip assessment or treatment that a person wants. The language here puts the person first.

ADHD and dyslexia are clinical diagnoses

- [x] Not medical or psychological advice
- [x] A qualified clinician for assessment or treatment
- [x] No creativity finding is a reason to skip assessment or treatment

One pair of researchers asked how common dyslexia was among students of different subjects. They wrote that "Two studies are reported on the prevalence of dyslexia among university students" (Wolff & Lundberg, 2002). One group studied art and the other

studied subjects outside the arts. Their reasons for asking come later in this section.

> **Key Concept:**
>
> Subclinical score. **A subclinical score is a high score on a measure of a condition's traits in someone who does not have the disorder.** A runner who scores high on a sleep-problems questionnaire, and who does not have a sleep disorder, has a subclinical score.

Declan's shed time follows his mood. **Some Saturdays he roughs out six new shapes in a morning, and some Saturdays he cannot settle to sanding a single one.** Either way the crate grows and the shelf of finished bowls stays short. He wants a way to choose what each session is for.

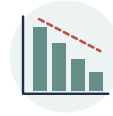
Shed time follows his mood



Some Saturdays six new shapes in a morning



Some Saturdays not a single one sanded



The crate grows, the shelf stays short

Before each session, decide whether today is for opening up (divergent practice) or narrowing down (convergent practice). Opening up means many rough shapes, and narrowing down means choosing one and finishing it. Write the choice on the shed whiteboard and stick to it for that session. The other kind of practice gets its own day.

Decide what each session is for

Practice	What it means
Opening up (divergent practice)	Many rough shapes
Narrowing down (convergent practice)	Choosing one and finishing it

On a finish day, choose the one piece before the session starts and put the rest out of sight. On an open day, set a number of rough ideas to reach and stop when you reach it. Either way, the whiteboard word decides what counts as a good session.

The whiteboard word decides

- On a finish day, one piece and the rest out of sight
- On an open day, a number of rough ideas to reach
- Stop when you reach it

> Exercise:
>
> Try it. **Choose divergent or convergent practice to match today's goal**, and pick only one.

On the first Saturday Declan writes "finish" on the whiteboard. **He takes one ash bowl from the crate, sands it through four grades of paper and oils it.** Three hours later it sits on the shelf beside the other three. The roughing gouge stays on its hook all day.

The first Saturday: finish



One ash bowl from the crate



Four grades of paper



Oiled and on the shelf three hours later

One goal per session keeps the work in one direction. Declan notices that the narrowing-down sessions feel slow, and that the finished bowl feels better than any morning of roughing out. The next Saturday he writes "open" and roughs out four shapes, with no plan to finish them.

One goal per session

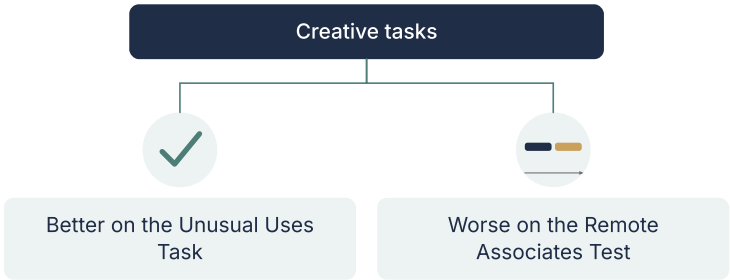
Saturday	Whiteboard	Result
First	Finish	One bowl finished
Next	Open	Four shapes roughed out

> **Science Says:**
> In one study of adults, "ADHD individuals outperformed non-ADHD individuals on the Unusual Uses Task, but performed worse than non-ADHD on the Remote Associates Test and the semantic IOR task" (White & Shah, 2006). **Adults with ADHD did better on one kind of creative task and worse on others.** "The relationship between ADHD and creative ability was mediated, in part, by differences in inhibition" (White & Shah, 2006).

The authors framed their results around "inhibitory control and its relative import in two aspects of creativity", which they named as

"divergent and convergent thinking" (White & Shah, 2006). **The study gives no reason to call anyone more or less creative overall.** Declan copies its name into his notebook for the middle step.

Adults with ADHD (White & Shah, 2006)



A later paper set out to explain the mixed picture. **Its authors wrote, "This research aimed to provide explanations for the inconsistent findings regarding creativity in ADHD"** (Boot et al., 2020). In that one paper, "Adults with ADHD reported more real-world creative achievements", and "adults with ADHD generated more original ideas when competing for a bonus" (Boot et al., 2020).

One paper, two findings (Boot et al., 2020)

- More real-world creative achievements
- More original ideas when competing for a bonus
- Explanations for the inconsistent findings

A review then gathered the studies together. **Its authors wrote that "we review 31 behavioral studies on creativity and ADHD"** (Hoogman et al., 2020). They found that "Most studies find evidence for increased divergent thinking for those with high ADHD scores

(subclinical) but not for those with the disorder (clinical)" (Hoogman et al., 2020). The evidence is mixed.

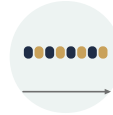
A review of 31 behavioral studies (Hoogman et al., 2020)



Increased divergent thinking with high ADHD scores (subclinical)



Not for those with the disorder (clinical)



The evidence is mixed

> **Key Concept:**
>
> Strength domain. **A strength domain is an area of work where a person already has skill and confidence.** A school caretaker who knows every pipe in the building, and starts sketching designs for the school garden's water butts, is working from a strength domain.

For the starter step Declan picks a finishable task in his strength domain. **As a tree surgeon he knows sycamore better than any other wood, so he chooses one small sycamore bowl.** He sets himself one afternoon to turn, sand and oil it. By five o'clock it is finished.

A finishable task in his strength domain



Sycamore, the wood he knows best



One small sycamore bowl



Finished by five o'clock

Earlier in the book you met belief in your own creative ability (see 7.2.3). **That belief went with creative work** (Tierney & Farmer, 2002; Haase et al., 2018), and a finished bowl in a familiar wood gives it something solid. Declan writes the date on the bowl's base in pencil.

Belief in your own creative ability

- That belief went with creative work (Tierney & Farmer, 2002)
- A finished bowl gives it something solid
- The date on the bowl's base in pencil

For the starter, choose a task you can finish in one session, in materials or skills you already know. Keep it small enough that finishing is likely. Put the finished piece where you will see it. The next task can stretch a little further once the first one is done.

A starter task

- [x] One you can finish in one session
- [x] In materials or skills you already know
- [x] The finished piece where you will see it

Science Says:

A paper on dyslexia and art began, **"It is widely held opinion that dyslexia is associated with remarkably artistic creativity"** (Wolff & Lundberg, 2002). The authors then weighed that opinion against the published research. They wrote that "Very few objective studies have been reported that confirm the conjectures on the relationship between dyslexia and artistic creativity" (Wolff & Lundberg, 2002).

In the second week **Declan takes the middle step and rejects the popular claim he hears most, that ADHD makes people naturally creative.** He writes three labels beside it, one study with mixed results, one paper whose results depended on the setting and one review with a mixed picture. The page goes on the shed wall beside the whiteboard.

The claim against the evidence

Source	Label
One study	Mixed results
One paper	Results depended on the setting
One review	A mixed picture

For the middle step, write the claim in one line and the evidence in three. Use the labels as you find them, mixed, one study or review, and keep the person out of it. Declan's page ends with the line "some studies yes, some no, and it depends on the task".

Some studies yes, some no

> - The claim in one line
> - The evidence in three
> - It depends on the task

In the third week Declan sits down with the woodwork club's leader for the advanced step. **They co-design his adaptations together, covering tools, time and feedback style.** He chooses a kitchen timer for forty-minute bouts and a standing bench by the door.

Adaptations co-designed with the club leader



Tools: a standing bench by the door



Time: forty-minute bouts on a timer



Feedback style: written notes

Nobody else decides what Declan needs. The club leader offers a few options for each area and asks which, if any, would help. Declan turns down ear defenders, since the lathe noise never bothers him, and asks for written notes. A diagnosis alone cannot tell a helper which changes a particular person will want.

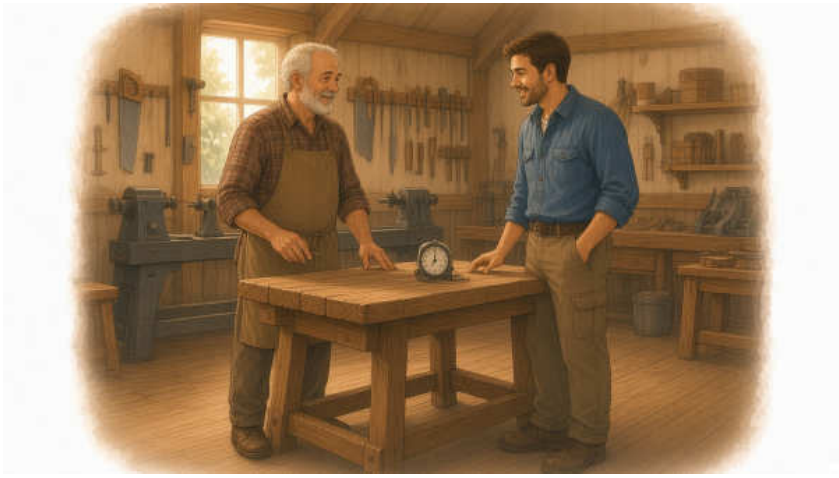
Nobody else decides what Declan needs

He asks for	He turns down
⊕ Written notes	⊖ Ear defenders
⊕ A standing bench by the door	⊖ The lathe noise never bothers him

> **Key Concept:**
> Co-designed adaptation. **A co-designed adaptation is a change to tools, time or feedback that the person chooses together with a helper.** A dancer with a hearing loss who agrees with her teacher on hand signals for counts, and picks the signals herself, has a co-designed adaptation.

For the advanced step, the person leads and the helper listens. Ask what helps, offer options and write down what the person picks. Review the changes after a month. Declan's own small discoveries at the

lathe count as mini-c creativity (Beghetto & Kaufman, 2007), whatever anyone else thinks of them.

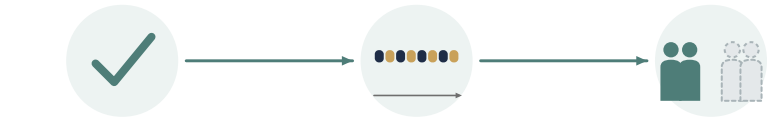


A woodwork club leader and a younger man talking beside a standing bench, a kitchen timer between them.

The same steps fit other people. **A woman with dyslexia who writes songs records her lyrics as voice notes and keeps a separate day for picking the best line.** She and her choir leader agree that feedback comes as a short voice message. She sets aside the popular claim about dyslexia and artistic gifts, and judges her songs as songs.

Three levels close this section, and each builds on the last. **The starter finishes one task in a strength domain.** The middle level sets one popular claim against mixed evidence, and the advanced level co-designs adaptations with the person.

Strengths and needs, at three levels



The starter finishes one task in a strength domain

The middle sets one popular claim against mixed evidence

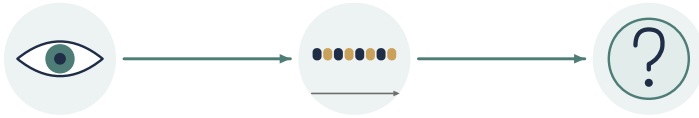
The advanced co-designs adaptations with the person

Exercise:

Strengths and needs.

1. Starter. **Build creative self-efficacy with one finishable task** in a strength domain.
2. Middle. **Reject one popular dyslexia or ADHD creativity myth** using the mixed-evidence labels from Wolff and Lundberg, Boot and the Hoogman review.
3. Advanced. **Co-design adaptations with the person**, covering tools, time and feedback style.

Fit creative practice to the person



And to their goal for the day

A mixed picture that depends on the task

Little firm evidence for special gifts

Key idea:

Fit creative practice to the person and their goal for the day, since research on adults with ADHD and on dyslexia shows a mixed picture that depends on the task, and popular claims of special gifts have little firm evidence behind them.

Quick check:

What is a subclinical score? Answer: A high score on a measure of a condition's traits in someone who does not have the disorder. What did the Hoogman review find in most studies? Answer: More divergent thinking for those with high ADHD scores, but not for those with the disorder. What did Wolff and Lundberg say about the dyslexia and art claim? Answer: Very few objective studies confirm it.



Module

9

Technology, AI and Cleverini Games

9.1 Capturing and Exploring Ideas

9.1.1 Notebooks, Sketchbooks, Voice Notes and Collections of Examples

Imagine Lorcan, forty-one, a deckhand on a river cruise boat who is making a weathervane for his mother's allotment shed. **The copper cockerel is cut out, and the tail fin has stumped him for a month.** His best ideas arrive while he coils ropes, and by the end of the shift they have gone.

A weathervane for an allotment shed

> - A deckhand of forty-one on a river cruise boat
> - The copper cockerel is cut out
> - The tail fin has stumped him for a month

This section is about notebooks, sketchbooks, voice notes and collections of examples. **I show you what one design researcher wrote about sketching, and why a pile of examples needs care.** Lorcan tries the steps over three weeks, and three levels of practice close the section.

A notebook in this section is a place for ideas, and it is never therapy. **Nothing here claims that writing about your feelings changes your creativity or your mood.** If low mood or worry builds up, a qualified clinician is the right person to talk to. The steps below are about catching and shaping ideas.

A place for ideas, never therapy

- [x] Nothing here claims that writing about your feelings changes your creativity
- [x] Low mood or worry: a qualified clinician
- [x] The steps are about catching and shaping ideas

The steps grew from design research on sketching and on copying examples, and from research on how habits form. No study in this section tested a notebook or a voice note as a creativity method, so the capture steps themselves are practice. Each finding below explains why one step is built the way it is.

Where the steps came from



> **Key Concept:**
>
> Idea capture. **Idea capture is putting an idea into a notebook, a sketch or a voice note at the moment it arrives, so that it is kept for later.** A hairdresser who whispers a new fringe shape into her phone between two clients is making an idea capture.

Keep the notebook and the notes for yourself. **Thinking about rewards before writing went with less creative poems in one study** (Amabile, 1985). Lorcan's sketchbook stays in his jacket pocket and never goes on the crew's group chat, so nobody grades a page.

Keep the notebook for yourself



Thinking about rewards went with less creative poems (Amabile, 1985)



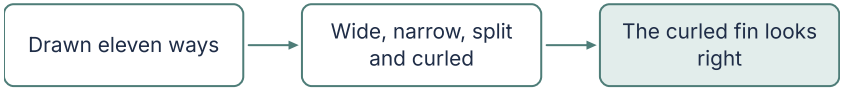
The sketchbook stays in his jacket pocket



Nobody grades a page

On Monday, during his lunch break on deck, Lorcan opens the pocket sketchbook. **He gives the stuck tail fin ten minutes and draws it eleven ways**, wide, narrow, split and curled. He writes nothing about how the stuck month has felt. By the end the curled fin looks right beside the cockerel.

Ten minutes on the stuck tail fin



> Exercise:
>
> Try it. **Sketch one stuck design for 10 minutes**, and leave feelings out of it.

A pencil and any scrap of paper are enough for the try it. Lorcan uses a pocket sketchbook because it survives the spray on deck. Any surface that takes ten fast drawings will do, and the drawings can be rough enough that nobody else could read them.

Give the sketch a clock and a single subject. Ten minutes on one stuck part keeps the page about the design. Draw each version small and side by side, so the next one can answer the last. Change one thing per version, such as the width, the angle or the outline.

Give the sketch a clock and a single subject

1. Ten minutes on one stuck part
2. Draw each version small and side by side
3. Change one thing per version

> **Science Says:**
>
> A design researcher wrote that in sketching, the designer **"creates visual displays which help induce images of the entity that is being designed"** (Goldschmidt, 1991). Her paper set this apart from lay sketching, where a drawing records a picture already held in the head. It added that "Sketching partakes in design reasoning and it does so through a special kind of visual imagery" (Goldschmidt, 1991).

Lorcan's page shows the same thing in small. **Each fin answers something he disliked in the one before**, a tail too stiff, then too floppy, then too busy. The curled fin is the first one he stops arguing with, and he had no picture of it before he drew it.

> **Science Says:**
>
> The same paper described the back-and-forth on the page. **"The dialectics of sketching is the oscillation of arguments which brings about gradual transformation of images, ending when the designer judges that sufficient coherence has been achieved"** (Goldschmidt, 1991). Oscillation means swinging back and forth.

On Tuesday Lorcan takes the starter step. **He collects five photos of old weathervanes he has seen from the boat**, a fox, a ship, a fish and two cockerels, and prints them small. Under each one he writes one feature he refuses to copy. Under both cockerels it is the same arrow-shaped tail.

Five photos of old weathervanes



A fox, a ship and a fish



Two cockerels



One feature he refuses to copy under each

The refusal mark is aimed at design fixation, which you met earlier in the book (Jansson & Smith, 1991; Smith et al., 1993; see 2.1.3). Lorcan's own tail stays curled, and the arrow stays on the photos. That evening he draws three more tails in case the curl fails, and none of them has an arrow.

The refusal mark is aimed at design fixation

Before	After
The same arrow-shaped tail under both cockerels	Lorcan's own tail stays curled Three more tails, none of them with an arrow

> **Key Concept:**
>
> Example collection. **An example collection is a set of finished pieces by other people, gathered to look at while you design.** A baker of celebration cakes who keeps a folder of photos of other bakeries' cakes has an example collection.

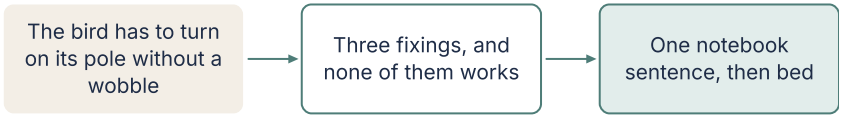
Write the refusal under the photo before you draw anything of your own. Choose a feature that turns up in more than one example, written in two words such as “arrow tail”. Gather the five from different makers and periods, so they share as little as possible. Keep them in the back of the sketchbook, to be checked and closed.

Write the refusal before you draw

- [x] A feature that turns up in more than one example
- [x] Two words, such as arrow tail
- [x] Five from different makers and periods

On Thursday the tail is settled, and the cockerel’s feet are the new problem. **The bird has to turn on its pole without a wobble.** At lunch he tries three fixings, and none of them works. That evening he writes the problem as one notebook sentence, “the feet must turn on the pole without a wobble”, and goes to bed.

The feet are the new problem



On Friday morning he reopens the notebook once, over breakfast. **The answer that comes is a collar like the ring that holds a mooring line**, slid over the pole under the feet. He sketches it in four lines and closes the book again. On Saturday he cuts the collar from a scrap of copper pipe.

Friday morning, reopened once



A collar like the ring that holds a mooring line



Sketched in four lines



Cut from a scrap of copper pipe

Work on the problem properly before you write the sentence. Longer preparation before a break went with a bigger benefit from the break in the incubation research (Sio & Ormerod, 2009). Write the sentence as the problem, with no answer in it, and keep it short enough to read in one breath.

Work on the problem properly first

- Longer preparation, a bigger benefit (Sio & Ormerod, 2009)
- The sentence holds the problem, with no answer
- Short enough to read in one breath

> **Key Concept:**
> Stuck sentence. **A stuck sentence is one written line that states a stuck problem, kept to be reopened later.** A gardener who writes “the hedge shades the beans by four o’clock” on the inside of the greenhouse door has written a stuck sentence.

Reopen the sentence once, at a set time the next day. Read it, write down whatever comes in a few words, and close the book. If nothing comes, the sentence stays where it is for another day, and the reopening still counts as done.

Reopen the sentence once



At a set time the next day



Whatever comes, in a few words



If nothing comes, another day

On the next Monday Lorcan takes the advanced step. **He picks one capture cue, the moment the boat ties up at the last pier**, and records a voice note there at the end of every shift for two weeks. He says only the idea, in under a minute, with nothing about his day.

One capture cue for two weeks

Day	1	2	3	4	5	6	7
The boat ties up at the last pier	☐	☐	☐	☐	☐	☐	☐
A voice note at the end of every shift	☐	☐	☐	☐	☐	☐	☐
Only the idea, in under a minute	☐	☐	☐	☐	☐	☐	☐

One cue at the end of every shift is the whole method. The cue borrows from research on health habits (Lally et al., 2010), so for ideas it is a guide and no promise. Lorcan starts each note with the project's name, "vane", so the notes sort themselves when he plays them back on Sundays.

One cue at the end of every shift

- Borrowed from research on health habits (Lally et al., 2010)
- For ideas it is a guide and no promise
- Each note starts with the project's name

On the second Wednesday the boat stays in dock for high water, and Lorcan misses his cue. **On Thursday he records at the pier as before.** A single missed day did little harm to habit progress in the same study (Lally et al., 2010), and he makes no extra notes to catch up.

A missed cue on the second Wednesday



The boat stays in dock for high water



Thursday at the pier as before



No extra notes to catch up

Pick a cue that already happens at the same time and place each day. Record the idea in your own words and stop. Leave out prompts about your mood or your day, so the notes stay a store of ideas. Once a week, play them back and copy any worth keeping into the notebook.

Pick a cue that already happens

- [x] The same time and place each day
- [x] The idea in your own words, then stop
- [x] Play them back once a week

Use whichever capture tool your hands are free for. On deck Lorcan's hands are wet and cold, so he speaks into his phone. At home on the shed bench he draws, because a fixing is easier to show than to say. Both kinds of capture end up in the same notebook on Sundays.

Whichever capture tool your hands are free for

Lorcan	Capture
On deck, hands wet and cold	A voice note into his phone
At home on the shed bench	A drawing of the fixing



A finished weathervane with a curled tail fin turning on the roof of an allotment shed.

On the last Sunday Lorcan counts thirteen voice notes from fourteen shifts. **One of them ends up on the weathervane**, a copper letter for each wind, beside the curled tail and the collar. He fixes it to the shed roof that afternoon, and his mother watches it turn. The other twelve notes stay in the notebook for the next project.

The same steps fit other makers. **A trainee tailor who designs waistcoats sketches one stuck collar for ten minutes**, marks the lapel she refuses to copy from five photos, and records ideas at the same bus stop each evening. On Sunday evenings she plays the week's notes back and copies the keepers into a notebook.

Capture and collect, at three levels



The starter marks one refused feature on five examples

The middle sleeps on a stuck sentence

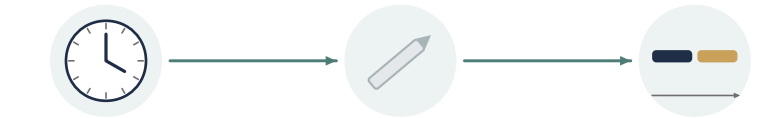
The advanced keeps one capture cue for two weeks

Exercise:

Capture and collect.

1. Starter. **Collect five examples and mark one feature you refuse to copy.**
2. Middle. **Capture a stuck problem in one sentence** in a notebook, sleep on it and reopen it once.
3. Advanced. **Use the same capture cue for two weeks**, with no journaling prompts.

Sketch to find a design



Capture ideas at one daily cue

Sketching helps induce images of the thing being designed

One refused feature marked on each example

Key idea:

Sketch to find a design and capture ideas at one daily cue, since one design researcher described sketching as making displays that help induce images of the thing being designed, and a collection of examples needs one refused feature marked on each piece.

Quick check:

What is a stuck sentence? Answer: One written line that states a stuck problem, kept to be reopened later. What does sketching create, in Goldschmidt's words? Answer: "visual displays which help induce images of the entity that is being designed". What does the advanced step leave out? Answer: Journaling prompts.

9.1.2 Diagrams, Mind Maps, Storyboards and Physical Models

Imagine Saoirse, twenty-nine, a trainee beekeeper studying for her association's basic certificate. **In June her first colony swarmed out of its box and into a neighbour's apple tree.** Now the exam is a month away, and she has offered to make a two-minute safety video for the beekeeping club.

A two-minute safety video

- A trainee beekeeper of twenty-nine
- Her first colony swarmed into a neighbour's apple tree
- The exam is a month away

This section is about diagrams, mind maps, storyboards and physical models. **I show you a study of mind maps as a way to remember facts, and why maps belong to learning in this book.** Saoirse tries the steps over one week, and three levels of practice close the section.



A swarm of bees hanging in a dark cluster from the branch of an apple tree.

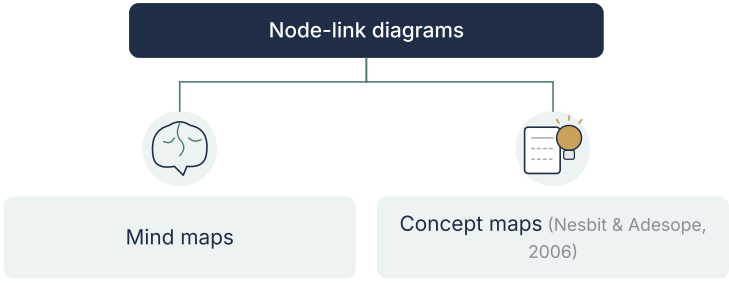
One team set out to test mind maps as a way of studying. Their aim was "To examine the effectiveness of using the 'mind map' study technique to improve factual recall from written information" (Farrand et al., 2002). They worked with "50 second- and third-year medical students" (Farrand et al., 2002).

A test of the mind map study technique

- To improve factual recall from written information
- 50 second- and third-year medical students
- Farrand et al., 2002

Concept maps are the node-link diagrams you met in 4.9.1 (Nesbit & Adesope, 2006). Mind maps and concept maps are both used here as tools for learning a subject. Each step says what to draw and how to check it. Saoirse's exam asks for facts, so a study drawing suits it.

Tools for learning a subject



> **Key Concept:**
> Self-quiz. **A self-quiz is testing your own memory of a topic with your notes out of sight.** A trainee taxi driver who covers the street map and names every turning from the station to the hospital is taking a self-quiz.

Pick a topic you will be tested on soon, and keep the map to one sheet. Put each idea in a box and write a word on every arrow, such as causes, treats or shows. The words on the arrows give the quiz something to check the next day.

One topic, one sheet

- [x] A topic you will be tested on soon
- [x] Each idea in a box
- [x] A word on every arrow, such as causes, treats or shows

On Monday evening Saoirse draws a concept map of bee diseases on a sheet of lining paper. **Each disease sits in a box, and labelled arrows join it to its signs and its treatment.** The map takes forty minutes and fills the sheet. She folds it and leaves it in the hall.

Monday evening: bee diseases



A sheet of lining paper



Labelled arrows to signs and treatment

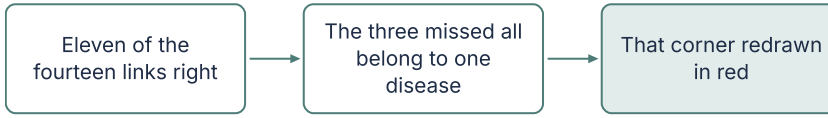


Forty minutes, then folded in the hall

> Exercise:
>
> Try it. **Draw a concept map of one topic you are studying**, then quiz yourself on it tomorrow.

On Tuesday she turns the map face down and writes out what she can remember. **She gets eleven of the fourteen links right**, and the three she missed all belong to one disease. She redraws that corner of the map in red and quizzes herself on it again at lunch.

Quiz yourself before you look again



Quiz yourself before you look at the map again. Write the boxes and the links from memory on a fresh page, then lay the map beside it and mark what you missed. Redraw only the part you got wrong, in a different colour so it stands out on the next quiz. The whole check takes about ten minutes.

> Science Says:
>
> The study reported that **"Recall of factual material improved for both the mind map and self-selected study technique groups at immediate test compared with baseline. However this improvement was only robust after a week for those in the mind map group"** (Farrand et al., 2002). "At 1 week, the factual knowledge in the mind map group was greater by 10% (adjusting for baseline)" (Farrand et al., 2002). Self-selected means the comparison students chose their own method.

The mind map study at 1 week (Farrand et al., 2002)

10%

Greater factual knowledge in the mind map group, adjusting for baseline

That study measured how well students remembered written facts. **It tested no creativity at all**, and it gives no reason to think a map makes ideas more original. Saoirse uses her maps for her exam.

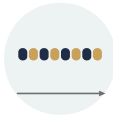
Treat the quiz result as a record of what you remember. Saoirse writes the date and her score, eleven of fourteen, in the corner of the map. She sets a second quiz for the following Tuesday, a week on, to see whether the links have held.

A record of what you remember

- It tested no creativity at all
- The date and her score in the corner of the map
- A second quiz a week on

The concept map review reported a range of results. **"Mean effect sizes varied from small to large depending on how concept maps were used and on the type of comparison treatment"** (Nesbit & Adesope, 2006). The authors added that "Significant heterogeneity was found in most subsets" (Nesbit & Adesope, 2006), meaning results differed between studies.

Concept map results varied



Mean effect sizes from small to large



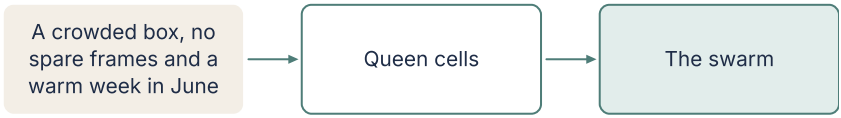
Depending on how concept maps were used



Significant heterogeneity in most subsets

On Wednesday Saoirse takes the starter step. **She draws a diagram of why her colony swarmed**, with a box for each cause and an arrow to what it led to. A crowded box, no spare frames and a warm week in June all point to queen cells, and the queen cells point to the swarm.

Why her colony swarmed



> **Key Concept:**
>
> Cause-and-effect diagram. **A cause-and-effect diagram is a drawing in which arrows run from each cause to what it leads to.** A bus company manager who draws arrows from roadworks and a broken ticket machine to late buses on one route has made a cause-and-effect diagram.

Quiz the diagram for recall only. Cover it, redraw the causes and arrows from memory and compare. Saoirse gets every box and misses one arrow, from spare frames to the crowded box. The quiz checks what she remembers, and the diagram makes no claim to new ideas.

Quiz the diagram for recall only



Cover it and redraw from memory



Every box, and one arrow missed



No claim to new ideas

Keep the boxes short and the arrows one way. One cause per box, written in three words or fewer, and one arrow for each link you can explain. If an arrow needs a sentence to justify it, write the sentence beside it. Saoirse's diagram ends with six boxes and seven arrows.

Short boxes, one-way arrows

- [x] One cause per box, in three words or fewer
- [x] One arrow for each link you can explain
- [x] Six boxes and seven arrows

On Friday Saoirse plans the club's safety video. **She draws a storyboard strip of four panels**, a beekeeper suiting up, lighting the smoker, opening the hive and checking a frame. The first panel solves the safety problem with a full suit and gloves, the way every video she has seen does it.

A storyboard strip of four panels

1. A beekeeper suiting up
2. Lighting the smoker
3. Opening the hive
4. Checking a frame

Plan the strip in words before you draw it. Write one line for each panel, saying what happens and what the viewer should notice. Four panels keep a two-minute video to one step per panel. Saoirse's four lines read suit, smoke, open and check.

Plan the strip in words first

- One line for each panel
- What happens and what the viewer should notice
- Suit, smoke, open and check

Key Concept:

Storyboard. **A storyboard is a row of small drawn panels that shows the steps of a scene or process in order.** A wedding planner who draws the bride's arrival, the walk, the vows and the photographs in four boxes for the venue staff has drawn a storyboard.

Then she draws a second strip that forbids panel 1's solution. **With the full suit banned, the second strip opens on calm handling**, slow movements and a smoker kept close. Making several versions side by side went with more diverse designs in one study of web adverts (Dow et al., 2010; see 5.2.2).

A second strip forbids panel 1

Before	After
A full suit and gloves	Calm handling Slow movements and a smoker kept close

Draw the second strip with the first one covered. Write the banned solution at the top of the page in capitals, so it stays in view as a rule. Keep the panels rough, with stick figures and arrows. Rough panels can be redrawn in minutes when a step changes.

Draw the second strip with the first covered



The banned solution at the top in capitals



Stick figures and arrows



Redrawn in minutes when a step changes

On Saturday the club's secretary sends Saoirse another club's safety video as a model. **She maps its scenes into a strip of her own, then stops and looks at what she has drawn.** Her strip copies four of its features, down to the same close-up of a gloved hand. She lists those four features to avoid copying.

A strip mapped from one example can stick to that example, the pattern called design fixation (Jansson & Smith, 1991). **Saoirse's list names the gloved close-up, the slow-motion smoke, the drum music and the closing logo.** She redraws the four panels without them, and the club's video gets its own look.

Four features to avoid copying

- [x] The gloved close-up
- [x] The slow-motion smoke
- [x] The drum music and the closing logo

Make the avoid list right after the mapping, while the example is fresh. Name each copied feature in a few words, and cross it off as you

redraw that panel. Keep the list with the strip, so the next draft starts from it. Saoirse pins hers to the edge of the laptop screen while she edits.

Make the avoid list right after the mapping

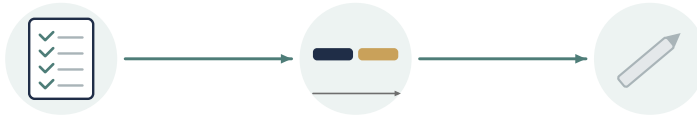


The same steps fit physical models. **A trainee carpenter who builds a card model of a stool from a catalogue photo lists the features he has copied**, the splayed legs and the round seat. His second card model keeps the joint he likes and drops both copied features.

Saoirse's own diagrams and strips are personal discoveries in a subject she is learning, the kind of thing the book calls mini-c (Beghetto & Kaufman, 2007). **She passes the certificate a month later**, and the club shows her video at its winter meeting. The swarm diagram goes in the front of her hive notebook, ready for next June.

The same steps fit other learners. **A history student draws a concept map of the causes of one war and quizzes herself on it the next morning.** For her school play's poster she storyboards four panels, then a second strip that bans her first idea.

Maps, strips and models, at three levels



The starter quizzes a cause-and-effect diagram

The middle forbids panel 1 in a second strip

The advanced lists the features to avoid copying

Exercise:

Maps, strips and models.

1. Starter. **Build a node-link diagram of causes and effects** for one problem, and quiz your recall only.
2. Middle. **Draw one storyboard strip of four panels**, then a second strip that forbids panel 1's solution.
3. Advanced. After mapping from one exemplar, **list the features to avoid copying**.

Use maps to learn a subject



Storyboards to explore a design

Mind-map recall held up after a week

Several versions side by side, more diverse designs

Key idea:

Use maps to learn a subject and storyboards to explore a design, since one study found that mind-map recall held up after a week for medical students, and making several versions side by side went with more diverse designs in a study of web adverts.

Quick check:

What is a self-quiz? Answer: Testing your own memory of a topic with your notes out of sight. What did the Farrand study measure? Answer: Recall of written facts, with no test of creativity. What does the middle step forbid in the second strip? Answer: Panel 1's solution.

9.2 Creating With Digital Tools and AI

9.2.1 Using Digital Tools to Write, Draw, Compose, Design and Experiment

Imagine Ikenna, thirty-eight, a postman who makes the theme tune and the cover art for his brother's weekly podcast about non-league football. **He works on free apps on an old laptop after his round, and he checks the play counts every few minutes.** The theme tune has had nine versions in a month, and none of them is finished.

A theme tune with nine versions

> - A postman of thirty-eight
> - The theme tune and cover art for his brother's podcast
> - Free apps on an old laptop

This section is about using digital tools to write, draw, compose, design and experiment. **I show you two studies of AI tools in idea work, and practical steps for keeping each tool in its place.** Ikenna tries the steps over two weeks, and three levels of practice close the section.

A digital tool is an instrument, like a pencil or a ukulele. The steps here claim a benefit only where a study found one, and they keep each finding to the task it tested. Everything else in this section is practice, including the way Ikenna uses each app.

A digital tool is an instrument

- [x] Like a pencil or a ukulele
- [x] A benefit claimed only where a study found one
- [x] Everything else is practice

One team set out to compare ideas made with and without ChatGPT, a widely used chatbot. "Across five experiments" (Lee & Chung, 2024), people worked on idea tasks with ChatGPT, with a conventional web search or with no technology. Their results come later in this section.

Across five experiments (Lee & Chung, 2024)



> **Key Concept:**
>
> Generative AI. **Generative AI is software that produces new text, pictures or sound in answer to a typed request.** A shop owner who types "a poster for a summer sale with a beach theme" and gets back three finished posters has used generative AI.

On the first Sunday Ikenna gives the theme tune a forty-minute block. **Before he starts, he turns off the play counts in the podcast app and closes the browser tab that shows them.** He records the ukulele

line twice and adds a simple drum pattern. Nobody hears it until the block ends.

A forty-minute block on Sunday



The play counts turned off



The ukulele line recorded twice



Nobody hears it until the block ends

Hide the numbers before the block begins. If the app has a setting that hides plays or likes, switch it on. If it has none, sign out of the account page or close that tab. Look at any numbers only after the block ends, and never while a draft is open.

Hide the numbers before the block begins

1. Switch on a setting that hides plays or likes
2. If it has none, sign out or close that tab
3. Look at any numbers only after the block ends

> Exercise:
>
> Try it. **Spend one digital draft block writing, drawing or composing**, with public metrics hidden.

Thinking about rewards before writing went with less creative poems in one study (Amabile, 1985). **Highly evaluative settings went with lower creative performance in studies of pressure** (Byron et al.,

2010). A play count on the screen is a running evaluation, so Ikenna's draft block keeps it out of sight.

A play count is a running evaluation



Pick one job for the block and one app to do it in. Writing, drawing and composing all count, as long as the block makes something. Forty minutes suits Ikenna's evenings after his round. Keep the length the same each time, so the block becomes a fixed part of the week.

One job, one app

- [x] Writing, drawing or composing
- [x] Forty minutes after his round
- [x] The same length each time

On Tuesday Ikenna takes the starter step. **He saves two versions of the tune under different limits before he merges anything.** One may use only the ukulele and his voice, and the other only the drum pattern and a whistle. He names the files "uke only" and "drums only", and plays both to his brother.

Two versions under different limits

File	Limit
Uke only	The ukulele and his voice
Drums only	The drum pattern and a whistle

Making several versions side by side went with more diverse designs in one study of web adverts (Dow et al., 2010; see 5.2.2). **Two files with different limits give Ikenna two real options before the merge.** His brother likes the whistle from one and the ukulele from the other, and the merged tune keeps both.

Two real options before the merge



More diverse designs side by side (Dow et al., 2010)



The whistle from one



The ukulele from the other

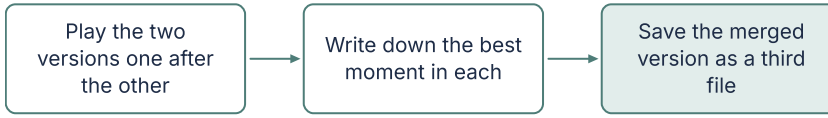
Set the two limits before you open the app. Write them in one line each, such as “voice and ukulele only” and “no melody, rhythm only”. Export each version as its own file with the limit in its name. Merge only after both files exist and you have heard them back to back.

Set the two limits before you open the app

- [x] One line each, such as no melody, rhythm only
- [x] Each version exported as its own file
- [x] Merge only after both files exist

Merge by taking parts from each file. Play the two versions one after the other and write down the best moment in each. Build the merged version from those moments, and save it as a third file so both originals survive. Ikenna's third file is the one his brother plays at the start of each episode.

Merge by taking parts from each file



> **Key Concept:**
>
> Chatbot. **A chatbot is a program that answers typed messages in a back-and-forth conversation.** A traveller who types questions about train times into a rail company's help window, and gets replies in plain sentences, is using a chatbot.

On the next Saturday Ikenna turns to the cover art. **He draws three rough covers in pencil first**, a football in a postbag, a floodlight and a muddy boot. Only then does he type a request into an image generator, the kind of generative AI that makes pictures, describing the postbag cover he likes best.

Three rough covers in pencil first



A football in a postbag



A floodlight



A muddy boot

The pencil covers are quick and rough by design. Ikenna gives each one four minutes and lets the lines stay untidy. A rough cover is enough to show what he wants, a football somewhere it does not belong.

> **Science Says:**
>
> A study of idea work with an AI image generator reported that "support from an AI image generator during ideation leads to higher fixation on an initial example" (Wadinambiarachchi et al., 2024). **"Participants who used AI produced fewer ideas, with less variety and lower originality compared to a baseline."** A baseline is the comparison condition.

Your own first sketch sets the direction before the image generator adds anything. A sketch is a working tool for finding a design (Goldschmidt, 1991). Ikenna's three pencil covers exist before any generated picture, so the generated postbag is checked against his ideas and never the other way round.

Your own first sketch sets the direction

Before	After
A generated picture first	Three pencil covers first The generated postbag checked against his ideas

Generate only after the sketch is on paper. Write one line under the sketch saying what the cover must show. Type your request from that line, and keep the sketch beside the screen while the pictures come back. If a generated picture pulls you away from all three sketches, go back to paper.

Generate only after the sketch is on paper

- [x] One line under the sketch
- [x] Type your request from that line
- [x] Pulled away from all three sketches: go back to paper

In the second week Ikenna takes the advanced step with episode themes for the coming season. **First he writes twelve themes with no tool**, then he asks ChatGPT for twelve more. Beside every theme on both lists he writes “inc” or “rad”, his shorthand for incremental and radical.

Episode themes for the coming season



Twelve themes with no tool



Twelve more from ChatGPT



Each marked inc or rad

Ikenna’s twelve themes take him half an hour on the sofa after his round. **The chatbot’s twelve arrive in seconds**, each with a tidy title and a one-line summary. He prints both lists on one sheet so neither sits on a screen.

> **Science Says:**
>
> The team reported that **“using ChatGPT increased the creativity of the generated ideas compared with not using any technology or using a conventional Web search (Google)”** (Lee & Chung, 2024). They added that “ChatGPT was most effective at generating incrementally (versus radically) new ideas” (Lee & Chung, 2024).

> **Key Concept:**
> Incremental idea. **An incremental idea is a small step on from something that already exists, and a radical idea is a large jump away from it.** A bakery that adds seeds to its usual loaf has an incremental idea, and one that starts posting bread to subscribers has a radical one.

Ikenna's two lists come out differently. **The ChatGPT list is strong on tidy themes, and ten of its twelve are marked "inc".** His own list has five marked "rad", including an episode recorded on the away fans' coach. He keeps the coach episode and two of the chatbot's themes for the season.

Compare the two sets on the same page. Write your unaided list first, so the chatbot's list cannot shape it. Mark every idea on both lists before you choose any. Count the marks for each list, and look hardest at the radical ideas, since the study found ChatGPT at its strongest on incremental ones.

Two lists on one sheet

List	Marks
The ChatGPT list	Ten of its twelve marked inc
His own list	Five marked rad, including the coach episode

At the end of the two weeks the podcast has a finished theme tune and a postbag cover. **Ikenna checks the play counts once, on Sunday evening**, after the new episode has been out for a day. The tune stays at its twelfth version. His brother asks for a winter cover, and Ikenna reaches for a pencil first.

Play counts checked once

- On Sunday evening
- The tune stays at its twelfth version
- A pencil first for the winter cover



A finished podcast cover showing a football tucked into a red postbag under a floodlight.

The same steps fit other makers. **A student who writes short films drafts her scripts with the view counts of her old videos hidden**, saves two versions under different limits and sketches each shot before trying an image generator. She writes her own film ideas before asking a chatbot for more.

A retired engineer who designs garden benches on screen works the same way. **He saves one version with only straight timber and one with only curves**, then merges the best joints from each. His pencil sketches sit beside the screen before any generated picture. He asks a chatbot for bench names only after writing ten of his own.

Digital tools, at three levels



The starter exports two versions under different constraints

The middle generates only after a first sketch

The advanced compares a ChatGPT set with an unaided set

Exercise:

Digital tools.

1. Starter. **Export two file versions made under different constraints** before merging.
2. Middle. If you use an image generator, **generate only after your own first sketch**.
3. Advanced. **Compare one ChatGPT-assisted idea set with an unaided set**, and note which ideas are incremental and which radical.

Make your own draft before the AI tool adds anything



AI image support went with more fixation

ChatGPT was most effective at incremental ideas

Across five experiments

Key idea:

Make your own draft, sketch or list before the AI tool adds anything, since AI image support went with more fixation on an initial example in one study, and ChatGPT was most effective at incremental ideas across five experiments.

Quick check:

What is generative AI? Answer: Software that produces new text, pictures or sound in answer to a typed request. In the Lee and Chung experiments, what was ChatGPT compared with? Answer: No technology and a conventional web search. What does the middle step ask you to do before using an image generator? Answer: Make your own first sketch.

9.2.2 What AI Can and Cannot Do for Your Creativity

Imagine Marisela, forty-four, a hospital switchboard operator who writes short ghost stories for her library's winter competition. **A friend on the night shift tells her that a chatbot now writes better stories than any person.** Marisela has a half-written story about a lift that stops at a floor the hospital does not have. She closes the file.

A ghost story for the winter competition

- A hospital switchboard operator of forty-four
- A lift that stops at a floor the hospital does not have
- A friend says a chatbot writes better stories

This section is about what AI can and cannot do for your creativity. **I show you studies that compared people and AI on stories and on short idea tasks, and what each one found.** Marisela tries the steps over one week, and three levels of practice close the section.

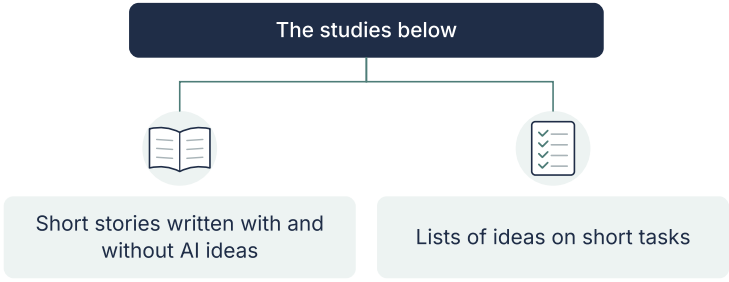
One team set out to compare people with AI chatbots on a classic idea task. They tested 256 people and several chatbots on the alternate uses task (Koivisto & Grassini, 2023). Their results come later in this section, beside a second study of the same kind.

A classic idea task (Koivisto & Grassini, 2023)

- 256 people
- Several chatbots
- The alternate uses task

Each study below answers a narrow question. One looked at short stories written with and without AI ideas, and two looked at lists of ideas on short tasks. Marisela reads each result as a finding about its own task. The steps in this section are practice built on those findings.

Each study answers a narrow question



Science Says:

In a study of short stories, the authors reported that **"access to generative AI ideas causes stories to be evaluated as more creative, better written, and more enjoyable, especially among less creative writers"** (Doshi & Hauser, 2024). They found too that "generative AI-enabled stories are more similar to each other than stories by humans alone" (Doshi & Hauser, 2024).

The authors named the trade-off in plain terms. They described an "increase in individual creativity at the risk of losing collective novelty"

and wrote that “This dynamic resembles a social dilemma”, in which “writers are individually better off, but collectively a narrower scope of novel content is produced” (Doshi & Hauser, 2024). Novelty here means newness across all the stories.

A social dilemma (Doshi & Hauser, 2024)

Individually	Collectively
⊕ Writers are better off	⊖ A narrower scope of novel content
⊕ An increase in individual creativity	⊖ The risk of losing collective novelty

Pictures showed a similar pull in a separate study, where AI image support went with more fixation on an initial example (Wadinambiarachchi et al., 2024). The competition asks for a cover drawing, so Marisela sketches hers in pencil before she opens any image tool.

> 🔑 **Key Concept:**
>
> Collective diversity. **Collective diversity is how different a whole group’s pieces of work are from one another.** A street where every front garden has a different layout has high collective diversity, and a street of identical gravel squares has low collective diversity.

On Sunday Marisela takes an index card and a pen. **She writes one line for what AI can do for her story and one for what it cannot.** Her card reads “can lift how my one story is rated” and “cannot keep my story from growing like everyone else’s”. She props the card against the lamp on her desk.

One index card, two lines



What AI can do for her story



What it cannot do



Propped against the lamp on her desk

> Exercise:
>
> Try it. **Write what AI can and cannot do for you in one line each**, from the Doshi finding.

Write both lines in your own words, from the finding. The first line is about one piece of work and how it is judged. The second is about the whole group of pieces and how alike they become. Keep the card where you write, and read it before you open a chatbot.

Write both lines in your own words

Line	About
The first line	One piece of work and how it is judged
The second line	The whole group of pieces and how alike they become

Marisela reads her card on Monday before the starter step, and again on Wednesday. **The two lines stop her treating the chatbot as either a rival or a ghostwriter.** By Thursday she can say both lines without looking.

Neither a rival nor a ghostwriter

- Read on Monday before the starter step
- Read again on Wednesday
- Said without looking by Thursday

Key Concept:

Social dilemma. **A social dilemma is a situation in which a choice that helps each person leaves the group as a whole worse off.** Each fisher on a lake gains from one more net, and the lake as a whole ends up with fewer fish when every fisher adds one.

Pick an object that is ordinary and close at hand for the starter. A hot-water bottle, a peg or a tea towel all work. Use the same object for both lists, so the two lists can be set side by side fairly.

An ordinary object close at hand



A hot-water bottle



A peg



A tea towel

On Monday Marisela takes the starter step with an object from the ward linen cupboard. **She lists uses for a hot-water bottle for three minutes on her own** and circles her best one, a ghost's pillow that is still warm. Then she asks a chatbot for uses and reads its list. Hers has nine uses and the chatbot's has twenty.



> **Science Says:**
> In the alternate uses study, the authors reported that "On average, the AI chatbots outperformed human participants" (Koivisto & Grassini, 2023). **"However, the best human ideas still matched or exceed those of the chatbots."** They wrote that the result "underscores the unique and complex nature of human creativity that may be difficult to fully replicate or surpass with AI technology" (Koivisto & Grassini, 2023).

Keep your best human idea, and mark it before you read the chatbot's list. Three minutes alone comes first, so your own list exists before any other. Circle the one idea you would defend, then read the chatbot's uses. Marisela's circle stays on the warm pillow.



A second team tested the chatbot GPT-4 against 151 people on three divergent thinking tasks (Hubert et al., 2024). **They reported that "AI was robustly more creative along each divergent thinking**

measurement in comparison to the human counterparts". They added that "when controlling for fluency of responses, AI was more original and elaborate" (Hubert et al., 2024).

GPT-4 against 151 people (Hubert et al., 2024)

- Three divergent thinking tasks
- AI was robustly more creative on each measurement
- More original and elaborate when controlling for fluency

Key Concept:

Controlling for fluency. **Controlling for fluency is comparing ideas in a way that removes the advantage of simply producing more of them.** A judge at a jam contest who scores each maker's single best jar, whatever the number of jars entered, is controlling for fluency.

These two studies tested short idea tasks, and their results stay with those tasks. Marisela writes both findings on the back of her card, each with its task beside it.

Two studies of short idea tasks



Their results stay with those tasks



Both findings on the back of her card

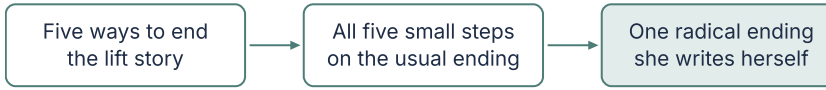


Each with its task beside it

On Wednesday Marisela takes the middle step. **She asks the chatbot for five ways to end the lift story, and all five are small steps on**

the usual ending, such as a ghost in the lift. Then she closes the chatbot and writes one radical ending herself, where the extra floor holds the hospital's forgotten phone calls.

The middle step on Wednesday



ChatGPT was most effective at incremental ideas in the five experiments you met earlier (Lee & Chung, 2024; see 9.2.1). **The radical option is the one to write yourself.** Ask the chatbot for incremental options first, so you can see the usual moves laid out, then close it before you write.

The radical option is the one to write yourself

- Ask for incremental options first
- See the usual moves laid out
- Close the chatbot before you write

Write the radical option with the chatbot closed and the five options out of sight. Give yourself ten minutes and one sheet. Aim for an ending that breaks a rule the five options all share, such as where the ghost lives. Keep the radical option even if it needs more work than the others.

Ten minutes and one sheet



The chatbot closed



Break a rule the five options all share



Keep the radical option



A writing group of six around a library table on a winter evening, with tea in paper cups.

On Thursday the writing group meets in the library. **One member has used a chatbot for every idea, and Marisela lays her list beside his.** Of his twelve story ideas, seven share a lift, a hospital or a ghostly nurse with stories from the group's last two meetings.

His list beside hers

List	Of twelve ideas
His, a chatbot for every idea	Seven share a lift, a hospital or a ghostly nurse
Marisela's	Three have no join to anything

Marisela's list has twelve ideas too, and three of hers have no join to anything. **The forgotten phone calls, a porter who only works on the missing floor and a lift that answers back stand alone.** She reads those three aloud first, and the group asks for the phone calls.

Three ideas that stand alone



The forgotten phone calls



A porter who only works on the missing floor



A lift that answers back

Lay the two lists side by side and join any ideas that share a setting, a character or a twist. Count the joins. An idea with no join is one the group has not seen yet, so give it extra attention.

Count the joins

- [x] The two lists side by side
- [x] Join ideas that share a setting, a character or a twist
- [x] An idea with no join gets extra attention

Bring both lists on paper, each with the same number of ideas. Twelve each is enough for one evening. Join two ideas only when the match is clear, and write the shared element on the pencil line, such as "lift" or "nurse". Check the joins together with the peer, so the count is agreed.

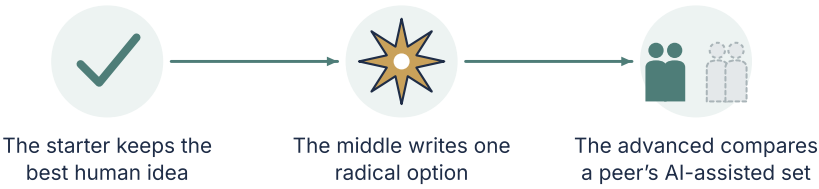
Bring both lists on paper

- [x] Twelve ideas each
- [x] The shared element on the pencil line
- [x] The joins checked together with the peer

Marisela enters the lift story with the forgotten phone calls. **She keeps the chatbot for checking spellings and for listing the usual moves she wants to avoid.** Her index card stays against the lamp for the next story. The cover is her own pencil drawing of the lift doors.

The same steps fit other writers. **A retired lorry driver who writes limericks for the parish newsletter lists his own rhymes before asking a chatbot for any**, and keeps his best one circled. He writes one strange limerick a month with the chatbot closed.

What AI can do, at three levels



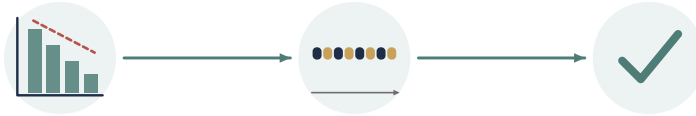
Exercise:

What AI can do.

1. Starter. **List uses for one object with and without a chatbot**, and keep your best human idea.
2. Middle. **Ask for incremental options**, then write one radical option yourself.

3. Advanced. **Compare your idea set with a peer's AI-assisted set** for sameness.

Use AI for what it can do



Higher ratings for individual stories

The stories grew more alike

The best human ideas matched or beat the chatbots

Key idea:

Use AI for what it can do and keep the rest for yourself, since AI ideas went with higher ratings for individual stories while the stories grew more alike, and the best human ideas matched or beat the chatbots on the alternate uses task.

Quick check:

What is collective diversity? Answer: How different a whole group's pieces of work are from one another. In the Koivisto and Grassini study, how did the best human ideas compare with the chatbots? Answer: They "still matched or exceed those of the chatbots". What did the Doshi and Hauser study find about AI-enabled stories as a group? Answer: They were "more similar to each other than stories by humans alone".

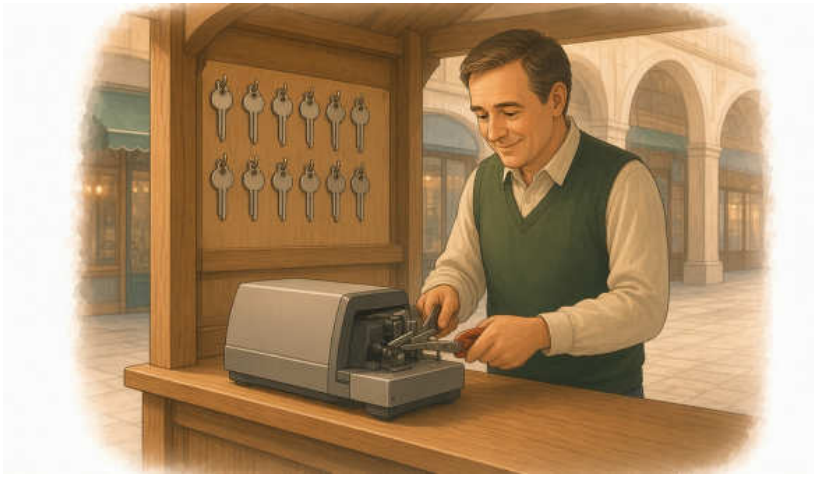
9.2.3 Using a Chatbot to Generate Alternatives and Challenge Your Ideas

Imagine Mehmet, fifty-two, who runs a key-cutting kiosk in a covered shopping arcade. **Since the big hardware shop opened by the ring road, his Saturday queue has shrunk to a handful of people.** He wants one new idea that brings people back to the kiosk. His favourite so far is a shelf where customers swap old key rings for free.

A key-cutting kiosk in a covered arcade

> - Mehmet, fifty-two, runs it
> - His Saturday queue has shrunk to a handful of people
> - His favourite idea: a key-ring swap shelf

This section is about using a chatbot to generate alternatives and to challenge your ideas. **I show you what research found when people worked on ideas with ChatGPT, and how to keep the chatbot as a helper.** Mehmet tries the steps over one week, and three levels of practice close the section.



A small key-cutting kiosk in a covered shopping arcade, with rows of blank keys hanging behind the counter.

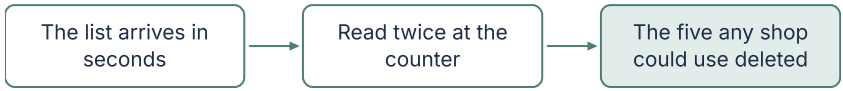
The steps here draw on studies that compared people working on ideas with and without ChatGPT, and on earlier research about feedback. The chatbot makes suggestions and challenges, and every final call stays with him. None of the studies tested a kiosk, so each finding guides one step and promises nothing about takings.

The chatbot as a helper

- [x] It makes suggestions and challenges
- [x] Every final call stays with him
- [x] No promise about takings

On Monday evening Mehmet asks a chatbot for ten other ideas to bring customers back. **The list arrives in seconds**, with a loyalty card, a discount day, a social media page and seven more. He reads it twice at the counter and deletes the five that any shop in the arcade could use.

Ten other ideas on Monday evening



> Exercise:
>
> Try it. **Ask a chatbot for 10 alternatives**, then delete the 5 most generic.

A generic idea is one that would fit any business on the street. Test each idea by swapping in another shop's name, such as the bakery or the phone stall. If it still works with the swap, delete it. What survives is tied to keys, locks or the kiosk itself.

A generic idea fits any business

- [x] Swap in another shop's name
- [x] If it still works, delete it
- [x] Keep what is tied to keys, locks or the kiosk

Mehmet's five survivors include a spare-key safe for regulars and a "lost key" noticeboard. **Stories written with AI ideas were more similar to each other than stories by people alone in one study** (Doshi & Hauser, 2024). Mehmet takes that as his reason to cut the generic five first.

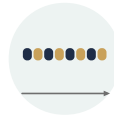
Mehmet's five survivors



A spare-key safe for regulars



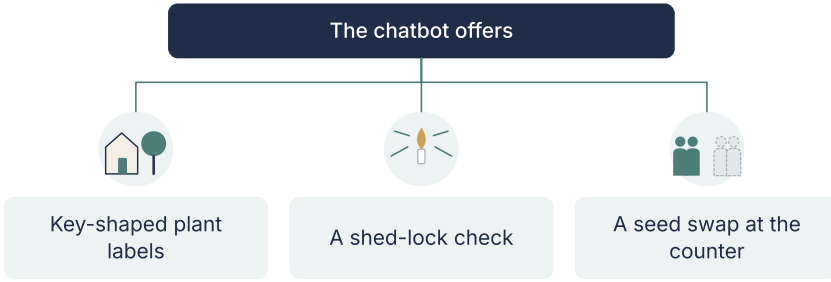
A lost key noticeboard



AI stories were more similar to each other (Doshi & Hauser, 2024)

Later that evening Mehmet tries one more request. **He asks for ideas that join keys with gardening**, the hobby of half his regulars. The chatbot offers key-shaped plant labels, a shed-lock check and a seed swap at the counter. He likes the plant labels, cut from old blanks.

Ideas that join keys with gardening



Ask for these distant combinations by naming two far-apart fields. Choose one field from your own work and one from your customers' lives. Check each idea for cohesion, then against your real premises, customers and budget, and keep only those that pass. A request such as "ideas that join keys and gardening for a small kiosk" is enough.

> **Science Says:**
>
> A team that ran five experiments with ChatGPT explained its results this way. **"the positive influence of ChatGPT can be attributed to its capability to combine remotely related concepts into a cohesive form, leading to a more articulate presentation of ideas"** (Lee & Chung, 2024). Articulate here means clearly expressed.

> **Key Concept:**
>
> Cohesion. **Cohesion is the way the parts of an idea fit together so that it works as one whole.** A wedding menu in which every course uses the same three spices has cohesion.

On Tuesday Mehmet takes the starter step with his favourite idea, the key-ring swap shelf. **He asks the chatbot to attack it with informational critiques only**, each one naming a weak spot in the shelf and what to try next. He tells it to leave out any judgement of him as a businessman.

Informational critiques only

- [x] Each one names a weak spot
- [x] And what to try next
- [x] No judgement of him as a businessman

The chatbot names three weak spots. **The shelf could empty in a day, it gives no reason to come back, and it takes counter space he needs.** Mehmet adds a rule of one swap per visit and moves the shelf to the side window. A follow-up question gets him a sign at children's eye height.

Weak spots and changes

Weak spot	Change
The shelf could empty in a day	One swap per visit
It takes counter space he needs	Moved to the side window

Ask for informational critiques by name. In one lab study, positive feedback in an informational style went with the most creative ideas when people also had high task autonomy (Zhou, 1998; see 7.4.2). Name the idea, ask for each weak spot with a next step, and keep the decision about every change with you.

Ask for informational critiques by name



Name the idea



Each weak spot with a next step



Keep the decision about every change

Ban comments about you in the same request. A verdict on the person belongs to the research on creative mortification (Beghetto, 2014; see 8.1.2), and a chatbot can phrase a verdict politely. If a reply says anything about your talent, delete that line and ask again about the work. Save the request, so the same wording is ready next time.

Key Concept:

Critique request. **A critique request is a typed request asking a chatbot to name weak spots in a piece of work, described in terms of the work.** A student who asks a chatbot to list three gaps in the argument of her essay, and nothing about her as a writer, has made a critique request.

Science Says:

In a study that compared ChatGPT with another idea tool, the authors reported that **"ChatGPT users generated a greater number of more detailed ideas, but felt less responsible for the ideas they generated"** (Anderson et al., 2024). Responsible here means that people felt the ideas were less their own.

Mehmet treats every chatbot idea as a suggestion he must adopt or drop himself. He writes his initials beside each idea he keeps. Ideas without initials come off the list at the end of the week. The chatbot's detailed ideas look finished, and the initials mark the moment each one becomes his.

Initials beside each idea he keeps



A suggestion he must adopt or drop himself



Ideas without initials come off the list



The moment each one becomes his

On Thursday Mehmet takes the middle step. **He asks the chatbot for incremental options on the swap shelf**, and it offers a swap card, a second shelf and a seasonal key-ring theme. Then he closes the chatbot

and writes one radical option on the back of a receipt, a free key-cutting lesson for children on Saturday mornings.

Incremental options, then one radical

Before	After
A swap card, a second shelf, a seasonal key-ring theme	A free key-cutting lesson for children on Saturday mornings

Mehmet's radical option breaks a rule all three incremental options share, that everything happens at the swap shelf. He gives it ten minutes and a pen at the back of the kiosk.

A rule all three options share

- Everything happens at the swap shelf
- Mehmet's radical option breaks it
- Ten minutes and a pen at the back of the kiosk

Test the radical option on one real customer before you build it. Describe it in a single sentence at the counter and note the first reaction. Mehmet tries the lesson on a mother waiting for a spare, and she asks for the date.

Test it on one real customer



A single sentence at the counter



Note the first reaction



A mother asks for the date

On Saturday Mehmet's nephew, who runs a phone repair stall in the same arcade, shows him a list he made with a chatbot. **Mehmet takes the advanced step and lays his own list of alternatives beside his nephew's.** Four ideas appear on both, almost word for word, including a swap card and a seasonal theme for the window.

His list beside his nephew's

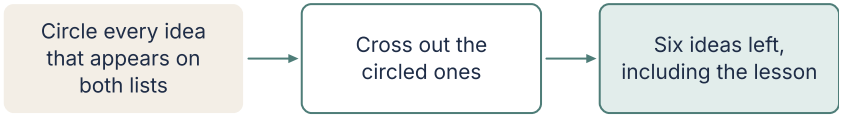
List	Ideas
On both, almost word for word	Four, including a swap card and a seasonal theme
Mehmet's other ideas	The plant labels and the children's lesson

His nephew is surprised, since the two stalls sell different things. **Mehmet's other ideas, including the plant labels and the children's lesson, come from his own trade and his own customers.** His nephew will write his own list first next time.

> **Key Concept:**
> Overlap check. **An overlap check is comparing two idea lists side by side to find the ideas that appear on both.** Two teachers planning a school fair who lay their lists of stalls together and circle the ones they both wrote are making an overlap check.

Circle every idea that appears on both lists, then cross out the circled ones. Count what is left on your list, and give those ideas more attention than any others. Mehmet's list has six ideas left after the overlap check, including the children's key-cutting lesson. He keeps a note of the shared ideas too, in case one suits him later.

The overlap check



Make the two lists the same length before you compare them. Ten or twelve ideas each is enough. Count an idea as shared when the core of it matches, even if the wording differs. Write the count at the top of your list.

Lists of the same length

- [x] Ten or twelve ideas each
- [x] Shared when the core of it matches
- [x] The count at the top of your list

At the end of the month Mehmet runs the first key-cutting lesson. **Six children cut a practice key each**, and four parents have spares cut. The swap shelf stays in the side window, and the plant labels sell out by noon. Two of the children come back the next week with a grandparent and a key to copy.

The same steps fit other small businesses. **A mobile hairdresser asks a chatbot for ten new services and deletes the five any salon could offer.** She asks it to attack her favourite with informational critiques only, and writes one radical service herself with the chatbot closed. Her initials go beside each service she keeps.

Alternatives and challenges, at three levels



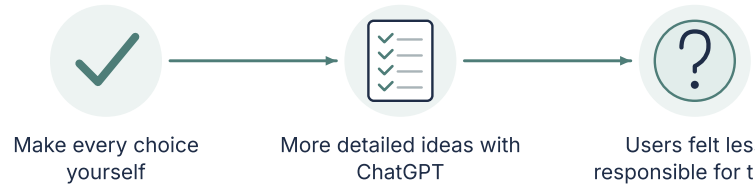
The starter asks for informational critiques only

The middle writes one radical option without the chatbot

The advanced compares a peer's AI list for overlap

> Exercise:
>
> Alternatives and challenges.
>
> 1. Starter. **Ask the chatbot to attack your favourite idea** with informational critiques only.
> 2. Middle. **Request incremental options**, then write one radical option without the chatbot.
> 3. Advanced. **Compare your alternatives with a peer's AI list** for overlap.

Use a chatbot to generate and to challenge



Key idea:

Use a chatbot to generate and to challenge, and make every choice yourself, since ChatGPT users in one study produced more detailed ideas but felt less responsible for them.

Quick check:

What is a critique request? Answer: A typed request asking a chatbot to name weak spots in a piece of work, described in terms of the work. How did the Lee and Chung team explain ChatGPT's positive influence? Answer: Its "capability to combine remotely related concepts into a cohesive form". What does the middle step ask you to write without the chatbot? Answer: One radical option. What did ChatGPT users report in the Anderson study? Answer: They "felt less responsible for the ideas they generated".

9.2.4 Spot the Cliché: Checking and Improving AI Suggestions

Imagine Thandiwe, twenty-six, a zookeeper for the red pandas who has to give the speech at her grandmother's eightieth birthday party. **She asked a chatbot for a first draft, and it arrived in seconds, smooth and warm.** Reading it aloud, she sees it could be about anyone's grandmother. The party is on Sunday, and her cousin speaks after her.

A speech for an eightieth birthday

- A zookeeper for the red pandas, twenty-six
- A chatbot draft that could be about anyone's grandmother
- Her cousin speaks after her

This section is about spotting clichés in AI suggestions and improving them. **I show you what research found about sameness in work made with AI, and how to check a draft line by line.** Each check takes a few minutes with a pen and printout. Thandiwe tries the steps over one week, and three levels of practice close the section.

The steps here draw on studies that compared work made with and without AI help, and on design research about copying examples. No study here tested a birthday speech, so each finding guides a step and promises nothing about how the party goes. Each step gives Thandiwe one thing to look for and one thing to do about it.

One thing to look for, one thing to do

- [x] No study here tested a birthday speech
- [x] Each finding guides a step
- [x] Nothing promised about how the party goes

> **Key Concept:**
>
> Cliché. **A cliché is a phrase or image used so much that it no longer surprises anyone.** A wedding card that calls the couple "two peas in a pod" is using a cliché.

On the first Monday Thandiwe prints the chatbot's draft and takes a highlighter to it on her lunch break. **She marks every phrase she has heard at other parties**, and finds eleven, from "a life well lived" to "young at heart". Then she rewrites three of them with facts only her family knows.

A highlighter on her lunch break



Every phrase heard at other parties



Eleven, from a life well lived to young at heart



Three rewritten with facts only her family knows

Read the draft aloud once before you highlight. A phrase that slides past easily when spoken is worth a mark. A trope is a familiar move, such as the joke about age or the closing toast to many more years, and it gets a mark too. Rewrite three marked lines, each with one fact that belongs to your subject alone.

Read the draft aloud once

- [x] A phrase that slides past easily gets a mark
- [x] A trope gets a mark too
- [x] Rewrite three marked lines

> Exercise:
>
> Try it. **Highlight repeated phrases and tropes in an AI draft**, then rewrite three of them.

Thandiwe's three rewrites replace "young at heart" with her grandmother's Saturday swims in the lido. **"A life well lived" becomes the forty years she ran the corner shop's post office counter.** "The glue that holds us together" becomes the Sunday stew pot that has never once been empty. Each one takes her about five minutes to write.

Three rewrites

Cliché	Rewrite
Young at heart	Saturday swims in the lido
A life well lived	Forty years at the post office counter
The glue that holds us together	The Sunday stew pot

Each rewrite carries a fact nobody else could write. Thandiwe phones her mother for two stories she has never heard, and gets the day the shop flooded and the year of the lido gala. She keeps both on a list beside the draft for later in the week, with a note of who told her each one.

> **Science Says:**
>
> In a study that compared ChatGPT with another idea tool, **different users came up with ideas that were closer in meaning to one another when they used ChatGPT** (Anderson et al., 2024). The paper's title names the pattern, "Homogenization effects of large language models on human creative ideation" (Anderson et al., 2024).

Thandiwe reads the study and thinks of her cousin, who has asked the same chatbot for his speech. **Two drafts made the same way could share lines**, and both will be heard in one room on Sunday. She makes a note to compare drafts with him on Saturday.

Two drafts made the same way



Her cousin asked the same chatbot



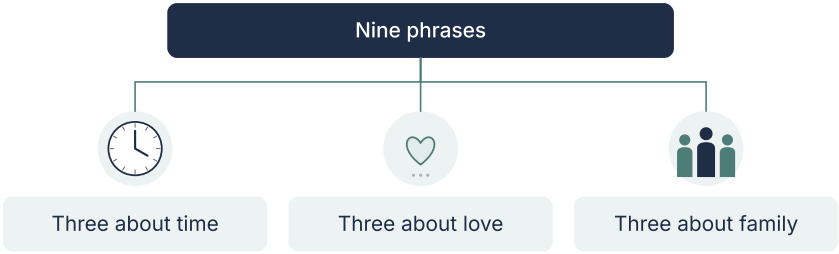
Both heard in one room on Sunday



Drafts compared on Saturday

Sameness can live inside one draft as well. The chatbot's speech has three phrases about time, three about love and three about family, and each set reads like a greeting card. Thandiwe counts them in the margin and adds the nine phrases to her highlighter list.

Sameness inside one draft



> **Key Concept:**
>
> Homogenisation. **Homogenisation is the drift of many people's work towards the same ideas and wording.** A high street where every new café opens with the same grey walls, the same filament bulbs and the same chalkboard menu shows homogenisation.

Sameness showed up in stories too. Stories written with AI ideas were more similar to each other than stories by people alone in one study (Doshi & Hauser, 2024). A birthday speech is a short story about one person, so Thandiwe treats every smooth line as a possible shared one. She reads the draft again with that in mind.

Sameness showed up in stories too

- Stories with AI ideas were more similar (Doshi & Hauser, 2024)
- A birthday speech is a short story about one person
- Every smooth line a possible shared one

On Tuesday Thandiwe takes the starter step. **She sees that the chatbot built the whole speech on one concept family, the journey**, with roads, chapters, milestones and the path ahead. She bans

journey ideas for ten minutes and writes about her grandmother any other way she can. The red pandas get their lunch late that day.

One concept family: the journey



Roads and chapters



Milestones and the path ahead



Banned for ten minutes

> **Key Concept:**
>
> Concept family. **A concept family is a group of ideas that share one core idea.** A coffee brand whose advertisements all show sunrises, alarm clocks and people stretching by a window is working inside one concept family, the morning.

In ten minutes Thandiwe writes about her grandmother as a weather forecaster, as a post office counter and as a stew pot. **The stew pot survives**, because everyone in the family has eaten from it. The journey stays banned for the rest of the speech, and she tapes the word, crossed out, to the fridge.

The stew pot survives

- A weather forecaster, a post office counter and a stew pot
- Everyone in the family has eaten from it
- The journey stays banned

AI image support went with higher fixation on an initial example in one study (Wadinambiarachchi et al., 2024), and design fixation has its

home earlier in the book (Jansson & Smith, 1991; Smith et al., 1993; see 2.1.3). **An AI draft is an example like any other**, so its first concept family can hold you in the same way.

An AI draft is an example like any other



Higher fixation on an initial example (Wadinambiarachchi et al., 2024)



Design fixation (Jansson & Smith, 1991)



Its first concept family can hold you

Name the concept family in one word before you ban it. Write the word at the top of a blank page and cross it out. Set a ten-minute timer and write only ideas from other families. When the timer ends, read what you have and keep the strongest piece.

Name the concept family in one word

- [x] Write it at the top and cross it out
- [x] Ten minutes on ideas from other families
- [x] Keep the strongest piece

On Wednesday Thandiwe takes the middle step. **She goes through the chatbot's remaining lines and marks each one "inc" or "rad"**, for a small step on the usual birthday speech or a large jump away from it. Every line gets "inc". She forces one radical rewrite, an opening in which her grandmother's red panda hat introduces the speech.

Every line marked inc or rad

Inc	Rad
⊕ A small step on the usual birthday speech	⊖ A large jump away from it
⊕ Every line gets inc	⊖ Her grandmother's red panda hat introduces the speech

ChatGPT was most effective at incrementally new ideas, compared with radically new ones, in a set of five experiments (Lee & Chung, 2024). **A speech made only of small steps on the usual will sound like the usual.** One forced radical line gives the room something it has not heard elsewhere. Thandiwe keeps the red panda hat line.

Small steps sound like the usual

> - ChatGPT most effective at incremental ideas (Lee & Chung, 2024)
> - One forced radical line
> - Something the room has not heard elsewhere

Mark every AI line before you rewrite any. Use two short marks, such as "inc" and "rad", and write them in the margin. Count each kind. Then choose one incremental line and push it until it breaks a rule of birthday speeches, such as who is allowed to speak first.

Mark every AI line first



Two short marks in the margin



Count each kind



Push one line until it breaks a rule

Keep the checking informational. **Highly evaluative settings went with lower creative performance across studies** (Byron et al., 2010). Mark the lines and leave yourself out of it, so a page full of highlighter reads as a list of jobs. Thandiwe marks in pencil and keeps the speech, and herself, out of any score.

Keep the checking informational



On Saturday Thandiwe's cousin sends over his own chatbot draft. **Thandiwe takes the advanced step and lays the two drafts side by side.** Seven phrases appear in both, including "the heart of the family", "words cannot express" and "here's to many more". They list the shared clichés together and delete all seven.

Seven phrases in both drafts

- [x] The heart of the family
- [x] Words cannot express
- [x] Here's to many more

Read the two drafts aloud one after the other, then mark every phrase that appears in both. Write the shared phrases in a list and delete each from both drafts. Two speakers at one party need two different speeches, so each cousin replaces the deleted lines with a fact from their own memories.

Two speakers, two speeches



Read aloud one after the other



Shared phrases deleted from both drafts



A fact from their own memories

One study of the alternate uses task compared chatbots with people. "While human responses included poor-quality ideas, the chatbots generally produced more creative responses" (Koivisto & Grassini, 2023). That finding comes from a short idea task, and Thandiwe's speech still rests on the stew pot and the red panda hat.

The alternate uses task (Koivisto & Grassini, 2023)

- Human responses included poor-quality ideas
- The chatbots generally produced more creative responses
- A finding from a short idea task



An elderly woman laughing at a birthday party in a community hall, wearing a knitted red panda hat.

On Sunday Thandiwe gives the speech in the community hall. **Her grandmother laughs at the red panda hat and cries at the stew pot.** Thandiwe's aunt asks for a copy to keep in the family album. Her cousin's speech, rewritten after Saturday, tells a story about her grandmother teaching him to drive, and no line in it repeats hers.

The same steps fit other speeches and letters. **A best man who gets a chatbot draft highlights its clichés and rewrites three with stories only he knows.** He bans its first concept family, marks every line, and compares his draft with the chief bridesmaid's for shared clichés. Both speeches end up sounding like the people who wrote them.

Spot the cliché, at three levels



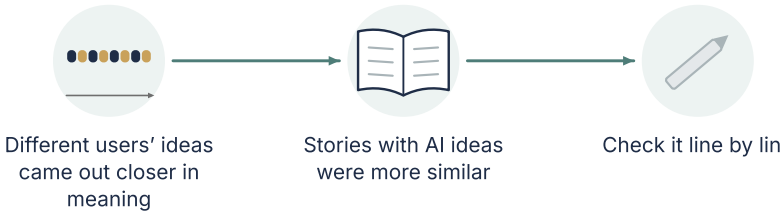
The starter forbids the AI's first concept family

The middle forces one radical rewrite

The advanced deletes clichés shared with a peer's draft

> Exercise:
>
> Spot the cliché.
>
> 1. Starter. **Forbid the AI's first suggested concept family** for 10 minutes.
> 2. Middle. **Mark each AI line incremental or radical**, and force one radical rewrite.
> 3. Advanced. **Lay your draft beside a peer's AI draft** and list the shared clichés to delete.

Treat an AI draft as an example to check



Key idea:

Treat an AI draft as an example to check, since different users' ideas came out closer in meaning to one another with ChatGPT in one study, and stories written with AI ideas were more similar to each other in another.

Quick check:

What is a concept family? Answer: A group of ideas that share one core idea. In the Anderson study, what happened to different users' ideas with ChatGPT? Answer: They came out closer in meaning to one another than with another idea tool. What does the advanced step ask you to delete? Answer: The clichés your draft shares with a peer's AI draft.

9.2.5 Keeping Your Own Direction and Making the Final Choices

Imagine Gwilym, sixty-one, a sheep farmer writing a chapter about his first lambing season for the village magazine. He typed his rough pages into a chatbot to tidy them, and **each tidy version sounds a little less like him.** The editor wants the chapter in two weeks, and Gwilym wants it to sound like the farm he knew at nineteen.

A chapter for the village magazine

> - A sheep farmer of sixty-one
> - His first lambing season
> - Each tidy version sounds a little less like him

This section is about keeping your own direction when an AI tool helps and making the final choices yourself. **I give you four steps that keep each decision with the writer**, from the first sentence to the final read with the AI switched off. Gwilym tries them over two weeks, and three levels of practice close the section.

The steps grew from studies of writers and idea generators working with AI, and from earlier research on choice and feedback. In each one the chatbot stays an optional helper, and the writer makes the final call. No study here tested a memoir, so each finding guides one step and promises nothing about the magazine.

The writer makes the final call

- [x] The chatbot stays an optional helper
- [x] No study here tested a memoir
- [x] Nothing promised about the magazine

> Science Says:
>
> **Two small think-aloud studies, with six and seven people, followed how people worked with AI on pictures and stories.** The authors reported that "moments of diminished control and uncertainty about ownership were common, particularly when AI contributions deviated from user expectations" (Rafner et al., 2025). Their title calls the results "Preliminary insights from think-aloud protocols" (Rafner et al., 2025).

On the first Monday Gwilym takes a card from the feed store and writes one line before he opens the chatbot. **"This chapter shows how frightened and proud I was in my first spring, in the words I would use at the mart."** He props the card against the screen, where he can see it from his chair.

One line before he opens the chatbot



Frightened and proud in my first spring



In the words I would use at the mart



Propped against the screen

> **Key Concept:**
> Direction sentence. **A direction sentence is one sentence that says what a piece is for and why it matters to its maker.** A retired nurse making a quilt for her granddaughter pins a card to the fabric that reads "This quilt holds the shirts of everyone who held her as a baby".

ChatGPT users reported a weaker sense of ownership of their ideas in one study (Anderson et al., 2024). Gwilym reads that and decides the card comes first every time. Each session starts with him reading it aloud, before a single AI line goes into the chapter. The card stays in his jacket pocket between sessions.

The card comes first every time

- ChatGPT users reported a weaker sense of ownership (Anderson et al., 2024)
- Read aloud at the start of each session
- In his jacket pocket between sessions

Make the sentence specific enough to rule lines out. A line about "a good chapter on farming" fits any draft at all, while "how frightened and proud I was" rules out every line that sounds like a brochure. Read it once at the start of each session. Cut any word in it that you would have to explain.

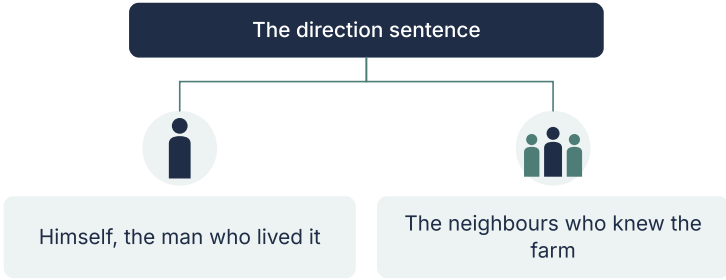
Make the sentence specific enough

Fits any draft	Rules lines out
⊕ A good chapter on farming	⊖ How frightened and proud I was ⊖ Every line that sounds like a brochure

> ✎ Exercise:
>
> Try it. **Before accepting any AI line, write your direction in one sentence.**

Gwilym's chapter counts as mini-c creativity (Beghetto & Kaufman, 2007), so its first judge is the man who lived it. He writes the direction sentence for himself and for the neighbours who will read the magazine, who knew the farm in those years. If one reader matters most, keep that person in mind as you write the sentence.

Its first judge



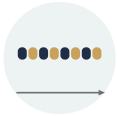
That evening Gwilym holds the chatbot's last tidy version up against the card. **Six of its sentences fail the test**, including "The rolling hills echoed with new life" and "Every lamb was a small miracle". He prints

the version and marks the six with a cross in red pen, ready to decide on them the next day.

Six sentences fail the test



The rolling hills echoed with new life



Every lamb was a small miracle



A cross in red pen

On Tuesday Gwilym takes the starter step. He pastes in his own rough opening page and asks the chatbot for suggestions, and it offers fourteen. **He marks every one keep, kill or change, and he makes each choice himself.** He keeps three, kills eight and changes three into his own words.

Fourteen suggestions

Choice	Count
Keep	Three
Kill	Eight
Change	Three

In one lab study, positive informational feedback in a condition with high task autonomy went with the most creative ideas (Zhou, 1998). **Gwilym treats the chatbot's suggestions as information**, and he keeps the autonomy by deciding each one. None of the fourteen goes into the chapter unread. Treat any suggestion you would never say aloud as a kill.

Suggestions as information

- Informational feedback with high task autonomy (Zhou, 1998)
- He keeps the autonomy by deciding each one
- Never said aloud: a kill

Key Concept:

Keep, kill or change. **Keep, kill or change is a three-way choice made on every suggestion, with no suggestion left undecided.** A head gardener given a designer's planting plan walks the border and writes keep, kill or change beside each of the twenty plants on the list before ordering any.

Mark every suggestion in the margin before you change any of the text. Write the word in full so you can follow your own reasons a week later. For each change, write your version beside the suggestion in your own words. Count the three piles at the end, and keep the count with the draft.

Mark every suggestion first



The word in full in the margin



Your version beside each change



The three piles counted

Poems written with outside reasons in mind were judged less creative than poems from the study's other two groups (Amabile, 1985). **Gwilym kills a suggestion to add his prize at the county show**, since he is writing the chapter for his own reasons. The prize came

eleven years after that first spring anyway, and it belongs in a different chapter.

For his own reasons

- Outside reasons: poems judged less creative (Amabile, 1985)
- He kills the prize at the county show
- It belongs in a different chapter

On the second Monday Gwilym takes the middle step. **Every version from the chatbot drops two details he cares about most**, the old ewe called Duchess who took in an orphan lamb and the paraffin lamp he read by on night checks. Both were in his first rough pages. He puts them back and decides to protect them.

Two details every version drops



The old ewe called Duchess



The paraffin lamp for night checks



Both put back and protected

In one study, AI ideas went with higher ratings for single writers and more sameness across their stories (Doshi & Hauser, 2024; see 9.2.2). **Gwilym reads that finding, with both its sides, as a reason to guard Duchess and the lamp.** They are the two parts of the chapter that belong to his farm and to nobody else's.

A reason to guard Duchess and the lamp

- Higher ratings for single writers (Doshi & Hauser, 2024)
- More sameness across their stories
- Parts that belong to his farm alone

Key Concept:

Uncommon detail. **An uncommon detail is a specific, unusual fact or image that only this maker would put in.** A local history leaflet on a village watermill that mentions the miller's cat, who slept every night on the grain scales, uses an uncommon detail.

Put square brackets round the detail and ask the tool to leave bracketed words alone. If a new version still drops it, put it back by hand and note the page and line where it went. Keep a list of protected details at the top of the draft, so each one gets checked at the final pass.

Square brackets round the detail



Ask the tool to leave bracketed words alone



Dropped again: put it back by hand



A list of protected details at the top

Different users' ideas came out closer in meaning with ChatGPT than with another idea tool (Anderson et al., 2024). **Duchess and the paraffin lamp come from one farm and one spring**, so no other writer in the magazine will have them. Gwilym adds them to the protected list in capital letters, with the page where each first appears.

One farm and one spring

- Ideas came out closer in meaning with ChatGPT (Anderson et al., 2024)
- No other writer will have Duchess and the lamp
- Added in capital letters



An old brass paraffin lamp hanging on a nail beside a lambing pen in a stone shed at night.

By Thursday of the second week the protected list has three lines, after Gwilym remembers the blue lambing chalk his father used. **Each one is back in the chapter in his own words.** Duchess appears in four places, and the lamp opens and closes the chapter. Check every protected detail each time a new version comes back.

Three protected lines

Day	1	2	3	4	5	6	7
Duchess, in four places	☐	☐	☐	☐	☐	☐	☐
The lamp opens and closes the chapter	☐	☐	☐	☐	☐	☐	☐
The blue lambing chalk	☐	☐	☐	☐	☐	☐	☐

On the second Friday Gwilym takes the advanced step. **He closes the chatbot and makes a final pass with the AI off**, reading aloud in the shed office. Then he lays it beside the chatbot's last version and underlines every sentence that could sit in anyone's farming memoir, finding nine in the chatbot's version and two in his own.

Sentences underlined

Version	Underlined
The chatbot's last version	Nine
His own	Two

ChatGPT was most effective at incrementally new ideas, compared with radically new ones, in a set of five experiments (Lee & Chung, 2024). On the alternate uses task, the strongest human ideas were level with or ahead of the chatbots' ideas (Koivisto & Grassini, 2023). **The final pass is the writer's chance to make the larger jumps.**

The larger jumps are the writer's



ChatGPT most effective at incremental ideas



The strongest human ideas level or ahead



The final pass

Switch the AI off for the whole final pass. Read your draft aloud from start to end and change only what you would change if you were telling the story. When you compare it with the AI version, rewrite the sentences you underlined in your own draft and leave the AI version as it is.

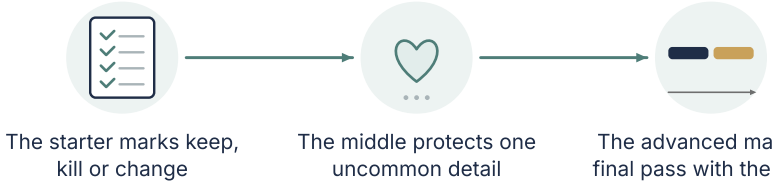
Switch the AI off for the whole final pass

- [x] Read aloud from start to end
- [x] Change only what you would change telling the story
- [x] Rewrite the sentences underlined in your own draft

Gwilym rewrites his two underlined sentences on the Saturday morning, and the chapter is finished. He reads it once more against the card.

On the Monday Gwilym takes the chapter to the magazine's editor. **The magazine prints it the next month with a photograph of a ewe very like Duchess.** A neighbour stops him at the mart to tell him about her own first paraffin lamp. Keep the card and the protected list with the printed chapter for the next piece.

Keep, kill or change, at three levels



The starter marks keep, kill or change

The middle protects one uncommon detail

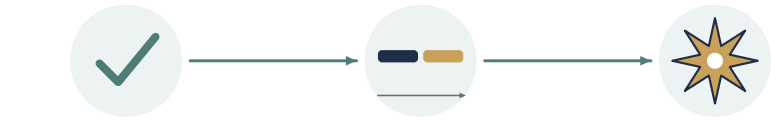
The advanced makes a final pass with the AI off

Exercise:

Keep your own direction and make the final choices.

1. Starter. **Mark each AI suggestion keep, kill or change**, and make every choice yourself.
2. Middle. **Protect one uncommon detail** the model keeps deleting.
3. Advanced. **Make a final pass with the AI off**, and compare it with the AI draft for sameness.

Write your direction before any AI line goes in



Key idea:

Write your direction before any AI line goes in, decide every suggestion yourself, and make the last pass with the AI off, so the finished piece keeps the details only you would put in.

Quick check:

What does a direction sentence say? Answer: What a piece is for and why it matters to its maker. What does the middle step ask you to protect? Answer: One uncommon detail the model keeps deleting, such as Duchess or the paraffin lamp. In the advanced step, what do you compare your final pass with? Answer: The chatbot's own draft, looking for sentences that could sit in anyone's work. What does the starter step ask you to do with every AI suggestion? Answer: Mark it keep, kill or change, and make the choice yourself.

9.3.1 What Each Game Practises and What Its Score Means

Imagine Ambrose, sixty-six, a lollipop man who sees the children across the road outside a primary school twice a day. **In the gap between the morning and afternoon crossings he plays word games in his phone's browser**, on the bench by the school gate. His grandson is sure the games will turn him into a poet by Christmas.

Word games on the bench by the school gate

- A lollipop man of sixty-six
- Played in the gap between the crossings
- His grandson expects a poet by Christmas

This section is about what each Cleverini game in this book practises and what its score means. **I show you what reviews of brain training found, what two word games say on their own pages, and how to read a score.** Ambrose tries the steps over one week, and three levels of practice close the section.



A lollipop man in a high-visibility coat sitting on a bench by a school gate, looking at his phone.

One team began with a gap. They wrote that “To date, the field has lacked a comprehensive review of the brain-training literature, one that examines both the quantity and the quality of the evidence according to a well-defined set of best practices” (Simons et al., 2016). Their focus was games and drills used to lift performance on other tasks.

A comprehensive review (Simons et al., 2016)

> - The field had lacked one
> - Both the quantity and the quality of the evidence
> - Games and drills used to lift performance on other tasks

Ambrose’s grandson has read that word games keep the mind young, and he sends his grandfather links to new ones each week. Ambrose likes the games and wants to know what they really practise. He gives himself one week to find out, a few minutes at a time on the bench.

One week to find out



Links to new games each week



What the games really practise



A few minutes at a time on the bench

> **Key Concept:**
>
> Brain training. **Brain training is playing games or drills in the hope of improving thinking beyond the game itself.** A commuter who does a memory drill on the train each morning, hoping to remember clients' names better at work, is doing brain training.

On Monday Ambrose plays one round of Letter Chain in Word Hunt. **The game's page describes "60 levels of Letter Chain, where you build your own words from touching letters".** Each round gives a small grid and "two to three minutes", the page adds. Finding many words fast from one small grid is fluency practice.

One round of Letter Chain in Word Hunt

- Build your own words from touching letters
- One small grid
- Finding many words from one small grid is fluency practice

After the round Ambrose writes a line in the notebook he keeps in his coat. **"I practised finding many words fast in this game, and I claim no far transfer to writing poems."** Far transfer has its home

earlier in the book (see 5.8.1), and the line keeps his claim to the game he played.

A line in the notebook in his coat



I practised finding many words in this game



I claim no far transfer to writing poems



Far transfer (see 5.8.1)

> Science Says:
>
> **A 2017 review weighed three popular kinds of training.** Its authors wrote that the evidence "casts serious doubts on the effectiveness of chess, music, and working memory training." They "conclude that far transfer of learning rarely occurs" (Sala & Gobet, 2017).

> Exercise:
>
> Try it. **After any puzzle session, write "I practised X in this game, and I claim no far transfer to Y".**

Name the skill in plain words when you fill in X. Use what the game asked you to do, such as finding many words fast. For Y, name the thing you most hope the game will help, such as writing, work or memory. Keep the lines in one place so you can read a week of them together.

Name the skill in plain words

- [x] X: what the game asked you to do
- [x] Y: what you most hope the game will help
- [x] A week of lines kept in one place

Write the line straight after the session, while the game is fresh. If you played two games, write one line for each. A line with a vague X, such as "brain power", needs a second try with a plainer name.

> Science Says:
>
> **A 2019 review looked across several kinds of cognitive training.** Its authors reported "minimal effect on domain-general cognitive skills" and wrote that "The cognitive-training program of research has showed no appreciable benefits" (Sala & Gobet, 2019).

A game mainly trains what it trains. Ambrose's Letter Chain rounds give him practice at finding words in a grid, which is near practice for more grids. His grandson's poem would need a far jump, and the reviews give him no grounds to promise it.

A game mainly trains what it trains

Near practice	A far jump
⊕ Finding words in a grid	⊖ His grandson's poem
⊕ Practice for more grids	⊖ No grounds to promise it

The reviews looked at training in general, and neither tested these two word games. The findings set the limit on what Ambrose claims. The game pages tell him what each game asks of him.

What sets the limit

- The reviews looked at training in general
- Neither tested these two word games
- The game pages tell him what each game asks

On Tuesday Ambrose takes the starter step with one run of Letter Wheel. **“Like an anagram hunt, you look for every real word the letters can make, including the short ones that are easy to overlook,” the game’s page says.** The page names no timer, so he plays for the hunt itself and keeps his eyes off the stars.

One run of Letter Wheel



Every real word the letters can make



Including the short ones that are easy to overlook



Played for the hunt itself

Play one run for the process alone. If a game lets you hide the score, hide it for that run. If it gives you no way to hide it, look away from it until the run ends. Notice which kinds of word you find first and which you find last.

Play one run for the process alone

- [ ] Hide the score for that run if the game allows it
- [ ] If not, look away from it until the run ends
- [ ] Notice which words you find first and last

Highly evaluative contexts went with lower creative performance across studies (Byron et al., 2010). **Poems written with outside reasons in mind were judged less creative in one study** (Amabile, 1985). Ambrose plays Letter Wheel for the hunt and leaves the stars until the run is over.

Evaluation and outside reasons



Highly evaluative contexts went with lower creative performance (Byron et al., 2010)



Outside reasons, less creative poems (Amabile, 1985)



Letter Wheel played for the hunt

The Letter Chain page lists Visual scanning, Vocabulary and Attention. The Letter Wheel page lists Vocabulary, Word recall and Pattern use. The fluency link in this book comes from what each game asks you to do.

Skill labels on the game pages

Game	The page lists
Letter Chain	Visual scanning, Vocabulary and Attention
Letter Wheel	Vocabulary, Word recall and Pattern use

> **Key Concept:**
>
> Skill label. **A skill label is the name of a skill that a game's own page says the game uses, which is the maker's claim.** A board game box printed with "builds patience" carries a skill label.

Some page labels share a name with a creative thinking skill and still describe a task with one right answer. Switcheroo's page says "Cognitive flexibility", the Logic Challenge and Math Matrix pages say "Flexible thinking", and the Mathematics page says "Arithmetic fluency". All four games stay out of this book.

On Wednesday, after the morning crossing, Ambrose takes the middle step. **He plays one Letter Chain round and then spends five minutes on a real creative task**, new words for the chant the children sing at the crossing. He writes six new lines and keeps two, one about puddles and one about the lollipop itself.

After the morning crossing



One Letter Chain round



Five minutes on a real creative task



Six new lines for the chant, two kept

Pair the game with a short creative task straight afterwards. Choose a task that matters in your own life, such as a verse, a sketch or a plan. Set five minutes and write whatever comes. The chant counts as mini-c work (Beghetto & Kaufman, 2007), and the game counts as practice for the game.

Pair the game with a short creative task

- [x] A task that matters in your own life
- [x] A verse, a sketch or a plan
- [x] The game counts as practice for the game

On Friday Ambrose takes the advanced step after a Letter Chain round. **“Letter Chain rewards the words you can actually pull from a small grid, and at the end of each round it lists the ones you missed,” the game’s page says.** He reads the list and writes that he passed over words ending in “ing” and most five-letter words.

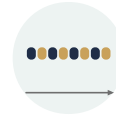
The missed list after a Letter Chain round



The words you can actually pull from a small grid



Words ending in ing passed over



Most five-letter words passed over

The Letter Chain page says “a five-letter word is worth 40 points and a six-letter word 60”. **Points reward longer words, and Letter Wheel stars count hints**, since its page gives “Three stars for finishing without a hint, two stars for one hint, and one star if you needed more.” Neither score is a count of ideas.

Ambrose copies the points line into his notebook beside the missed words. His round scored well because of two six-letter words, though he found only one five-letter word. That fits the page’s line that “longer words score far more” in Chain rounds.

> **Key Concept:**
>
> Game score. **A game score is the points or stars a game gives you for one round or level.** A darts player’s total of 180 in a Tuesday league match is a game score.

A game score shows how you did at that game, and a game score is never an IQ. It is never a creativity test and never a diagnosis, and Ambrose treats Friday's result as a record of that game alone. Neither game page names score bands, so there is no band to read a score against.

A record of that game alone

- [x] Never an IQ
- [x] Never a creativity test
- [x] Never a diagnosis

Read the missed list slowly before the next round starts. Sort the missed words by their endings and by their lengths. Look for the group with the most words in it.

Read the missed list slowly

- [x] Sort the missed words by their endings
- [x] Sort them by their lengths
- [x] Look for the group with the most words

At the end of the week Ambrose reads his notebook to his grandson over tea at the café by the park. **The grandson laughs at the far transfer line and asks for the puddle verse again.** Ambrose keeps playing in the gap, and the verse goes up on the school noticeboard.

The same reading fits any game you meet outside this book. Find the page's skill labels, ask what the game asks you to do, and see what its score counts. Then decide which skill name in this book, if any, fits the task.

Read each game for what it is, at three levels



The starter plays for process

The middle pairs a game with a creative micro-task

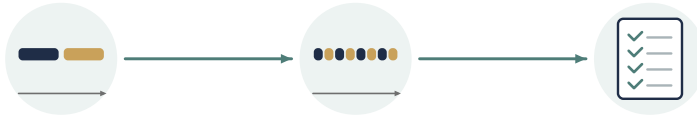
The advanced reads the list of missed words

Exercise:

Read each game for what it is.

1. Starter. **Play for process**, and hide the score for one run if the game allows it.
2. Middle. **Pair a game session with a real creative micro-task** straight afterwards.
3. Advanced. **After one Word Hunt Letter Chain round, read the page's list of missed words**, write which endings or lengths you passed over, and record it as that game's result only.

Claim only what a game practises



Far transfer rare in reviews of brain training

Little effect on general thinking skills

A record of that game alone

Key idea:

Claim only what a game practises, since reviews of brain training found far transfer rare and little effect on general thinking skills, and read every score as a record of that game alone.

Quick check:

What is a skill label? Answer: The name of a skill that a game's own page says the game uses, which is the maker's claim. What do the stars in Letter Wheel count? Answer: Hints. What does the advanced step ask you to read after a Letter Chain round? Answer: The page's list of missed words. Which three kinds of training did the 2017 review doubt? Answer: "chess, music, and working memory training".

9.3.2 Choosing Games, Difficulty, Apps and Offline Alternatives

Imagine Juniper, thirty-three, a dog groomer who has twenty minutes between appointments and wants one word game to fill the gap. **A regular customer has sent her an advert for a paid brain app that promises a sharper mind in a month.** Juniper reads it twice on the step outside the grooming parlour, between a spaniel and a poodle.

One word game for a twenty-minute gap

> - A dog groomer of thirty-three
> - An advert for a paid brain app
> - It promises a sharper mind in a month

This section is about choosing games, difficulty levels and apps, and about paper alternatives to a screen. **I show you what reviews of brain-training research say about choosing, what each game's page says, and how to pair a game with paper.** Juniper tries the steps over two weeks, and three levels of practice close the section.



A dog groomer in a blue tunic sitting on a step outside a grooming parlour, reading her phone.

The choices here draw on reviews of brain-training research and on each game's own page. Each step gives Juniper one thing to choose and one thing to keep track of. Each choice rests on a finding or a page. No study here tested a grooming parlour, so each finding guides a choice and promises nothing about the game.

One thing to choose, one to keep track of

- [x] Reviews of brain-training research
- [x] Each game's own page
- [x] Nothing promised about the game

On the first Monday Juniper starts with paper. **In her twenty-minute gap she spends ten minutes sketching new layouts for her grooming table**, with her phone in her bag. She draws five, and one of them puts the dryer on a swing arm above the table. The other four go in a folder under the till.

Ten minutes on paper first



New layouts for her grooming table



Her phone in her bag



A dryer on a swing arm

> Exercise:
>
> Try it. **Spend 10 minutes on an offline sketch exploration, with no app.**

Sketching has been studied as part of how designers reason (Goldschmidt, 1991). **Keep the sketches rough and number each one as you go.** Stop when ten minutes are up, even in the middle of a line. Choose one sketch to look at again the next day.

Keep the sketches rough

- [x] Number each one as you go
- [x] Stop when ten minutes are up
- [x] Choose one to look at again the next day

On Tuesday Juniper takes the starter step. **She writes “grooming brush” at the top of a page, sets a timer for three minutes and lists uses.** She lists fourteen, from a doll’s hairbrush to a tool for scrubbing muddy boots, and writes 14 at the bottom of the page.

A paper list of uses



Grooming brush at the top of a page



From a doll's hairbrush to scrubbing muddy boots



The count at the bottom of the page

Choose an object you handle every day for the paper list. Write it at the top, set the timer and number each use as it comes. Count the uses when the timer ends, and write the count on the page. Juniper's list is mini-c work for her alone (Beghetto & Kaufman, 2007).

An object you handle every day

- [x] Write it at the top
- [x] Number each use as it comes
- [x] Write the count on the page

On Wednesday Juniper takes the middle step with the advert. **She writes one line under it, "This app may make me quicker at its own puzzles, and I expect no gain beyond them."** Reviews of cognitive training found little effect on general thinking skills and rare far transfer (Sala & Gobet, 2019; Sala & Gobet, 2017; see 9.3.1).

One line under the advert



Quicker at its own puzzles



No gain beyond them



Rare far transfer (Sala & Gobet, 2017)

Science Says:

A 2017 review of training studies also weighed how well each study was designed. It found that "the effect sizes are inversely related to the quality of the experimental design (e.g., presence of active control groups)" (Sala & Gobet, 2017).

Juniper reads the review's wording slowly on her next break. The advert names a study and a percentage. She wants to know what the people in its comparison group did while the others played. The percentage means little to her until she knows that.

The comparison group

- The advert names a study and a percentage
- What did the people in its comparison group do?
- The percentage means little until she knows

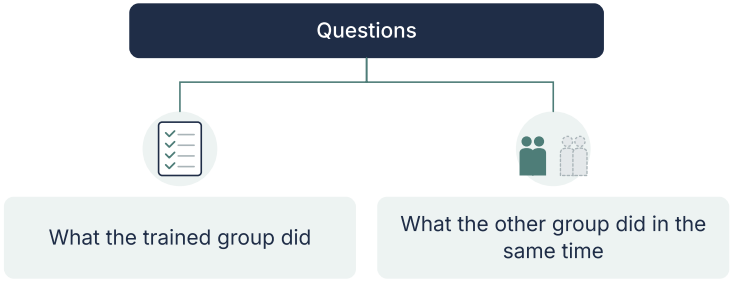
Key Concept:

Active control group. **An active control group is a comparison group that spends the same time on a different activity, so that the trained group is measured against people who also did something.** A trial of a new reading scheme might compare one class using it with another class that spends the same hours on ordinary library reading.

The advert says nothing about that group. **Juniper adds a second line under the advert, asking what the other group spent its time on.** A review of brain-training evidence set out best practices for judging

claims like this one (Simons et al., 2016). She sends the question to the customer that evening.

Judging a claim like this one



Look for the comparison behind any claim an app makes. Find what the trained group did and what the other group did in the same time. If the advert gives no answer, write the near-transfer limit in one line and keep it. A claim with no comparison described tells you about the advert and little about the app.

The two word games in this book run in a browser at no cost. "Letter Wheel is free in your browser on phones, tablets and computers. All 160 levels are included, and there are no ads," its page says. Both game pages add, "It opens instantly in your browser. No sign-up needed to start."

The two word games in this book

Page	Says
Letter Wheel	Free in your browser, no ads
Both game pages	No sign-up needed to start

Juniper searches the Cleverini site for a phone app and finds none listed, so she plays in her phone's browser. She saves the two game pages as bookmarks. **She deletes the paid advert from her messages.**

No app needed



Played in her phone's browser



The two game pages saved as bookmarks



The paid advert deleted

> **Key Concept:**
>
> Difficulty level. **A difficulty level is a stage in a game that sets how hard its rounds are.** A ski resort's runs, marked green, blue, red and black, are difficulty levels.

Letter Wheel's page sets out how its levels grow. "Four-letter wheels start at level 4, five letters at 11, six at 46 and seven at 101," it says. It adds, "Each level gives you three free hints that reveal one letter each, plus five shuffles." Juniper starts at level 1 and plays a wheel or two in each gap.

How Letter Wheel's levels grow

- Four-letter wheels start at level 4
- Seven letters at 101
- Three free hints and five shuffles each level

The Letter Chain page describes its own tools and audience. "You get three rotations per level," it says. It adds that "Later grids and the

chain mode are aimed at teens and adults.” Juniper reads both pages before she plays either game.

The Letter Chain page



Three rotations per level



Later grids and the chain mode



Aimed at teens and adults

From the second Monday Juniper takes the advanced step. **She chooses Letter Wheel as the screen partner of the paper list from 3.1.1**, where you list uses for an object against a three-minute timer and count the ones that fit. She alternates the two across her gaps, and her first paper object is a lead clip.

A screen partner for the paper list

- Letter Wheel
- The paper list from 3.1.1
- Alternated across her gaps, starting with a lead clip

Choose the game mode that suits the gap you have. Letter Chain rounds are timed, so they suit a gap with no interruptions. Letter Wheel’s page names no timer, so a round can stop when the next dog arrives, which is why Juniper picks it. Read both pages before you choose, since the pages set the rules.

> **Key Concept:**
> Offline partner. **An offline partner is a paper task that practises the same skill as a screen game.** A pencil crossword in the Sunday paper, kept beside an online crossword, is an offline partner.

Keep the paper count and the game result in separate columns. Label one column "paper list" and the other "Letter Wheel", and write the date beside each entry. Use a pencil so a wrong entry can be fixed. Never add the two together, since the game result is a record of that game alone.

Two separate columns

Paper list	Letter Wheel
⊕ The uses she counted	⊖ The level she reached

A game score is never a creativity test and never a diagnosis. **Juniper's Letter Wheel column shows the level she reached and the stars she earned**, and her paper column shows the uses she counted. She reads each column on its own. The two columns answer two different questions, one about a game and one about her paper list.

Missing a single day made little difference to forming a habit in one study (Lally et al., 2010). **Juniper keeps the same gap for both tasks**, the one after her late morning appointment. When a dog arrives early, she picks up the alternation at the next gap. The gap itself is her cue, so she sets no alarm.

The same gap for both tasks



The one after her late morning appointment



Picked up at the next gap



The gap itself is her cue

Choose one gap in your day and keep the pairing there. Do the paper list in one session and the game in the next. If you miss a session, carry on from where the alternation stopped, and write the missed date in both columns with nothing beside it. Keep the same order each week.

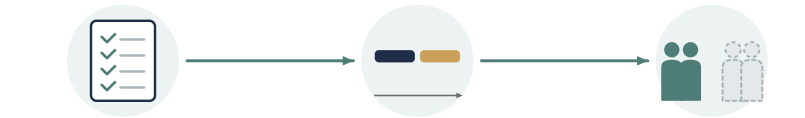
One gap in your day

- [x] The paper list in one session, the game in the next
- [x] A missed session: carry on from where it stopped
- [x] The same order each week

After five working days, Juniper has three entries in the paper column and two in the game column. **The paper column has a new object every time**, from a lead clip to a tennis ball, and the game column has reached level 4, the first four-letter wheel. The dryer goes up on its swing arm the following month.

The same choices fit any game you are offered. **A nurse with a break between shifts reads each game page for its platform, cost and levels**, pairs it with a paper list, and keeps the two counts apart. She writes the near-transfer limit of any paid app in one line and keeps it inside her diary.

A game and its paper partner, at three levels



The starter counts uses for one object

The middle writes an app's near-transfer limit

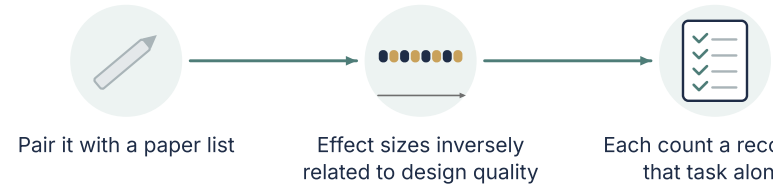
The advanced pairs Letter Wheel or Letter Chain with paper

Exercise:

Choose a game and its paper partner.

1. Starter. **Do a paper uses task for one object** for 3 minutes, and count the uses.
2. Middle. **If you use any brain-training app**, write its near-transfer limit in one line.
3. Advanced. **Choose one fluency game mode, Letter Chain or Letter Wheel**, as the screen partner of the 3.1.1 Starter paper list, alternate the two across sessions and keep each count separate.

Choose a free browser game for what it practises



Key idea:

Choose a free browser game for what it practises and pair it with a paper list, since effect sizes in training studies were inversely related to the quality of the experimental design, and keep each count as a record of that task alone.

Quick check:

What does an active control group do? Answer: It spends the same time on a different activity, so the trained group is measured against people who also did something. Name one difficulty tool on the Letter Wheel page. Answer: Three free hints per level, or five shuffles. What does the advanced step ask you to keep separate? Answer: The game count and the paper list count, kept in separate columns.



Module

10

Your Training Program, Practice Plan and Practitioner Levels

10.1 Establishing Your Starting Point

10.1.1 Choosing What You Want to Create and Develop

Imagine Briony, forty-four, a pharmacy technician who has written "be more creative" at the top of a new notebook. **She is torn between two crafts, cutting linocut prints and writing song lyrics.** Both appeal to her, and neither has a plan. She gives herself one week to choose and set a goal she can work towards.

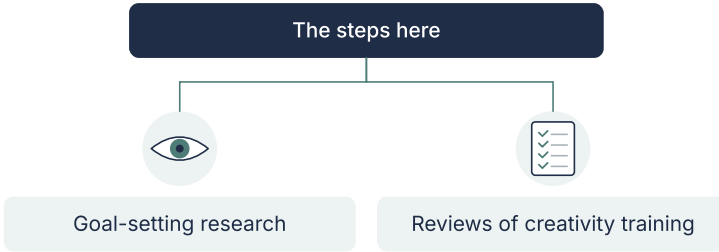
Two crafts, one choice

- A pharmacy technician of forty-four
- Linocut prints or song lyrics
- She is torn between two crafts

This section is about choosing what you want to create and develop, and turning that choice into a goal. **I show you what goal-setting research found and how to write a goal for a creative field.** Briony tries the steps over one week in her spare room, and three levels of practice you can try yourself close the section.

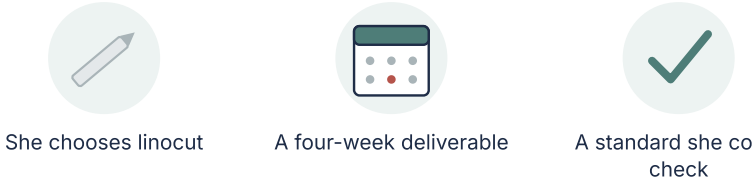
The steps here come from goal-setting research and from reviews of creativity training. None of that research tested linocut or song lyrics, so each finding shapes a step and promises nothing about the prints. The choices belong to Briony. She keeps a dated record of each step, so she can see later what she tried and when.

Goal-setting and training research



On Monday evening Briony chooses linocut, since she wants to make something she can hold. **She names a four-week deliverable with a standard she could check**, six prints of the town bandstand, each with clean edges and an even black. She writes it under the old wish and dates it with Monday's date.

Monday evening: linocut



> Exercise:
>
> Try it. **Name one domain and one 4-week deliverable** with a proficiency standard.

One review of goal research gave this definition. **"A goal is the object or aim of an action, for example, to attain a specific standard of proficiency, usually within a specified time limit"** (Locke & Latham, 2002). Briony's bandstand prints have an aim, a standard and four weeks. Check your own goal for all three parts before you start.

Write the standard as something you can see on the finished piece. "Clean edges and an even black" can be seen on the paper. "Good prints" can mean anything, so it gives you nothing to test a print against. Keep the standard to one line, written in plain words beside the deliverable.

Write the standard on the finished piece

- [x] Something you can see
- [x] Described so that another person could check it

> **Key Concept:**
>
> Proficiency standard. **A proficiency standard is the level a finished piece must reach, described so that another person could check it.** A bakery that requires every loaf to sound hollow when tapped underneath has a proficiency standard.

Choose the deliverable from the field itself. The more successful programmes in one review were likely to use "realistic exercises appropriate to the domain at hand" (Scott et al., 2004). A print edition is the kind of thing linocut makers produce, so practice and field match. Pick a deliverable that people in your field would recognise as finished work.

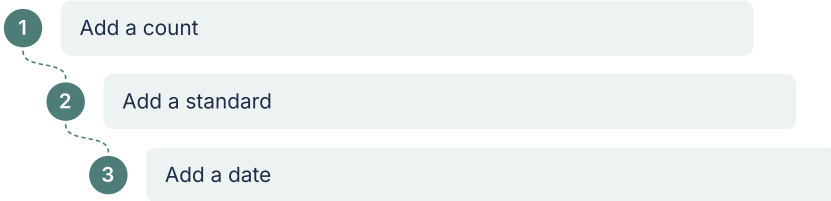
On Tuesday Briony takes the starter step. **She rewrites "be more creative" as one specific, difficult goal**, to cut a new practice block every week for four weeks and to print the bandstand block until six prints in a row meet her standard. The goal is hard for a beginner, and every part of it can be counted.

> Science Says:
>
> **A long review of goal-setting research looked at how goals relate to performance.** The authors wrote, "We found that specific, difficult goals consistently led to higher performance than urging people to do their best" (Locke & Latham, 2002). They added that "The effect sizes in meta-analyses ranged from .42 to .80" (Locke & Latham, 2002).

> Key Concept:
>
> Specific goal. **A specific goal is an aim that states exactly what will count as done.** A choir member who aims to sing the alto line of one carol from memory by the December concert has a specific goal.

Turn a wish into a goal by adding a count, a standard and a date. Take the vague line and ask what you would see on the day it came true. Write that as the goal, then make it a notch harder than feels comfortable. Strike out the old wish so only the goal remains.

Turn a wish into a goal



The same review named one way goals work. It reported that **"goals serve a directive function; they direct attention and effort toward goal-relevant activities and away from goal-irrelevant activities"**

(Locke & Latham, 2002). Briony's lyrics notebook goes back on the shelf for the four weeks, out of sight of her cutting table.

Goals serve a directive function



They direct attention and effort



Toward goal-relevant activities



And away from irrelevant ones

On Wednesday Briony takes the middle step. **Linocut is new to her, so she sets a learning goal before any polished print**, to discover five ways of cutting on scrap lino by Saturday. She buys a pack of offcuts and two gouges on her way home. She keeps the bandstand block wrapped until the learning goal is met.

A learning goal first

- Linocut is new to her
- A learning goal before any polished print

One large review found that "on average, creativity can be enhanced" (Haase et al., 2025). **That average covers many methods and many people**, so Briony treats it as a reason to start and leaves the size of any change to her own practice. She writes the five-strategy target on a card by the lino.

> Science Says:
>
> **The same review described what to do when a task is new and complex.** It reported that "When people are confronted with a task that is complex for them, urging them to do their best sometimes leads to better strategies" than a hard performance goal. It wrote, "The antidote is to set specific challenging learning goals, such as to discover a certain number of different strategies to master the task" (Locke & Latham, 2002).

> Key Concept:
>
> Learning goal. **A learning goal is an aim measured by the number of methods you discover.** A new allotment holder who sets out to test four ways of protecting seedlings from slugs this spring has a learning goal.

Set the number of strategies before you start, and keep it small. Five is enough for one week. Write each strategy on the scrap as you find it, with a word or two about the mark it makes and the tool that made it. Stop when you reach the number, even if a sixth idea appears.

Set the number of strategies before you start

- [x] Five strategies
- [x] By Saturday

By Saturday Briony has five strategies on one offcut. **Fine lines with the V-gouge, broad clearing with the U-gouge, cross-hatching, dots, and leaving the lino uncut for white.** Two of the five suit the bandstand railings. She labels the offcut and pins it above the table in her spare room.

Five strategies on one offcut



On Friday evening, before the offcut is finished, Briony takes the advanced step. **She writes one intrinsic reason and one extrinsic pressure.** The reason is the quiet of cutting after a loud day at the counter. The pressure is her sister's idea that she sell cards at the Christmas fair.

She keeps the intrinsic reason as the driver. Poems written with outside reasons in mind were judged less creative than the other groups' poems in one study (Amabile, 1985). The fair stays on the list as a maybe, below the line about quiet. Keep the pressure written down, so it stays visible and stays second.

The intrinsic reason is the driver

- [x] One intrinsic reason
- [x] One extrinsic pressure
- [x] Written on separate lines

Write the two reasons on separate lines and circle the one that drives the work. Read the circled line before each session. If the

outside pressure grows louder, read the circled line again and keep the goal as you wrote it. Briony tapes her circled line inside the lid of her tool box.

Belief in one's own creative ability went with creative performance at work in one study (Tierney & Farmer, 2002). **Briony picks a goal she believes she can grow into**, hard enough to stretch her and close enough to her hands to try this week. Choose a goal at the edge of what you can do now.

A goal she can grow into

> - Belief in her own creative ability
> - It went with creative performance



A small linocut block of a bandstand half cut, beside two gouges and a roller.

Choosing one field first suits the view that creativity is domain specific (Baer, 1998). Briony's lyrics wait for another season. Pick one field at a time and keep the others on a list for later. The skills she builds

in linocut belong to linocut, and she makes no promise that they will carry over to songs.

One field first

> - Creativity is domain specific
> - Choose one field first

On Sunday Briony draws the bandstand onto her first real block. **Her goal, her five strategies and her circled reason sit on one page**, and four weeks of cutting are ahead of her. She sets her first session for Monday after work. Set your own first session before you close the notebook, so the goal has a start date.

One page on Sunday

- [x] Her goal
- [x] Her five strategies
- [x] Her circled reason

The same steps fit other makers. **A retired postal worker who wants to write poetry names one deliverable**, eight short poems about his street by the end of the month, each read aloud without stumbling. He writes a learning goal for the first week and circles his reason for writing, the pleasure of the right word.

Each of the three steps takes one evening and one page. The goal goes at the top, the learning goal sits below it, and the two reasons go at the bottom with one circled. Keep the page where you work, and read it before each session for the first four weeks of practice.

Choose what to create, at three levels



The starter rewrites a wish as a specific goal

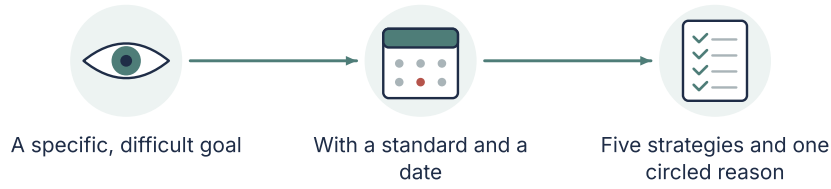
The middle sets a learning goal

The advanced lists one intrinsic reason and one extrinsic pressure

Exercise:

Choose what to create and develop.

1. Starter. **Rewrite "be more creative" into one specific difficult goal.**
2. Middle. **If the domain is new, set a learning goal** to discover 5 strategies before a polished product.
3. Advanced. **List one intrinsic reason and one extrinsic pressure**, and keep the intrinsic reason as the driver.



Key idea:

Choose one field and give it a specific, difficult goal with a standard and a date, since specific, hard goals were tied to better performance than being told to do your best, and learning goals helped on tasks that were new and complex.

Quick check:

What three parts turn a wish into a goal? Answer: A count, a standard and a date. What does a learning goal count? Answer: The methods you discover. What did the review find against urging people to do their best? Answer: "specific, difficult goals consistently led to higher performance". Which reason drives Briony's work? Answer: The quiet of cutting after a loud day at the counter.

10.1.2 Recording a Baseline Through Several Creative Tasks

Imagine Tadeusz, fifty-seven, a piano tuner who writes hymn tunes for his parish in the evenings. **He wants to know where his creative work stands before he starts a training plan.** He has a feeling about it, and a feeling is hard to compare with anything. So he gives himself one week to record where he starts, task by task.

Where his creative work stands

- A piano tuner of fifty-seven who writes hymn tunes
- Before he starts a training plan

This section is about recording a starting point through several creative tasks. **I show you how to score a short ideas task, rate ideas in a set order and have a finished piece judged by others.** Tadeusz works through the steps from Monday to Saturday, and three levels of practice you can try yourself close the section.



A man with a tuning fork and a small case of tools, sitting at an upright piano in a quiet church hall.

The steps here come from research on how creative tasks are scored. One team wrote, “In the current work, a systematic framework for practical scoring decisions was developed” (Reiter-Palmon et al., 2019). Their framework concerns research scoring, so each step here shapes Tadeusz’s own record and promises nothing about his tunes.

On Monday evening, before any task, Tadeusz writes his rules on one sheet. **He decides how he will score before he sees a single answer.** A use counts once, repeats are struck out, and a use counts only if someone could actually do it. He dates the sheet and pins it inside the lid of his tool case.

His rules on one sheet

- [x] He decides how he will score
- [x] Before he sees a single answer

> **Key Concept:**
> Rule sheet. **A rule sheet is a written list of how each task will be scored, fixed before the tasks are done.** A pub quiz league that agrees before the season which spellings will count as correct has a rule sheet.

Write your rules first, while you have no answers to favour. Keep each rule to one line. Say what counts, what gets struck out and how many points each rating can take. Once the tasks begin, the rules stay as written for the whole week, and the sheet stays in sight while you score.

Then Tadeusz sets a three-minute timer and lists uses for a tuning fork. **He counts fourteen uses that pass his rules, his fluency score.** He circles the two he thinks most creative, by the Top 2 method (Silvia et al., 2008). One is a drumstick for a toy xylophone and one a stamp that presses a Y into clay.

A three-minute uses list



A tuning fork



Fourteen uses pass his rules



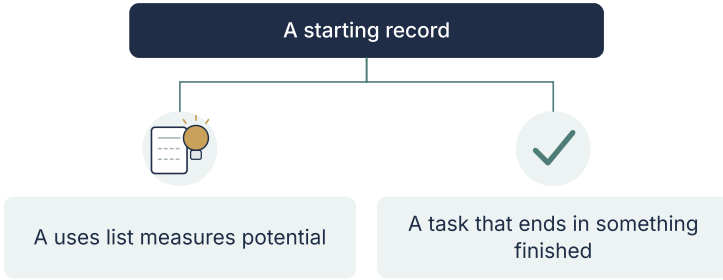
His fluency score

> Exercise:
>
> Try it. **List uses for one object for 3 minutes**, count fluency and circle your Top 2 for originality.

> Science Says:
>
> **A review of divergent thinking scoring named the usual dimensions.** It reported, “Most commonly, responses are scored for fluency, flexibility, and originality” (Reiter-Palmon et al., 2019). The same authors described divergent thinking tests as measures of creative potential.

A uses list measures potential, so a starting record needs more than one kind of task. Tadeusz’s fourteen uses tell him how freely ideas come in three minutes. They say little about a finished tune. That is why his week includes ideas, ratings and one piece of finished work.

More than one kind of task



Plan your own week with at least one task that ends in something finished. Pick a short ideas task, a rating step and one small piece you can complete in an evening. Spread them across the week so no evening is crowded. Write the plan on the back of the rule sheet, beside the date.

> **Key Concept:**
> Starting record. **A starting record is a dated set of scores from several tasks, kept as the point that later scores are compared with.** A swimmer who logs her times over 50, 100 and 200 metres in the first week of a training block keeps a starting record.

Count fluency by your rules and nothing else. Strike out repeats and anything that breaks a rule, then count what is left. Write the number at the top of the list with the date. Circle your Top 2 after the count, so the circling has no effect on the number.

Count fluency by your rules

- [x] Strike out repeats
- [x] Count nothing else

On Tuesday Tadeusz takes the starter step. **He rates each of his Top 2 for novelty first, then for usefulness**, on a scale of one to five. The xylophone drumstick gets three for novelty and four for usefulness. The clay stamp gets four for novelty and two for usefulness, since few people need a Y in clay.

> Science Says:
>
> **One study asked how novelty and usefulness feed into creativity ratings.** The authors wrote, "Results generally indicate a greater importance of novelty than usefulness in the prediction of creativity scores" (Diedrich et al., 2015). They added, "If an idea is not novel its usefulness does not matter much, but if an idea is novel its usefulness will additionally determine its actual creativity" (Diedrich et al., 2015).

Rate novelty first, and write the number before you think about use. Then rate usefulness on its own line. Keep the two numbers apart, so a handy idea does not lift its own novelty score. Use the same scale for every idea on the sheet, and write the scale at the top so you use it again next month.



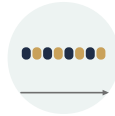
The order suits what Tadeusz is trying to learn. **His clay stamp is the more novel idea, and its low usefulness shows him what it still**

lacks. Both go on the starting record exactly as rated, with the date. Rate your own Top 2 in the same order.

The clay stamp



The more novel idea



Its low usefulness



What it still lacks

On Thursday Tadeusz takes the middle step. **He writes one finished sixteen-bar tune for an evening hymn and asks two appropriate observers to rate it** (Amabile, 1982; Hennessey, 1994). One is the parish organist. The other is a retired music teacher who sings in the choir.

A finished sixteen-bar tune

- For an evening hymn
- Two appropriate observers rate it

Each observer gets a clean copy and a card with a scale of one to five, and rates the tune alone. **The organist gives it three and the music teacher gives it four.** He adds a line about how he wrote the tune, since judges can rate the process as well as the product (Hennessey, 1994).

Two observer scores

Observer	Score
The organist	Three
The music teacher	Four

Choose observers who know the field and can judge the piece on its own terms. Ask each one separately and give them the same simple scale. Keep the piece short, so it can be finished in one evening and rated in a few minutes. Write each score down exactly as given, and thank each observer without asking for reasons.

Choose observers who know the field

- [x] Appropriate observers
- [x] They can judge the piece on its own terms

A finished piece belongs in a starting record because ideas are only part of creative work. A uses list shows how freely ideas come, and a finished tune shows what he can complete. Tadeusz wants both on the sheet from the first week.

On Saturday Tadeusz takes the advanced step. **He gives his own tune a rating of four and writes it at the right edge of the sheet, under "self".** The fourteen uses, the Top 2 ratings and the two observer scores sit in their own columns.

A self-rating of four

> - At the right edge of the sheet
> - Under self

His own view and the task scores answer different questions. Self-ratings and divergent thinking scores went together only weakly in one study (Haase et al., 2018). Tadeusz reads the two side by side and draws no conclusion from either alone.

Give your self-rating the same scale and the same date as the rest. A scale of one to five lets you set your number beside the observers' numbers with no converting. Write a few words under it saying why you chose it. Tadeusz writes "a strong last line" under his four.

The same scale and the same date

- [x] For your self-rating
- [x] As the rest of the record

> **Key Concept:**
>
> Self column. **A self column is the place on a record sheet kept only for the maker's own scores, apart from task and observer scores.** A darts league scorecard with a separate box where each player notes how well they think they threw has a self column.

Use the observers' scale for your own rating, so the numbers sit side by side. Read yours beside theirs, and keep both. If your number and theirs differ, that difference is part of the record.

By Saturday evening Tadeusz has one dated sheet. **It holds his rules, a fluency count, two pairs of ratings, two observer scores and a self-rating**, each in its own place.

Keep the starting record exactly as it was on the day. Make no changes to it later, even if a score now looks too high or too low. File it where you can find it in a month, with the rule sheet clipped to the front, so the same rules can be used again.

One dated sheet

- His starting record
  - His rules
  - A fluency count
  - Two pairs of ratings
  - Two observer scores
  - A self-rating

The same steps fit other makers. **A school cook who writes short plays could list uses for a ladle, rate her Top 2 and ask two drama club leaders to rate a one-page scene.** Her self-rating would go in its own column. Her rule sheet would come first, written before any task.

Your starting record, at three levels



The starter rates the Top 2 for novelty, then usefulness

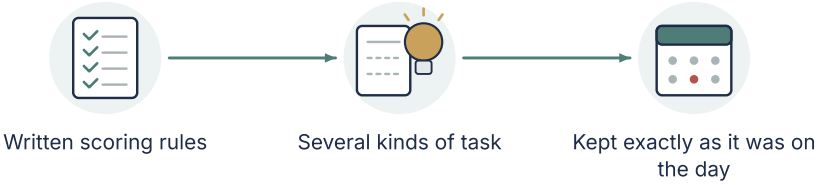
The middle has a finished piece rated by two observers

The advanced records a self-rating separately

> **Exercise:**
>
> Record a starting point.
>
> 1. Starter. **Rate each Top-2 idea for novelty, then usefulness.**
> 2. Middle. **Have one finished mini-product rated by two appropriate observers.**

3. Advanced. **Record a self-rating separately**, and never treat it as the divergent thinking score.

Record your starting point



Key idea:

Record your starting point with written scoring rules and several kinds of task, since divergent thinking tests are used as measures of creative potential, novelty mattered more than usefulness in one study, and self-ratings went only weakly with divergent thinking scores.

Quick check:

When does Tadeusz write his rule sheet? Answer: On Monday evening, before any task. Which does he rate first, novelty or usefulness? Answer: Novelty. Who rates his sixteen-bar tune? Answer: The parish organist and a retired music teacher. Where does his self-rating go? Answer: In its own column labelled “self”.

10.1.3 Building a Sustainable Weekly Routine Across the Four Books

Imagine Nkechi, thirty-five, a tyre fitter who is writing a crime novella set in a garage like hers. **She works through all four books in this series, and her practice happens whenever she remembers it.** Some weeks she writes three times, and some weeks not at all. She gives herself one week to build a routine she can keep.

Four books, no routine

> - She works through all four books in this series
> - Her practice happens whenever she remembers it

This section is about building a weekly routine that holds attention, memory, intellect and creative practice together. **I show you how to tie practice to a set moment, space it across the week and give it a specific weekly aim.** Nkechi tries the steps from Monday to Sunday, and three levels of practice you can try yourself close the section.



A woman in work overalls in a tyre bay at the end of a shift, a paperback notebook in her pocket.

The steps here borrow from habit, planning and memory research. One memory review stated, “This review found 839 assessments of distributed practice in 317 experiments located in 184 articles” (Cepeda et al., 2006). None of these studies tested a novella or a creative routine, so each finding shapes a step and promises nothing about Nkechi’s book.

On Monday evening Nkechi takes the first step. **She writes one if-then plan that names the book for the day**, “If I hang my overalls on the hook on Monday, then I open the Creativity book and do one drill.” She copies it onto a card and tapes it beside the hook.

One if-then plan

- [x] One if-then plan
- [x] It names the book for the day

> Exercise:
>
> Try it. **Write one if-then that names which of the four books** supplies today’s drill.

An if-then plan fixes the moment and the action before the day arrives. Planning research describes this kind of plan as one that spells out “the when, where, and how of goal striving in advance” (Gollwitzer & Sheeran, 2006). Nkechi’s card names the moment, the place and the book.

An if-then plan fixes two things



The moment



The action



Before the day arrives

Name a moment that already happens every day. Hanging up a coat, switching off the kettle or locking the back door all work. Keep the action small enough to start in under a minute, and name the book in the plan so there is nothing left to decide.

> Science Says:
>
> **A review of planning studies pooled the results of many tests.** It reported, "Findings from 94 independent tests showed that implementation intentions had a positive effect of medium-to-large magnitude" on goal attainment, with d = .65 (Gollwitzer & Sheeran, 2006). That pooled result comes from planning research in general, and Nkechi applies it to her routine as practice.

The pooled effect is an average, so Nkechi treats it as a reason to plan. Her card applies the same kind of plan to one small habit of her own. Whether it starts her writing is something her own week will show. She ticks the back of the card each time the plan starts a session.

Reading the pooled effect

- The pooled effect is an average
- A reason to plan

Tie one plan to each moment. Two plans on the same hook leave the card unclear about what comes first. If you want a second session in a day, give it a second moment of its own. Nkechi keeps one card and one hook for the whole week.

> **Key Concept:**
> Implementation intention. **An implementation intention is a plan written in the form "when this happens, I will do that".** A nurse who decides that when her shift ends she will walk the first mile home has an implementation intention.

Write the plan on a card and keep it where the moment happens. Read it once when you write it and once the first time the moment comes. If the plan fails to start you twice, change the moment and keep the action.

Keep the card where the moment happens

- [x] Write the plan on a card
- [x] Keep it where the moment happens

The same moment each time suits what habit research found. **Repeating a daily behaviour in a consistent context went with growing automaticity in one study** (Lally et al., 2010). That study followed eating, drinking and activity habits, so Nkechi borrows the idea of a steady cue and claims no timescale for her writing.

Repeating a daily behaviour



Still on Monday, Nkechi takes the starter step. **She places her creative block on Monday, Wednesday and Friday**, three weekdays with a day between each. Each block is forty minutes at the same moment, after the overalls go on the hook. Tuesday and Thursday stay free for the other books.

Her creative blocks



A Monday creative block



A Wednesday creative block



A Friday creative block

Spread your creative blocks with a gap between each one. Three blocks on non-consecutive days give each session a rest day after it. Write the days on the card under the if-then plan. Keep the length of each block the same for the whole week.

> Science Says:
>
> **The same memory review asked how the gap between study sessions relates to later recall.** It reported, “Analyses suggest that ISI and retention interval operate jointly to affect final-test retention; specifically, the ISI producing maximal retention increased as retention interval increased” (Cepeda et al., 2006). ISI means the gap between study sessions, and the retention interval is the time until the test.

Longer horizons went with longer best gaps in that review. A test soon after study suited a shorter gap than a test long after it. Nkechi wants her craft to hold for the whole novella, so she keeps a full day between blocks and leaves them spread out.

Spacing and the horizon

- Longer horizons, longer best gaps
- In that review

> **Key Concept:**
>
> Spaced practice. **Spaced practice is practice split into sessions with gaps between them.** A learner driver who takes lessons on Monday, Wednesday and Saturday has spaced practice.

For Nkechi the finding is a reason to spread her blocks. **The review studied recall of learned material**, so the spacing principle guides her timetable and claims nothing about her prose.

A review of recall

- The review studied recall of learned material
- Plan for a missed block from the start

Plan for a missed block from the start. In one study of health habits, "Missing one opportunity to perform the behaviour did not materially affect the habit formation process" (Lally et al., 2010). If a block is missed, the next one goes ahead at its usual moment with its usual length.

On Wednesday Nkechi takes the middle step. **She replaces "do my best" with a specific weekly deliverable, one finished scene of 800 words**, in which the mechanic finds the missing car's tyre in the scrap pile. She writes the target and the word count at the top of a fresh page before her block.

A specific weekly deliverable

Before	After
Do my best	One finished scene of 800 words

Make the weekly target something you can count and finish. Goal research tied specific, hard goals to better performance than being told to do your best (Locke & Latham, 2002). A scene of 800 words can be counted and finished, and "do my best" can mean anything on any evening.

Make the weekly target countable

- [x] Something you can count
- [x] Something you can finish

On Friday, in her third block, Nkechi finishes the scene at 812 words. **She has met her weekly target on the last of her three blocks.** She writes the count and the date at the bottom of the page. The next week's target goes at the top of the following page before she closes the notebook.

Her weekly target met

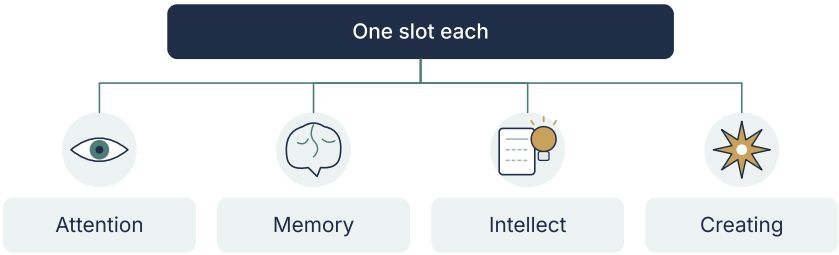
> - On the last of her three blocks
> - The next week's target written before the week ends

Write the next week's target before the week ends. A target written on Friday is ready when Monday's moment comes. Keep each weekly

deliverable about the same size for the first month, so the routine stays steady. Check the count each Friday and write it beside the date.

On Sunday Nkechi takes the advanced step. **She builds a four-book weekly grid, one slot each for attention, memory, intellect and creating.** Attention goes on Tuesday, memory on Thursday and intellect on Saturday. Her creative blocks keep Monday, Wednesday and Friday, and Sunday stays free.

A four-book weekly grid



Give each kind of practice a set length as well as a set day. On Nkechi's grid, attention, memory and intellect each take twenty minutes. Her creative blocks keep their forty minutes. She writes the if-then moment for each day in its square, so every session has a cue.

> Key Concept:
>
> Weekly grid. **A weekly grid is a one-page table that gives each kind of practice its own day and time.** A family that pins up a chart showing who cooks on each night of the week keeps a weekly grid.

Give each book its own row and each day its own column. Write the moment and the length of each session in its square. Leave at least

one day empty, so a missed session has somewhere to go without crowding the rest of the week.

Rows and columns

- [x] Each book its own row
- [x] Each day its own column

A routine that runs for weeks fits what one review found about course length. One review found that "Complex courses were the most effective training method", and such courses "usually lasted for several weeks" (Haase et al., 2025). Nkechi's grid is built to run for months, one week at a time.

A routine that runs for weeks

> - Practice at set moments
> - It fits what one review found about course length

By Sunday evening Nkechi has a card by the hook, three circled days, a finished scene and a grid. **Her practice now has a set moment, a set spread and a set target.** She pins the grid beside the calendar and fills in Monday's moment for the coming week.

The same steps fit other makers. **A night porter who paints miniatures could write an if-then tied to the end of his shift**, place three painting blocks on non-consecutive days and aim for one finished figure each week. His grid would hold the other books on the days between.

A weekly routine, at three levels



The starter writes one if-then that names a book

The middle spaces the blocks across the week

The advanced builds a four-book weekly grid

Exercise:

Build a weekly routine.

1. Starter. **Place the creative block on 3 non-consecutive weekdays.**
2. Middle. **Name one specific weekly deliverable** in place of "do my best".
3. Advanced. **Build a four-book weekly grid** with one slot each for attention, memory, intellect and creating.

Tie practice to a set moment



Key idea:

Tie practice to a set moment, spread it across the week and give it a specific weekly target, since if-then plans went with better goal attainment across many tests, and the best gap between sessions in memory research grew with the time until the test.

Three set things

- A set moment
- A set spread
- A set target

Quick check:

What does Nkechi's if-then plan name? Answer: The moment, the place and the book. Which days hold her creative blocks? Answer: Monday, Wednesday and Friday. What does ISI mean in the memory review? Answer: The gap between study sessions. How long is her weekly scene? Answer: 800 words.

10.2 The Creativity Training Program

10.2.1 How the Program Works

Imagine Odhran, forty-eight, a thatcher who makes corn dollies for the village harvest supper. **He has plenty of straw and plenty of ideas, and no plan for when or how to practise.** He plaits for a whole Saturday afternoon and then leaves the straw for weeks. He gives himself one week to see how a program works.

Plenty of straw, plenty of ideas

> - He has plenty of straw and plenty of ideas
> - No plan for when or how to practise

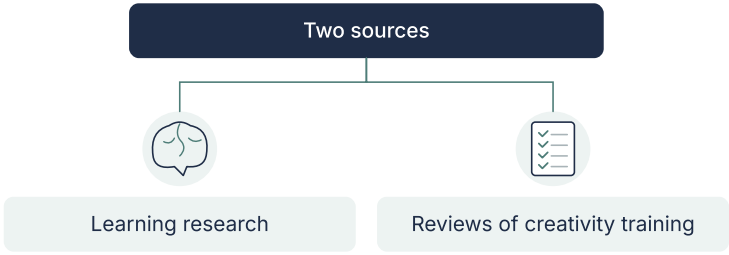
This section is about how the program in this module fits together. **I show you its three layers, why the sessions are spread out and why it mixes drills with real work from your field.** Odhran tries the steps from Monday to Friday, and three levels of practice you can try yourself close the section.



A man on a ladder against a half-thatched cottage roof, with bundles of straw on the ground below.

The program borrows from learning research and from reviews of creativity training. Two memory researchers wrote about "The term desirable difficulty, coined in 1994" (Bjork & Bjork, 2020), and that idea shapes how the sessions here are spaced. The daily, weekly and monthly layers are this book's design, so Odhran treats them as practice.

The program borrows from



On Monday evening Odhran takes the first step. **He sketches the program in three layers on one sheet.** The daily layer is ten minutes plaiting one new braid, and the weekly layer is one new dolly design by Sunday. The monthly layer is a set of twelve dollies for the supper tables in four weeks.

Three layers on one sheet



> Exercise:
>
> Try it. **Sketch the program as a daily micro-task**, a weekly challenge and a monthly project.

Make each layer serve the one above it. The daily braid feeds the weekly design, and each weekly design adds to the monthly set. Write the three layers in a column with the shortest at the top. Keep the daily task small enough to fit on the busiest day.

Make each layer serve the one above it

- Each layer serves the one above it
- A layered program is built to run for weeks

In one large review, “Complex courses were the most effective training method” (Haase et al., 2025). **A layered program is built to run for weeks**, so Odhran’s sheet covers a month and leaves room for the next one.

> Key Concept:
>
> Program layer. **A program layer is one level of a practice plan, set by its time span.** A runner’s plan with a daily stretch, a weekly long run and a monthly race has three program layers.

Give every layer a finish line you can see. The daily braid is finished when it holds its shape. The weekly design is finished when it stands on the table. The monthly set is finished when twelve dollies are ready for the supper.

A finish line you can see

- [x] The daily braid is finished
- [x] A time span for each layer

Odhran pins the sheet in the barn where he stores his straw. **Each layer now has a time span and a finish line**, and the next step is deciding when the longer sessions happen. Until now they happened on one Saturday afternoon, whenever the weather kept him off the roofs.

On Monday night Odhran takes the starter step. **He schedules two spaced sessions, on Tuesday and Friday evenings, in place of one long Saturday.** Each session is forty-five minutes of plaiting. The days between give him time away from the straw before he picks it up again.

Two spaced sessions

Before	After
One long Saturday	Tuesday evening Friday evening

Split your longer practice into two sessions with days between them. Choose two evenings that are at least two days apart. Keep the two sessions the same length. Write both on the sheet beside the weekly layer, so the week's plan sits in one place.

> Science Says:
>
> **Two memory researchers described what slower practice can do.** In Bjork and Bjork's account, quick gains during practice frequently do little for what is kept and carried over to new tasks later, while practice that adds challenges and slows visible progress frequently does the most for that later learning (Bjork & Bjork, 2020). They counted spreading practice out, set against bunching it, among the most dependable desirable difficulties.

The research behind that finding is about learning and memory. **Odhran borrows the spacing principle for his timetable and claims nothing about the dollies themselves.** A Saturday binge may feel productive while it lasts. Two spaced evenings may feel slower, and that is the trade the program makes.

The spacing principle

- Borrowed for his timetable
- Nothing claimed about the dollies themselves

Expect spaced practice to feel harder at the start. A second session that begins with fumbled plaits is part of the plan. Write one line after each session about what came back easily and what needed relearning, and leave the schedule as it is.

> **Key Concept:**
> Desirable difficulty. **A desirable difficulty is a hard part of practice built in on purpose because it helps learning last.** A language learner who tests herself on last week's words before looking at the list is using a desirable difficulty.

Spacing has a large evidence base, with 839 assessments of distributed practice in one review (Cepeda et al., 2006). **That review studied recall**, so Odhran keeps its lesson to the timetable. His Tuesday and Friday evenings go on the sheet in pencil.

Keep the gap between sessions about the same each week. Tuesday and Friday leave two clear days between them, and three days back to Tuesday. A steady pattern is easier to keep than a new one each week. Odhran copies the two evenings into next week's diary before Friday comes.

Keep the gap the same each week

- [x] Tuesday and Friday
- [x] About the same gap each week

On Wednesday Odhran takes the middle step. **He picks one realistic domain exercise and one skill heuristic for the same week.** The exercise is a five-straw spiral, the plait at the heart of most traditional dollies. The heuristic is to take a familiar shape and change one part of it.

One week, two kinds of practice

Domain exercise	Skill heuristic
One realistic domain exercise	One skill heuristic

Pair a real piece of work from your field with one thinking skill. Choose an exercise that people in your craft actually make. Choose one heuristic you can apply to it in the same week. Write both on the sheet, so each session has a task and a skill.

> Science Says:
>
> **A review of creativity training looked across many programmes.** It reported, "Based on 70 prior studies, it was found that well-designed creativity training programs typically induce gains in performance with these effects generalizing across criteria, settings, and target populations" (Scott et al., 2004).

The same review found that more successful programmes were likely to use "realistic exercises appropriate to the domain at hand" (Scott et al., 2004). **Odhran's spiral is the real craft, and the heuristic is the skill he practises inside it.** He will apply the heuristic to a familiar shape and build the result from the spiral.

The real craft and the skill

- Odhran's spiral is the real craft
- The heuristic is the skill he practises inside it

Practise the heuristic on its own before you use it on the real piece. Five minutes of quick sketches is enough. Try the change on

three familiar shapes, then pick the one worth plaiting. Keep the sketches with the sheet.

> **Key Concept:**
> Skill drill. **A skill drill is a short exercise that practises one thinking skill on its own.** A chess player who solves five two-move puzzles each morning is doing a skill drill.

On Wednesday evening Odhran does his skill drill with a pencil. **He changes one part of three familiar shapes**, a bell, a lantern and a horseshoe. The lantern with a looped top is the one he chooses for Friday.

A skill drill with a pencil

- [x] He changes one part of three familiar shapes
- [x] Before the real piece

Choose the real piece after the drill, using what the drill showed you. The drill is quick and rough, and the real piece takes longer. Picking the piece last keeps the heuristic in charge of the choice. Odhran saves the bell and the horseshoe for later weeks.

Choose the real piece after the drill

- [x] Drill first
- [x] Then choose the real piece

On Friday evening Odhran plaits the second spaced session. **He finishes a straw lantern with a looped top, plaited from the five-straw spiral, his weekly design**, two days ahead of Sunday. The

plait starts clumsily and settles after ten minutes. He stands the finished dolly on the barn shelf.

Friday evening



A straw lantern with a looped top



Plaited from the five-straw spiral



His weekly design

Later that evening Odhran takes the advanced step. **He writes one line on the sheet about the limits of practice**, “Practice matters, and it is not everything.” He writes it under the three layers, where he will see it each week.

The line comes from a large review of practice. **Practice explained only part of the differences in performance in one review** (Macnamara et al., 2014). Odhran keeps practising, and he keeps the line as a reminder that skill grows from more than hours.

The limits of practice

> - Practice explained only part of the differences in performance
> - In one review

Keep the limits line short and keep it where you plan. One sentence is enough. Read it when a week goes badly, so a slow week stays a slow week. Leave the plan as it is and start the next session at its set time.

By Friday night Odhran has a three-layer sheet, two spaced sessions done and one new dolly. **His practice now has a shape he can repeat**

each week. The supper set has eleven dollies to go, and three weeks left to make them.

The same steps fit other makers. **A bus driver who writes short songs could sketch three layers**, one verse line each day, one song each week and a set of four by the month's end. He would space two longer sessions and pair a real song with one skill.

How the program works, at three levels



The starter schedules two spaced sessions

The middle pairs a domain exercise with a skill drill

The advanced writes one line on the limits of practice

Exercise:

See how the program works.

1. Starter. **Schedule two spaced sessions this week** in place of one massed session.
2. Middle. **Pick one realistic domain exercise and one skill heuristic** for the same week.
3. Advanced. **Write one line saying practice matters** and Macnamara's limits show it is not everything.

The program stacks three layers



Key idea:

The program stacks daily, weekly and monthly layers, spaces its sessions and pairs real domain work with skill drills, since spacing is a reliable desirable difficulty in learning research and well-designed creativity training typically produced gains that carried across settings.

Quick check:

What are Odhran's three layers? Answer: A daily braid, a weekly design and a monthly set of twelve dollies. Which evenings hold his spaced sessions? Answer: Tuesday and Friday. What heuristic does he use? Answer: Take a familiar shape and change one part of it. What line does he write for the advanced step? Answer: Practice matters, and it is not everything.

10.2.2 Daily Creativity Workouts

Imagine Solveig, thirty-nine, a dental hygienist who is writing rhymes for a picture book about a hedgehog who loses his shoes. **She writes in bursts, a whole Sunday at a time, and then nothing for a fortnight.** The rhymes come slowly after each long gap. She gives herself two weeks to try a short daily workout instead.

Rhymes in bursts

> - A whole Sunday at a time
> - Then nothing for a fortnight

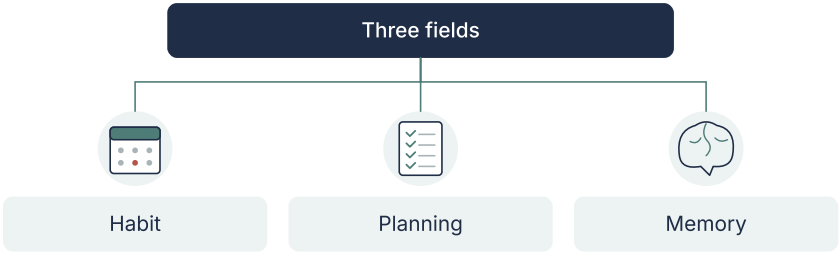
This section is about the program's daily layer, a short workout at one point each day. **I show you how to size the task, tie it to a cue, keep it short and restart after a missed day.** Solveig works through the steps over two weeks, and three levels of practice you can try yourself close the section.



A woman in a dental hygienist's tunic walking home along a terraced street after work, with a canvas bag over her shoulder.

The steps here borrow from habit, planning and memory research. None of those studies tested picture-book rhymes or a daily creative workout, and the ten-minute length and the task menu are this book's design. Treat these steps as practice. The choices about what to write and when belong to Solveig alone, page by page.

The steps here borrow from



On Monday evening Solveig takes the first step. **She does a ten-minute rhyme task at the moment she hangs her bag on the hall hook.** The task is four rhyming lines for the page where the hedgehog finds one shoe in a puddle. She sets a kitchen timer and writes standing at the hall shelf, still in her coat.

A ten-minute rhyme task

- Ten minutes of rhymes
- The moment she hangs her bag on the hall hook

> Exercise:
>
> Try it. **Do a 10-minute domain micro-task at the same cue today.**

Pick a daily task from the real work of your field. More successful training programmes in one review were likely to use "realistic exercises appropriate to the domain at hand" (Scott et al., 2004). For Solveig that means rhyming lines for her own hedgehog book. A general word game would sit further from the pages she wants to finish.

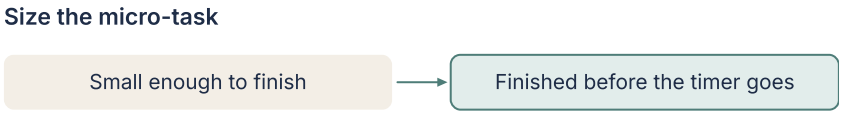
Pick a daily task

- [x] From the real work of your field
- [x] Small enough to finish in ten minutes

Tie the workout to a moment that already happens each day. Repeating a behaviour in a consistent context went with growing automaticity in one study (Lally et al., 2010), which followed eating, drinking and activity habits. Solveig borrows the steady cue and claims nothing about how long her own rhyming habit will take to form, or whether it will.

> **Key Concept:**
> Micro-task. **A micro-task is a piece of creative work small enough to finish in one short session.** A garden designer who sketches one corner of a new border during her morning tea break, and stops when the tea is gone, is doing a micro-task.

Size the micro-task so you can finish it before the timer goes. Four lines, one sketch or one short paragraph is about right for ten minutes. Write the next day's task on a slip of paper the evening before and leave it by the cue. Then the cue starts the work with nothing left to decide.



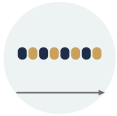
When the timer goes on Monday, Solveig has four lines. **Two of the rhymes work and two feel forced, and she stops at ten minutes anyway.** She underlines the forced pair for a later, longer bout. She

writes Tuesday's task on a slip, the hedgehog asking a heron for help, and leaves it on the shelf.

Monday: four lines



Two of the rhymes work



Two feel forced



She stops at ten minutes anyway

On Tuesday Solveig takes the starter step. **She puts an if-then card on her desk that reads "After I hang my bag on the hook, I open my notebook and start."** She props the card against a jar of pencils. That evening the card is the first thing she sees after the hook, and she starts within a minute.

An if-then card on her desk

> - After I hang my bag on the hook
> - I open my notebook

Write the card naming the cue first and the action second. Plans that set out the when and where in advance went with better goal attainment in one review (Gollwitzer & Sheeran, 2006). Keep the action to the first small move, such as opening the notebook. Put the card where you will see it straight after the cue.

Write the card

1. Name the cue first
2. Name the action second

> **Key Concept:**
>
> Daily workout. **A daily workout is a short practice session done at the same point in each day.** A trumpet player in a brass band who runs scales for ten minutes before breakfast every morning, at the same music stand, has a daily workout.

From Wednesday to Friday Solveig keeps each bout at ten minutes. **On Thursday the rhymes flow and she wants to keep going, and she stops when the timer goes.** She notes the line where she stopped, so Friday's bout can start there. By Friday she has drafted lines for five pages, one page for each of the five evening bouts.

On Thursday

- The rhymes flow
- She stops when the timer goes

Keep the daily bout short, even on good days. A short bout is easy to start again tomorrow. Set the timer every time, even when the lines are coming easily.

Keep the daily bout short

- [x] Stop when the timer goes
- [x] Even on good days

On Saturday morning Solveig takes the middle step. **She adds a second, spaced bout of thirty minutes after breakfast, to revise the week's lines.** She fixes one of the forced pairs from Monday by changing the puddle to a ditch. The other pair waits for next week.

Add one longer bout later in the week, days after the first try at the same lines. Learning researchers count spreading practice out, set against bunching it, among the most dependable desirable difficulties (Bjork & Bjork, 2020). Distributed practice has a large evidence base in studies of recall (Cepeda et al., 2006), so Solveig borrows the timetable idea only.

One longer bout later in the week

> - Thirty minutes after breakfast
> - Days after the first try at the same lines

By the end of the first week Solveig has five daily bouts and one longer Saturday bout. **She keeps a short practice record in the back of the notebook**, with the date, the minutes and the number of lines. The record is for counting practice and spotting missed cues, and she claims nothing else for it.

A short practice record

- [x] In the back of the notebook
- [x] A few lines for each day

Keep the record to three facts per day. Write the date, the minutes and what you made. Leave feelings and reflections out of it, so the

record stays quick to fill in. Check it each Saturday to see whether the bouts happened at the cue.

Three facts per day

- [x] The date
- [x] The minutes
- [x] The lines

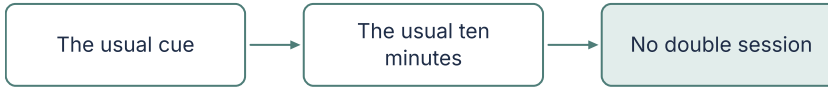
The second week runs the same way until Thursday. **That morning her son wakes with a fever, and Solveig spends the evening looking after him.** The bag goes on the hook late, and the bout does not happen. She leaves the notebook closed and puts the slip for Thursday's task back on the shelf for the next evening.

Thursday of the second week

> - Her son wakes with a fever
> - An evening looking after him

On Friday evening Solveig takes the advanced step. **She resumes at the usual cue, for the usual ten minutes, with no double session to make up Thursday.** In the habit study, "Missing one opportunity to perform the behaviour did not materially affect the habit formation process" (Lally et al., 2010). She writes Thursday's four lines and stops at the timer.

Back at the usual cue



> **Key Concept:**
> Restart rule. **A restart rule is a rule, set in advance, for how practice resumes after a missed session.** A swimming club that asks members to return at their usual lane time after a missed week, with no extra lengths and no extra sessions, has a restart rule.

Write your restart rule on the back of the if-then card before you need it. Solveig's reads "After a missed day, I start again at the hook, ten minutes, no extra." Keep the rule short enough to read in one glance, and write it while the routine is going well. Then a missed day has a plan waiting for it.

Write your restart rule

- [ ] On the back of the if-then card
- [ ] Before you need it

Treat a missed day as closed. A double session makes the next bout twice as long and harder to start. It also moves the work away from the cue and turns a missed day into a debt. Keeping the usual length at the usual moment protects the routine that the whole workout is built on.

By the second Friday Solveig has nine daily bouts and one Saturday bout in her record. **The hedgehog book now has draft rhymes for nine pages**, with one forced pair still underlined for Saturday. The bag goes on the hook each evening, and the notebook opens after it. Her Saturday bout is set for the next morning.

The same steps fit other makers. **A railway signaller who draws cartoons could do one ten-minute panel when he hangs up his jacket after a shift.** His if-then card would sit on the table by the door.

His restart rule would bring him back at the jacket hook after any missed day, for one panel and no more.

A daily workout, at three levels



The starter puts an if-then card on the desk

The middle adds one spaced longer bout

The advanced resumes at the next cue after a missed day

> **Exercise:**
>
> Build a daily creativity workout.
>
> 1. Starter. **Put an if-then card on the desk** (“After [cue], I open my tools and start”).
> 2. Middle. **Keep daily bouts short** and add a second spaced bout later in the week.
> 3. Advanced. **After a missed day, resume at the next cue** with no double session.

A short creative workout at the same cue



A ten-minute daily bout | One spaced longer bout | Restart at the usual cue

Key idea:

Do a short creative workout at the same cue each day, add one spaced longer bout and restart at the usual cue after a miss, since repetition in a consistent context went with growing automaticity in one study of health habits, and a single missed opportunity made no material difference to habit formation there.

Quick check:

What is Solveig's cue? Answer: Hanging her bag on the hall hook when she gets home from work each evening. How long is each daily bout? Answer: Ten minutes, set on a small kitchen timer at the hall shelf. When does she add a longer bout? Answer: On Saturday morning, for thirty minutes after breakfast. What does she do on the Friday after her son's illness keeps her from Thursday's bout? Answer: She resumes at the usual cue for the usual ten minutes, with no double session.

10.2.3 Weekly Challenges

Imagine Rashid, twenty-nine, a British Sign Language interpreter who writes comedy and wants to perform at an open mic night. **His jokes arrive on buses and in queues, and most of them never reach paper.** He means to sit down and write each week, and the week ends first. He gives himself three weeks to try a weekly challenge.

Jokes that never reach paper

> - His jokes arrive on buses and in queues
> - Most of them never reach paper

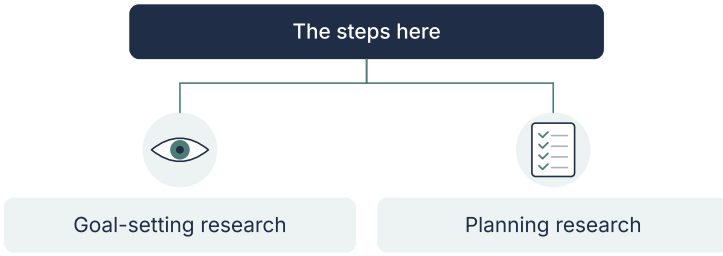
This section is about the weekly layer of the program, one challenge with a clear standard each week. **I show you how to set a countable standard, start it on a set evening, cap the attempts and handle a missed week.** Rashid tries the steps over three weeks, and three levels of practice you can try yourself close the section.



A man signing to a small audience at a community centre, with a notebook sticking out of his jacket pocket.

The steps here come from goal-setting and planning research. Those studies looked at goals and plans in general, and none tested comedy writing. The challenges themselves are this book's design, so each finding shapes a step and promises nothing about whether a joke gets a laugh. Rashid's own cards will show what each week produced.

Where the challenge steps come from



On Monday of the first week Rashid takes the first step. **He states one weekly challenge with a countable standard, ten new jokes about bus stops by Sunday.** He writes it on an index card and props it against the kettle. Ten is a number he can check on Sunday night.

One weekly challenge



> Exercise:
>
> Try it. **State one weekly challenge with a countable standard.**

Give the challenge a number and a finishing day. "Write some jokes" leaves the week open. "Ten jokes about bus stops by Sunday" can

be checked with a glance at the page. Pick one theme for the week, so every attempt points the same way and the week has a single subject.

A number and a finishing day

- [x] Give the challenge a number
- [x] Give it a finishing day

In goal research, specific, hard goals were tied to better performance than being told to do your best (Locke & Latham, 2002). **A goal also points attention at the work that serves it**, and away from the rest (Locke & Latham, 2002). Rashid's bus stop theme keeps his week's attention on one subject.

> **Key Concept:**
> Weekly challenge. **A weekly challenge is one creative task with a countable standard to be met within seven days.** An art student who sets out to fill eight pages with figure sketches by Friday has a weekly challenge.

Set the number a notch above what feels comfortable. Look at what you managed in a recent week and add a little. If you have no recent week to go by, start with a number you could reach on a tired evening and raise it the following week.

A stretch he can meet

Week	Jokes
His best week	Five
This challenge	Ten

Rashid checks his notebook from last month. **He wrote five jokes in his best week, so ten is a stretch.** He thinks it is a stretch he can reach in two evenings. He keeps the card at ten and writes “two evenings” underneath it, in smaller letters.

Check that the challenge is hard and still within reach. Ask whether you have the skill to meet it if the week goes well. Ask whether you will still want it on Thursday. If either answer is no, lower the number before the week starts, and write the new number on the card.

Check the challenge twice

- [x] Hard enough to stretch you
- [x] Still within reach

Rashid puts both questions to his own week. **He has the skill to write ten short jokes, and he still wants the challenge when he pictures Thursday.** Both answers are yes, so the card stays at ten. He keeps the card by the kettle, where he sees it every morning.

Two conditions

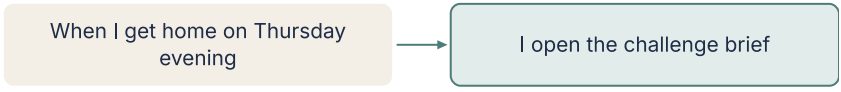
> - He has the skill
> - He still wants the challenge

> Science Says:
>
> **Goal research also looked at what happens as goals get harder.** One review reported that "the highest or most difficult goals produced the highest levels of effort and performance" (Locke & Latham, 2002). It added, "Performance leveled off or decreased only when the limits of ability were reached or when commitment to a highly difficult goal lapsed" (Locke & Latham, 2002).

Those two conditions shape Rashid's number. If either condition changes, the review gives him a reason to lower the number for the next week. He writes both conditions in small letters on the card.

Still on Monday, Rashid takes the starter step. **He adds an if-then plan, "When I get home on Thursday evening, I open the challenge brief."** Thursday is his only evening with no interpreting booking. He writes the plan on the back of the card, under the standard.

An if-then plan



Tie the challenge to one weekday evening you can protect. Plans that set out when and where in advance went with better goal attainment in planning research (Gollwitzer & Sheeran, 2006). Name the evening, name the first action and put the plan where you will see it on that evening.

Protect one weekday evening

- [x] One weekday evening you can protect
- [x] Tie the challenge to it

On Thursday evening Rashid takes the middle step. **He writes a brief that allows ten attempts and stops when the count is done.** Each attempt is one joke, written in a few minutes and left as it is. At the tenth attempt he stops, even though an eleventh idea about a bus timetable arrives.

Ten attempts

> - The brief allows ten attempts
> - It stops when the count is done

> **Key Concept:**
> Attempt count. **An attempt count is the number of tries a session allows before it stops.** A darts player who throws fifty practice darts at double top and then puts the board away is using an attempt count.

Stop at the count, even when the ideas keep coming. Write any extra idea in one line at the bottom of the page for next week. Stopping on time keeps the session short enough to repeat. It also leaves you with something ready to start the next challenge, written in your own words.

The count is the limit

- [x] Stop at the count
- [x] Even when the ideas keep coming

Learning goals that set a number of strategies to discover helped on new, complex tasks in goal research (Locke & Latham, 2002). **Rashid is new to writing for the stage, so his count is a count of tries**, and the polish can come in a later week. He keeps every attempt, good or weak, on the same page.

By Sunday of the first week Rashid has ten jokes about bus stops. **He has met the standard on the card, and three of the ten make his flatmate laugh.** He marks those three with a star. The eleventh idea is waiting at the bottom of the page for the second week.

After the first week

- Ten jokes meet the standard on the card
- Three of them make his flatmate laugh

Write the brief on one card, using the same parts every week. Keep each part to a few words. Use the same layout every week, so you can read a new brief in seconds. File each finished card behind the last one, so the weeks stay in order.

The same parts every week



> 🗝 **Key Concept:**
>
> Challenge brief. **A challenge brief is a short written card that sets out a week's task, its standard, its attempt count and when it starts.** A primary teacher who hands each group a card saying what to build, from what and by when has given a challenge brief.

In the second week Rashid takes the advanced step. **He sets a domain-real challenge, a five-minute set at the open mic night on Thursday.** Training programmes that did better in one review were likely to use "realistic exercises appropriate to the domain at hand" (Scott et al., 2004). A set on a real stage is the work itself.

A domain-real challenge

> - A five-minute set
> - At the open mic night on Thursday

On Tuesday an agency calls to book him for a two-day conference in Leeds, covering Thursday. **He takes the booking and misses the open mic night.** He has the three starred jokes and a rough running order, and no stage to try them on that week. The conference runs late both evenings.

On Friday Rashid finishes the advanced step. **He schedules only the next week's cue, Thursday evening at the open mic, and adds nothing to the weekend.** In a study of health habits, a single missed opportunity made no material difference to habit formation (Lally et al., 2010). The five-minute set moves to the third week as it was.

Schedule only the next cue

- [x] Thursday evening at the open mic
- [x] Nothing added to the weekend

Treat a missed week as finished business. Write the new date on the card and keep the same task. Avoid stacking two challenges into one week to catch up. One missed week stays one missed week, and the routine carries on at the next cue.

Treat a missed week as finished business

Before	After
A missed open mic night	The next Thursday on the card

By the end of the second week Rashid has one finished challenge, one missed one and one cue set for week three. **His cards are filed in order**, and each shows its standard and its result.

The same steps fit other makers. **A care home cook who draws comic strips could set eight panels about the dinner rush by Sunday.** Her if-then would name her day off. Her brief would allow eight attempts and stop at eight, and a missed week would move only the next cue.

Weekly challenges, at three levels



The starter states one challenge with a countable standard

The middle adds a set evening and an attempt count

The advanced sets a domain-real challenge

Exercise:

Set a weekly challenge.

1. Starter. **Add an if-then** ("When [weekday evening], I open the challenge brief").
2. Middle. **Write a brief with a count of attempts allowed**, and stop when the count is done.
3. Advanced. **Set a domain-real challenge**, and if you miss it, schedule only the next week's cue.



Key idea:

Give each week one challenge with a countable standard, a set evening, an attempt count and a plan for a missed week, since harder goals went with more effort and performance until the limits of ability were reached or commitment lapsed.

Quick check:

What is Rashid's first weekly standard? Answer: Ten new jokes about bus stops by Sunday. Which evening does his if-then name? Answer: Thursday evening. What does he do when an eleventh idea arrives? Answer: He stops at ten and writes it at the bottom of the page. What does he schedule after the missed set? Answer: Only the next week's cue.

10.2.4 Monthly Projects

Imagine Carys, fifty-two, a bookbinder who wants to make a concertina book of the old painted shop fronts in her town. **She has forty sketches of shop signs and no finished book to show for them.** Each new sketch leads to another, and the binding never starts. She gives herself four weeks to turn the sketches into one finished project.

Forty sketches, no finished book

> - Forty sketches of shop signs
> - No finished book to show for them

This section is about the monthly layer of the program, one finished project over about four weeks. **I show you how to define the product, map strategies first, apply one heuristic to a real draft and have the result rated.** Carys works through the steps over four weeks, and three levels of practice you can try yourself close the section.

The steps here borrow from goal-setting research, studies of creativity training and work on rating creative products. None of that research tested a concertina book or a monthly project, and the four-week brief is this book's design. Treat these steps as practice. The choices about the book belong to Carys, from the first sketch to the last stitch.

Three research sources



On the first Monday Carys takes the first step. **She defines a four-week product, a concertina book of twelve painted shop fronts, bound and finished by the last Saturday.** She adds one

observer review at the end, by the curator of the town museum. She writes both on a card and tucks it into her bench drawer.

A four-week product



A concertina book



Twelve painted shop fronts



Bound and finished by the last Saturday

> Exercise:
>
> Try it. **Define a 4-week product with one observer review at the end.**

Define the product so you can tell on the last day whether it exists. Name the object, the number of parts and the date. “A concertina book of twelve shop fronts by the last Saturday” passes that test. “Something with my sketches” leaves the month open, with no day on which the work is done.

A product you can check

- [x] On the last day
- [x] You can tell whether it exists

In one review, “Complex courses were the most effective training method”, and they “usually lasted for several weeks” (Haase et al., 2025). **A monthly project gives the program that kind of length**, with one piece of work carried from start to finish. Goal research tied specific, hard goals to better performance (Locke & Latham, 2002), so Carys names hers exactly.

> Key Concept:
> Monthly project. **A monthly project is one finished piece of work planned to be completed over about four weeks.** A village woodwork evening class that spends four Tuesdays building one small stool for each student to take home is running a monthly project.

Book the observer at the start of the month. Ask someone who knows the field and played no part in the making. Tell them the date and what they will see. A review that is booked in advance gives the month a fixed end, and the last week a clear purpose.

That week Carys calls in at the town museum on her lunch break. **The curator agrees to look at the finished book on the last Saturday afternoon of the month.** Carys writes the time on her card. Now the project has a product, a date and a reader waiting for it at the end of the month.

The review is booked

- The curator agrees to look at the finished book
- On the last Saturday afternoon of the month

In the first week Carys takes the starter step. **She sets a learning goal to map five binding strategies before locking a plan.** She folds five small dummies from scrap paper. One is a single long fold, one is glued sections, one uses tabbed joins, one has wrapped hard covers and one closes with a ribbon tie.

Map before you lock a plan

- A learning goal to map five binding strategies
- Before locking a plan

Map the strategies side by side before you choose one. Learning goals that set a number of strategies to discover helped on new, complex tasks in goal research (Locke & Latham, 2002). Make each strategy small and quick, so the map takes days and the real work keeps its weeks. Label each one in a few words.

> **Key Concept:**
> Strategy map. **A strategy map is a set of small trial versions, one for each way of making a piece, kept together for comparison before one is chosen.** A home cake maker who sketches five ways to stack the tiers of a wedding cake on one sheet before choosing one has made a strategy map.

On the first Saturday Carys lays the five dummies along her bench. **The glued sections hold the long strip flattest, and the ribbon tie keeps it closed in a bag.** She chooses those two together. She writes the choice on the card under the product line and puts the other three in a box.

What the strategy map showed

Strategy	What it does
Glued sections	Hold the long strip flattest
Ribbon tie	Keeps it closed in a bag

Choose from the map with the finished product in mind. Ask which strategy best serves the object you defined on the first day of the month. Keep the dummies you did not choose in a labelled box, since a later project may need one of them. Write the reason for your choice on the card in one line.

Choosing from the map

> - Choose from the map
> - With the finished product in mind

In the second and third weeks Carys takes the middle step. **She applies one Module 4 heuristic, eliminate (4.3.3), to a real draft of the book.** She binds a first draft of all twelve panels and then asks what each part could lose. She removes the printed shop names under each panel, so the painted signs carry their own words.

One heuristic on a real draft

- [x] Eliminate, from Module 4
- [x] Applied to a real draft of the book

Apply the heuristic to the real draft, and keep it to one heuristic for the month. More successful programmes in one review were likely to focus on “the heuristics involved in skill application” (Scott et al., 2004). A bound draft is the real work. Use the same heuristic on each part of it, one part at a time.

One heuristic for the month

- [x] Apply it to the real draft
- [x] Keep it to one

By the end of the third week the draft has lost its labels and a heavy border on each panel. **The strip reads as one street now, panel after panel.** Carys trims two panels that crowded their neighbours. She has six days left and twelve panels ready for the final binding, with the ribbon tie still to fit.

One street

> - The strip reads as one street now
> - Panel after panel

Write down each change the heuristic made. One line per change is enough, with the date and the part. The list shows you later what the heuristic did to the piece. It also gives the observer something to read if they ask how the piece came about.

Write down each change

1. One change the heuristic made
2. One dated line in pencil

In the fourth week, with the binding done, Carys takes the advanced step. **She scores three final cover ideas for novelty first, then usefulness.** A plain cloth cover gets two for novelty and five for

usefulness, and a painted shop-front cover gets three and four. A folded paper awning gets five and three, so she chooses the awning.

Score three final cover ideas



Rate every final idea on the same scale, novelty first. Usefulness added to creativity mainly among novel ideas in one study (Diedrich et al., 2015). Write the novelty number before you think about use, then rate usefulness on its own line. Choose the idea that stays novel and still does its job well enough for the piece.

> **Key Concept:**
> Review booking. **A review booking is a date and time fixed at the start of a project for an observer to rate the finished piece.** A school drama group that books the head teacher for its last rehearsal on the first day of term has made a review booking.

On the last Saturday the curator turns the book page by page. **She rates it four out of five and says the awning cover made her smile.** Carys writes the rating on the card. The curator is one appropriate observer (Amabile, 1982; Hennessey, 1994), and Carys files her score with the rest of the project.

The curator rates it

- Four out of five
- The awning cover made her smile

Treat one rating as one view of the piece. A month of hours made the book, and many other things shaped how it turned out. Keep the rating with the card, and let it inform the next project without deciding it.

Five lines on one card

- **The whole project**
  - The product
  - The strategy map
  - One heuristic
  - The review booking
  - The rating

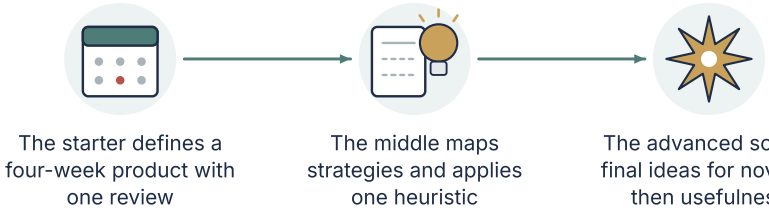


An older woman in a museum cardigan turning the pages of a concertina book with an awning-shaped paper cover, in a quiet museum office.

By the end of the month Carys has one finished book, a strategy map, a list of changes and an outside rating. **Her card now holds the whole project in five lines.** She files it in the bench drawer with the strategy map. The forty sketches are still in their folder, and the next month's project can start from them.

The same steps fit other makers. **A dairy farmer who writes songs could define a four-week product of three finished songs** and map five structures in the first week. Then he would apply one heuristic to the real drafts and ask the leader of the local folk club for an outside rating on the last Saturday.

A monthly project, at three levels



> Exercise:
>
> Run one monthly creative project.
>
> 1. Starter. **In week 1, set a learning goal to map 5 strategies** before locking a plan.
> 2. Middle. **Apply one Module 4 heuristic** to a domain-real draft.
> 3. Advanced. **Score final ideas for novelty, then usefulness**, and get one outside rating.

Run one four-week project



Key idea:

Run one four-week project with a defined product, a strategy map, one heuristic on the real draft and an outside rating at the end, since the multi-week complex courses in one review showed the largest training effects, learning goals helped on new, complex tasks, and usefulness added to creativity mainly among novel ideas.

Quick check:

What is Carys's four-week product? Answer: A concertina book of twelve painted shop fronts, bound by the last Saturday. How many binding strategies does she map in the first week of the month? Answer: Five, each folded as a small paper dummy. Which heuristic does she apply to the draft? Answer: Eliminate, from Module 4, which removes the printed shop names under each panel. Who gives the outside rating? Answer: The curator of the town museum, on the last Saturday afternoon of the month.

10.2.5 Your First Twelve Weeks of Rising Difficulty

Imagine Augustin, seventy, a retired lift engineer who builds wooden marble runs for his grandchildren in his garden shed. **His first designs were too ambitious, and two of them never ran a marble from top to bottom.** The unfinished pieces lean against the shed wall. He gives himself twelve weeks to build up difficulty one step at a time.

Too ambitious

> - His first designs were too ambitious
> - Two of them never ran a marble from top to bottom

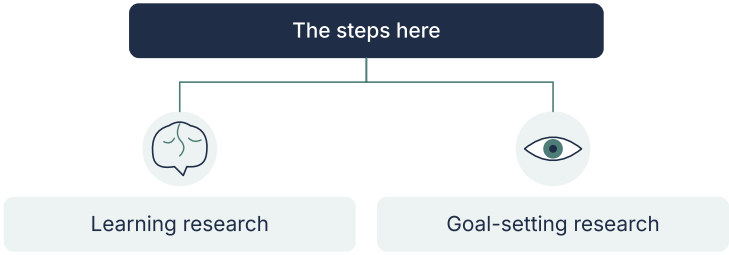
This section is about the program's first twelve weeks of rising difficulty. **I show you how to start with an easy win, add one solvable constraint, space the sessions and raise the challenge only while commitment holds.** Augustin works through the steps over twelve weeks, and three levels of practice you can try yourself close the section.



A man in his seventies in a garden shed, holding a marble at the top of a simple wooden ramp.

The steps here borrow from learning research and from goal-setting research. That research studied memory, learning and work goals, and none of it tested marble runs. The twelve-week ladder is this book's design, so each finding shapes a step and promises nothing about whether a run will work first time.

Learning and goal research



In the first week Augustin takes the first step. **He builds an easy win, a straight ramp with three drops that a marble rolls down in one go.** It takes him one Tuesday morning. In the second week he adds one constraint that still feels solvable, a run that keeps the marble moving for at least ten seconds.

An easy win



> Exercise:
>
> Try it. **Week 1 an easy win; week 2 add one constraint** that still feels solvable.

Start with a task you are confident of finishing. The easy win shows that the tools, the space and the time all work. Then add one constraint, and only one. Ask whether you can picture a way to meet it before you start, and pick a gentler one if you cannot.

Start with an easy win

- [x] A task you are confident of finishing
- [x] One you can finish in one session

Augustin can picture the ten-second run before he cuts a single piece. **He adds two switchbacks to slow the marble, a fix he has seen in his grandchildren's toys.** The run takes two sessions, and on Friday the marble rolls for twelve seconds. The constraint was hard enough to make him think and close enough to finish.

One solvable constraint

> - Two switchbacks
> - To slow the marble

> Science Says:
>
> **Learning research draws a line between difficulties that help and difficulties that block.** Bjork and Bjork wrote of such challenges, "If, however, the learner does not have the background knowledge or skills to respond to them successfully, they become undesirable difficulties" (Bjork & Bjork, 2020). Their work comes from learning and memory, and the line it draws shapes how Augustin's steps rise.

A difficulty helps only while you can meet it. Augustin's two early failures were runs he had no way to finish with the skills he had then. A rising ladder keeps each new step within reach of the last. He writes "can I picture a way?" on the shed door.

Two kinds of difficulty

Helps	Blocks
⊕ You can meet it	⊖ You cannot meet it yet

Check each new step against what you can already do. If the step needs a skill you have never tried, split it into two smaller steps. If it needs nothing new at all, it is a repeat, so add one small change. Write the step down before the session begins.

> Key Concept:
>
> Easy win. **An easy win is a first task chosen so that it can be completed in one session.** A new allotment holder who sows radishes in the first week, because they come up quickly, is choosing an easy win.

The easy win and the ten-second run sit on the shed shelf. **Both of them work, which is more than the two pieces against the wall can say.** Augustin labels them “week 1” and “week 2”. He keeps them in sight as the steps get harder.

Two finished pieces

- Both of them work
- More than the two pieces against the wall can say

Label each finished piece with its week and keep it in sight. The row of working pieces shows how far the ladder has come. When a later step goes badly, look back along the shelf to the last one that worked. Start the next session from there.

Label each finished piece

- [x] With its week
- [x] Keep it in sight

At the end of week 1 Augustin takes the starter step. **He plots twelve weeks of sessions on a wall chart, Tuesday and Friday mornings, twenty-four sessions in all.** No week has more than two sessions. The chart leaves no room for a binge weekend when the grandchildren visit.

Twelve weeks on a wall chart

- Tuesday and Friday mornings
- Twenty-four sessions in all

Plot every session for the twelve weeks before you start the third week. Pick two days with at least two days between them. Give each session the same length. Learning researchers count spreading practice out, set against bunching it, among the most dependable desirable difficulties (Bjork & Bjork, 2020), so the chart spreads the work out.

> Key Concept:
>
> Difficulty ladder. **A difficulty ladder is a dated plan that fixes in advance the weeks when a mastery step may be taken, with holds allowed between them.** A choir that pencils one harder anthem into its calendar every other month, and can skip a month, has a difficulty ladder.

The best gap between study sessions grew with the time until the test in one memory review (Cepeda et al., 2006). **Augustin wants his skills to last beyond twelve weeks**, so he keeps the gap steady and never squeezes extra sessions into a week. The chart goes on the shed wall above the bench.

Cross off each session on the chart as you finish it. A crossed box shows the session happened. An empty box shows a gap you can see at once. Leave missed boxes empty and carry on at the next session.

Cross off each session

- [x] As you finish it
- [x] On the wall chart

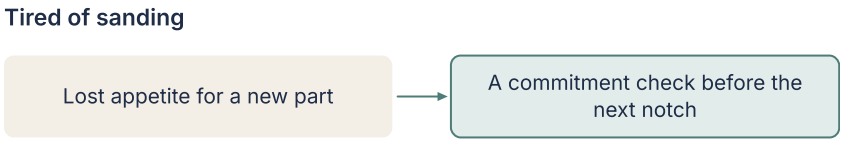
In week 3 Augustin takes the middle step. **Every two weeks he raises the goal one notch, if his commitment holds.** Week 3 adds a corner where the marble changes direction, and week 5 adds a gate that drops

the marble onto a second track. Each notch is one new part, built on the run before.



Raise difficulty one notch at a time, every two weeks. The first week of each pair builds the new part. The second week makes it run reliably. Harder goals went with more effort and performance in goal research until ability or commitment ran out (Locke & Latham, 2002).

At the start of week 7 Augustin makes his commitment check. **He finds he is tired of sanding and has lost some of his appetite for a new part.** So he keeps the same level for weeks 7 and 8 and polishes the gate. In week 9 his appetite is back, and he adds a seesaw switch.



Make the check at the start of each week a notch is due. Before you touch the task, write the date on the card and a yes or no for whether your appetite for the next part has held. If it is yes, raise the notch. If it is no, hold the level for two more weeks and ask again.

> **Key Concept:**
> Commitment check. **A commitment check is a short question asked before raising difficulty, about whether you still want the goal.** A runner who asks herself each Sunday whether she still wants the autumn race before adding a mile is making a commitment check.

From week 8 to week 10 Augustin takes the advanced step. **The sessions still take effort to start, and he keeps the Tuesday and Friday cue anyway.** He walks to the shed after his morning tea, as he has for eight weeks. The habit feels unfinished, and he carries on.

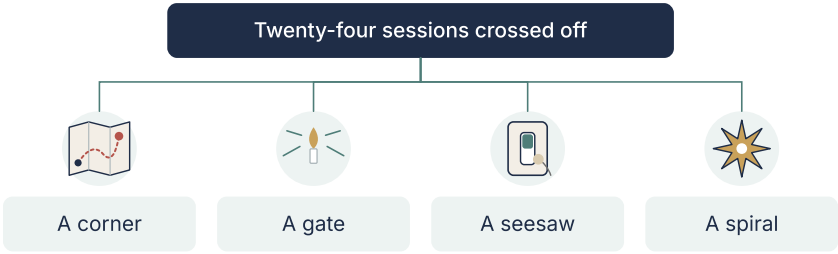
Keep the cue anyway

- The sessions still take effort to start
- He keeps the Tuesday and Friday cue anyway

Keep the cue even when the habit still feels unfinished. In one study of health habits, the time people took to reach a plateau varied widely from person to person (Lally et al., 2010). Eight weeks may be early for you. Keep the same cue and the same days, and let the chart do the counting.

In week 11 Augustin raises the last notch, a spiral around a broom handle. **By the end of week 12 he has crossed off twenty-four sessions and built one run with a corner, a gate, a seesaw and a spiral.** The marble takes twenty-two seconds to reach the bottom. His grandchildren time it with a kitchen timer.

By the end of week 12



One large review found that “on average, creativity can be enhanced”, and that “Complex courses were the most effective training method” (Haase et al., 2025). **Augustin’s twelve weeks are his own course**, and the shelf of runs is his record of it.

At the end of the twelve weeks, choose the next ladder from the chart. Look at which notches went smoothly and which needed a hold. Start the next ladder one step above the last notch you finished. Keep the same days if they worked.

The same steps fit other makers. **A retired bus mechanic who carves love spoons could start with a plain spoon** and then add one solvable constraint, a single twist in the handle. He would plot twenty-four sessions, raise one notch every two weeks and keep his cue through weeks 8 to 10.

An easy win, at three levels

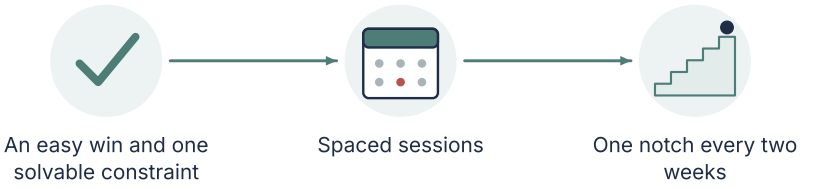


Exercise:

Plan twelve weeks of rising difficulty.

1. Starter. **Plot 12 weeks of spaced sessions** with no single binge week.
2. Middle. **Every 2 weeks, raise goal difficulty one notch** if commitment holds.
3. Advanced. **In weeks 8 to 10, keep the cue** even if the habit still feels unfinished.

Twelve weeks of rising difficulty



Key idea:

Start with an easy win, add one solvable constraint, space the sessions and raise one notch every two weeks while commitment holds, since difficulties became undesirable in learning research when the learner lacked the knowledge or skills to respond to them, and harder goals helped until ability or commitment ran out.

Quick check:

What is Augustin's week 2 constraint? Answer: A run that keeps the marble moving for at least ten seconds. How many sessions does his chart hold? Answer: Twenty-four, on Tuesday and Friday mornings. What does he do at his week 7 commitment check? Answer: He holds the same level for weeks 7 and 8. When does a difficulty become undesirable, in Bjork and Bjork's words? Answer: When "the learner does not have the background knowledge or skills to respond to them successfully".

10.2.6 Adapting the Program When Life Changes

Imagine Priyanka, thirty-one, a junior architect who writes short radio plays on the train home from work. **Her routine worked for months, and then her daughter was born on the Tuesday of the first week.** The train, the station café and the forty-minute sessions have all gone. She gives herself two weeks to adapt the program to her new days.

A routine that worked for months

> - Her routine worked for months
> - Then her daughter was born

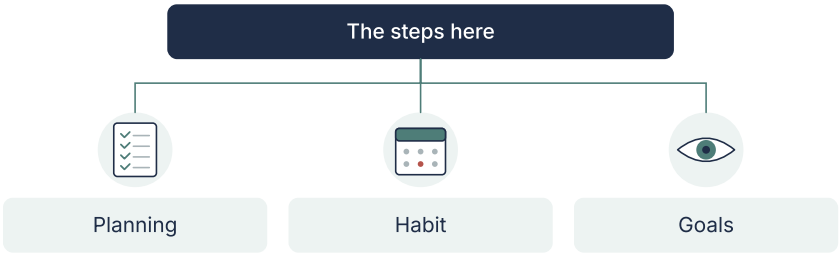
This section is about adapting the program when life changes. **I show you how to rewrite a plan for a new schedule, shrink the bout, swap a hard goal for a learning goal and lighten the load under strain.** Priyanka tries the steps over two weeks, and three levels of practice you can try yourself close the section.



A woman holding a newborn in a sling, with a script notebook and a pencil on the arm of a sofa beside her.

The steps here borrow from planning, habit and goal research. None of those studies looked at new parents or radio plays, and the adapted week is this book's design. If a life change brings illness, trauma or severe distress, a qualified clinician comes first, and creative training is optional.

Planning, habit and goal research



On the Saturday of the first week Priyanka takes the first step. **She rewrites her if-then plan for the new schedule, "When the baby goes down for her first afternoon nap, I open my script notebook."** The old plan named a train that she no longer catches. The new one names a moment that happens every day.

A new cue



> Exercise:
>
> Try it. **Rewrite one if-then for the new schedule** this week.

Find the new moment that comes every day, and tie the plan to it. Look at the changed day and pick the most regular thing in it. Keep

the action as small as it was, the first move only. Cross out the old plan on the card so the new one stands alone.

Find the new daily moment

- [x] One that comes every day
- [x] Tie the plan to it

Priyanka writes the new plan on a fresh card and props it on the bookshelf by the sofa. **Her old card goes in the back of the notebook with a line through it.** The first nap comes at about two o'clock most days. That is regular enough to hang a plan on.

The old card

> - In the back of the notebook
> - With a line through it

> Science Says:
>
> **A review of planning studies found that if-then plans served several purposes.** It reported that "Implementation intentions were effective in promoting the initiation of goal striving, the shielding of ongoing goal pursuit from unwanted influences, disengagement from failing courses of action, and conservation of capability for future goal striving" (Gollwitzer & Sheeran, 2006).

Two of those purposes fit a changed life. Letting go of a plan that no longer works is one, and saving effort for later is the other. Priyanka's rewrite drops the train plan and keeps her energy for the moments she

still has. The review studied goals in general, so she treats this as practice.

What if-then plans can do

- Two purposes fit a changed life
- From a review of planning studies

Rewrite the plan as soon as the old moment disappears. A plan tied to a moment that has gone will fail every day. Write the new one the same week, before the routine fades. Read it once when the moment first comes, and tick the card when the plan starts a session.

> **Key Concept:**
> Schedule rewrite. **A schedule rewrite is a new version of a practice plan made to fit a changed daily life.** A shift worker who moves his gym sessions from evenings to mornings when his rota changes has made a schedule rewrite.

On the Sunday Priyanka takes the starter step. **She cuts her session from forty minutes to a ten-minute bout and keeps the nap cue.** Ten minutes fits inside even a short nap. When the baby sleeps at two, she writes one exchange between two characters and stops at ten minutes.

A smaller bout

When	Session
Before	Forty minutes
Now	Ten minutes

Shrink the bout and keep the cue. Pick a length you could manage on your worst day. Keep it at the same moment every day, even when it feels too small to matter. In one study of health habits, “Performing the behaviour more consistently was associated with better model fit” (Lally et al., 2010).

A small bout at a steady moment keeps the routine alive. Priyanka’s ten minutes are a quarter of her old sessions. The cue is new and the habit of opening the notebook is the same. Her plays can wait for longer sessions in the months ahead.

Why a small bout counts

> - A small bout at a steady moment
> - Keeps the routine alive

Count the small bouts as real practice. Mark each one on the card with a tick, the same as a long session. A row of ticks shows the routine is still running. If ten minutes is too long on a given day, five minutes at the same cue still earns the tick.

> Key Concept:
>
> Minimum bout. **A minimum bout is the shortest session that still counts as practice, kept for times when life leaves little room.** A cellist who plays one slow scale on nights when she gets home late is keeping a minimum bout.

Still on the Sunday, Priyanka takes the middle step. **She replaces a hard performance goal, a finished thirty-minute play by the end of the month, with a learning goal for seven days.** The learning goal is to discover three ways to open a scene using sound alone. She writes it on the card under the plan.

Swap the hard goal

- A finished thirty-minute play by the end of the month
- A learning goal

Swap the hard goal for a learning goal when the task feels newly complex. Learning goals that set a number of strategies to discover helped on complex tasks in goal research (Locke & Latham, 2002). Keep the number small and the week short. Return to the performance goal when the week is over and the days feel steadier.

When the task feels newly complex

- [x] Swap the hard goal
- [x] Choose a learning goal

From Monday to Wednesday of the second week Priyanka keeps her ten-minute bouts at the nap. **She finds two ways to open a scene**

with sound, a kettle that clicks off in an empty kitchen and rain heard through a letterbox. She writes each one as a few lines of script.

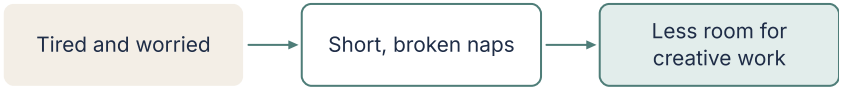
Record each strategy as you discover it, with the date. A learning goal is met by the count, so the record is what tells you when you are done. Write one line per strategy and a few words of script to show it works. Stop looking once the number is reached.

Record each strategy

- [x] As you discover it
- [x] With the date

On Wednesday night the baby develops a cold and a temperature, and on Thursday the GP checks her over. **Priyanka is tired and worried, and the naps are short and broken.** The ten-minute bout no longer fits. She looks at the card and decides how much creative work the week can hold.

Strain changes what a week can hold



Strain changes what a week can hold. Priyanka decides to adjust the load and keeps the cue as it is. She will reopen the full bout when the hard days pass.

On Thursday Priyanka takes the advanced step. **She shortens the creative load to one five-minute bout a day, at the same nap.** On Thursday and Friday she reads back one page of the sound openings and adds a single line. The cue and the notebook stay the same.

Lighten the load



Lighten the load when strain is high, and reopen it when the strain eases. Cut the length of the bout, and keep the cue and the notebook. Write the date you lightened it on the card. When the hard days pass, return to the earlier length at the same moment.

> **Key Concept:**
>
> Creative load. **Creative load is the amount of creative work planned for a given week.** A choir director who plans two new pieces for a quiet month and one for a busy month is adjusting the creative load.

On Saturday the baby is better and sleeps for an hour after lunch. **Priyanka reopens the full ten-minute bout and finds her third way to open a scene**, a radio left on in a car park. Her seven-day learning goal is met on its last day. She ticks the card and writes the date beside the three openings.

Return to the full plan in steps

- [x] The full ten-minute bout first
- [x] Then her third way to open a scene

Return to the full plan in steps. Go back to the earlier bout length first. Leave the performance goal until a full week has run at that length, then pick up the longer goal again where you left it.

By the end of the second week Priyanka has a new if-then, a ten-minute bout, three openings and two days at a lighter load. **The program has changed shape to fit her days, and it is still running.** The thirty-minute play waits on the shelf for the weeks ahead.

The same steps fit other makers. **A carpenter who paints watercolours and moves to night shifts could rewrite his plan** around waking in the afternoon. He would shrink the bout, set a seven-day learning goal and lighten the load during the first hard fortnight, then reopen it in steps.

Adapting the program, at three levels



> Exercise:
>
> Adapt the program.
>
> 1. Starter. **Cut to a minimum bout** and keep the same cue.
> 2. Middle. **Replace a hard performance goal with a learning goal** for 7 days.
> 3. Advanced. **If stressors are high, shorten the creative load** and reopen it when intensity drops.

When life changes



Key idea:

When life changes, rewrite the plan, shrink the bout, swap to a learning goal and lighten the load under strain, since if-then plans helped with disengagement from failing courses of action and with saving capability for later, and steadier repetition was associated with better model fit in one study of health habits.

Quick check:

What is Priyanka's new cue? Answer: The baby's first afternoon nap. How long is her minimum bout? Answer: Ten minutes. What is her seven-day learning goal? Answer: To discover three ways to open a scene using sound alone. What does she do when the baby is unwell? Answer: She shortens the load to one five-minute bout a day at the same nap.

10.3.1 Attention, Memory and Intellect Practice Inside Creative Work

Imagine Yaw, forty-five, a sound engineer asked to make a ten-second station ident for a community radio station. **He has a week, a library of recorded sounds and a habit of judging every idea the moment it arrives.** Most of his ideas are gone within seconds. He gives himself one week to practise the other books' skills inside this task.

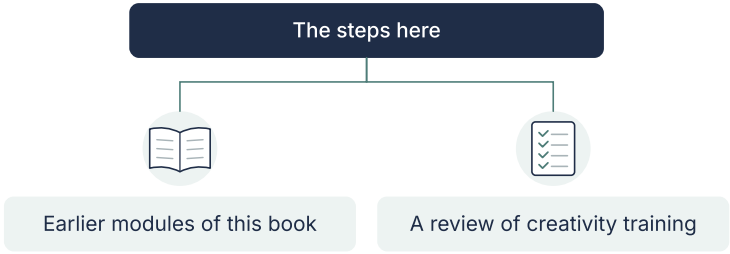
Every idea judged on arrival

> - A week and a library of recorded sounds
> - A habit of judging every idea the moment it arrives

This section is about practising attention, memory and intellect inside creative work. **I show you how to switch between a wide gather and a focused check, label the check, take a light break and map the skills you used.** Yaw tries the steps from Monday to Friday, and three levels of practice you can try yourself close the section.

The steps here draw on earlier modules of this book and on a review of creativity training. The way the steps slot together is this book's design, and none of the research tested a radio ident. Treat these steps as practice. The sounds Yaw chooses, and the order he puts them in, are his own decisions.

Earlier modules and one review



On Monday Yaw takes the first step. **He spends five minutes gathering widely, then five minutes checking with focus.** In the gather he lists every sound that could say “local radio”, from a kettle and bus brakes to a market trader, a church bell and gulls on the river. In the check he tests each one against the brief.

Two halves of the task

Half	Time
Gathering widely	Five minutes
Checking with focus	Five minutes

> Exercise:
>
> Try it. **For one creative task, gather widely for 5 minutes**, then check with focus for 5.

Set your attention to suit the job in front of you. A muddy task with many possible answers suits wide attention, and a clear task suits narrow attention (Vartanian, 2009; see 2.2.2). The gather is the muddy part of Yaw’s ident. The check against a ten-second brief is the clear part, with one right length.

Set your attention to suit the job

- [x] Wide for gathering
- [x] Focused for checking

Time the two halves separately and keep them apart. Write freely during the gather and judge nothing at all. When the timer goes, switch to the check and read each item against the brief. Keep both lists on the same page, so you can see what the gather produced and what the check kept.

Keep the halves apart

> - Time them separately
> - Keep them apart

> **Key Concept:**
> Wide gather. **A wide gather is a short, timed spell of collecting every possibility that touches a task, before any are judged.** A florist who pulls every bloom in the shop that might suit an autumn wedding onto one bench, before choosing any, is doing a wide gather.

The gather gives Yaw twenty-three sounds in five minutes, more than he usually allows himself in an hour. **The check keeps seven that are short, clear and recognisably local.** The church bell and the gulls survive, and so does the market trader's call. The kettle goes, since every station in the country could use a kettle.

Seven survive the check

- The check keeps seven
- Short, clear and recognisably local

Judge each gathered item against the brief, one line at a time. Read the brief aloud once before you start the check. Keep an item only if it meets every part of the brief as written. Strike the rest through lightly, so you can still read them if the kept list runs short later in the week.

Judge each gathered item

- [x] Against the brief
- [x] One line at a time

On Tuesday Yaw takes the starter step. **He labels one sub-step "intellect check", the step that follows idea generation.** He writes three combinations of his seven sounds and checks each against fixed facts. Each must fit ten seconds, leave room for the spoken station name and avoid clashing pitches.

Name the checking step

- Intellect check
- The step that follows idea generation

Give the checking step its own name, so you know when you are in it. Making ideas and judging them are two separate jobs (see 2.3.3). Write "intellect check" in the margin where judging begins. In this

book's terms, the check works on variables you have identified, such as length and pitch, and the gather works on the rest.

> **Key Concept:**
> Intellect check. **An intellect check is a labelled step in creative work where ideas are tested against fixed facts and rules.** A crossword setter who counts the letters in each answer against the squares in the grid before the puzzle goes to print is making an intellect check.

The intellect check removes one combination, which runs to thirteen seconds. **A second one fails because the bell and the bus brakes clash badly in pitch.** The third, gulls, then the bell, then a voice, fits in nine seconds and passes all three facts. Yaw marks it as the working draft and saves the file.

A clash in pitch

- [x] The bell
- [x] The bus brakes

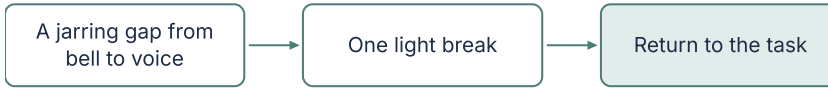
List the fixed facts before you run the check. For Yaw they are ten seconds, room for the station name and no clashing pitches. Write them at the top of the page, numbered. Then each combination is held to the same facts, and the check takes minutes.

List the fixed facts first

- [x] Before you run the check
- [x] Judge each idea against them

On Wednesday morning the draft gets stuck. **Yaw cannot find a way to move from the bell to the voice without a jarring gap of silence.** He tries four edits in twenty minutes, crossfades and cuts, and each sounds forced. So he takes the middle step, saves the file and stands up from the desk.

When an idea is stuck



When an idea is stuck, take one light break and then return. Pick something that asks little of your mind, such as coiling cables, washing a mug or a slow walk round the block. Keep it short, ten or fifteen minutes, and leave your phone behind. Then go back to the same problem at the same desk.



A man coiling audio cables over his elbow in a corridor lined with equipment cases, his headphones hung round his neck.

Yaw spends fifteen minutes coiling the studio's cables. **When he sits down again, he hears the market trader's call as the bridge between bell and voice.** He tries it, and the join is smooth on the first listen through the studio speakers. The ident now runs gulls, bell, trader and then the station name, in ten seconds exactly.

The bridge

> - The market trader's call
> - Between bell and voice

Return to the exact point where you stopped. Note the stuck spot before the break, in a few words. Try the first idea that comes, and run the intellect check on it before you keep it. If nothing comes, gather widely for five minutes on the stuck spot alone.

Return to the exact point

- [x] After one light break
- [x] Where you stopped

On Friday Yaw takes the advanced step. **He notes which book skill he used in each phase of the same task.** Monday's gather used wide attention and his memory of the sound library. Tuesday's check used intellect, and Wednesday's break and return drew on the creative work of letting a problem rest.

A skill for each phase

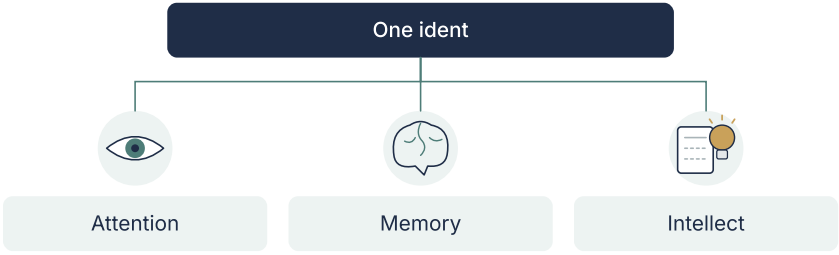
> - One book skill
> - For each phase of the same task

Write a skill map for the task once it is done. Number the phases in the order they happened, and write a book's name against each number. Keep the map clipped to the finished piece, so it stays with the work it describes.

> **Key Concept:**
>
> Skill map. **A skill map is a short after-task record for seeing, across many tasks, which skills your creative work leans on most.** A trainee detective who notes after each closed case which steps used observation, which used recall and which used reasoning, on one sheet per case, keeps a skill map.

More successful programmes in one review were likely to focus on "development of cognitive skills and the heuristics involved in skill application" (Scott et al., 2004). **Yaw's map shows that one ident used three books' skills**, each in its own phase.

Yaw's skill map



Choose one skill to watch more closely in the next task. Look at the map and find the phase that felt slowest. Name the book that phase drew on, and plan one drill from that book for the week ahead. Yaw picks memory, since he searched his sound library slowly on Monday and missed two sounds.

One skill to watch

- [x] Choose one skill
- [x] Watch it more closely in the next task

By Friday afternoon the ident is finished and emailed to the station manager for broadcast. **Yaw has a ten-second piece, two lists, a labelled check and a skill map.** He also has a habit he wants to keep, judging ideas only when the labelled check begins. The next job is a jingle for the breakfast show.

The same steps fit other makers. **A school librarian who writes short poems could gather widely for five minutes on a theme**, then run an intellect check on rhyme and line count. After a stuck line she would take a light break, then map which book's skill each phase used, with the four phases down the left.

Practice inside creative work, at three levels



The starter gathers widely, then checks with focus

The middle labels the check and takes a light break when stuck

The advanced notes which book skill each phase used

Exercise:

Practise the other books inside creative work.

1. Starter. **Label one sub-step "intellect check"** after idea generation.
2. Middle. **After a stuck idea, take one light break**, then return.

3. Advanced. **On the same domain task, note which book skill you used** in each phase.

Switch, label, rest and map



Key idea:

Switch between wide gathering and focused checking, label the check, take a light break when stuck and map the skills each phase used, since a muddy task suits wide attention and a clear task suits narrow attention, and the stronger training programmes in one review gave a central place to thinking skills and heuristics.

Quick check:

How long are Yaw's gather and check on Monday? Answer: Five minutes each, the gather first and the check second. What does he name the judging step? Answer: "Intellect check", written in the margin where judging begins. What light break does he take on Wednesday? Answer: Fifteen minutes coiling the studio's cables, then back to the same desk. What does his finished ident run, in order? Answer: Gulls, the church bell, the market trader's call and the station name, in ten seconds exactly.

10.3.2 One Real Task, Four Abilities

Imagine Esperanza, thirty-seven, who runs a wool shop and must dress the spring window by Saturday. **The window is half done, with a stepladder, a box of yellow yarn and no idea holding it together.** Each year she builds it in one rushed evening. This year she gives herself a week to use all four abilities on it.

A window half done

> - A stepladder and a box of yellow yarn
> - No idea holding it together

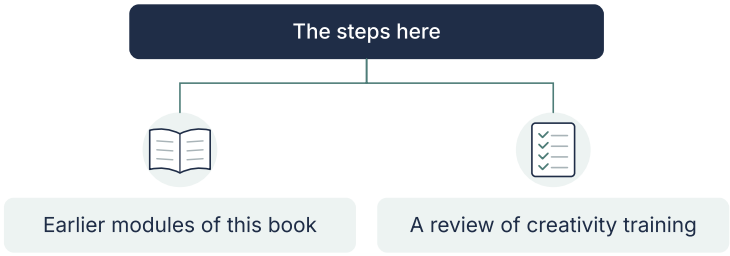
This section is about using all four abilities together on one real task. **I show you how to choose an unfinished task, run four labelled passes through it, have the result rated and record which skill each pass used.** Esperanza works through the steps from Monday to Sunday, and three levels of practice you can try yourself close the section.



A woman on a stepladder in an empty shop window, holding a ball of yellow wool and looking out at the street.

The steps here draw on earlier modules of this book and on a review of creativity training. Running four abilities through one task is this book's design, and no study has tested the four together as a set. Treat these steps as practice. The window, its colours, its prices and its customers are Esperanza's own to decide.

Two sources for these steps



On Monday Esperanza takes the first step. **She chooses one unfinished real task from her own field, the spring window.** It has a deadline, a fixed space and a purpose she cares about, bringing people through the door. She writes "spring window, Saturday" at the top of a page and lists the four passes below it, one per line.

One unfinished real task

- The spring window
- From her own field

> Exercise:
>
> Try it. **Choose one unfinished real task from your domain.**

Choose a task that is real, unfinished and due soon. More successful programmes in one review were likely to use "realistic

exercises appropriate to the domain at hand" (Scott et al., 2004). A real task brings its own limits and reasons to finish. Pick something you must do this month anyway, so practice and work share the same hours.

Choose a live task

- [x] Real
- [x] Unfinished
- [x] Due soon

The window suits Esperanza for that reason. **It will be done by Saturday whatever happens, so the passes cost her no extra week.** They only change how she spends the four evenings she had already planned to give it. She clears the counter after closing on Tuesday, opens her notebook and sets a timer for the first pass.

> **Key Concept:**
> Live task. **A live task is a real piece of unfinished work from your own field, used as the ground for practice.** A junior chef who tries a new way of plating on the evening's actual starter, with diners waiting in the restaurant, is working on a live task.

Run the passes in a fixed order, gather, remember, generate and check. Set a timer for each one, ten or fifteen minutes is enough. Write the name of the pass at the top of its own page before the timer starts.

Four passes in a fixed order



On Tuesday evening Esperanza runs the gather pass. **She walks the length of the high street for ten minutes and notes what catches her eye in other windows.** The baker has a single hanging sign, and the florist has stacked crates of daffodils by the door. The charity shop has a washing line of children's coats in bright colours.

The gather pass

> - Ten minutes on the high street
> - What catches her eye in other windows

Back in the shop she runs the remember pass. **She recalls what customers asked for last spring and which window sold best.** Baby cardigans and pastel cotton were the questions she heard most. The window that sold best two years ago had one big shape with a few prices on cards.

The remember pass

- [x] What customers asked for last spring
- [x] The window that sold best

Use cues to bring back what you already know about the task. Look through old receipts, photos or notes from the same task in other years. Ask what people asked for, what sold and what fell flat. Write each memory as one line, with the year beside it.

> **Key Concept:**
> Labelled pass. **A labelled pass is one run through a task with a single named job, such as gathering or checking.** A proofreader who reads a page once only for spelling and once more only for the page numbers in the margin makes two labelled passes.

On Wednesday she runs the generate pass. **She writes twenty ideas for the window in fifteen minutes**, judging none of them as they come. They include knitted lambs on a hillside, a giant yellow pompom sun and a washing line of baby cardigans with pompom daffodils pegged between them. The last one borrows from the charity shop's coats.

The generate pass

> - Twenty ideas for the window
> - In fifteen minutes

Then comes the fourth pass. **She tests each idea against fixed facts, a window two metres wide, a budget of forty pounds, prices on show and strong afternoon sun that fades yarn.** The hillside is too big and the sun too costly. In this book's terms, the check works on variables she has identified, and the washing line passes it.

The check pass

Fixed fact	Limit
Window width	Two metres
Budget	Forty pounds
Prices	On show

Keep each pass to its own job, even when an idea jumps ahead. If a judgement arrives during the generate pass, write it in the margin for the check. If a new idea arrives during the check, add it at the bottom of the generate page. The four pages stay separate and in order, one job each.

One job per pass

- [x] Keep each pass to its own job
- [x] Even when an idea jumps ahead

On Thursday and Friday evenings Esperanza builds the window. **She strings a line of white cord across the glass and pegs up six baby cardigans in pastel cotton.** Between them she clips yellow pompom daffodils, and each cardigan carries a small price card. She stands on the pavement at nine o'clock on Friday night to look at it.

The finished window

> - A line of white cord across the glass
> - Six baby cardigans in pastel cotton

On Saturday morning Esperanza takes the middle step. **She asks the window dresser from the department store across the road to rate the finished window**, on a scale of one to five. He gives it four and says the line draws the eye along the glass. Esperanza writes the score on the task page, beside the date.

The observer

> - The window dresser
> - From the department store across the road

Choose an observer whose own work is close to yours. Ratings by appropriate observers are one way creativity research judges finished products (Amabile, 1982; Hennessey, 1994). Give the observer a simple scale and a minute alone with the piece. Write the score down exactly as given, with any short comment, and leave the comment unargued.

On Sunday Esperanza takes the advanced step. **She writes which Module 2 skill each pass used, with no new claims about any of them.** The gather used wide attention, the remember pass used recall with cues, the generate pass kept making apart from judging and the check used the judging side of intellect.

A pass record

- [x] The Module 2 skill each pass used
- [x] No new claims about any of them

Name the skill, the pass and nothing more. Use the same words the earlier module used for each skill. Make no claim that the pass made the window better, since the record exists to show what you practised. Keep it to one line per pass, and leave a line blank if you cannot name its skill.

> **Key Concept:**
> Pass record. **A pass record is a written note of what each labelled pass produced and which skill it drew on.** A kitchen fitter who notes after each job what the measuring visit, the order and the fitting day each produced, and which skill each one needed, keeps a pass record.

More successful programmes in one review were likely to focus on "development of cognitive skills and the heuristics involved in skill application" (Scott et al., 2004). **Esperanza's record shows four skills used on one task**, all in one week.

Four skills on one task

- Four skills
- One task

Reuse the same four passes on the next real task. Keep the page headings the same, so each new record can be laid beside the last one. Look for the pass that took longest or produced least. That pass is the one to practise with its own module's drills before the next real task comes due.

Reuse the same four passes

- [x] On the next real task
- [x] In the same fixed order

By Sunday evening the window is finished, rated and recorded. **Esperanza has one real task done with four labelled passes, one**

observer score and a pass record. Two customers came in on Saturday afternoon to ask about the cardigans. The summer window is due in June, and the four page headings are already written for it.

The same steps fit other makers. **A parish secretary who writes the church newsletter could take next month's issue as her live task.** She would gather, remember, generate and check in four labelled passes over a week. Then she would ask one regular reader to rate the finished issue and write which skill each pass used.

One real task, at three levels



The starter chooses one unfinished real task

The middle runs four labelled passes and has the result rated

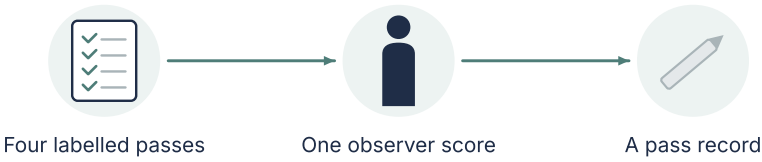
The advanced writes which Module 2 skill each pass used

Exercise:

Run one real task of your own through four abilities.

1. Starter. **Run four labelled passes** (gather, remember cues, generate, intellect check).
2. Middle. **Have one observer rate the finished piece.**
3. Advanced. **Write which Module 2 skill each pass used**, with no new claims.

Four abilities on one real task



Key idea:

Choose one real, unfinished task, run it through four labelled passes, have the result rated and record which skill each pass used, since the stronger training programmes in one review were built around real work from the trainee's own field and around thinking skills and heuristics, and appropriate observers can rate the finished piece.

Quick check:

What real task does Esperanza choose? Answer: The half-finished spring window of her wool shop, due by Saturday. What are her four passes, in order? Answer: Gather, remember cues, generate and intellect check, each on its own page. Which idea passes the intellect check? Answer: The washing line of baby cardigans with pompom daffodils pegged between them. Who rates the finished window? Answer: The window dresser from the department store across the road, who gives it four out of five.

10.4.1 Measuring Fluency, Originality, Usefulness and Finished Work

Imagine Wilhelmina, fifty-eight, a canal lock keeper who paints roses and castles on narrowboat panels. **She is two months into the program and wants to know whether anything has changed.** Her starting record sits in a folder next to last month's uses list for a windlass. She gives herself one month to measure her progress fairly.

Two months in

> - She is two months into the program
> - She wants to know whether anything has changed

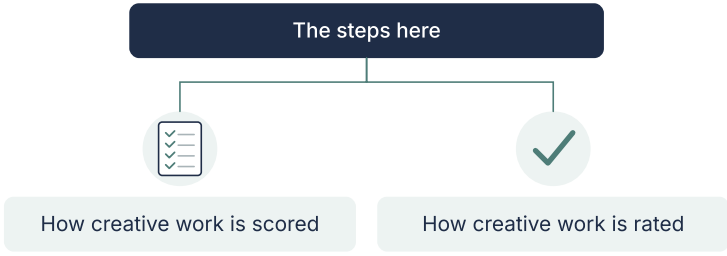
This section is about measuring your creative progress over time. **I show you how to re-score old work with the same rules, compare ratings with your starting record, keep earlier ratings sealed and chart each measure in its own column.** Wilhelmina works through the steps over four weeks, and three levels of practice you can try yourself close the section.



A woman in a canal worker's fleece painting a red rose on a black narrowboat panel, with a lock gate behind her.

The steps here come from research on how creative work is scored and rated. Those studies scored tasks in research settings, and none followed a lock keeper's paintings. The month-by-month comparison is this book's design, and it uses no population norms or cut-offs, only her own earlier scores.

Scoring and rating research



In the first week Wilhelmina takes the first step. **She re-scores last month's saved uses list for a windlass with the same fluency rule sheet she wrote at the start** (see 10.1.2). Last month she counted

eleven uses. Today, reading the same rules slowly, she counts ten, since two of the uses are the same idea in different words.

The same rule sheet



Last month's saved uses list



For a windlass



The fluency rule sheet she wrote at the start

> Exercise:
>
> Try it. **Re-score last month's saved uses list** with the same fluency rule sheet.

Re-score old work before you score new work. Use the same rule sheet, word for word. Read each rule aloud before you start, then score the old list as if you had never seen it. If your new count differs from the old one, write both numbers down and keep the rule sheet as it is.

Old work first

- [x] Re-score old work
- [x] Before you score new work

Fluency, flexibility and originality are the most common ways to score this kind of task (Reiter-Palmon et al., 2019). **Wilhelmina tracks fluency and originality**, the two her starting record used. Adding a new measure halfway through would leave her nothing to compare it with.

> Science Says:
>
> **A review of divergent thinking scoring found wide variation in how even one measure is scored.** It reported that "even with respect to only one dimension (e.g., originality), scoring decisions vary extensively" (Reiter-Palmon et al., 2019). The review concerned research scoring, and the same risk applies when one person scores her own lists months apart.

The variation the review found is a reason to fix the rules and re-check them. Wilhelmina's eleven and ten came from the same rule sheet, read with different care. The sheet stays as written. She adds one line to it, "same idea in other words counts once", so the next re-score has the rule spelled out.

A reason to fix the rules

- The variation the review found
- Fix the rules and re-check them

Add clarifying lines to the rule sheet and date them. Never change an old rule silently. Write each new line at the bottom with today's date, and apply it to every list from that day forward. Re-score any list you compare against, so all of them follow the same lines.

Clarifying lines

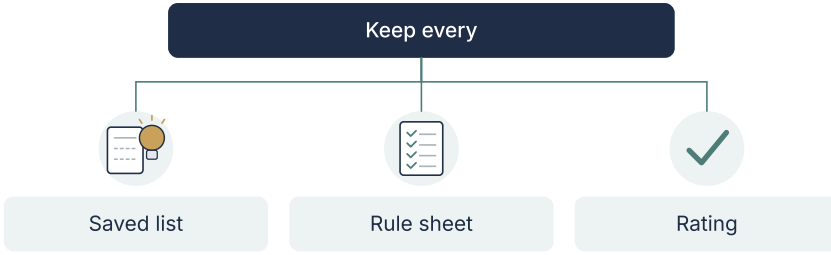
- [ ] Added to the rule sheet
- [ ] Dated

> **Key Concept:**
>
> Rule drift. **Rule drift is a gradual change in how a scoring rule is applied while its wording stays the same.** A quiz master who starts accepting near-miss spellings by the end of the season, under the same written rules, shows rule drift.

Later that week Wilhelmina does a fresh three-minute uses task for a mooring rope. **She scores it with the updated rule sheet and counts fifteen uses.** Her re-scored windlass list gave ten. She writes both numbers on one page, each with its date and the object it came from.

Keep every saved list, rule sheet and rating in one folder, in date order. A re-score needs the original list exactly as written. Photocopy or photograph each list before you mark it again, so the first marks stay readable. Wilhelmina keeps a clean copy of each uses list behind the marked one.

One folder, in date order



In the second week Wilhelmina takes the starter step. **She compares this month's Top 2 originality ratings with those on her starting sheet.** The friend who rated her starting Top 2 rates this month's pair

on the same five-point scale (Silvia et al., 2008). The starting pair scored three and two, and this month's pair scores four and three.

Compare like with like, the same task type, the same rater and the same scale. If any of those change, write the change beside the numbers. Show the rater only this month's pair. Then lay the two sheets side by side and read across.

Like with like

Keep the same	For Wilhelmina
Task type	A uses list
Rater	Herself
Scale	The same scale

The rise from three and two to four and three is a change on her own sheets. **Wilhelmina writes it down as a difference between two months and claims no more for it.** One month is a short time, and one rater is one view. She files the two sheets together in the folder.

Written down plainly

> - A difference between two months
> - She claims no more for it

Measure novelty before usefulness when you rate ideas. Usefulness added to creativity mainly among novel ideas in one study (Diedrich et al., 2015). Wilhelmina's friend rates each of the Top 2 for originality first. Then she adds a usefulness score on its own line, so the two numbers stay apart.

> **Key Concept:**
> Sealed rating. **A sealed rating is an old score stored with its date, so it can be compared with later scores without shaping them.** A cheese competition that keeps the previous year's scores in an envelope until this year's judges have tasted is using sealed ratings.

In the third week Wilhelmina takes the middle step. **She invites two new observers to rate one finished panel, a door with roses and a castle.** One is a sign painter at the boatyard and the other is a volunteer at the canal museum. Her old ratings from the starting record stay sealed in an envelope until both have scored.

Two new observers

- [x] One finished panel
- [x] A door with roses and a castle

Seal old ratings before new observers see the piece. Put the earlier scores in an envelope and write the date on it. Give each observer the same scale and ask them to score alone. Open the envelope only after every new score is written down.

Seal old ratings first

- [x] Before new observers see the piece
- [x] Store each old score with its date

Both observers give the door four out of five, and the sign painter likes the shading on the castle. **When the envelope is opened, the old ratings for her starting panel read three and three.** Two

appropriate observers are one way to rate a finished product (Amabile, 1982; Hennessey, 1994). Wilhelmina writes the new scores below the old ones.

The envelope opened

- Old ratings for her starting panel
- Three and three

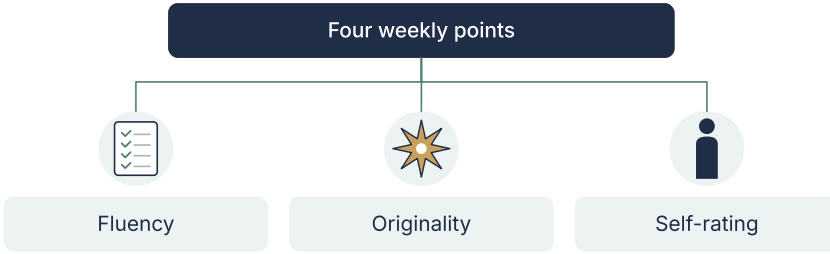
Keep the observers and the old scores apart, every time. A new observer who sees an old score may lean towards it. Use new observers when you can, so no one is rating against their own memory. Write who rated what, and when, beside each score.

Kept apart every time

- [x] A sealed envelope
- [x] Two new observers

In the fourth week Wilhelmina takes the advanced step. **She plots four weekly points of fluency, originality and self-rating in three columns, and never merges them.** Fluency runs fifteen, fourteen, seventeen and sixteen, and originality runs three and a half, three, four and three and a half. Her self-rating runs three, three, four and four.

Three columns, never merged



Leave the columns apart, whatever the numbers do. Self-ratings and divergent thinking scores went together only weakly in one study (Haase et al., 2018). So a self-rating belongs beside the other scores, never added to them. Write the date at the top of each row.

> Key Concept:
>
> Progress chart. **A progress chart is a dated table that sets each measure in its own column, week by week.** A cyclist who logs her weekly distance, average speed and resting heart rate in three columns keeps a progress chart.

Wilhelmina's chart shows only her own path, with no norm to rank it against. Each column is read against her own earlier weeks.

Only her own path

- Wilhelmina's chart shows only her own path
- Scored by rules she can show anyone

Read the chart across rows and down columns, and draw no line between the columns. A rise in one column says something about that measure only. Look for patterns over four weeks, and treat a single

week's jump as one point. Keep the chart in the folder with the starting record.

Read the chart

- [x] Across rows
- [x] Down columns
- [x] No line between the columns

By the end of the month Wilhelmina has a re-scored list, a clarified rule sheet, two rating comparisons and a four-week chart. **Each measure sits in its own place, scored by rules she can show anyone.** The next month starts with the same sheet and a fresh object for the uses task.

The same steps fit other makers. **A ferry steward who writes short stories could re-score last month's saved list with the same rule sheet**, compare Top 2 ratings with his starting sheet, invite two new readers with old ratings sealed and chart three columns for four weeks.

Measuring progress, at three levels



The starter re-scores last month's saved list

The middle compares like with like and seals old ratings

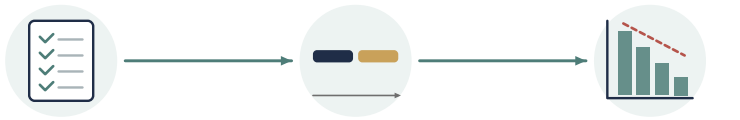
The advanced plots fluency and originality beside self-rating for 4 weeks

Exercise:

Measure progress fairly.

1. Starter. **Compare this month's Top-2 originality ratings with the starting sheet.**
2. Middle. **Invite two new observers for a finished piece**, and keep old ratings sealed until after.
3. Advanced. **Plot fluency and originality beside self-rating for 4 weeks**, and never merge the columns.

Measure progress



Fixed rules

Like-for-like comparisons and sealed ratings

Separate columns

Key idea:

Measure progress with fixed rules, like-for-like comparisons, sealed ratings and separate columns, since scoring decisions varied extensively even for one dimension, and self-ratings went only weakly with divergent thinking scores in one study.

Quick check:

Why does Wilhelmina's re-score give ten uses in place of eleven? Answer: Two of the uses were the same idea in different words. Who rates her Top 2 each month? Answer: The same friend who rated her starting sheet, on the same five-point scale. When does she open the sealed envelope? Answer: After both new observers have given their scores. How many columns does her chart have? Answer: Three, for fluency, originality and self-rating.

10.4.2 What “Practitioner” Means, Levels of Practice and Qualification Criteria

Imagine Ffion, forty-seven, a veterinary nurse who cuts paper silhouettes of animals in her back room. **She has finished her first twelve weeks of practice and has a folder thick with pieces, logs and notes.** A friend asked her what level she had reached, and she had no answer. She gives herself one Saturday morning to find out.

A folder thick with work

> - Her first twelve weeks of practice finished
> - Pieces, logs and notes

This section is about what “practitioner” means here, the five levels and the evidence each one asks for. **I show you the level names, what each level looks like in creative work and how to set your evidence beside each one.** Ffion works through the steps in one morning, and the usual Starter, Middle and Advanced exercises close the section.



A woman at a small table in a back room, cutting a paper silhouette of a dog with a craft knife.

The levels and their criteria are this book's own practice structure. No study tested them, and none is cited here, since they describe a way of organising practice. Treat these steps as practice. The levels give no outside title and carry no public standing.

The book's own structure

> - The levels and their criteria
> - Both are this book's own practice structure

On Saturday morning Ffion opens her planner at a clean page. **She copies the book's five level names down the margin, Basic, Intermediate, Advanced, Expert and Master.** She uses these names only, with no titles from craft websites. The same five names appear in the Intellect book of this series.

> Exercise:
>
> Try it. **Copy the book's level names into your planner**, with no outside titles.

> Key Concept:
>
> Practitioner. **A practitioner, in this book, is someone who practises creativity on purpose, on real work, and keeps the evidence of that practice.** A beekeeper who works her hives each week, tries a new method each season and notes what she did and what happened is a practitioner of beekeeping.

Use the level names exactly as the book gives them. Write them in order, from Basic at the top to Master at the bottom, the same order as Table 10.1. Leave space beside each one for evidence. Keep outside titles off the page, so the planner holds one set of levels and nothing else.

Use the level names exactly

- [x] As the book gives them
- [x] Each level on its own half page

Give each level its own half page. Under each name, copy that row's evidence kinds from Table 10.1 as separate lines, with the section number beside each one. Draw a small box at the end of every line, and tick it only when the item is in your folder, dated.

Ffion reads the five rows of Table 10.1. **Each row describes what your practice shows and lists outputs of this book's exercises that can show it, with the section that produces each one.** No level asks for

a set number of hours, projects or weeks. You judge the evidence yourself at the twelve-week review.

Table 10.1: Levels of practice and the evidence for each

Level	What your practice shows	Evidence to collect, and the section that produces it
Basic	You keep a short daily routine in one field and have a record of where you started	A starting record (10.1.2) and a short practice record (10.2.2)
Intermediate	You meet weekly challenges and use a heuristic on real drafts	Challenge briefs filed with their results (10.2.3) and a list of the changes a heuristic made (10.2.4)
Advanced	You finish a monthly project, choose among strategies before you start and track your measures	A strategy map and an outside rating for a finished project (10.2.4), and a progress chart of your measures (10.4.1)
Expert	You raise difficulty to a dated plan and can name the skills each phase of a real task used	A twelve-week difficulty ladder with each finished piece labelled by its week (10.2.5), a skill map (10.3.1) and labelled-pass pages with an observer's score (10.3.2)
Master	You keep practice going across reviews and plan each new challenge yourself	A maintenance plan (10.4.3) and a season plan for your next challenge (10.4.4)

Read each level as a description of practice, never as a rank of the person. A level says what your folder can show today, at this review. It says nothing about your worth or your talent. Two people at the same level may have very different work in their folders.

Reading a level

It is	It is never
⊕ A description of practice	⊖ A rank of the person

Use the section number beside a blank line to find the exercise behind it. Run that exercise on your next real piece, and file what it produces in the folder with the date. If a run produces nothing you can use, file the attempt anyway with its date and run the exercise again on the next piece.

Find the exercise behind it

- A blank line
- The section number beside it

Key Concept:

Practitioner level. **A practitioner level is one of five named steps in this book's practice structure, each described by the evidence a person can show.** A climbing club whose coloured wristbands each stand for routes a member has climbed in front of a coach uses something like practitioner levels.

Ffion looks at the Basic row first. **She has a starting record from her first week and a short practice record that covers every week since.** Both kinds of evidence the row names are in her folder, each one dated. She ticks both boxes under Basic in her planner and turns to the next half page.

Her evidence so far

- A starting record from her first week
- A short practice record for every week since

Start with the lowest level and work upward. At each twelve-week review, check each row in turn and stop at the first row where evidence is missing. Your level is the row above it, and the row with the gap is your next step. Ffion's next step is Intermediate for that reason.

Start with the lowest level

- [x] Begin with Basic
- [x] Work upward

Then Ffion takes the starter step. **She lists the qualification criteria for Intermediate next to her current evidence.** Her eight challenge briefs from weeks five to twelve, each filed with its result, sit beside the first criterion. Beside the second, a list of the changes a heuristic made, she has nothing yet.

Write each criterion on its own line and your evidence beside it. Use the words from the table, so you are checking against the book's criteria and nothing looser. Leave a line blank when you have no evidence for it, even if you feel sure you could produce some. A blank line tells you what to practise next.

One criterion per line

- [x] Each criterion on its own line
- [x] Your evidence beside it

> **Key Concept:**
>
> Qualification criterion. **A qualification criterion is a kind of evidence that a level asks you to show, such as a finished project or a review note.** A baking club that asks each member to bring one finished loaf and the card of the recipe they followed before moving on to pastry has set two qualification criteria.

Her short practice record is full, but it never names a heuristic she used on her real drafts. **She did reverse the shapes on two silhouettes, a heuristic from the course, and wrote nothing about it at the time.** The pieces show the change, and the log stays silent. She writes "change list?" beside the blank line.

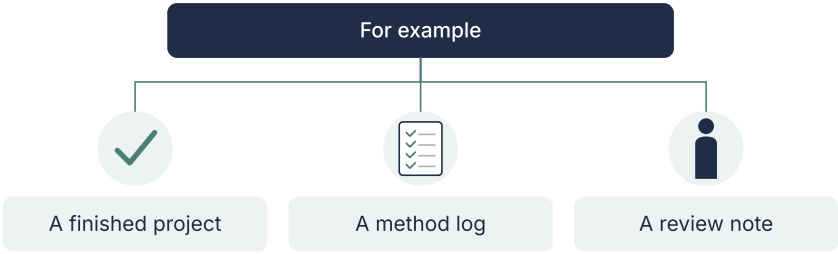
Make each log entry name the method you used. A line such as "reversed the shape on the fox" takes seconds and turns a piece into evidence. Write it on the day, while you still remember which method you used and on which piece. A log that names methods serves every level above Basic.

A log entry that names the method

Before	After
Nothing written at the time	→ The method named in the entry

Next Ffion takes the middle step. **For each criterion she attaches one artifact, such as a finished project, a method log or a review note.** Her first-week sheet goes beside the starting record line, and the brief for the greyhound silhouette goes beside the first Intermediate line. She clips each artifact to its line with a bulldog clip.

One artifact per criterion



Choose the artifact that shows the criterion most clearly. Measures from the progress chart in 10.4.1 can count as evidence where a criterion asks for them. Label each artifact with the criterion it supports and the date it was made. Finished projects show what you made, method logs show how, and review notes show what an observer saw.

Choose the clearest artifact

- [x] One artifact for each criterion
- [x] The one that shows it most clearly

Last, Ffion takes the advanced step. **She strikes out any wording that makes her level sound like an award from an outside body.** Her draft profile for a craft fair said “Approved Intermediate Papercutter”. She crosses it out and writes “working at Basic in a creativity practice book” in its place.

Keep level wording plain and personal. Say which book’s levels you are using, what your evidence shows and the month you last reviewed, so readers can see how recent it is. Avoid words that suggest an outside body checked your work, since none did. The levels are for organising your own practice and choosing the next step at each review.

Keep level wording plain

- Plain and personal
- Nothing that sounds like an award from an outside body

By noon Ffion has a clear answer for her friend. **She is at Basic, with one of the two Intermediate criteria already backed by evidence.** The missing piece is a list of the changes a heuristic made. She starts the list with one dated line about the reversed fox and counts twelve weeks forward to her next review.

The same steps fit other makers. **A school caretaker who builds birdhouses could copy the five level names into his notebook** and list the criteria for the next level beside his evidence. He would clip one artifact to each criterion and strike out any wording on his stall sign that sounds like an official award.

Levels of practice, at three levels



The starter copies the book’s level names into a planner

The middle sets evidence beside each criterion

The advanced strikes any wording that sounds like a public licence

Exercise:

Set your evidence beside the levels.

1. Starter. **List the book’s qualification criteria** next to your current evidence.
2. Middle. **For each criterion, attach one artifact**, such as a project, a method log or a review note.

3. Advanced. **Strike any wording that sounds like a public licence** or accredited certificate.

This book's practice structure



Five named levels | Criteria backed by evidence | Plain, personal wording

Key idea:

The five levels, Basic, Intermediate, Advanced, Expert and Master, are this book's practice structure, each described by outputs of this book's own exercises, with no minimum counts and no outside standing, and you assess yourself at each twelve-week review by stopping at the first row with evidence missing.

Quick check:

What are the five level names, in order? Answer: Basic, Intermediate, Advanced, Expert and Master. What kinds of evidence can back a criterion? Answer: Outputs of this book's exercises, such as a starting record, a short practice record, filed challenge briefs and a progress chart. Which Intermediate criterion is Ffion missing? Answer: A list of the changes a heuristic made. What does she strike out? Answer: "Approved Intermediate Papercutter" on her craft fair profile.

10.4.3 Your Journal, Level Review and Maintenance Plan

Imagine Bartholomew, sixty-three, a retired surveyor who carves birds from driftwood in his garden shed. **His practice journal is full of long pages about his days, and he cannot find the facts he needs.** His first level review is due at the end of the twelfth week. He gives himself two weeks to get his records ready.

Long pages, missing facts

- His journal is full of long pages about his days
- He cannot find the facts he needs

This section is about the journal as a training record, the level review and keeping practice going. **I show you how to write one-line logs, add a weekly measure, rewrite a plan when your week changes and hold a review with criteria and artifacts only.** Bartholomew takes two weeks over the steps, and three levels of practice close the section.



A man in a garden shed carving a small wooden bird, with a pile of driftwood on the bench beside him.

The steps here are this book's own practice structure. The journal here is a training log for review and planning, and I claim no other benefit for it. Treat these steps as practice. The level review runs every twelve weeks, and the levels and their criteria are the ones set out in 10.4.2.

On the Monday of week eleven Bartholomew takes the first step. **He switches to a one-line training log, the date, whether he kept his cue and the name of the task.** Monday's line reads "Mon 3rd, cue kept Y, wren from the beach root". He leaves out any line about how the day felt.

A one-line training log



> Exercise:
>
> Try it. **Write a one-line training log entry** with date, cue kept (Y or N) and task, and no prompts about feelings.

Keep each log entry to one line with three facts. Write the date first, then Y or N for the cue, then the task in a few words. Write it as soon as the session ends, before you tidy the tools away. A short line is quick to write and quick to find at review time.

One line, three facts

- [x] One line for each session
- [x] Three facts on each line

By Saturday of week eleven Bartholomew has six lines. **Five say Y, and one, on Thursday, says N, since he spent the day at the dentist.** He can see his week at a glance. The long pages from earlier weeks stay in the front of the journal, and the lines start on a fresh page.

> Key Concept:
>
> Log line. **A log line is the smallest unit of a training log, one dated line for each session.** A lighthouse keeper's entry reading "lamp lit at 18.02, lens cleaned" is a log line.

On the Sunday of week eleven Bartholomew takes the starter step. **He pastes one number from his 10.4.1 measures into the log, his fluency count from a three-minute uses task for a chisel.** The count is fourteen. He skips any score for how creative he feels that week.

One weekly measure

- His fluency count
- From a three-minute uses task

Add one measure each week and leave out scores for how you feel. Choose a divergent thinking count or an observer's rating, scored by the same rules each time. Self-ratings and divergent thinking scores went together only weakly in one study (Haase et al., 2018). A measured number gives the review something it can check.

Add one measure each week

- [x] One measure each week
- [x] No scores for how you feel

Write the measure on its own line with the date and the rule sheet it used. Keep the same type of measure from week to week, so the numbers can be compared. If you change the measure, start a new column and leave the old one as it was.

On the Tuesday of week twelve Bartholomew's bowls club moves its practice to Tuesday mornings. **His old cue was his walk to the shed after Tuesday breakfast, and now he is on the green at that hour.** He misses Tuesday's carving session. The log line reads "Tue 11th, cue kept N, bowls moved".

A changed week

When	Tuesday after breakfast
Before	His walk to the shed
Now	On the green

That evening Bartholomew takes the middle step. **He rewrites his maintenance if-then, "When I get back from bowls on Tuesday, I open the shed and carve."** He pins it on a new card to the shed door. In one study of health habits, a single missed opportunity made no material difference to habit formation (Lally et al., 2010).

The new maintenance if-then

> - When I get back from bowls on Tuesday
> - I open the shed and carve

Rewrite the plan as soon as your week changes. Find the new moment that sits closest to the old one. Keep the action and the length

the same. Write the date of the change in the log, so the review can see why a line says N.

> Key Concept:
>
> Maintenance plan. **A maintenance plan is the set of written arrangements that keeps practice running between two level reviews.** A cyclist's card listing the Saturday ride, what happens after a missed week and the date of the next fitness test is a maintenance plan.

Keep the maintenance plan on one card. Write the cue for each practice day, the restart rule after a miss and the date of the next review. Read the card at the start of each week, before the first session. Change it only when your week changes, and date each change.

On the Saturday of week twelve Bartholomew takes the advanced step. **He fills in a level review sheet using only the criteria from 10.4.2 and the artifacts that back them.** He is checking Intermediate, the level above the Basic evidence he already holds. He sets the sheet on the bench beside his finished birds.

Table 10.2: Bartholomew's level review sheet for Intermediate

Criterion	Artifact	Met
Challenge briefs filed with their results	Briefs for the wren, the curlew and the oystercatcher, each with its result	Yes
A list of the changes a heuristic made	A dated list of the changes "eliminate" made to the curlew and the oystercatcher	Yes

Fill the review sheet with criteria and artifacts only. Copy each criterion word for word from the level table, and beside it name the artifact that backs it and where it is. You run the review yourself, so leave out how you feel about the work and check the evidence only.

Criteria and artifacts only

- [x] The criteria from 10.4.2
- [x] The artifacts that back them

Every line on Bartholomew's sheet has an artifact beside it. **He writes the outcome as a dated sentence in the journal, "Intermediate, from the week-twelve review, Saturday 15th".** If a line had stayed empty, he would have written "keep practising" and named the missing criterion. He clips the sheet into the back of the journal.

> **Key Concept:**
> Level review. **A level review is a dated check of a person's evidence against the criteria for a level, held at a set interval.** A guide dog school that checks each young dog against the skills for its next stage every season holds a level review.

Hold the review every twelve weeks, on a date you set in advance. Write the next review date on the maintenance card as soon as one review ends. Gather the log, the measures and the artifacts in the week before. Twelve weeks is also the length of the difficulty ladder.

Hold the review

- Every twelve weeks
- On a date you set in advance

Keep the review day itself for checking only. Bartholomew lays out the log, the measure lines and the birds on the Friday evening. On Saturday he only reads each criterion and ticks or leaves the box empty.

An empty box gets no excuse beside it, only the name of the exercise that would fill it.

Review day is for checking only

> - Checking only on the review day
> - Held on a date set in advance

After the review Bartholomew writes the next date on his maintenance card. **The next review falls twelve weeks on, and it will check the Advanced criteria.** He reads the Advanced row and notes what it asks for, a strategy map, an outside rating and a progress chart. His first monthly project starts on Monday.

The next stretch

- [x] The next review falls twelve weeks on
- [x] It will check the Advanced criteria

End each review by planning the next stretch of practice. Read the criteria for the next level and pick the first piece of evidence to work towards. Write it as the first task on the card. Then the maintenance plan points at the next review from its first day.

End each review with a plan

- [x] Plan the next stretch of practice
- [x] Before the review ends

By the end of week twelve Bartholomew has a page of one-line logs, a weekly measure, a new if-then and a completed review. **His journal**

now holds the facts a review needs, each easy to find. The long pages from his early weeks are still there, in front of the lines.

The same steps fit other makers. **A retired midwife who writes children's poems could keep one-line logs**, paste one measure each week and rewrite her if-then when her choir changes night. Every twelve weeks she would fill a review sheet with criteria and artifacts only.

Journal and review, at three levels



The starter writes a one-line training log entry

The middle adds one weekly measure and rewrites the plan when the week changes

The advanced fills a level review sheet with the 10.4.2 criteria

Exercise:

Keep the journal and hold a level review.

1. Starter. **Each week, paste one divergent thinking score or observer rating from 10.4.1**, and skip scores for how you feel.
2. Middle. **Rewrite your maintenance if-then** after a schedule change.
3. Advanced. **Fill a level review sheet with the 10.4.2 criteria** and artifacts only.

Keep the practice running



Key idea:

Keep the journal as one-line logs with one weekly measure, rewrite the plan when your week changes and hold a level review every twelve weeks with criteria and artifacts only, since self-ratings and divergent thinking scores went together only weakly in one study, and a single missed opportunity made no material difference to habit formation in another.

Quick check:

What three facts go in Bartholomew's log line? Answer: The date, whether he kept his cue and the task name. What number does he paste in on Sunday? Answer: His fluency count of fourteen for a chisel. Why does he rewrite his if-then? Answer: His bowls club moved to Tuesday mornings. How many weeks apart are the level reviews? Answer: Every twelve weeks, on a date set in advance.

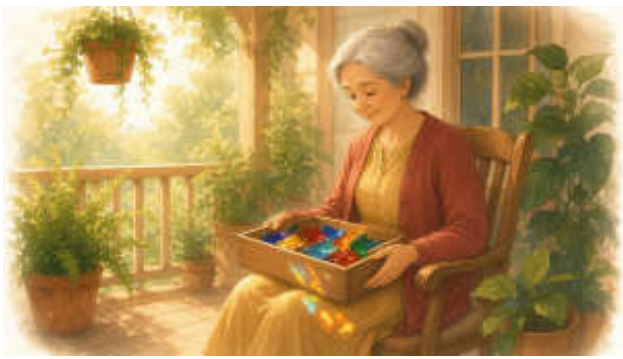
10.4.4 Choosing the Next Challenge and Continuing Throughout Life

IMAGINE MARGUERITE, sixty-six, a retired health visitor who has just finished a year of writing short stories. **She met every challenge she set herself, and now she wants to learn stained glass.** A box of offcut glass sits in her porch, beside a cutter she has never used. She gives herself one Sunday to plan the next eight weeks.

Every challenge met

- She met every challenge she set herself
- Now she wants to learn stained glass

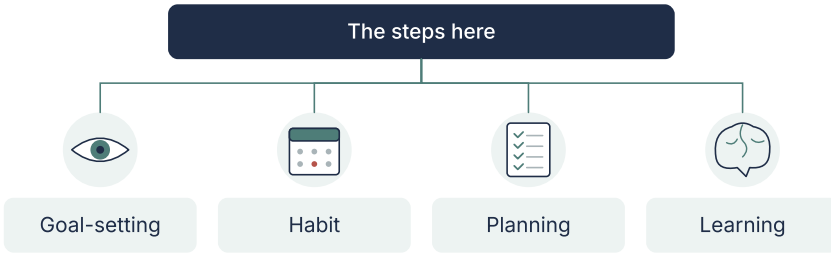
This section is about choosing the next challenge and practising for life. **I show you how to name a new challenge, start a new field fresh, set a new season's first cue and raise difficulty only after a solvable challenge.** Marguerite plans her next eight weeks, and three levels of practice you can try yourself close the section.



A woman in her sixties sitting in a sunny porch with a box of coloured glass offcuts on her knees.

The steps here borrow from goal-setting, habit, planning and learning research. None of that research tested stained glass or a lifetime of creative practice, and the eight-week season is this book's design. Treat these steps as practice. Fit each challenge to your own health and access, with an adapted tool or a pace goal where you need one.

Four research fields



On Sunday morning Marguerite takes the first step. **She names her next eight-week challenge, three small panels for the porch window, each twenty centimetres square.** Her standard is hard for a beginner, every joint soldered smooth, no light through any gap and each panel lying flat. She writes it on the first page of a new notebook.

An eight-week challenge



> Exercise:
>
> Try it. **Name the next 8-week challenge** with a specific difficult standard.

Name the next challenge with a count, a standard and a time span. In goal research, specific, hard goals were tied to better performance than being told to do your best (Locke & Latham, 2002). Choose a standard you could check with your eyes or a ruler. Then make it one notch harder than feels safe.

Name the next challenge

- [x] A count
- [x] A standard
- [x] A time span

Marguerite checks the challenge against what she knows. **She has never cut glass, so three panels in eight weeks is a stretch.** Her friend, who gave her the box of offcuts, finished a first panel in three weeks at a beginners' class. Marguerite keeps the number at three and writes "class on Thursdays" under the standard.

> Key Concept:
>
> Next challenge. **A next challenge is the goal chosen to follow a finished one, set with its own standard and time span.** A cellist who finishes her grade five pieces and books a summer recital of three new works for the village hall has chosen a next challenge.

Choose the next challenge before the last one fades. Look back at the last challenge for one thing you want more of, such as working with

your hands. Let that guide the choice of field. Write the reason down in one line, so you can read it on a slow week.

Choose before the last one fades

- Follow a finished challenge
- Choose the next one before it fades

Marguerite wants work she can hold up to the light. **Her stories lived on paper, and glass will live in the porch window.** She writes one line about why she chose glass under the standard. Then she closes the story notebook and puts it on the porch shelf with the others from the year.

A new home for the work

The idea		What it is like
Her stories lived on paper	≈	Glass will live in the porch window

Still on Sunday, Marguerite takes the starter step. **Glass is a new field for her, so she assumes her skills will not carry over and plans a fresh starting record.** Creative skill has been argued to be specific to its field (Baer, 1998). Her year of stories gives her a habit of practice, and the glass skills start from zero.

A fresh starting record

- Glass is a new field for her
- She assumes her skills will not carry over

Plan a fresh starting record whenever you switch fields. Choose two or three short tasks from the new field and score them in the first week. Use a new rule sheet written for the new materials and tools. File it apart from the old field's records, since the two sets of scores measure different skills in different materials.

> **Key Concept:**
> Domain switch. **A domain switch is a move from practising in one creative field to practising in another.** A wedding photographer who takes up pottery in the quiet winter months and starts again at the beginner's wheel has made a domain switch.

Marguerite writes her starting record plan on the second page. **In the first week she will cut ten straight pieces and five curved ones, and count the clean breaks.** She will also make one simple two-colour square and ask the class tutor to rate it. She writes the rule for a clean break, no chips along the edge.

First-week starting tasks

Cut	Count
Straight pieces	Ten
Curved pieces	Five

Keep the starting tasks small enough to finish in the first week. One short skill task and one tiny finished piece are enough. Write the rule sheet before you start, as you did in the old field. The first week's scores then become the point the next eight weeks are measured from, in the new field only.

Small starting tasks

- [x] Small enough to finish in the first week
- [x] Count the clean breaks

Next Marguerite takes the middle step. **She writes an if-then plan for the first cue of the new season, "When I come home from the Tuesday swim, I lay out the glass tools."** Her old story cue was the morning tea after breakfast, and the glass needs daylight and a clear bench. The swim happens every Tuesday and Friday.

The first cue of the new season

> - When I come home from the Tuesday swim
> - I lay out the glass tools

Write the new season's first cue before the season starts. Plans that set out when and where in advance went with better goal attainment in planning research (Gollwitzer & Sheeran, 2006). Name a moment that already happens, and keep the first action small. Put the card where the cue happens, so you see it at once.

Write the first cue early

- [x] Before the season starts
- [x] Tuesday after the swim

Expect gaps over a lifetime of practice, and plan the restart now. In one study of health habits, a single missed opportunity made no material difference to habit formation (Lally et al., 2010). Marguerite

writes a restart rule on the back of the card. After any missed session, she lays out the tools at the next swim and nothing more.

Gaps over a lifetime

- Expect gaps
- Plan the restart now

Marguerite also plans the season's end. **The eight weeks finish on the last Friday in May, and she writes that date beside the standard.** The class tutor has agreed to look at the three panels that week. She writes the three dates on the inside cover of the notebook.

> **Key Concept:**
> Practice season. **A practice season is a stretch of weeks given to one challenge, with its own start, cue and end.** A bell-ringing band that spends the autumn learning one new method, ready to ring it on Christmas morning, is in a practice season.

Last, Marguerite takes the advanced step. **She writes one desirable difficulty into the plan, curved cuts in the third panel, to go ahead only if the first month's panels prove solvable.** Her story year cannot tell her that, since her glass skills start from zero. Difficulties became undesirable when learners lacked the skills to meet them (Bjork & Bjork, 2020).

One desirable difficulty

- [x] Curved cuts in the third panel
- [x] Only when the last challenge was hard and still met

Raise difficulty only when the last challenge was hard and still met. Look at the last challenge and ask whether you met its standard on time. If you did, add one difficulty to the next plan. If you did not, keep the next plan at the same level and raise it after a challenge you do meet.

Practice explained only part of the differences in performance in one review (Macnamara et al., 2014). **Marguerite keeps practising for the pleasure of the work and makes no promise about where it leads.** Her next eight weeks are one more season in a long run of them.

Why she keeps practising

> - For the pleasure of the work
> - No promise about where it leads

Write the end date of the season in the notebook, and plan the next choice for that week. When the season ends, look at what you made and what you want more of. Choose the next challenge then, and start its first cue within a fortnight of the end. Seasons follow each other, so practice continues for life.

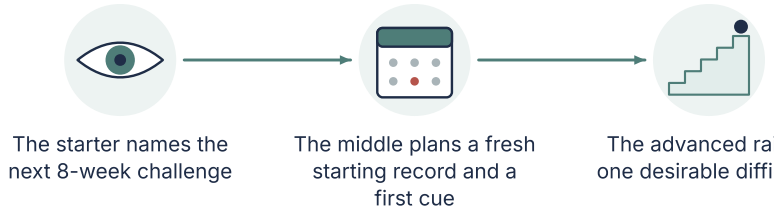
Write the end date

- [x] The last Friday in May
- [x] Plan the next choice for that week

By Sunday evening Marguerite has a challenge, a fresh starting record plan, a new cue and one planned difficulty. **Her stained glass season starts on Tuesday after the swim.** The story notebooks sit on the shelf, and she may return to them in a later season, with a fresh look at the old stories. For now the glass comes first.

The same steps fit other makers. **A retired postman who has spent a year on watercolour could choose wood carving for the winter.** He would name an eight-week challenge, plan a fresh starting record for the new field, write an if-then for the first cue and plan one difficulty to add only if his first carvings prove solvable.

The next challenge, at three levels



Exercise:

Choose your next challenge and season.

1. Starter. **If the domain is new, assume domain specificity** and plan a fresh starting record.
2. Middle. **Write an if-then for the new season's first cue.**
3. Advanced. **Raise one desirable difficulty** only if last month's challenge was solvable.

Keep practising throughout life



A next challenge with a specific standard

The season's first cue

Difficulty raised only when earned

Key idea:

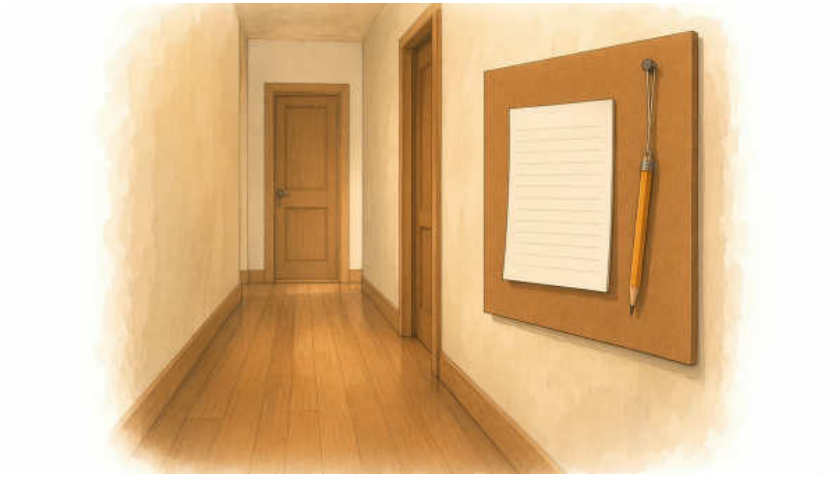
Choose the next challenge with a specific standard, start fresh in a new field, set the season's first cue and raise difficulty only after a solvable challenge, since specific, hard goals were tied to better performance, difficulties became undesirable when the learner lacked the skills to meet them, and a single missed opportunity made no material difference to habit formation in one study.

Quick check:

What is Marguerite's next challenge? Answer: Three small glass panels for the porch window in eight weeks, each twenty centimetres square. Why does she plan a fresh starting record? Answer: Glass is a new field, and she assumes creative skill is specific to its field. What is her new cue? Answer: Coming home from the Tuesday swim, when she lays out the glass tools. When will she add curved cuts to the third panel? Answer: Only if the first month's panels prove solvable.

A. A Simple Weekly Practice Planner and Method Chooser

On a Sunday evening I sit down with a pencil, last week's sheet and a blank one. **Ten minutes is enough to plan a week of creative practice.** I tie each session to a moment I already have, spread the sessions out and write one specific target at the top of the page.



A cork noticeboard in a narrow hallway, with one ruled sheet pinned at its centre and a pencil hanging beside it on a string.

> **Key Concept:**
> How to use this planner. **Every sheet here is a blank copy of a plan from Module 10**, and the method chooser at the end comes from Module 4. The days, cues and minutes in the filled rows are examples to change. The From column names the section that explains each idea. Use a pencil, because the first version is a draft.

The week rests on three habits. **Tie each session to a set moment, spread the sessions across the week and give the week one specific target.** A target such as “ten new jokes by Sunday” can be checked, and “do my best” cannot.

Pick a context cue, such as hanging your bag on the hall hook. **Write your implementation intention in the form “After [cue], I open my tools and start.”** Write the cue in the second column of the planner, so the plan starts itself.

Table A.1: My weekly planner

Day	Cue (after this)	What I do	Minutes	Done
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday		Read the week’s log and plan next week	10	

Fill in the cue column first, then the task. Pick moments that happen on most days, and put the creative block on three weekdays with a day between each. Tick the Done column as soon as a session ends, and leave a missed day blank.

The program behind the planner has three layers. **A daily workout, a weekly challenge and a monthly project** each get their own place on the sheet. For the monthly project, map the strategies side by side before you choose one. Table A.2 shows what each layer asks for and where it is explained.

Table A.2: The three layers

Layer	What it asks for	From
Daily workout	A 10-minute domain micro-task at the same cue each day, with a second spaced bout later in the week	10.2.2
Weekly challenge	One challenge with a countable standard, a set evening, an attempt count and a plan for a missed week	10.2.3
Monthly project	A 4-week product with a learning goal to map 5 strategies in week 1 and one observer review at the end	10.2.4
All three	Two spaced sessions in place of one massed session, and the creative block on 3 non-consecutive weekdays	10.1.3, 10.2.1

Keep the daily bout short, even on good days. A short bout is easy to start again tomorrow. Set the timer every time, even when the lines are coming easily, and stop when it rings.

Each weekly challenge gets a brief on one card. **Use the same parts every week, so you can read a new brief in seconds.** File each finished card behind the last one, so the weeks stay in order.

Table A.3: Challenge brief card

Task	Standard (countable)	Attempts allowed	Evening it starts	Result

Stop when the attempt count is done, even if the last try went well. For the monthly project, book the observer at the start of the month, and tell them the date and what they will see. A review that is booked in advance gives the month a fixed end.

The first twelve weeks rise in difficulty one notch at a time. **Start with an easy win, then add one constraint that still feels solvable.** Plot every session before the third week, with days between them and no single binge week.

Table A.4: Twelve-week difficulty ladder

Weeks	What changes	From	Done
1	An easy win, a task you are confident of finishing	10.2.5	
2	Add one constraint that still feels solvable	10.2.5	
3 to 12	Every 2 weeks, raise goal difficulty one notch if commitment holds	10.2.5	
8 to 10	Keep the cue even if the habit still feels unfinished	10.2.5	
12	Level review	10.4.3	

Pick your easy win before week 1 starts, and set out the tools and the space the night before. Write the one constraint for week 2 on an index card beside the tools, and pick a gentler one if you cannot picture a way to meet it.

Before each notch, ask yourself if the goal still matters to you. **If the answer is yes, raise the notch.** If it is no, hold the level for two more weeks and ask again.

Life changes, and the plan changes with it. **Write the plans for bumps before the bumps arrive.** Fill in the blank rows for the bumps you can see coming, such as a new shift pattern or a busy month.

Table A.5: Plans for bumps

If this happens	Then I will	From
I miss a day	Resume at the next cue with no double session	10.2.2
I miss a weekly challenge	Schedule only the next week's cue	10.2.3
My schedule changes	Rewrite one if-then for the new schedule this week	10.2.6

If this happens	Then I will	From
Life leaves little room	Cut to a minimum bout and keep the same cue	10.2.6
A performance goal is too hard for now	Replace it with a learning goal for 7 days	10.2.6
Stressors are high	Shorten the creative load and reopen it when intensity drops	10.2.6

The method chooser starts from the difficulty. **Write one sentence naming what makes the problem hard, before you pick any method.** A sentence with a fix hidden inside it, such as "We should get a new presenter", steers you straight to that fix, so cross it out and write what is hard.

Watch for the difficulty changing halfway through. Once a vague problem is framed, it becomes a need for ideas, so switch to the idea-making family. A method that has done its job gets put down.

Table A.6: Method chooser

What makes it hard	Method family	Example from the book
Nobody agrees what the problem is	Framing	Rewrite the problem until it points somewhere, such as "Listeners switch off at twenty to eight, when the news hands over to adverts"
There are too few ideas	Idea-making	Everyone writes alone first
The ideas keep coming out the same	Shake-up	Pick a random word, such as "kettle", and ask how the work could be like it
Making one thing better makes another worse	Trade-off	Ask whether the two needs can be separated, such as by time of day
There are plenty of ideas and one has to be chosen	Judging	Judge the options against the real limits of the job

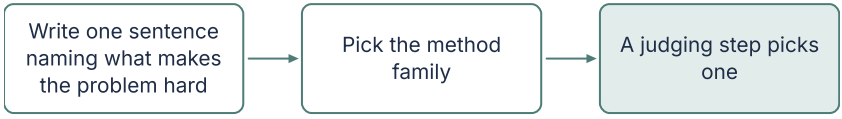
Every family ends the same way. **Once a method has made its options, a judging step picks one.** If two families both seem to fit, start with whichever is quicker to try, and switch if it stalls. Some problems need no creative method at all, such as a broken machine that needs an engineer.

Write the family and the result beside each problem when you finish. **A dated page keeps a record of which family suited which kind of trouble.** Keep it with the planner sheets, so the next problem of the same kind starts with a family already tried.

> Exercise:
>
> Fill in your first week.
>
> 1. Write three moments you meet every week in the Cue column of Table A.1.
> 2. Place the creative block on 3 non-consecutive weekdays.
> 3. **Fill in one challenge brief** in Table A.3 with a countable standard.
> 4. Write one difficulty sentence for a real problem and find its family in Table A.6.

My Sunday sheet rarely survives the week unchanged. **A crossed-out cue with a better one pencilled beside it is a sign the planner is working.** Keep the old sheets in a folder, and at the twelve-week review they show the pattern of your own practice.

From difficulty to a method



Key idea:

Plan sessions on set cues, spread them out and give each week one countable target, and choose a method by naming the difficulty first.

B. Sleep, Movement and Meal Planning Worksheets

Before I change how I sleep, move or eat, I write down a plain week of what I already do. **A week on paper shows the gaps more clearly than any guess.** The sheets below hold that week, and each one leaves room to plan one change.



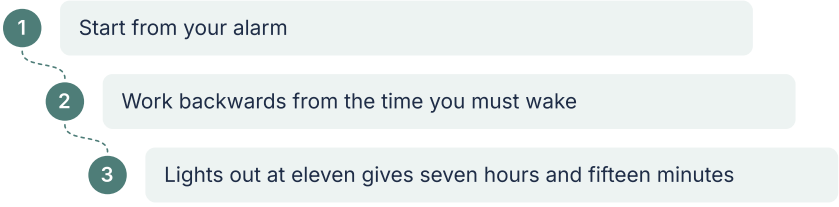
A clipboard hanging on a hook by a back door, with three sheets of paper clipped to it and a stub of pencil under the clip.

> **Key Concept:**
> How to use these worksheets. **Each sheet copies the advice in Module 6 and adds nothing stronger.** None of it is medical advice. If you are pregnant, have a sleep disorder or a long-term illness, or plan a big change to how you sleep, eat or move, talk to a qualified clinician first.

Sleep

The sleep sheet starts from your alarm. **Work backwards from the time you must wake to find the start of your sleep window.** Seven hours before a quarter past six is a quarter past eleven, so lights out at eleven gives seven hours and fifteen minutes, with a little room for falling asleep.

Find your sleep window



One panel of experts wrote that "Adults should sleep 7 or more hours per night on a regular basis" (Watson et al., 2015). **That makes seven hours the floor for adults aged 18 to 60.** A second panel advised seven to nine hours for young adults and adults, and seven to eight for older adults (Hirshkowitz et al., 2015).

Table B.1: My sleep window and wind-down hour

Wake time	Sleep window (start and end)	Wind-down hour (start and end)	Stuck problem for the morning revisit

Start your wind-down hour at the same time each night, and write its start time on the sheet. **Set the day's hardest problem down before that hour starts**, then read the last drafts again soon after waking, with a firm limit on the time.

Weekends count as well. The first panel asks for seven hours "on a regular basis" (Watson et al., 2015), so a late Saturday needs a later Sunday alarm that keeps the seven hours. Mark weekend nights on the sheet in the same way as weekdays.

Table B.2: A week of sleep notes

Night	Time to bed	Time awake	Hours	One line from the morning revisit
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

These hour counts are meant for healthy sleepers. **Anyone who snores heavily, lies awake most nights or falls asleep in the day should see a clinician** before building a routine around them.

Keep each line of the sleep notes short, with the time to bed, the time awake and one line from the morning revisit. A late night shows plainly as a short line, so you can see which evening moved it.

Movement

The movement sheet is a seven-day grid. **Put every walk and strength session in a real slot**, so clashes with work and sleep show before the week starts. Table B.3 sets out the weekly figures the grid aims at.

Table B.3: Weekly movement figures

Kind of activity	Weekly figure for adults	From
Aerobic	150 to 300 minutes of moderate activity, or 75 to 150 minutes of vigorous activity, or a mix of the two	6.2.1
Strength	All major muscle groups on 2 or more days a week	6.2.1
Balance, for adults aged 65 and over	Varied activity with balance and strength at moderate or greater intensity on 3 or more days a week	6.2.1
Sitting	Break up long periods of not moving with some activity, with no set number of minutes	6.2.2

Moderate activity has a plain test. **The NHS describes it as a pace where you "can still talk, but not sing"** (National Health Service, 2024). Anyone with a heart, joint or other health condition, or planning harder training, should ask a clinician first.

Strength needs its own slots in the week. The NHS lists carrying heavy shopping bags, lifting weights, working with resistance bands, body-weight exercises and heavy gardening among the activities that strengthen muscles (National Health Service, 2024). Pick one you can do where you already are, and give it two slots on the grid.

Table B.4: My movement grid

Day	Walk or aerobic (time and minutes)	Strength (time)	Sitting breaks	Walk slot before a creative task
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				

Day	Walk or aerobic (time and minutes)	Strength (time)	Sitting breaks	Walk slot before a creative task
Saturday				
Sunday				

Mark each walk slot on the grid beside the task it comes before. **Adjust the grid after one week without cutting sleep**, and move a session that keeps clashing to a slot that works.

Count your longest stretch of sitting on one working day, and mark it on the grid. Neither the WHO nor the NHS gives a number of minutes, so any count you use is your own choice. Light activity counts, so a short stand and stroll is enough to break a stretch.

Meals

The meal sheet looks at the pattern across weeks. **Check each meal against a MIND-style plate**, and write the evening's template dinner in its own column. Add up the close meals at the end of each week and compare the totals week to week.

Table B.5: A pattern week

Day	Dinner shape (grain, vegetable, protein)	Close to a MIND-style plate (Y or N)	Water with the meal	Thirst and mood
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

Caffeine gets its own line. **Count caffeine as one daily budget from all drinks and foods**, and compare your largest single dose with the 200 mg that a European panel found raised no safety concerns for

adults who are not pregnant (EFSA Panel on Dietetic Products, Nutrition and Allergies [NDA], 2015).

Treat alcohol as no help to ideas. The level of alcohol with the least harm was zero in one large analysis (GBD 2016 Alcohol Collaborators, 2018). Leave alcohol off the sheet as a health habit.

Table B.6: Caffeine budget and supplements

Day	Caffeine sources and times	Largest single dose (mg)	Day's total (mg)	Any supplement, and the clinician's test behind it

Save caffeine for problem-solving blocks. In one study, 200 mg of caffeine helped problem solving and had no significant effect on creative generation (Zabelina & Silvia, 2020). Write the time of each cup on the sheet beside the task it went with.

Supplements belong with a clinician. **List a supplement only when a clinician has found a diagnosed deficiency.** Write the clinician's name and the test date beside it.

> Exercise:
>
> Three sheets, one week.
>
> 1. Fill in Table B.1 tonight and keep Table B.2 for seven nights.
> 2. **Draft a 7-day grid with aerobic minutes and 2 strength slots** in Table B.4.
> 3. Fill in Table B.5 for a week, then change one dinner.

My own first week on paper surprised me with one late night I had forgotten. **One change at a time is enough to start with**, and the sheets for the next week show whether it held.

Key idea:

Write down a week of sleep, movement and meals before you change anything, then change one thing and keep it on the sheet.

C. Exercise Bank, Cleverini Game Guide and Offline Alternatives

Some evenings I have twenty minutes and no wish to search a whole book for something to practise. **This bank writes out the book's exercises in full**, so you can pick one and start straight away. There are 575 of them, sorted by skill, by method, by field and by level.



A shoebox of index cards on a bookshelf, with coloured tabs sticking up between the cards.

> **Key Concept:**
> How to use this bank. **Choose the skill, method or field you want, then choose a level.** A Try it takes a few minutes. Starter, Middle and Advanced rows build on each other and on the Try it above them, so read a topic's rows from the top. A row marked Steps is one exercise set out in numbered steps.

Each row is copied word for word from the module where it first appears. **Some rows name a person, a Try it or a table from their own topic**, such as "your Try it table" or "your best seed". Read those rows together with the rows above them, and use your own task wherever a row names someone else's.

Exercises by skill

The first table holds the core skills of creativity. **Fluency, flexibility, originality and elaboration come first**, followed by seeing a problem from several angles, asking questions, spotting assumptions, combining ideas and choosing what to work on. Every topic starts with its Try it.

Table C.1: Core skills

Topic	Level	Exercise
Fluency	Try it	In one minute, list uses for an empty jam jar. Then **cross out ideas that do not fit** and count the rest.
Fluency	Starter	Set a timer for three minutes and list uses for a shoe. Cross out ideas that do not fit, then count the rest.
Fluency	Middle	Do one three-minute round with a new object each day for nine days,

Topic	Level	Exercise
		and write each count down.
Fluency	Advanced	Pick a real task from home or work. Follow one rule, ten options before you choose, then pick the best and say why.
Flexibility	Try it	List eight uses for a newspaper. Next to each, write its kind in one word, then count the kinds.
Flexibility	Starter	List uses for a towel for two minutes. Name the kinds, then add one idea from a new kind.
Flexibility	Middle	List ideas for a rainy Sunday, swapping each time between two unlike kinds, such as food and sound.
Flexibility	Advanced	Take a real task from home or work. Draw an idea map of its kinds, invent one missing kind and develop the best idea from it.
Originality	Try it	List uses for a cup for one minute. Mark each idea you believe few people would write, then count the marks.
Originality	Starter	Take three common uses for a spoon. Rewrite each one until you believe it would be missing from a list of common answers.
Originality	Middle	From any list, circle your two most creative ideas. Ask two people to rate each from 1 to 5.
Originality	Advanced	Take a real task. Write its purpose, then find one

Topic	Level	Exercise
		unusual idea that still serves it.
Elaboration	Try it	Take one bare idea, a park bench. In one minute, **add every detail you can** beyond the seat and the legs.
Elaboration	Starter	Sketch a lamp in one line. **Add three details** to the sketch, such as a switch, a pattern on the shade or its height.
Elaboration	Middle	Write one idea twice, sparse and full. Mark the details that changed what it can do.
Elaboration	Advanced	Take an unfinished piece of your own. Decide what it still needs, add those details, then hand it to someone to test.
Seeing a Problem From Several Angles	Try it	Take one small annoyance from today. **Write it as two different problems**, each in one sentence.
Seeing a Problem From Several Angles	Starter	Write one problem from your week in two different sentences. Keep both, and list **what each one lets you see** that the other hides.
Seeing a Problem From Several Angles	Middle	Add a third view that clashes with the first two, and write one idea that keeps the clash.
Seeing a Problem From Several Angles	Advanced	Take a real problem from home or work. Write three views, pick the hardest one and solve the problem from there.
Asking Better Questions	Try it	Before you start one task today, **write three different questions** it

Topic	Level	Exercise
		could be asking. Read them before you choose.
Asking Better Questions	Starter	Write three questions for one task. Pick the one **least like the first question** you wrote and answer it.
Asking Better Questions	Middle	Add one question that keeps a clash in view, such as cheap and long lasting, and answer it.
Asking Better Questions	Advanced	Take a real brief. Rewrite its question three ways, then answer the third version.
Spotting Hidden Assumptions	Try it	Before you start one task today, **write down one rule you are treating as given**. Ask who set it.
Spotting Hidden Assumptions	Starter	Pick one task and name one assumption in it. Write **what changes if it is false**.
Spotting Hidden Assumptions	Middle	Ask a friend for three small puzzles that share one trick, then one that needs a new trick. Notice the pull of the old trick. This set-up goes back to the water-jar puzzles of Luchins (1942).
Spotting Hidden Assumptions	Advanced	Take a real brief. List the assumptions everyone involved shares, reverse one and redesign the plan.
Breaking Fixed Patterns and Habits of Thought	Try it	Pick up a spoon. **Name its usual use**, then list five uses that have nothing to do with eating.
Breaking Fixed Patterns and Habits of Thought	Starter	Look round your room. Find **one object you only ever see one way**, and give it a second job.

Topic	Level	Exercise
Breaking Fixed Patterns and Habits of Thought	Middle	Find one word that goes with cottage, Swiss and cake. It follows the Remote Associates Test (Mednick, 1962). Then write which guesses your first idea blocked.
Breaking Fixed Patterns and Habits of Thought	Advanced	Take a routine from home or work. Reverse it or change one feature, try it for a week and note what you learn.
Combining Distant Ideas	Try it	Write two things from different worlds, such as a bicycle and a teapot. **Write one way they could join.**
Combining Distant Ideas	Starter	Pick a far world and list five things in it. Join each to a task of yours, **keeping a part of both** in one sentence.
Combining Distant Ideas	Middle	Stay with one combination task for five minutes. Mark the joins that came after minute three.
Combining Distant Ideas	Advanced	Take a real project. Open a book at random, list associations for the first picture or object, and join them to one project limit.
Visual Thinking	Try it	Pick a small problem. For two minutes, **sketch it with shapes only**, using no words at all.
Visual Thinking	Starter	Take your Try it sketch. **Rotate, merge or cut**, and write one line on what changed after each move.
Visual Thinking	Middle	From the changed sketch, draw one option that works and one that surprises.

Topic	Level	Exercise
Visual Thinking	Advanced	Take a real task. Make three sketches, pick one and add the detail someone would need to build it.
Thinking in Metaphors	Try it	For a problem of yours, finish this line. **This problem is like ___ because ___.**
Thinking in Metaphors	Starter	Write two metaphors for one problem. List three features of the problem, and **keep the metaphor that shares more**.
Thinking in Metaphors	Middle	Ask what happens next in your kept metaphor. Turn it into one step with a name and a date.
Thinking in Metaphors	Advanced	Take a real problem shared with others. Find a metaphor they accept, and test it by asking what they picture.
Building an Idea Step by Step	Try it	Write your idea in one sentence. **Add one concrete next part**, and nothing more.
Building an Idea Step by Step	Starter	Give one idea three timed passes, memory, then change, then use. **Write one line after each pass.**
Building an Idea Step by Step	Middle	Add a detail pass, with at least three details nobody asked for.
Building an Idea Step by Step	Advanced	Take a real idea. Write three versions over a week, each built on the last, and ask a user what is missing.
	Try it	Pick a real question you care about that has no deadline this week. **Leave**

Topic	Level	Exercise
Tolerating Uncertainty and Staying With Open Questions		**it open for a set time** and list your unknowns.
Tolerating Uncertainty and Staying With Open Questions	Starter	Write two answers you are not ready to choose between. **Keep both for a day**, then add what you learned.
Tolerating Uncertainty and Staying With Open Questions	Middle	Add one question whose answer would change the choice, and find out what you can.
Tolerating Uncertainty and Staying With Open Questions	Advanced	Take a real decision with room. Set an end date, delay it on purpose, and log new information weekly.
Recognising an Interesting Question or a Problem Worth Solving	Try it	From one messy situation, write three candidate questions. **Star the one worth a day's work.**
Recognising an Interesting Question or a Problem Worth Solving	Starter	Run your three questions through the four tests. A question with one known fix fails the last test, so **cross it out**, then rank by ticks.
Recognising an Interesting Question or a Problem Worth Solving	Middle	Set your starred question beside a quick list of ideas. Note which looks more original.
Recognising an Interesting Question or a Problem Worth Solving	Advanced	Make a one-minute case to someone with a say on why this question, who cares and what you would try first.
Choosing Ideas According to Their Purpose, Audience and Possibilities	Try it	List five ideas for one task. **Mark each for purpose fit, then audience fit**, in two columns.
	Starter	Mark five ideas for purpose and audience.

Topic	Level	Exercise
Choosing Ideas According to Their Purpose, Audience and Possibilities		**Drop any idea that fails on purpose**, even an original one.
Choosing Ideas According to Their Purpose, Audience and Possibilities	Middle	Keep three finalists. Write one audience objection for each and one change that answers it.
Choosing Ideas According to Their Purpose, Audience and Possibilities	Advanced	Choose one idea and write a brief stating its purpose, its audience and one possibility you are giving up.
Recognising What an Unfinished Idea Needs	Try it	For one unfinished idea, **mark the need it has most**, out of facts, detail, a new angle and stopping.
Recognising What an Unfinished Idea Needs	Starter	Mark one need for an unfinished idea. **Add only that one missing piece**, and do not restart.
Recognising What an Unfinished Idea Needs	Middle	If the idea looks like something you have seen, use one new strategy and mark the needs again.
Recognising What an Unfinished Idea Needs	Advanced	Decide whether to finish, revise or set aside a real draft, and write the yardstick you used.

Run one core skill for a whole week before you move to the next. Start with its Try it on the first day, then take one level a day. Use your own task in every row, and keep the pages together under the topic name.

The second table goes back to the start of the book. **It holds the exercises on what creativity is and how it works with memory,**

attention and intellect. Many of them are short, and several are set out as numbered steps.

Table C.2: Creativity and its partner abilities

Topic	Level	Exercise
Creativity, Imagination, Intellect and Innovation, and Their Partners	Try it	In thirty seconds, name two uses for a spoon. Then name two more that nobody at your table would think of. It is a short form of the Alternate Uses Task (Haase et al., 2025).
Creativity, Imagination, Intellect and Innovation, and Their Partners	Steps	**Spot the partners.** 1. Pick one thing you made or fixed this week. 2. Write which partner helped most, **attention, memory or knowledge**. 3. Write one moment where imagination came in, and what it pictured. 4. Next time you make something, ask your weakest partner for help first, and note what changes.
Definitions Through the Ages, and This Book's Definition	Try it	Take one task with every fact given, such as a recipe. Remove one fact and notice how the task opens up.
Definitions Through the Ages, and This Book's Definition	Steps	**Name the variables.** 1. List six tasks from your week. 2. Mark each one "variables identified" or "variables not identified". 3. Pick one marked "variables not identified" and write three things that could change in it. 4. Choose one of those, try it, and note **what you found**.
Everyday Creativity, Expression and Invention	Try it	Write down one thing you did this week that was

Topic	Level	Exercise
		new to you, however small.
Everyday Creativity, Expression and Invention	Steps	**A week of small firsts.** 1. Each day for a week, do one ordinary thing a new way, such as your walk to the shops or your breakfast. 2. Write it down in one line. 3. Mark each one “new to me” or “maybe new to others”. 4. At the end of the week, pick the one you liked most and **take it one step further**.
From Early Tools, Images and Stories to the First Writers on Creativity	Try it	Press a fingertip into some flour and draw one pattern. Ask a friend what it means.
From Early Tools, Images and Stories to the First Writers on Creativity	Steps	**Make it the old way.** 1. Tell a short story to someone **with no notes**, in three minutes or less. 2. Draw one scene from it with the plainest tool you have, such as a pencil. 3. Make a simple sound pattern to go with it by clapping or tapping. 4. Write which of the three felt easiest and which felt new. Repeat the newest one tomorrow and note what changed.
How People Trained and Measured Creativity Through Craft, Play and Learning	Try it	Copy a simple doodle from any page, then change one thing about it. Notice which part feels like yours.
How People Trained and Measured Creativity Through Craft, Play and Learning	Steps	**Copy, vary, make.** 1. Pick an everyday object near you, such as a mug or a chair. 2. Sketch it or describe it in a few lines, **as closely as you can**. 3. Change one feature, such as the handle or the legs, and sketch or describe the

Topic	Level	Exercise
		new version. 4. Change two more features and give the object a use nobody planned for it. Write one line on what each change taught you.
Remarkable Creators at Work, and the Brain Behind New Ideas	Try it	Make five quick sketches of one idea, such as a sign for your front door, before you choose one.
Remarkable Creators at Work, and the Brain Behind New Ideas	Steps	**Ten tries.** 1. Pick a small task, such as a name for a club or a title for a photo. 2. Write ten options in five minutes **without judging any of them**. 3. Wait an hour, then circle the best two. 4. Improve one of the two and write a line on what you changed and why.
Talent, Experience and Practice	Try it	Draw a simple cup with your non-writing hand. Notice which lines come out differently from your usual drawing.
Talent, Experience and Practice	Steps	**Change the route.** 1. Pick a task you know well, such as fixing a recipe, planning a weekend or tidying a cupboard. 2. Write the first way your experience tells you to do it. 3. Write three ways a complete beginner might try it, and try one this week. 4. Note what you noticed that **the old way had hidden**.
How Creative Work Happens	Try it	Fix a candle to a wall using only the candle, a box of thumbtacks and a matchbox. Then read on and compare.
	Steps	

Topic	Level	Exercise
How Creative Work Happens		**Work, walk away, return.** 1. Pick a small open problem, such as a gift idea or a better layout for a messy shelf. 2. Work on it hard for fifteen minutes and write every idea. 3. Do something easy for an hour, such as a short walk or washing up. 4. Come back, write any new ideas, then pick one and **revise it twice**.
What a Creativity Test Can and Cannot Tell You	Try it	In two minutes, list uses for a paperclip. Then circle your two best and **rate each from 1 to 5**.
What a Creativity Test Can and Cannot Tell You	Steps	**Score yourself fairly.** 1. List uses for a brick for three minutes, then count them for **fluency**. 2. Sort your ideas into kinds and count the kinds for flexibility. 3. Circle any idea you believe few people would write, for originality. 4. Take your best idea and add three details for elaboration. Date the sheet and keep it in your practice journal to repeat later.
Memory	Try it	Name one real problem or unfinished project from your own life. Write it at the top of a blank page.
Memory	Starter	For your Try it problem, list what you know or have lived through that bears on it.
Memory	Middle	Next to each item, write R if you remembered it and N if it is new to you. **Mark where the first N appears.**
Memory	Advanced	

Topic	Level	Exercise
		Join two R items, or one R and one N, into one new option for that problem. Write one reason it might work.
Imagination	Try it	For about five minutes, recall a recent event in detail, its setting, people and actions. Then list ideas for one small problem.
Imagination	Starter	Imagine a creature from another planet and draw it. Then **mark which features came from animals you know**.
Imagination	Middle	Draw a second one, starting from the planet's conditions and what it would need to survive. Put the two side by side.
Imagination	Advanced	Imagine one future day when a real project is in use, in detail. List what in that scene does not exist yet and would be needed.
When Memory Gets in the Way	Try it	Look at a photo of any chair for ten seconds. Then sketch your own chair and count the parts you reused.
When Memory Gets in the Way	Steps	**Past your own first ideas.** 1. Pick a problem and write your first three ideas, the remembered kind you learned to spot. 2. Name **the one feature they share**, such as legs on every chair. 3. Write three more ideas, with one rule. None may use that feature. 4. Compare the second round with the first.

Topic	Level	Exercise
When Memory Gets in the Way	Starter	Pick an example, such as a bag. List its features and faults by name, then make a version with none of them.
When Memory Gets in the Way	Middle	Swap in an example from outside the usual group, such as a bird’s nest. Make a second version and **compare**.
When Memory Gets in the Way	Advanced	In your own field, collect three existing solutions to a current brief. Name their shared features, then design one option without them.
Attention	Try it	For three minutes, note the sights, sounds and textures around you in detail.
Attention	Starter	Scan a whole room for one minute, finding small things across it. Then name five unusual examples of a group, such as vehicles.
Attention	Middle	Look at a tree. Name its whole shape, then one small part, then the whole again. Switch three times.
Attention	Advanced	In a quiet place, watch one real work scene for ten minutes. List details others would miss and **use one in a current project**.
Focused and Open Attention	Try it	Next time you search for an idea, rest your eyes on a blank wall or the sky, or close them.
Focused and Open Attention	Starter	Before a task, ask whether its variables are identified. Write “focus” or “widen”

Topic	Level	Exercise
		and check afterwards how it went.
Focused and Open Attention	Middle	Before an open ideas task, sit five minutes noticing whatever comes. Before a one-answer puzzle, sit five minutes on your breath. Compare.
Focused and Open Attention	Advanced	On a real task, close screens and messages while you search for ideas. Reopen them to check details, and note which part needed which.
Mind Wandering, Breaks and Incubation	Try it	Before you step away from a problem, write the open question in one line. Let it be the thought you come back to.
Mind Wandering, Breaks and Incubation	Starter	After hard work on a problem, take a light break, such as folding laundry, with nothing demanding. Return and add new ideas.
Mind Wandering, Breaks and Incubation	Middle	For a week, note where you were and what you were doing when your best daily idea appeared. Mark it on task or away.
Mind Wandering, Breaks and Incubation	Advanced	On one focused and one open task, mark each drift and whether it cost an error or brought an idea.
How Intellect and Creativity Relate	Try it	Take one real problem from your week. List what is known and fixed, and what is not yet identified.
How Intellect and Creativity Relate	Starter	List names for a new café for two minutes, then your most creative names for

Topic	Level	Exercise
		two more. Compare count and quality.
How Intellect and Creativity Relate	Middle	List the knowledge and reasoning a task needs, then what else, such as persistence or a new angle.
How Intellect and Creativity Relate	Advanced	In a project, find a step treated as creative whose variables are identified, and a routine step whose variables are not identified. Handle each the matching way.
Intellect	Try it	Read a problem, such as a friend's message asking for help. After each sentence, update a one-line note of what is needed.
Intellect	Starter	Write two things any idea for a real problem must do. List ideas, and strike any that drops one.
Intellect	Middle	Pick one approach, such as starting from the people involved. Use only that for ten minutes, mark each drift and return. Count your marks and look at the ideas the approach gave you.
Intellect	Advanced	Meet three needs at once, then add a fourth and check which ideas survive.
Generate and Judge	Try it	During your next short task, such as a message, mark G each time you make and J each time you judge.
Generate and Judge	Starter	Take one draft. Make without judging for four

Topic	Level	Exercise
		minutes, then judge for four and mark what to keep, cut or change. Repeat twice and note what each block changed.
Generate and Judge	Middle	Push one kind of gift idea, such as homemade, as far as it goes before trying another.
Generate and Judge	Advanced	Find the piece of a real task with one right answer, such as a measurement. Solve it fully first.
When You Need Which	Try it	Name one task that stalled this month. Write down the step where it stopped, and ask whether its variables are identified.
When You Need Which	Starter	Ask whether the stalled step lacks material, has the wrong focus, has lost what is fixed or has unidentified variables. Let that ability lead.
When You Need Which	Middle	On a small task, judge while making, then make while judging. Compare it with your usual way.
When You Need Which	Advanced	Before a real task, set a signal to change mode, such as three ideas on one theme. Note whether it fired on time.

These topics suit a quiet evening with a notebook. Several of them ask you to look back at your own week, so fill them in near the end of a day. Keep each page dated, so you can come back to it.

The third table holds the skills that keep practice going. **Sleep, movement, food, mood, motivation, stages of life and the tools**

you use all have exercises here, and the last two topics are about word games.

Table C.3: Keeping practice going

Topic	Level	Exercise
How Sleep Supports Creativity, and a Workable Sleep Routine	Try it	Pick a stuck problem. Work on it for 15 minutes, sleep, and revisit it the next morning.
How Sleep Supports Creativity, and a Workable Sleep Routine	Starter	Set a sleep window of 7 hours or more tonight.
How Sleep Supports Creativity, and a Workable Sleep Routine	Middle	Protect the last hour before bed from high-demand work on the stuck problem.
How Sleep Supports Creativity, and a Workable Sleep Routine	Advanced	Track 5 nights of bedtime, wake time and a morning revisit of one problem.
Breaks, Daydreaming and Returning to an Unfinished Idea	Try it	During an easy job that keeps your hands busy, keep a pencil and slip within reach. Write two or three drifting words, then carry on.
Breaks, Daydreaming and Returning to an Unfinished Idea	Starter	List three busy-hands breaks where the mind can drift, such as ironing or sorting buttons, and three unsafe settings, such as driving or using machinery. Keep the first list at the workspace.
Breaks, Daydreaming and Returning to an Unfinished Idea	Middle	Make a longer first attempt before the break.
Breaks, Daydreaming and Returning to an Unfinished Idea	Advanced	Give two unfinished problems same-length breaks, one plain rest and one an easy chore. On return, compare the new ideas.

Topic	Level	Exercise
Walking, Aerobic Exercise, Strength and Balance	Try it	**Take a 10-minute walk, then write a 5-minute idea list** on a problem you are stuck on.
Walking, Aerobic Exercise, Strength and Balance	Starter	**Walk on a treadmill or along a corridor during one idea block.**
Walking, Aerobic Exercise, Strength and Balance	Middle	Add one muscle-strengthening session this week.
Walking, Aerobic Exercise, Strength and Balance	Advanced	Take one outdoor walk for analogies or idea quality.
Your Weekly Movement Plan, Including Sedentary Days	Try it	**Draft a 7-day grid with aerobic minutes and 2 strength slots**, each one in a real time slot.
Your Weekly Movement Plan, Including Sedentary Days	Starter	**On a sedentary day, stand or walk 3 minutes each hour, 5 times.** These are practice numbers that no source gives.
Your Weekly Movement Plan, Including Sedentary Days	Middle	Put one walk straight before a creative work block.
Your Weekly Movement Plan, Including Sedentary Days	Advanced	Adjust the plan after one week without cutting sleep.
Dietary Patterns and Adequate Nutrition	Try it	List this week's meals. **Mark each one that comes close to a MIND-style plate.**
Dietary Patterns and Adequate Nutrition	Starter	Add one day this week with **a serving of green leafy vegetables or berries**.
Dietary Patterns and Adequate Nutrition	Middle	Write down one claim that alcohol is good for health, and cut it with the finding that the level of alcohol with the least harm was zero (GBD 2016 Alcohol Collaborators, 2018).

Topic	Level	Exercise
Dietary Patterns and Adequate Nutrition	Advanced	Read the labels on what you buy for one week, and take no stack of supplements.
Practical Meals, Hydration and When Supplements May Matter	Try it	Drink a glass of water with your next meal. **Note only how thirsty you were and how your mood felt.**
Practical Meals, Hydration and When Supplements May Matter	Starter	Build **one Mediterranean or MIND-style dinner** this week.
Practical Meals, Hydration and When Supplements May Matter	Middle	Remove one alcohol-for-health habit for a week.
Practical Meals, Hydration and When Supplements May Matter	Advanced	Before taking any supplement, ask a clinician about **a named deficiency**.
Caffeine, Alcohol, Supplements and Other Substances	Try it	Estimate today's caffeine in milligrams. **Compare your largest single dose with EFSA's 200 mg.**
Caffeine, Alcohol, Supplements and Other Substances	Starter	If you use caffeine for work, **save it for problem-solving blocks**, since the study found no gain for idea generation.
Caffeine, Alcohol, Supplements and Other Substances	Middle	Write why alcohol is no creativity tool, using **the zero line and the beer study's limits**.
Caffeine, Alcohol, Supplements and Other Substances	Advanced	For one product or drink sold as sharpening focus or creativity, copy its exact claim, note whether a published study is named, and if one is, write **what that study measured**.
Stress, Fatigue and Creative Frustration	Try it	Name today's stressor as judging or no control. **Rate today's block 0, 1 or 2.**
	Starter	

Topic	Level	Exercise
Stress, Fatigue and Creative Frustration		For 20 minutes, **add one control lever** by choosing the order of your subtasks yourself.
Stress, Fatigue and Creative Frustration	Middle	For 30 minutes, reduce one heavy judging cue by closing the door, muting notifications or pausing live critique.
Stress, Fatigue and Creative Frustration	Advanced	After a frustrating block, **switch only the stressor type you named** and keep the same problem.
Mood, Mental Health and the Myth of the Suffering Genius	Try it	**List one mood word for your last creative hour.** Mark it activating and positive, or fear and anxiety, with no diagnosis.
Mood, Mental Health and the Myth of the Suffering Genius	Starter	**Rewrite one suffering-genius claim you have heard as "evidence mixed".**
Mood, Mental Health and the Myth of the Suffering Genius	Middle	Plan one session that aims for an engaged good mood, with no distress used as fuel.
Mood, Mental Health and the Myth of the Suffering Genius	Advanced	Share the care path. When distress rises, pause creative goals and seek help.
Keeping Questions Alive and Following Your Interests	Try it	Pick one unanswered question in your project. **Spend 12 minutes only on what you still want to know.**
Keeping Questions Alive and Following Your Interests	Starter	Write 5 follow-up questions from your one question, and **rank them by pull**, leaving usefulness out of the ranking.
Keeping Questions Alive and Following Your Interests	Middle	For this session, **protect one autonomy cue** by

Topic	Level	Exercise
		choosing the next question yourself.
Keeping Questions Alive and Following Your Interests	Advanced	Pair a high-curiosity question with **one incidental fact to learn beside it**.
Play, Enjoyment and Personal Reasons to Create	Try it	**Rewrite today's brief with only personal reasons.** Hide every reward and status reason for 20 minutes, then work.
Play, Enjoyment and Personal Reasons to Create	Starter	**Add one playful rule only**, a silly constraint or score-free improvising, for 10 minutes.
Play, Enjoyment and Personal Reasons to Create	Middle	Protect your competence by picking a small playful version you can finish today.
Play, Enjoyment and Personal Reasons to Create	Advanced	Compare two 15-minute runs, one enjoyment first and one evaluation first, and keep the product private.
Moving Beyond "I Am Not a Creative Person"	Try it	Rewrite "I am not creative" as **a line about the efficacy you have built so far in this task**.
Moving Beyond "I Am Not a Creative Person"	Starter	Do **one 15-minute task** in a field where you already feel able to do the job.
Moving Beyond "I Am Not a Creative Person"	Middle	Raise **one job-complexity or mastery step** inside a familiar task, and note your belief 1 to 5 after.
Moving Beyond "I Am Not a Creative Person"	Advanced	Rate your belief 1 to 5 before and after **three short trials you can finish**, keeping self-rating apart from product quality.
Fixation	Try it	**Name the idea you keep returning to in one**

Topic	Level	Exercise
		sentence. Stop, and set a timed delay before your next attempt.
Fixation	Starter	**After your first stuck attempt, do a low-demand, unrelated activity**, then return once.
Fixation	Middle	Once you have named the idea you keep returning to, change only the representation, a sketch and then a verbal list, then stop.
Fixation	Advanced	On your return, forbid the named idea for 10 minutes and generate only alternatives.
Perfectionism, Fear of Judgement and Comparison	Try it	Split your standards into **one quality goal and one originality goal**. Keep them apart for 20 minutes.
Perfectionism, Fear of Judgement and Comparison	Starter	Time-box a deliberately unfinished draft, and **stop at the timer even if it is imperfect**.
Perfectionism, Fear of Judgement and Comparison	Middle	Spot socially prescribed lines such as “they will think”, and **rewrite each as a self-standard or drop it**.
Perfectionism, Fear of Judgement and Comparison	Advanced	Watch for the inverted U. If standards keep rising with no new drafts, **pause raising the bar**.
Changing the Task, the Materials, the Setting or the Pace	Try it	**Change only how the task is framed.** Rewrite the prompt in one new sentence, then work on it for 15 minutes.
Changing the Task, the Materials, the Setting or the Pace	Starter	**Change the room or desk setup only**, and keep the same problem for 15 minutes.

Topic	Level	Exercise
Changing the Task, the Materials, the Setting or the Pace	Middle	Use a tool or material you never use for this task.
Changing the Task, the Materials, the Setting or the Pace	Advanced	Change pace only, with a half-speed careful pass and then a timed burst on the same prompt.
Protecting Time and Making a Place to Work	Try it	Pick one cue, the same seat or the same time after something. Do a 20-minute create block today.
Protecting Time and Making a Place to Work	Starter	Prepare the place once, with a clear surface, tools ready and the phone out of reach before the cue.
Protecting Time and Making a Place to Work	Middle	Raise your autonomy by choosing the task inside the protected block yourself.
Protecting Time and Making a Place to Work	Advanced	Log cue adherence for 14 days, and note how automatic it feels, with nothing on product quality.
New Experiences, Encouraging People and Honest Feedback	Try it	Take part in one active new experience tied to your project, more than watching.
New Experiences, Encouraging People and Honest Feedback	Starter	Ask one peer for informational feedback on what to try next, with no score.
New Experiences, Encouraging People and Honest Feedback	Middle	Work near a creative peer and reduce close monitoring for one session.
New Experiences, Encouraging People and Honest Feedback	Advanced	Pair developmental feedback with autonomy by choosing how to use the note yourself.
	Try it	

Topic	Level	Exercise
Returning After a Break, a Setback or a Major Life Change		In your first session after a break, **work for 15 minutes, in private, with no audience and no score**.
Returning After a Break, a Setback or a Major Life Change	Starter	Write the date you stopped and the date you restart, and **mark the gap as a break with no verdict**.
Returning After a Break, a Setback or a Major Life Change	Middle	Choose **a smaller re-entry scope**, one unfinished piece only, and park the rest for a week.
Returning After a Break, a Setback or a Major Life Change	Advanced	Map the life change in one line, pick **which creative thread still fits** and restart only that.
Pretend Play, Stories, Drawing, Building and Questions With More Than One Answer	Try it	Ask one open question with at least three acceptable answers. **Collect your child's answers without ranking them.**
Pretend Play, Stories, Drawing, Building and Questions With More Than One Answer	Starter	Give **15 minutes to pretend play or building** in which no adult offers a "better" solution.
Pretend Play, Stories, Drawing, Building and Questions With More Than One Answer	Middle	If scores or "slump" talk come up, **note the Torrance variation and the Kim critiques side by side**.
Pretend Play, Stories, Drawing, Building and Questions With More Than One Answer	Advanced	**Map one child's idea as mini-c personal understanding**, leaving any TTCT score out of the map.
Helping a Child Without Taking Over the Idea	Try it	**When you help, ask one question about the process.** Give no verdict on the person.
Helping a Child Without Taking Over the Idea	Starter	**Leave the materials in the child's hands**, and keep

Topic	Level	Exercise
		adult hands off the product.
Helping a Child Without Taking Over the Idea	Middle	Replace “you’re not artistic” with one line saying improvement is possible.
Helping a Child Without Taking Over the Idea	Advanced	After feedback, check whether the child still wants to keep going with that aim.
Interests, Skills and Personal Projects	Try it	Pick one interest. **Give it a 20-minute personal project block with no grade.**
Interests, Skills and Personal Projects	Starter	**Name one skill to practise** inside that interest this week.
Interests, Skills and Personal Projects	Middle	**Compare an originality goal with a fluency goal once**, since peaks differ by task.
Interests, Skills and Personal Projects	Advanced	**Try one short ideation practice session**, then go back to the personal project.
Peer Judgement, Online Comparison and Finding Your Own Direction	Try it	**Spend one creative hour with the metrics hidden**, with no view of likes.
Peer Judgement, Online Comparison and Finding Your Own Direction	Starter	After seeing a peer’s post, **write your next step for your own project**, with ranks left out.
Peer Judgement, Online Comparison and Finding Your Own Direction	Middle	After a comparison spike, **switch to a private 15-minute direction draft** with no audience.
Peer Judgement, Online Comparison and Finding Your Own Direction	Advanced	If shame spikes after critique, **pause public sharing and keep a private mini-c draft**.

Topic	Level	Exercise
Creating Alongside Work, Family and Limited Time	Try it	**Book one 25-minute create block** straight after a fixed daily cue.
Creating Alongside Work, Family and Limited Time	Starter	If interrupted once, **resume at the next cue** and leave the streak myth behind.
Creating Alongside Work, Family and Limited Time	Middle	**Trade one obligation block for a create block** this week, keeping family and work agreements clear.
Creating Alongside Work, Family and Limited Time	Advanced	**List one workplace stimulant and one obstacle** to creativity this week.
Using Experience Without Becoming Trapped by Familiar Solutions	Try it	**Name your default expert solution in one line.** Then set it aside for 15 minutes.
Using Experience Without Becoming Trapped by Familiar Solutions	Starter	**Ask a non-expert one question about the problem** before you answer it yourself.
Using Experience Without Becoming Trapped by Familiar Solutions	Middle	Change the task environment once, with a new tool or a new setting.
Using Experience Without Becoming Trapped by Familiar Solutions	Advanced	Delay rework on a stuck expert problem, and take a low-demand break in between.
Drawing on a Lifetime of Experience and Learning New Forms	Try it	Name one lifetime skill. **Invent one new form that uses it, for 20 minutes.**
Drawing on a Lifetime of Experience and Learning New Forms	Starter	**Join or sample one professionally led arts session** if one is available.
Drawing on a Lifetime of Experience and Learning New Forms	Middle	**Learn one unfamiliar tool or medium** for a familiar theme.
	Advanced	

Topic	Level	Exercise
Drawing on a Lifetime of Experience and Learning New Forms		**Track process enjoyment apart from product polish** for 2 weeks.
Adapting Tools and Pace, and Creating With Others	Try it	**Create with one other person for 20 minutes.** Share informational comments only.
Adapting Tools and Pace, and Creating With Others	Starter	**Adapt one tool**, such as larger print, a seated option or a shorter bout.
Adapting Tools and Pace, and Creating With Others	Middle	**Set a slower pace goal** with a process checklist, leaving product ranking out.
Adapting Tools and Pace, and Creating With Others	Advanced	If a session is missed, **resume at the next scheduled group** with no “catch-up grind”.
Adapting Creative Practice to Different Strengths and Needs	Try it	**Choose divergent or convergent practice to match today’s goal**, and pick only one.
Adapting Creative Practice to Different Strengths and Needs	Starter	**Build creative self-efficacy with one finishable task** in a strength domain.
Adapting Creative Practice to Different Strengths and Needs	Middle	**Reject one popular dyslexia or ADHD creativity myth** using the mixed-evidence labels from Wolff and Lundberg, Boot and the Hoogman review.
Adapting Creative Practice to Different Strengths and Needs	Advanced	**Co-design adaptations with the person**, covering tools, time and feedback style.
Notebooks, Sketchbooks, Voice Notes and Collections of Examples	Try it	**Sketch one stuck design for 10 minutes**, and leave feelings out of it.
	Starter	

Topic	Level	Exercise
Notebooks, Sketchbooks, Voice Notes and Collections of Examples		**Collect five examples and mark one feature you refuse to copy.**
Notebooks, Sketchbooks, Voice Notes and Collections of Examples	Middle	**Capture a stuck problem in one sentence** in a notebook, sleep on it and reopen it once.
Notebooks, Sketchbooks, Voice Notes and Collections of Examples	Advanced	**Use the same capture cue for two weeks**, with no journaling prompts.
Diagrams, Mind Maps, Storyboards and Physical Models	Try it	**Draw a concept map of one topic you are studying**, then quiz yourself on it tomorrow.
Diagrams, Mind Maps, Storyboards and Physical Models	Starter	**Build a node-link diagram of causes and effects** for one problem, and quiz your recall only.
Diagrams, Mind Maps, Storyboards and Physical Models	Middle	**Draw one storyboard strip of four panels**, then a second strip that forbids panel 1's solution.
Diagrams, Mind Maps, Storyboards and Physical Models	Advanced	After mapping from one exemplar, **list the features to avoid copying**.
Using Digital Tools to Write, Draw, Compose, Design and Experiment	Try it	**Spend one digital draft block writing, drawing or composing**, with public metrics hidden.
Using Digital Tools to Write, Draw, Compose, Design and Experiment	Starter	**Export two file versions made under different constraints** before merging.
Using Digital Tools to Write, Draw, Compose, Design and Experiment	Middle	If you use an image generator, **generate only after your own first sketch**.
Using Digital Tools to Write, Draw, Compose, Design and Experiment	Advanced	**Compare one ChatGPT-assisted idea set with an unaided set**, and note which ideas are

Topic	Level	Exercise
		incremental and which radical.
What AI Can and Cannot Do for Your Creativity	Try it	**Write what AI can and cannot do for you in one line each**, from the Doshi finding.
What AI Can and Cannot Do for Your Creativity	Starter	**List uses for one object with and without a chatbot**, and keep your best human idea.
What AI Can and Cannot Do for Your Creativity	Middle	**Ask for incremental options**, then write one radical option yourself.
What AI Can and Cannot Do for Your Creativity	Advanced	**Compare your idea set with a peer's AI-assisted set** for sameness.
Using a Chatbot to Generate Alternatives and Challenge Your Ideas	Try it	**Ask a chatbot for 10 alternatives**, then delete the 5 most generic.
Using a Chatbot to Generate Alternatives and Challenge Your Ideas	Starter	**Ask the chatbot to attack your favourite idea** with informational critiques only.
Using a Chatbot to Generate Alternatives and Challenge Your Ideas	Middle	**Request incremental options**, then write one radical option without the chatbot.
Using a Chatbot to Generate Alternatives and Challenge Your Ideas	Advanced	**Compare your alternatives with a peer's AI list** for overlap.
Spot the Cliché	Try it	**Highlight repeated phrases and tropes in an AI draft**, then rewrite three of them.
Spot the Cliché	Starter	**Forbid the AI's first suggested concept family** for 10 minutes.
Spot the Cliché	Middle	**Mark each AI line incremental or radical**,

Topic	Level	Exercise
		and force one radical rewrite.
Spot the Cliché	Advanced	**Lay your draft beside a peer's AI draft** and list the shared clichés to delete.
Keeping Your Own Direction and Making the Final Choices	Try it	**Before accepting any AI line, write your direction in one sentence.**
Keeping Your Own Direction and Making the Final Choices	Starter	**Mark each AI suggestion keep, kill or change**, and make every choice yourself.
Keeping Your Own Direction and Making the Final Choices	Middle	**Protect one uncommon detail** the model keeps deleting.
Keeping Your Own Direction and Making the Final Choices	Advanced	**Make a final pass with the AI off**, and compare it with the AI draft for sameness.
What Each Game Practises and What Its Score Means	Try it	**After any puzzle session, write "I practised X in this game, and I claim no far transfer to Y".**
What Each Game Practises and What Its Score Means	Starter	**Play for process**, and hide the score for one run if the game allows it.
What Each Game Practises and What Its Score Means	Middle	**Pair a game session with a real creative micro-task** straight afterwards.
What Each Game Practises and What Its Score Means	Advanced	**After one Word Hunt Letter Chain round, read the page's list of missed words**, write which endings or lengths you passed over, and record it as that game's result only.
Choosing Games, Difficulty, Apps and Offline Alternatives	Try it	**Spend 10 minutes on an offline sketch exploration, with no app.**
Choosing Games, Difficulty, Apps and Offline Alternatives	Starter	**Do a paper uses task for one object** for 3 minutes, and count the uses.

Topic	Level	Exercise
Choosing Games, Difficulty, Apps and Offline Alternatives	Middle	If you use any brain-training app, write its near-transfer limit in one line.
Choosing Games, Difficulty, Apps and Offline Alternatives	Advanced	Choose one fluency game mode, Letter Chain or Letter Wheel, as the screen partner of the Starter paper list, alternate the two across sessions and keep each count separate.

Pick the topic that matches the week you are having. A week of short nights points to the sleep topic, and a week stuck on the same idea points to the fixation topic. Do its Try it the same day.

Exercises by method

Each method has its own topic in the next table, in the order the book teaches them. **The four stages of creative problem solving come first**, followed by brainstorming, the SCAMPER prompts, analogy, lateral thinking, combination tables, contradictions, design thinking, the methods that give an idea a form and the ways to choose and combine methods.

Table C.4: Methods

Topic	Level	Exercise
Clarify	Try it	Write one task from your week as three wishes starting It would be great if. Keep the wish with the most unknowns.
Clarify	Starter	Pick one task and list everyone it touches. Write what each person would call the real task.

Topic	Level	Exercise
Clarify	Middle	Write your task with both wants, then with one dropped. **List the ideas the shorter version shuts out.**
Clarify	Advanced	Take a real task from home or work. Climb it with why, check it against your starter list and write one framed statement to carry into Ideate.
Ideate	Try it	Take one framed task. For five minutes, **list every idea you can** without crossing any out.
Ideate	Starter	List ideas for one framed task for five minutes. **Mark the minute when a new kind of idea first appears**, and keep going past it.
Ideate	Middle	Before a group talk about ideas, write your own list alone. Pool the lists before anyone speaks.
Ideate	Advanced	Take a real framed task. List twenty ideas without judging, then put the list away until tomorrow.
Develop	Try it	Take a list of ideas and write one test from your limits, such as time or money. **Cross out the ideas that fail it.**
Develop	Starter	Write one idea and its details on a card. **Ask someone to say how they would carry it out**, and fix what they get wrong.
Develop	Middle	Give your list and tests to someone else. Compare their picks with yours and rewrite one test.

Topic	Level	Exercise
Develop	Advanced	Take a real task. Write tests, choose one idea, fix three weak spots and make it ready to try.
Implement	Try it	Pick one idea you have written down. **Write the smallest action** that would put it into the world this week.
Implement	Starter	For one idea, **write two or three signs** that would show a first try is done.
Implement	Middle	List every job in the try. Give each an owner and a date, and name one person to ask for feedback.
Implement	Advanced	Take a real idea. Run the try, write three lines afterwards and make one change before the next try.
Brainstorming Alone	Try it	Find a spot where nobody can see your page. **Write ideas for one task until the page is full**, then count them.
Brainstorming Alone	Starter	Write ideas alone until you stall. **Then write three more before you stop**, and star the best of the three.
Brainstorming Alone	Middle	When others are nearby, write your ideas down and say none of them aloud until your list is done.
Brainstorming Alone	Advanced	Take a real task. Keep a private list for a week, adding ideas whenever they come, and choose only at the end.
Brainstorming Together	Try it	With two or more people, go round in turn. **Each**

Topic	Level	Exercise
		person adds one idea, with no interrupting. Stop after five rounds.
Brainstorming Together	Starter	In a group, let one person speak at a time while **the others write their own ideas** on slips.
Brainstorming Together	Middle	After a group list, ask each person to write alone for five minutes. Pool those lists and compare the counts.
Brainstorming Together	Advanced	On a real task, write alone first, build in rounds, then choose with written tests.
Brainwriting	Try it	With a few people, **each write three ideas in silence**. Pass your sheet on, and add to the next one.
Brainwriting	Starter	In a group, pass sheets round and **add to each one without talking**. Draw an arrow when you build on an idea.
Brainwriting	Middle	Run one spoken round and one written round on the same task. Count the ideas from each.
Brainwriting	Advanced	On a real task, run a written swap with names left off, then choose with written tests and keep the sheets.
Reverse Brainstorming	Try it	Pick a project. **List ten ways to make it fail.** Write fast and judge none yet.
Reverse Brainstorming	Starter	Take your Try it list. **Flip each way to fail** into a way to prevent it or a change of design.

Topic	Level	Exercise
Reverse Brainstorming	Middle	In a group, have each person write a make-it-worse list alone before any talk. Pool and flip together.
Reverse Brainstorming	Advanced	On a real plan, list failure modes, mark the real risks and write one design change for each. Read the risk list again before you start.
Substitute, Combine and Adapt	Try it	Take something you use every day. **Swap one part for something else**, and write what changes.
Substitute, Combine and Adapt	Starter	Take two things you use for close jobs. **Combine them into one** and write what the new thing does.
Substitute, Combine and Adapt	Middle	Name one problem in plain words. Borrow a feature from another field and adapt it to your thing.
Substitute, Combine and Adapt	Advanced	On a real task, run Substitute, Combine and Adapt in turn, then choose with two written tests.
Modify and Put to Other Uses	Try it	Pick one thing you own. **Make one feature bigger, smaller or stronger**, and write what you get.
Modify and Put to Other Uses	Starter	Take one thing. **List ten new uses for it** and five new people who might need it.
Modify and Put to Other Uses	Middle	Run Modify and Put to other uses on one idea. Join the best of each and keep the better version.
Modify and Put to Other Uses	Advanced	On a real product or service, modify one feature, find one new use,

Topic	Level	Exercise
		then test it on three people.
Eliminate, Reverse and Rearrange	Try it	List the parts of one plan. **Remove the part that seems most needed** and write what breaks.
Eliminate, Reverse and Rearrange	Starter	Take one plan. **Swap who gives and who gets** at one step, and write the new version.
Eliminate, Reverse and Rearrange	Middle	Write the steps of a routine on cards. Rearrange them twice and keep the order that solves a problem.
Eliminate, Reverse and Rearrange	Advanced	On a real plan, remove one part, reverse one and rearrange the rest, then choose with two written tests.
Applying SCAMPER to an Object, a Story and an Everyday Problem	Try it	Pick one object near you. **Run all seven prompts on it once**, writing one answer for each.
Applying SCAMPER to an Object, a Story and an Everyday Problem	Starter	Take a short story you know. **Apply three prompts to it** and write one new version for each.
Applying SCAMPER to an Object, a Story and an Everyday Problem	Middle	Run all seven prompts on an everyday problem, then pick two answers and develop them.
Applying SCAMPER to an Object, a Story and an Everyday Problem	Advanced	Compare your object, story and problem runs. Note which prompts paid off, and explain to someone why SCAMPER is a practice drill with thin evidence.
Finding a Similar Principle in a Different Situation	Try it	Name one situation where a problem got solved. **List the relations that made it**

Topic	Level	Exercise
		work, and leave out how it looked.
Finding a Similar Principle in a Different Situation	Starter	Take the relations from your Try it. **Map them onto a new problem**, and ignore any matches in looks.
Finding a Similar Principle in a Different Situation	Middle	If stuck, write what you are trying to achieve, and find a situation that achieved it.
Finding a Similar Principle in a Different Situation	Advanced	Pick a source from a far field. Map its relations onto a real problem, and list where the fit breaks.
Borrowing Ideas From Nature, Other Fields and Everyday Experience	Try it	Pick one problem. **Borrow one idea from nature, another field or daily life**, and write how it might help.
Borrowing Ideas From Nature, Other Fields and Everyday Experience	Starter	Take the idea from your Try it. **Write the principle in one line**, without naming the source.
Borrowing Ideas From Nature, Other Fields and Everyday Experience	Middle	Write what must be true in your setting for the idea to work, and tick what you can meet.
Borrowing Ideas From Nature, Other Fields and Everyday Experience	Advanced	For a real problem in your field, take one source of each kind. Compare their principles by purpose, fit and reality. Keep the best and say why the rest fail.
Making the Familiar Strange and the Strange Familiar	Try it	Pick a place or task you know well. **Describe it as if you had never seen it**, in plain actions.
Making the Familiar Strange and the Strange Familiar	Starter	Pick something strange to you. **Name the relations it shares with something you know** until it feels ordinary.

Topic	Level	Exercise
Making the Familiar Strange and the Strange Familiar	Middle	On one problem, make it strange to spot an odd part, then make the fix familiar by linking it to a known solution.
Making the Familiar Strange and the Strange Familiar	Advanced	Offer one change from these moves to the person who runs a real place, and get their yes.
Turning a Comparison Into a New Idea	Try it	Write one comparison for a problem as **Like X because of a relation, therefore we could try Y.**
Turning a Comparison Into a New Idea	Starter	Write five comparisons for one problem. **Drop the ones that share only looks**, and keep the rest.
Turning a Comparison Into a New Idea	Middle	For each one kept, write what the idea must achieve, and rewrite the therefore line to meet it.
Turning a Comparison Into a New Idea	Advanced	Use a comparison for a real decision. Choose the therefore line with tests from the people affected.
Challenging Assumptions and Reversing the Usual Approach	Try it	Name when the usual approach acts, such as after a problem appears. **Write how it would work at the opposite time**, such as before.
Challenging Assumptions and Reversing the Usual Approach	Starter	Take a task where A usually goes to B. **Write what would happen if B came to A**, and what that would need.
Challenging Assumptions and Reversing the Usual Approach	Middle	Alone on paper, name the usual helper. Write a version with the opposite kind of helper.
	Advanced	Apply two different reversals to one real brief.

Topic	Level	Exercise
Challenging Assumptions and Reversing the Usual Approach		Judge both against stated criteria and keep one for a small trial.
Random Entry	Try it	Cover the problem. **Draw one random word or image**, and list eight handles it brings to mind before you link any of them.
Random Entry	Starter	Take three handles from your Try it list. **Force a link from each** to your problem, and keep the least obvious.
Random Entry	Middle	Set a timer for five minutes of linking from a new random word, then choose the two links that pass a check.
Random Entry	Advanced	For a real task, write a colleague's must-have first. Draw three random words and keep the links that meet it.
Provocation	Try it	Write one plainly false statement about a problem. **List five things that would follow** if it were true.
Provocation	Starter	From your Try it list, **pull out one usable direction** and write its principle. Drop the rest.
Provocation	Middle	Write a second provocation that bends the problem the opposite way, and compare the two lists.
Provocation	Advanced	In your own field, choose a direction from a provocation that can be trialled safely. Write the

Topic	Level	Exercise
		trial, what could go wrong and how you would notice.
Moving From an Unexpected Thought to a Useful Possibility	Try it	Catch one unexpected thought, yours or someone else's. **Write its core in one line**, and one possibility built on it.
Moving From an Unexpected Thought to a Useful Possibility	Starter	For the possibility in your Try it, **list three tests it must meet**.
Moving From an Unexpected Thought to a Useful Possibility	Middle	Revise it, one or two changes at a time, until at least two tests pass. Keep the core the same.
Moving From an Unexpected Thought to a Useful Possibility	Advanced	Take an unexpected thought from your work and climb its ladder. Write a small trial plan for the top rung.
Constraints as a Creative Tool	Try it	Pick one task. **Add one limit on time, materials or rules**, and list five ideas that fit inside it.
Constraints as a Creative Tool	Starter	Remove the limit from your Try it. **Make a second list** and compare it with the first.
Constraints as a Creative Tool	Middle	For one task, write a limit that would help and one that would harm, and what each removes.
Constraints as a Creative Tool	Advanced	For a real task in your field, write its purpose and design one limit that serves it. Run a short session inside the limit.
Separating a Challenge Into Features and Options	Try it	Pick a task you are stuck on. **List four to six features**, parts that could be done in different ways.
	Starter	

Topic	Level	Exercise
Separating a Challenge Into Features and Options		For each feature from your Try it, **list at least three options**, including one you would never normally pick.
Separating a Challenge Into Features and Options	Middle	Mark each feature fixed or free, and write the fixed limits at the top of the page.
Separating a Challenge Into Features and Options	Advanced	For a real task at work, list features and options with a colleague, ready to combine in a table.
Building a Combination Table and Exploring New Arrangements	Try it	Build a small table for one task. **Write three features with three options each**, and read out one combination.
Building a Combination Table and Exploring New Arrangements	Starter	In your Try it table, **circle three combinations** you would never have planned.
Building a Combination Table and Exploring New Arrangements	Middle	With two or three others, each fill a table alone in writing, then merge the sheets and read ten combinations aloud.
Building a Combination Table and Exploring New Arrangements	Advanced	Build a table for a real task at work. Read combinations in all four ways and shortlist five, with one note on why each is worth checking.
Choosing Combinations to Develop Further	Try it	Write one line on what your task is for. **Pick the two combinations from your table** that serve it best.
Choosing Combinations to Develop Further	Starter	Cross out every combination on your shortlist that **breaks a fixed limit**, such as a budget or a date.
	Middle	

Topic	Level	Exercise
Choosing Combinations to Develop Further		Develop one surviving combination into a one-page outline with its first step, its total cost and one thing to pack or arrange.
Choosing Combinations to Develop Further	Advanced	Take a chosen combination from a real work table to a small trial. Write what counts as a pass, and name who will judge it.
Finding the Contradiction	Try it	Pick a task where a fix made something else worse. **Name what improved and what got worse.**
Finding the Contradiction	Starter	Write your Try it result as **one sentence** with the move in the middle.
Finding the Contradiction	Middle	List three ways the contradiction shows up in a normal week, each in one short line.
Finding the Contradiction	Advanced	For a real task at work, write a contradiction a stakeholder would recognise, and check the wording with them.
Using Selected Inventive Principles in Everyday Examples	Try it	Pick one prompt. **List three applications** of it to your named contradiction.
Using Selected Inventive Principles in Everyday Examples	Starter	Apply a second prompt to the same contradiction. **Keep the better fit** from the two prompts.
Using Selected Inventive Principles in Everyday Examples	Middle	Apply one prompt to an everyday object, then transfer the useful part back to your task.
Using Selected Inventive Principles in Everyday Examples	Advanced	On a real work contradiction, keep one prompt application that

Topic	Level	Exercise
		survives your purpose, cost and safety checks.
Looking for a Different Arrangement Instead of Accepting the First Compromise	Try it	Write your first compromise in one sentence. **Invent one different arrangement** that aims to serve both halves of your contradiction.
Looking for a Different Arrangement Instead of Accepting the First Compromise	Starter	Score your first compromise and your new arrangement on **what the task is for**, plus cost and safety.
Looking for a Different Arrangement Instead of Accepting the First Compromise	Middle	Change the place or sequence of a resource or step, and write how that serves both halves.
Looking for a Different Arrangement Instead of Accepting the First Compromise	Advanced	On a real work contradiction, use the written first compromise as the benchmark. Strike amount-change disguises, and stop when one arrangement beats it on purpose, cost and safety.
Understanding the People You Are Creating For	Try it	Pick one thing you are making or fixing. **Do one short watch** and write three notebook lines about who came and what they did.
Understanding the People You Are Creating For	Starter	Note one assumption about the people you watched, and **check it against a real cue** from a short watch or a quote.
Understanding the People You Are Creating For	Middle	Write one user need plus one limit, with no solution named.
Understanding the People You Are Creating For	Advanced	For a real task at work, write a need a stakeholder

Topic	Level	Exercise
		accepts in their own words.
Defining the Real Need and Generating Solutions	Try it	Take one need from a real task. **Rewrite it as a question that starts with how might we**, with no solution named.
Defining the Real Need and Generating Solutions	Starter	For the question from your Try it, **list eight solutions**, including one you would normally reject.
Defining the Real Need and Generating Solutions	Middle	Sort the eight into groups, then keep two that come from different groups.
Defining the Real Need and Generating Solutions	Advanced	For a real user group at work, write a how-might-we question they accept and generate solutions aimed at them.
Quick Prototypes, Testing and Learning From Users	Try it	Pick one keeper idea. **Build a ten-minute prototype** that a user can see or touch.
Quick Prototypes, Testing and Learning From Users	Starter	Show your ten-minute prototype to one person and **note one surprise** in their words.
Quick Prototypes, Testing and Learning From Users	Middle	Revise one feature from that surprise, and show the new version to the same person.
Quick Prototypes, Testing and Learning From Users	Advanced	For a real work task, run two build, show, change rounds on the same prototype. Before round two, name the one feature you will change, and stop when a round brings no new surprise.
Mind Mapping as a Method for Generating Ideas	Try it	Write one problem in the middle of a blank page. **Add six branches of**

Topic	Level	Exercise
		associations, one or two words each.
Mind Mapping as a Method for Generating Ideas	Starter	Grow two branches from your Try it further and **circle three idea seeds**.
Mind Mapping as a Method for Generating Ideas	Middle	Turn the three seeds into idea statements, then check each one against the real place and write its limit beside it.
Mind Mapping as a Method for Generating Ideas	Advanced	For a real work problem, build a full map, write your criteria first and keep the statements that meet them (Scott et al., 2004).
“What If” Scenarios	Try it	Pick one real situation. **Write five world rules it runs on**, and underline the one closest to the problem.
“What If” Scenarios	Starter	Change only your underlined rule. **Tick each other rule that still holds**, and rewrite until all do.
“What If” Scenarios	Middle	From the what-if, chain lines, each following the last, until one names something the place already has.
“What If” Scenarios	Advanced	At work, write a what-if on a time, a money and a who-comes rule. Strike any too far to picture on a real day, then chain each kept one home.
The Worst Idea Technique	Try it	Pick a real problem. **List five deliberately bad solutions**, one short line each.
The Worst Idea Technique	Starter	From your Try it, **turn one bad idea into a possible**

Topic	Level	Exercise
		good idea by swapping its bad part for the opposite.
The Worst Idea Technique	Middle	With one to three others, each write five worst ideas alone on paper, then compare, turn or harvest them and choose with written tests.
The Worst Idea Technique	Advanced	For a real work problem, turn or harvest one worst idea until it meets your written criteria (Scott et al., 2004).
How Living Things Solve Problems	Try it	Name one living system near you. **List how it solves one problem**, in three short notes.
How Living Things Solve Problems	Starter	From your Try it, **state the principle in plain words**, with the living thing's name left out.
How Living Things Solve Problems	Middle	Pick one popular nature design story and write one line that a source backs and one line that is overstated.
How Living Things Solve Problems	Advanced	For a real limit at work, name a nature principle that could apply and write one limit it must meet (Scott et al., 2004).
From a Principle in Nature to a Design of Your Own	Try it	Write one principle from nature at the top of a page. **Sketch one human design** that uses it.
From a Principle in Nature to a Design of Your Own	Starter	Under your Try it sketch, **note how big the principle is in nature and how big your design must be**, and what keeps it working at the new size.
	Middle	

Topic	Level	Exercise
From a Principle in Nature to a Design of Your Own		Reread your notes and drop or rewrite any claim that matches a known overstatement.
From a Principle in Nature to a Design of Your Own	Advanced	For a real work problem, build a quick prototype of one nature principle in your own field (Scott et al., 2004).
Six Thinking Hats	Try it	Pick one idea. **Examine it in three modes, facts, risks and benefits**, for three minutes each on separate sheets.
Six Thinking Hats	Starter	After your Try it, **add a new options mode and then a decision mode**, each on its own sheet.
Six Thinking Hats	Middle	With one to three others, each write every mode alone on paper before anyone reads out.
Six Thinking Hats	Advanced	For a real work idea, run the modes with criteria from the people the idea would affect (Scott et al., 2004).
Sketches, Drafts, Models and Prototypes	Try it	Take one idea. **Make two quick sketches of it**, each a different layout, and write one thing each sketch shows that the other hides.
Sketches, Drafts, Models and Prototypes	Starter	Turn one Try it sketch into **one paper model or one draft paragraph**.
Sketches, Drafts, Models and Prototypes	Middle	Compare your two sketches side by side and list every way they differ before choosing one to take further.
	Advanced	

Topic	Level	Exercise
Sketches, Drafts, Models and Prototypes		For a real work idea, make a shape the people it affects can react to (Scott et al., 2004) and check it against real limits (Cropley, 2006).
Trying the Idea, Gathering Feedback and Revising It	Try it	Pick one idea. **Try it for ten minutes in real use**, and write down one surprise in a single line.
Trying the Idea, Gathering Feedback and Revising It	Starter	After your Try it, **ask one person who used the idea one descriptive question**.
Trying the Idea, Gathering Feedback and Revising It	Middle	Change one feature from what you learned and run the same try window once more.
Trying the Idea, Gathering Feedback and Revising It	Advanced	For a real work idea, run two rounds of change, judged against criteria from the people it affects (Scott et al., 2004).
Deciding What to Finish, Change or Set Aside	Try it	Take four to six ideas. **Sort them into finish, change and set aside**, and write one reason beside each.
Deciding What to Finish, Change or Set Aside	Starter	Write **one hard limit of the job that forces at least one idea into set aside**.
Deciding What to Finish, Change or Set Aside	Middle	Pick one idea to finish first, and write two change tasks for one idea in the change pile.
Deciding What to Finish, Change or Set Aside	Advanced	Sort a set of real work ideas with criteria from the people they affect (Scott et al., 2004).
Combining Methods	Try it	Take one problem. **Run one method for five minutes, then a second method for five minutes**, on separate sheets.

Topic	Level	Exercise
Combining Methods	Starter	After your Try it, **mark every idea with a letter for the method that made it**.
Combining Methods	Middle	Add a select step with three written limits and choose one idea.
Combining Methods	Advanced	Run a method pair on a real work problem with criteria from the people it affects (Scott et al., 2004), and if others join, have each person write alone.
Choosing a Method for the Difficulty You Are Facing	Try it	Take one problem of your own. **Name the difficulty in one sentence**, then pick the method family that fits it.
Choosing a Method for the Difficulty You Are Facing	Starter	If the need is unclear, **start with problem construction** before any idea-making method.
Choosing a Method for the Difficulty You Are Facing	Middle	If a group needs many ideas, have everyone write alone first.
Choosing a Method for the Difficulty You Are Facing	Advanced	For a real work problem, pick a method and add a judging step (Cropley, 2006; Scott et al., 2004).
Learning From Creative Work	Try it	Pick one short creative work you admire. **Study it for ten minutes**, and list its parts with one line on what each part does.
Learning From Creative Work	Starter	**Reconstruct the parts in your own words**, with the original out of sight.
Learning From Creative Work	Middle	Vary one part and create a new version.
Learning From Creative Work	Advanced	In your own field, run the study, reconstruct, vary and create cycle once.

Topic	Level	Exercise
Practising Through Writing, Images, Music, Movement and Making	Try it	Take one problem of your own. **Work on it in one thinking form besides prose**, a sketch, a short movement or a list of sounds.
Practising Through Writing, Images, Music, Movement and Making	Starter	**Translate your Try it thinking form back into one written sentence.**
Practising Through Writing, Images, Music, Movement and Making	Middle	Work on the same problem in a second thinking form, and compare what the two thinking forms showed.
Practising Through Writing, Images, Music, Movement and Making	Advanced	Use a thinking form your own field relies on, such as plans for a builder or a rehearsal for a teacher (Scott et al., 2004).
Applying Creativity at Home, at Work and in Everyday Decisions	Try it	Pick one difficulty at home or at work. **Apply one method to it for ten minutes**, and keep everything you write.
Applying Creativity at Home, at Work and in Everyday Decisions	Starter	**Write your decision criteria before choosing** an option.
Applying Creativity at Home, at Work and in Everyday Decisions	Middle	If other people are involved, have everyone write ideas first.
Applying Creativity at Home, at Work and in Everyday Decisions	Advanced	Take a real workplace difficulty with its limits (Acar et al., 2019), and apply a method to it (Puccio et al., 2006; Scott et al., 2004).
Completing a Personal Project and Reviewing What You Learned	Try it	Pick a small personal project. **Write what done looks like in three lines** that someone else could check.
	Starter	

Topic	Level	Exercise
Completing a Personal Project and Reviewing What You Learned		**Complete a minimum version** of your Try it project.
Completing a Personal Project and Reviewing What You Learned	Middle	Review it with what worked and what to change next, as a short checklist.
Completing a Personal Project and Reviewing What You Learned	Advanced	Take a project in your own field to a finish, with feedback from the people it is for once along the way (Scott et al., 2004).
Daily Creative Drills	Try it	Pick one ability. **Run one ten-minute drill for it today**, and keep what you write.
Daily Creative Drills	Starter	**Repeat your drill tomorrow**, and expect the habit to take weeks or months to feel automatic, if it ever does.
Daily Creative Drills	Middle	Rotate the abilities across the days of one week.
Daily Creative Drills	Advanced	Build a ten-minute drill on a problem from your real work.
Creative Challenges of Rising Difficulty, From First Attempts to Open Projects	Try it	Pick a field you work in. **Set yourself a tightly limited task**, with a fixed size, material and time, and make one attempt.
Creative Challenges of Rising Difficulty, From First Attempts to Open Projects	Starter	**Do the same topic again with one limit removed.**
Creative Challenges of Rising Difficulty, From First Attempts to Open Projects	Middle	Take an ill-defined problem in the same field, and construct the problem before you make anything, then give the ideas a long session.
	Advanced	

Topic	Level	Exercise
Creative Challenges of Rising Difficulty, From First Attempts to Open Projects		Choose an open project in your field, and write evaluate and finish criteria before you start.

Learn one method at a time. Run its Try it on a small problem first, then use the Starter row on a real one. Move on to the next method once you can run the steps without reading them.

Exercises by field

The field exercises put the skills and methods to work on one kind of making. **Writing, images, music, making, invention, products and services, home life and moving a method between fields each have their own topic.** Most fields have one topic for their skills and one for a whole project.

Table C.5: Fields

Topic	Level	Exercise
Finding Stories, Characters and Voices	Try it	Take one thing you saw today. **Write five story seeds from it**, one line each.
Finding Stories, Characters and Voices	Starter	Take your best seed. **Give it three characters**, each with a different want, and write one sentence in each voice.
Finding Stories, Characters and Voices	Middle	Write one short scene in two voices. Rate both on two things a skilled reader would look for, then ask one skilled reader to rate them.
Finding Stories, Characters and Voices	Advanced	Finish a scene of one page and read it to a real audience. Note which lines they remember.

Topic	Level	Exercise
A Writing Project From First Idea to Revision	Try it	From one story seed, write a one-page first draft in twenty minutes. Keep going without fixing anything.
A Writing Project From First Idea to Revision	Starter	Write a second first draft of the same seed from a different starting scene. Compare the two before anyone critiques either.
A Writing Project From First Idea to Revision	Middle	Pick two things to improve, revise only for those and write one note for each change.
A Writing Project From First Idea to Revision	Advanced	Give the draft to one skilled reader. Revise once under a single limit, such as 20 percent fewer words.
Seeing, Sketching and Composing	Try it	In ten minutes, make ten one-minute sketches of things within reach, one per minute. Draw only edges and shadows.
Seeing, Sketching and Composing	Starter	Pick one view. Draw it in three frames, wide, middle and close, using the card window.
Seeing, Sketching and Composing	Middle	Develop the best frame into a fuller drawing. Give one viewer who draws the five-second look, then change one thing.
Seeing, Sketching and Composing	Advanced	Finish one study of your one thing and give it to a real viewer. Note where their eye went first.
A Visual Project From First Sketch to Finished Piece	Try it	For one poster or picture, sketch three thumbnails in six minutes. Give each a different main picture.

Topic	Level	Exercise
A Visual Project From First Sketch to Finished Piece	Starter	Take all three thumbnails to rough colour. **Pick one, and write why it beat the others.**
A Visual Project From First Sketch to Finished Piece	Middle	Rank every part of your pick 1 to 5 by importance. **Make one greyscale version, in greys only,** where size and contrast follow that order, adding nothing new.
A Visual Project From First Sketch to Finished Piece	Advanced	Finish the piece under named limits, such as size, colours and date, and put it where it will be seen.
Playing With Rhythm, Melody and Sound	Try it	Make up eight bars of rhythm only, on a tabletop or your knees. **Write the pattern down** before you add any notes.
Playing With Rhythm, Melody and Sound	Starter	Keep the rhythm from your Try it. **Write a new melody** that fits it, and play both versions.
Playing With Rhythm, Melody and Sound	Middle	Loop two chords on a phone or keyboard. Improvise over them for two minutes without stopping.
Playing With Rhythm, Melody and Sound	Advanced	Keep one eight-bar idea. Play it on a new sound source, then note what the new sound suggests.
A Music Project From Idea to Performance	Try it	Hum a thirty-second sketch into your phone. **Use one motif only**, and repeat it with small changes.
A Music Project From Idea to Performance	Starter	Build a short piece with a fixed form. **Leave one section open**, and make it up each time you play.

Topic	Level	Exercise
A Music Project From Idea to Performance	Middle	Rehearse for a week, then record one take with no stopping. Note the single place it sagged.
A Music Project From Idea to Performance	Advanced	Perform the piece for one listener who knows music. Make one change from what they say.
Materials, Tools and Hands-On Experiments	Try it	Pick one small job. **Try it in three materials**, five minutes each, and note what each one did.
Materials, Tools and Hands-On Experiments	Starter	Take the material that won your Try it. **Build the object from that material alone**, then rebuild it once with one change.
Materials, Tools and Hands-On Experiments	Middle	Build two small test versions side by side in two different materials. Note what each one gave and took away.
Materials, Tools and Hands-On Experiments	Advanced	Share one experiment with another maker. Ask what they would change, and try their idea once.
A Making Project From Model to Working Object	Try it	Write one sentence naming the object you want. **Add one test** that would prove it works.
A Making Project From Model to Working Object	Starter	Build two rough models that move in different ways. **Hold both against your test** and keep the better one.
A Making Project From Model to Working Object	Middle	Build it full size and run the test. Redesign once under one limit, and run every test once more.
A Making Project From Model to Working Object	Advanced	Give the object to one other person for a week of

Topic	Level	Exercise
		use. Fix the biggest annoyance they find.
Questions, Hypotheses and Inventive Experiments	Try it	Write three questions about one odd result you noticed. **Pick the one you could test this week.**
Questions, Hypotheses and Inventive Experiments	Starter	Take your circled question. **Write one hypothesis and one planned observation**, with time, days and a pass or fail line.
Questions, Hypotheses and Inventive Experiments	Middle	Run the mini-experiment. Note the single biggest surprise in one sentence.
Questions, Hypotheses and Inventive Experiments	Advanced	Revise the hypothesis after the result. Keep the same test where you can, and write what changed in the guess.
An Invention Project From Problem to Prototype	Try it	Watch the problem happen once in its real setting. **Write the exact spot and moment** the current fix fails.
An Invention Project From Problem to Prototype	Starter	From your failure note, list up to three jobs the prototype must do and rank them. **Aim the first rough build at the top job only.**
An Invention Project From Problem to Prototype	Middle	Run the same test under three different real conditions. Change nothing between runs, and record pass or fail for each condition.
An Invention Project From Problem to Prototype	Advanced	Document three constraints you used on the build. Date the page and keep it with the object.

Topic	Level	Exercise
Spotting Needs and Opportunities	Try it	Pick a small business you know. **Write what it sells, who pays and one thing they buy nearby** that it lacks.
Spotting Needs and Opportunities	Starter	Take the thing those payers buy elsewhere. **Write three opportunity statements** for how the business could offer it, one sentence each.
Spotting Needs and Opportunities	Middle	Rate each statement on novelty and fit from 1 to 5. Keep the highest on both scales.
Spotting Needs and Opportunities	Advanced	Write one failure claim you have heard. Set it beside the Castellion and Markham caution before you kill or keep the idea on the page.
A Product or Service Idea From Concept to Test	Try it	Write one product or service concept in a single sentence. **Add one clear check a customer could prove false** within a week.
A Product or Service Idea From Concept to Test	Starter	Write two concept cards for one need. **Ask a few people in the target group** which they would try first and why.
A Product or Service Idea From Concept to Test	Middle	For the most-picked card, write the cost of one sale, the price and a month’s fixed costs. Work out the sales that cover them.
A Product or Service Idea From Concept to Test	Advanced	Write what would kill the idea. Set it beside the Castellion and Markham caution before you stop or continue.
	Try it	

Topic	Level	Exercise
Creative Solutions at Home and in Daily Routines		Pick one daily friction. **Spend ten minutes improving it** in a way you can finish today.
Creative Solutions at Home and in Daily Routines	Starter	Make two variants of the same routine fix. **Use each one for two days** and keep the one you enjoyed using.
Creative Solutions at Home and in Daily Routines	Middle	Name one constraint as a design rule and rebuild the kept fix inside it once.
Creative Solutions at Home and in Daily Routines	Advanced	Repeat the kept fix for three days. Note one mood word each day as a practice record only, outside any therapy use.
Cooking, Gardening, Celebrations and Family Projects	Try it	Pick one familiar dish or garden bed. **Change one part only** and cook or tend it once.
Cooking, Gardening, Celebrations and Family Projects	Starter	Plan a small celebration with one constraint. **Stay inside that constraint** from the first list to the last tidy up.
Cooking, Gardening, Celebrations and Family Projects	Middle	Family project. Make one physical piece with the people you live with.
Cooking, Gardening, Celebrations and Family Projects	Advanced	Teach one small skill that is new to the learner, then watch them try it once without taking over.
Carrying a Method From One Field to Another	Try it	Name one method you already use. **Write its source domain and a target domain** where you want to try it.
Carrying a Method From One Field to Another	Starter	List what must change for your method to fit the target domain. **Star one change** to try first.

Topic	Level	Exercise
Carrying a Method From One Field to Another	Middle	Run a twenty-minute trial in the target domain. Score fit on your named dimensions and note what broke and what held.
Carrying a Method From One Field to Another	Advanced	Write a transfer claim that names who, where and when it held, and which claims stay outside it.

Choose the field you already work in first. Then try one topic from a field you know less well, and use the same task in both. A pencil, a page and a timer cover most of these rows.

Exercises by level

The training program sorts its exercises by level. **All the Try it rows come first, then every Starter, every Middle and every Advanced row**, so you can see each level across the whole program. The topic column shows which part of the program each row belongs to.

Table C.6: The training program, by level

Level	Topic	Exercise
Try it	Choosing What You Want to Create and Develop	**Name one domain and one 4-week deliverable** with a proficiency standard.
Try it	Recording a Baseline Through Several Creative Tasks	**List uses for one object for 3 minutes**, count fluency and circle your Top 2 for originality.
Try it	Building a Sustainable Weekly Routine Across the Four Books	**Write one if-then that names which of the four books** supplies today's drill.
Try it	How the Program Works	**Sketch the program as a daily micro-task**, a weekly

Level	Topic	Exercise
		challenge and a monthly project.
Try it	Daily Creativity Workouts	**Do a 10-minute domain micro-task at the same cue today.**
Try it	Weekly Challenges	**State one weekly challenge with a countable standard.**
Try it	Monthly Projects	**Define a 4-week product with one observer review at the end.**
Try it	Your First Twelve Weeks of Rising Difficulty	**Week 1 an easy win; week 2 add one constraint** that still feels solvable.
Try it	Adapting the Program When Life Changes	**Rewrite one if-then for the new schedule** this week.
Try it	Attention, Memory and Intellect Practice Inside Creative Work	**For one creative task, gather widely for 5 minutes**, then check with focus for 5.
Try it	One Real Task, Four Abilities	**Choose one unfinished real task from your domain.**
Try it	Measuring Fluency, Originality, Usefulness and Finished Work	**Re-score last month's saved uses list** with the same fluency rule sheet.
Try it	What "Practitioner" Means, Levels of Practice and Qualification Criteria	**Copy the book's level names into your planner**, with no outside titles.
Try it	Your Journal, Level Review and Maintenance Plan	**Write a one-line training log entry** with date, cue kept (Y or N) and task, and no prompts about feelings.
Try it	Choosing the Next Challenge and Continuing Throughout Life	**Name the next 8-week challenge** with a specific difficult standard.
Starter	Choosing What You Want to Create and Develop	**Rewrite "be more creative" into one specific difficult goal.**
Starter	Recording a Baseline Through Several Creative Tasks	**Rate each Top-2 idea for novelty, then usefulness.**
Starter		**Place the creative block on 3 non-consecutive weekdays.**

Level	Topic	Exercise
	Building a Sustainable Weekly Routine Across the Four Books	
Starter	How the Program Works	**Schedule two spaced sessions this week** in place of one massed session.
Starter	Daily Creativity Workouts	**Put an if-then card on the desk** (“After [cue], I open my tools and start”).
Starter	Weekly Challenges	**Add an if-then** (“When [weekday evening], I open the challenge brief”).
Starter	Monthly Projects	**In week 1, set a learning goal to map 5 strategies** before locking a plan.
Starter	Your First Twelve Weeks of Rising Difficulty	**Plot 12 weeks of spaced sessions** with no single binge week.
Starter	Adapting the Program When Life Changes	**Cut to a minimum bout** and keep the same cue.
Starter	Attention, Memory and Intellect Practice Inside Creative Work	**Label one sub-step “intellect check”** after idea generation.
Starter	One Real Task, Four Abilities	**Run four labelled passes** (gather, remember cues, generate, intellect check).
Starter	Measuring Fluency, Originality, Usefulness and Finished Work	**Compare this month’s Top-2 originality ratings with the starting sheet.**
Starter	What “Practitioner” Means, Levels of Practice and Qualification Criteria	**List the book’s qualification criteria** next to your current evidence.
Starter	Your Journal, Level Review and Maintenance Plan	**Each week, paste one divergent thinking score or observer rating**, and skip scores for how you feel.
Starter		**If the domain is new, assume domain**

Level	Topic	Exercise
	Choosing the Next Challenge and Continuing Throughout Life	**specificity** and plan a fresh starting record.
Middle	Choosing What You Want to Create and Develop	**If the domain is new, set a learning goal** to discover 5 strategies before a polished product.
Middle	Recording a Baseline Through Several Creative Tasks	**Have one finished mini-product rated by two appropriate observers.**
Middle	Building a Sustainable Weekly Routine Across the Four Books	**Name one specific weekly deliverable** in place of “do my best”.
Middle	How the Program Works	**Pick one realistic domain exercise and one skill heuristic** for the same week.
Middle	Daily Creativity Workouts	**Keep daily bouts short** and add a second spaced bout later in the week.
Middle	Weekly Challenges	**Write a brief with a count of attempts allowed**, and stop when the count is done.
Middle	Monthly Projects	**Apply one heuristic** to a domain-real draft.
Middle	Your First Twelve Weeks of Rising Difficulty	**Every 2 weeks, raise goal difficulty one notch** if commitment holds.
Middle	Adapting the Program When Life Changes	**Replace a hard performance goal with a learning goal** for 7 days.
Middle	Attention, Memory and Intellect Practice Inside Creative Work	**After a stuck idea, take one light break**, then return.
Middle	One Real Task, Four Abilities	**Have one observer rate the finished piece.**
Middle	Measuring Fluency, Originality, Usefulness and Finished Work	**Invite two new observers for a finished piece**, and

Level	Topic	Exercise
		keep old ratings sealed until after.
Middle	What “Practitioner” Means, Levels of Practice and Qualification Criteria	**For each criterion, attach one artifact**, such as a project, a method log or a review note.
Middle	Your Journal, Level Review and Maintenance Plan	**Rewrite your maintenance if-then** after a schedule change.
Middle	Choosing the Next Challenge and Continuing Throughout Life	**Write an if-then for the new season’s first cue.**
Advanced	Choosing What You Want to Create and Develop	**List one intrinsic reason and one extrinsic pressure**, and keep the intrinsic reason as the driver.
Advanced	Recording a Baseline Through Several Creative Tasks	**Record a self-rating separately**, and never treat it as the divergent thinking score.
Advanced	Building a Sustainable Weekly Routine Across the Four Books	**Build a four-book weekly grid** with one slot each for attention, memory, intellect and creating.
Advanced	How the Program Works	**Write one line saying practice matters** and Macnamara’s limits show it is not everything.
Advanced	Daily Creativity Workouts	**After a missed day, resume at the next cue** with no double session.
Advanced	Weekly Challenges	**Set a domain-real challenge**, and if you miss it, schedule only the next week’s cue.
Advanced	Monthly Projects	**Score final ideas for novelty, then usefulness**, and get one outside rating.
Advanced		

Level	Topic	Exercise
	Your First Twelve Weeks of Rising Difficulty	**In weeks 8 to 10, keep the cue** even if the habit still feels unfinished.
Advanced	Adapting the Program When Life Changes	**If stressors are high, shorten the creative load** and reopen it when intensity drops.
Advanced	Attention, Memory and Intellect Practice Inside Creative Work	**On the same domain task, note which book skill you used** in each phase.
Advanced	One Real Task, Four Abilities	**Write which skill each pass used**, with no new claims.
Advanced	Measuring Fluency, Originality, Usefulness and Finished Work	**Plot fluency and originality beside self-rating for 4 weeks**, and never merge the columns.
Advanced	What “Practitioner” Means, Levels of Practice and Qualification Criteria	**Strike any wording that sounds like a public licence** or accredited certificate.
Advanced	Your Journal, Level Review and Maintenance Plan	**Fill a level review sheet with the criteria** and artifacts only.
Advanced	Choosing the Next Challenge and Continuing Throughout Life	**Raise one desirable difficulty** only if last month’s challenge was solvable.

The same four levels run through the whole bank. **Table C.7 counts the rows at each level**, with the exercises set out as numbered steps counted on their own.

Table C.7: Rows at each level

Level	Rows in this bank
Try it	148
Starter	139
Middle	139

Level	Rows in this bank
Advanced	139
Steps	10
All	575

Cleverini game guide

Two Cleverini word games suit this book, and both practise fluency. **Word Hunt counts only in its Letter Chain mode, and Letter Wheel is played untimed.** Both are practice only. A game score is never a creativity test and never a diagnosis, and it is a record of that game alone.

Table C.8: The two games

Game	What the game's page says	Timer	What the score counts
Word Hunt, Letter Chain mode	"60 levels of Letter Chain, where you build your own words from touching letters", and "Letter Chain rewards the words you can actually pull from a small grid, and at the end of each round it lists the ones you missed"	Timed, "two to three minutes" a round	Points, since "a five-letter word is worth 40 points and a six-letter word 60"
Letter Wheel	"Like an anagram hunt, you look for every real word the letters can make, including the short ones that are easy to overlook"	The page names no timer	Hints, since "Three stars for finishing without a hint, two stars for one hint, and one star if you needed more"

Both games run free in a browser. **"Letter Wheel is free in your browser on phones, tablets and computers. All 160 levels are**

included, and there are no ads," its page says. Both game pages add, "It opens instantly in your browser. No sign-up needed to start."

Each page sets out its own levels and tools. **"Four-letter wheels start at level 4, five letters at 11, six at 46 and seven at 101," the Letter Wheel page says**, and it gives three free hints that reveal one letter each, plus five shuffles, at every level.

The Letter Chain page says that "Later grids and the chain mode are aimed at teens and adults," and it gives three rotations per level. Pick a level on either page that you can finish without a hint.

The skill labels on each page are the maker's own claims. **The Letter Chain page lists Visual scanning, Vocabulary and Attention, and the Letter Wheel page lists Vocabulary, Word recall and Pattern use.** Points reward longer words and stars count hints, so neither score is a count of ideas.

Offline alternatives

Every game in Table C.8 has a paper partner that practises the same skill. **The partners in Table C.9 are exercises from the bank, copied word for word**, so they need only a pencil, a page and a timer. Use them when there is no screen to hand, or alternate them with a game.

Table C.9: Paper partners

Game	Paper partner
Word Hunt, Letter Chain mode, or Letter Wheel	Set a timer for three minutes and list uses for a shoe. Cross out ideas that do not fit, then count the rest.
Either game	Do a paper uses task for one object for 3 minutes, and count the uses.

Keep the paper count and the game result in separate columns. **Label one column for the paper list and one for the game, and write the**

date beside each entry. Never add the two together, since each count is a record of that task alone. Keep the sheets in date order, so the newest count sits on top.

A paper column and a game column

- [x] Label one column for the paper list
- [x] One for the game
- [x] Write the date beside each entry

Key idea:

Pick an exercise by skill, method, field or level and read its topic from the top, and treat the two word games as fluency practice with a paper partner, each count kept on its own.

D. Practice Tasks with Worked Examples

A FRIEND ONCE ASKED ME to show him a method working on a real problem before he tried it himself. **A worked example shows each step on someone else's task**, so you can see the moves before you make them on your own. This appendix gives four tasks, each with a worked example from the book's stories.

The tasks run in the order of a real problem, from naming the difficulty, to making options, to stating a clash, to doing the work in labelled passes. Each one fits on a single sheet of paper.

The tasks run in the order of a real problem



> **Key Concept:**
>
> How to use these tasks. **Try each task on your own problem first, then read its worked example.** Every example retells a story from the module named in its table, in the same facts and numbers. Treat every step as practice, and judge it by what it gives you on your next real task.

Task 1: Name the difficulty before you pick a method

Take one problem of your own. **Write one sentence naming what makes it hard**, then pick the method family that fits it. Check the sentence for a fix hidden inside it before you go on.

Read your difficulty statement back and cross out any fix inside it. "We should get a new presenter" is a solution in disguise, so Maeve crossed it out and wrote what was hard. Some problems need no creative method at all, such as a broken machine that needs an engineer.

Table D.1: Four problems at a community radio station

Difficulty statement	Family	What happened
Nobody can name what is wrong with the breakfast show	Framing	Three rewrites gave "Listeners switch off at twenty to eight, when the news hands over to adverts"
Thirty ideas are needed for summer outdoor broadcasts	Idea-making	Six volunteers wrote alone first, and ten minutes gave forty-one ideas
Every new jingle sounds like the last	Shake-up	A random word, "kettle", gave a jingle that starts quiet and rises to a whistle
Younger listeners want the music louder and older listeners want it quieter	Trade-off	The two needs were separated by time of day, quieter before nine in the evening

Every family ended with a judging step. **For the jingle, the judge was whether it fitted the station's sound.** Once the breakfast show was framed, its problem became a need for ideas, so the family changed.

Task 2: Build a combination table

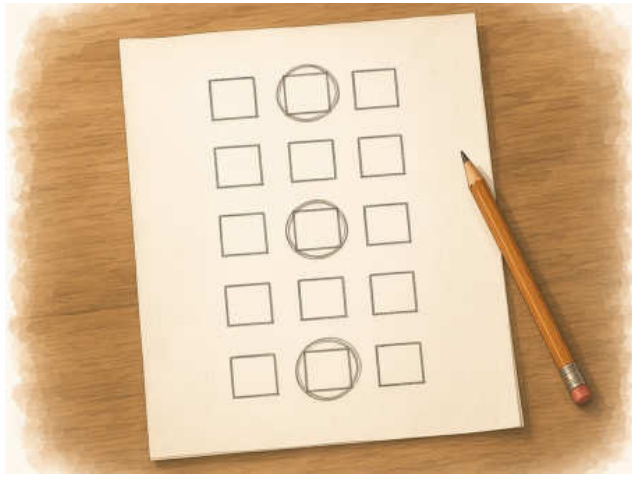
Pick one task with a few features. **Write three features with three options each**, with the usual choice in the first box of every row, and read out one combination.

Table D.2: Four ways round a holiday table

Way to move	Bruno's reading
One row at a time	Seaside, train, rented flat, cafés and the beach, last year's holiday with a different way to get there
The oddest box in every row	Own town, bikes, canal boat, cooking and doing nothing
A die for each row	Hills, coach, friend's spare room, picnics and swimming
Two anchors	Canal boat and bikes, so the place needs a canal and a towpath and meals are cooked on board

Some boxes clash when they meet. **Bruno's car clashed with almost everything**, since the canal, the bikes and the hostel would each be easier without it. He circled the canal boat week, the hills by coach and a week at home with a tent in the garden.

Ask each helper to fill the table alone first, then merge the sheets and talk, so every person's options reach the page. Talking groups make fewer and weaker ideas than the same people alone (Mullen et al., 1991; Diehl & Stroebe, 1987). A table of many combinations is a list of possibilities, and every one still needs checking.



A large sheet of paper with five rows of boxes drawn in pencil, three of them circled.

Task 3: Write the contradiction in one sentence

Pick a task where a fix made something else worse. **Write one sentence with the improving move in the middle**, the gain before it and the loss after it. Check that both halves name something you could count or time.

Write the move in the middle, so you can see the harm it causes. A contradiction appears only when the move that serves one half harms the other. Ask what you would change to get the first half, then write down what that change does to the second.

Table D.3: Two contradictions, written out

Task	Gain	Move	Loss
A community bike library	Overnight damage is cut	Heavier locks	Every morning unlock is slower
A small home freezer	Time is saved on weeknights	Cooking a double batch of chilli on Sunday	The freezer is full

Measures go beside the sentence before any inventing. **Quinn timed ten minutes of unlocking and counted two bikes lost in a month.** A second draft named the overnight need against the morning need, so the metal became one way the contradiction showed up.

Task 4: Run one real task through four passes

Choose one unfinished real task from your own field. **Run four labelled passes in a fixed order, gather, remember, generate and check**, each with its own timer and its own page. Then ask one observer to rate the finished piece.

Table D.4: A spring shop window in four passes

Pass	What Esperanza did
Gather	Walked the high street for ten minutes and noted a single hanging sign, crates of daffodils and a washing line of children's coats
Remember	Recalled that customers asked most for baby cardigans and pastel cotton, and that the best window had one big shape with a few prices on cards
Generate	Wrote twenty ideas in fifteen minutes, judging none of them as they came
Check	Tested each idea against a window two metres wide, a budget of forty pounds, prices on show and afternoon sun that fades yarn

The washing line of baby cardigans passed the check. **A window dresser rated the finished window four out of five**, and said the line drew the eye along the glass.

Keep each pass to its own job, even when an idea jumps ahead. If a judgement arrives during the generate pass, write it in the margin. If a new idea arrives during the check, add it at the bottom of the generate page. Label each pass at the top of its page first, so its job stays clear.

Each worked example is a shortened story. **Table D.5 names the section where each one is told in full**, with the method behind it.

Table D.5: Where each worked example comes from

Task	Story	Method	From
1	Maeve's four problems at a community radio station	Matching methods to difficulties	4.12.1
2	Bruno's family holiday table	Combination table	4.6.2
3	Quinn's bike library and a family freezer	Finding the contradiction	4.7.1
4	Esperanza's spring shop window	Four labelled passes on one real task	10.3.2

Do each task a second time a few days later, on a new problem. Use a problem from your own week, such as a club that has lost members or a room that never stays tidy. Keep the first page beside the second, so you can see which steps came more easily the second time.

Do each task a second time

- [x] A few days later
- [x] On a new problem

My friend tried the combination table on his allotment the following weekend. **The worked examples gave him the moves, and his own task gave him the answers.** Each task here works the same way on a problem of yours.

> **Exercise:**
>
> Do them again.
>
> 1. Write a difficulty sentence for a second problem and name its family.

2. **Build a table for a real task** and read it in all four ways.
3. Write a contradiction for a task at work and put one measure beside each half.
4. Reuse the four pass headings on your next real task.

Key idea:

Try each task on your own problem first, then check your steps against the worked example, and judge every method by what it gives you on the next real task.

Moves and answers



Try each task on your own problem first

Then check your steps against the worked example

His own task gave him the answers

E. Progress Journal and Practitioner-Level Rubrics

Twelve weeks into my own practice I opened my journal and found long pages about how each day felt. **The facts I needed for a review were buried in them.** The sheets in this appendix keep those facts short, dated and easy to find, from the first starting record to each twelve-week level review.



A spiral notebook open on a garden bench, with short dated lines running down one page.

> **Key Concept:**
>
> How to use these pages. **Every sheet copies a record from Module 10 and adds blank rows for your own.** The levels and their evidence are this book's own practice structure. No study tested them, and they give no outside title. You judge your own evidence at each twelve-week review.

The record has four parts. **A starting record, a training log, a progress chart and a level review sheet** each have a table below, in the order you will need them. The From column names the section where each part is explained.

Table E.1: The four parts of the record

Part	What it holds	When you fill it in	From
Starting record	A dated set of scores from several tasks, kept as the point that later scores are compared with	In your first week	10.1.2
Training log	One dated line for each session, with whether the cue was kept and the task	At the end of every session	10.4.3
Progress chart	Each measure in its own column, week by week	Once a week	10.4.1
Level review sheet	Each criterion for a level, the artifact that backs it and whether it is met	Every twelve weeks	10.4.3

The starting record comes first. **Write the scoring rules down before you do any task**, so the same rules can be used every time. A uses task for three minutes gives a fluency count, the Top 2 ideas are rated for novelty and then usefulness, and a finished piece is rated by observers.

Table E.2: Starting record

Date	Task and rule sheet	Fluency count	Top 2 ratings, novelty then usefulness	Observer ratings	Self column

Use a uses task with a three-minute timer and an everyday object, and count only the uses that fit the rule sheet. Rate each of your Top 2 for novelty first and usefulness second. For the finished piece, ask two observers who know the field and played no part in making it.

The self column sits at the right edge, apart from every other score. **Self-ratings and divergent thinking scores went together only weakly in one study** (Haase et al., 2018), so a self-rating belongs beside the other scores and is never added to them. Write your rating on the same scale as the observers used.

The training log keeps each session to one line. **Write the date, then Y or N for the cue, then the task in a few words.** Leave out any line about how the day felt. Once a week, add one measure on its own line, with the date and the rule sheet it used.

Write the line as soon as the session ends, before you tidy the tools away. A short line is quick to write and quick to find at review time. If you miss a session, still write the date, N for the cue and the task, so the gap shows on the page.

Table E.3: Training log

Date	Cue kept (Y or N)	Task	Weekly measure and rule sheet

When your week changes, write the date of the change in the log. **The review can then see why a line says N.** Keep the same type of measure from week to week, and start a new column if you change it.

The progress chart compares like with like. **Use the same task type, the same rater and the same scale**, and if any of those change, write the change beside the numbers. Seal old ratings in a dated envelope

before new observers see a piece, and open it only after every new score is written down.

Table E.4: Progress chart

Week	Fluency	Originality	Self-rating	Changes to task, rater or scale
1				
2				
3				
4				

Leave the columns apart, whatever the numbers do. **The chart shows your own path, with no norm to rank it against.** Each column is read against your own earlier weeks. Add the new row on the same day each week, so the gaps between rows stay equal.

The level review follows the rows of the level table. **Table E.5 copies the five levels, their descriptions and their evidence word for word**, with the section that produces each kind of evidence named inside the table.

Table E.5: Levels of practice and the evidence for each

Level	What your practice shows	Evidence to collect, and the section that produces it
Basic	You keep a short daily routine in one field and have a record of where you started	A starting record (10.1.2) and a short practice record (10.2.2)
Intermediate	You meet weekly challenges and use a heuristic on real drafts	Challenge briefs filed with their results (10.2.3) and a list of the changes a heuristic made (10.2.4)
Advanced	You finish a monthly project, choose among strategies before you start and track your measures	A strategy map and an outside rating for a finished project (10.2.4), and a progress chart of your measures (10.4.1)

Level	What your practice shows	Evidence to collect, and the section that produces it
Expert	You raise difficulty to a dated plan and can name the skills each phase of a real task used	A twelve-week difficulty ladder with each finished piece labelled by its week (10.2.5), a skill map (10.3.1) and labelled-pass pages with an observer's score (10.3.2)
Master	You keep practice going across reviews and plan each new challenge yourself	A maintenance plan (10.4.3) and a season plan for your next challenge (10.4.4)

At each twelve-week review, start with Basic and work down the table. **Stop at the first row where evidence is missing.** Your level is the row above it, and the row with the gap is your next step.

Copy each criterion word for word into the review sheet. **Beside it, name the artifact that backs it and where it is**, and tick Met only when the artifact itself is in your folder, dated.

Table E.6: Level review sheet

Criterion, copied word for word	Artifact that backs it, and where it is	Met

Fill the sheet with criteria and artifacts only. **You run the review yourself, so leave out how you feel about the work and check the evidence only.** Gather the log, the measures and the artifacts in the week before the review.

Write the outcome as one dated sentence in the journal. **If every line has an artifact, name the level and the review date.** If a line stays empty, write "keep practising" and name the missing criterion. Then write the next review date, twelve weeks on, on your maintenance card.

Exercise:

Start your record.

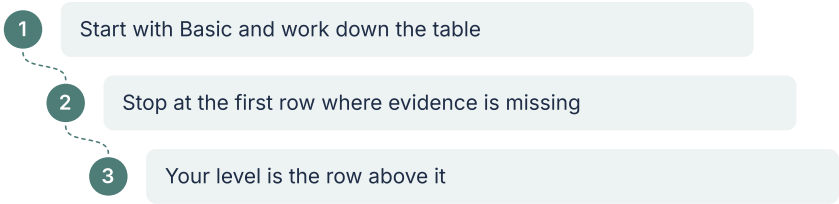
1. Write your scoring rules on a rule sheet, then fill in Table E.2 in your first week.
2. Write one line of Table E.3 at the end of every session.
3. **Add one row to Table E.4 each week**, and keep the columns apart.
4. At week twelve, copy the criteria for your next level into Table E.6 and attach one artifact to each.

My journal still holds the long pages from my early weeks, in front of the short lines. **The short lines are the ones a review can use.** Each review ends with a date for the next one and the first piece of evidence to work towards.

Key idea:

Keep fixed scoring rules, one-line logs and separate columns, and let a twelve-week review of criteria and artifacts, never your mood, show your level.

At each twelve-week review



F. A Short Glossary

A word I learned in one module can come back three modules later, and by then I have half forgotten what it meant. **This glossary gathers the book's main terms in one place**, each in the words the book used when it first explained the term. It holds 89 terms in alphabetical order.



A small wooden step stool in a library aisle, with one book pulled halfway out from the shelf above it.

> **Key Concept:**
> How to use this glossary. **Each meaning is copied from the place where the book first explains the term**, and the From column names that section. Read the full section when you want the example and the evidence behind a term. Terms that serve only one story or one exercise are left out.

The first table runs from A to L. **Method names, skills and program terms sit side by side**, so a term such as Clarify appears next to Closed task.

Table F.1: Terms from A to L

Term	Meaning	From
Adapted tool	An adapted tool is a tool changed in size, grip or print so that the maker can keep working.	8.4.2
Autonomy	Autonomy is the sense that your actions come from your own choice.	7.2.1
Benign envy	Benign envy is wanting what someone else has achieved, with no wish to take it from them.	7.3.2
Biomimicry	Biomimicry is design that borrows a working principle from a living thing.	4.10.1
Brain network	A brain network is a team of areas in different parts of the brain that tend to switch on together.	1.2.3
Brainwriting	Brainwriting is a group making ideas in writing and passing them round.	4.2.3
Caffeine budget	A caffeine budget is a day's planned caffeine total, counted from all drinks and foods, with every source added together.	6.4.1
Chatbot	A chatbot is a program that answers typed messages in a back-and-forth conversation.	9.2.1
Clarify	Clarify is finding and framing the task before you solve it.	4.1.1
Cliché	A cliché is a phrase or image used so much that it no longer surprises anyone.	9.2.4

Term	Meaning	From
Closed task	A closed task is one with so many fixed limits that only a narrow range of answers fits, which makes it a safe first attempt.	4.12.7
Contradiction	A contradiction is where making one half better makes the other half worse.	4.7.1
Convergent thinking	Convergent thinking closes in, judging those answers and keeping the best.	1.1.1
Creative mindset	A creative mindset is a belief about whether creativity is fixed at birth or can grow.	7.2.3
Creative mortification	Creative mortification is the loss of the will to chase a creative aim after a setback, in Beghetto's term (Beghetto, 2014).	8.1.2
Creative self-rating	A creative self-rating is your own score of how creative you are, kept apart from how good the work is.	7.2.3
Curiosity	Curiosity is the wish to learn something for its own sake, drawn by what is new or hard.	7.2.1
Daily workout	A daily workout is a short practice session done at the same point in each day.	10.2.2
Default solution	A default solution is the answer an experienced person reaches for first, out of habit, before studying the problem at hand.	8.3.2
Desirable difficulty	A desirable difficulty is a hard part of practice built in on purpose because it helps learning last.	10.2.1
Develop	Develop is choosing the most promising ideas and making them stronger before you try any of them.	4.1.3
Diagnosed deficiency	A diagnosed deficiency is a low level of a nutrient found by a clinician's test, the case in which a supplement may matter.	6.3.2
Dietary pattern	A dietary pattern is the overall mix of foods a person eats across weeks, as opposed to any single food or meal.	6.3.1
Difficulty ladder	A difficulty ladder is a dated plan that fixes in advance the weeks when a mastery step may be taken, with holds allowed between them.	10.2.5
Difficulty statement	A difficulty statement is one sentence naming what makes a problem hard, written before any method is picked.	4.12.1

Term	Meaning	From
Divergent thinking	Divergent thinking opens out, finding many possible answers to one task.	1.1.1
Drill	A drill is a practice move kept so small and fixed that starting it needs no decision, so the only daily question is whether it happened.	4.12.6
Effect size	An effect size shows how big a difference is compared with the normal spread between people.	1.2.2
Elaboration	Elaboration is adding detail beyond the minimum an idea needs.	3.1.4
Far transfer	Far transfer is using what you learned in a setting that looks quite different from where you learned it.	5.8.1
Fixed pattern	A fixed pattern is a groove your mind has worn by use.	3.2.4
Flexibility	Flexibility is the number of different kinds among your ideas.	3.1.2
Fluency	Fluency is how many ideas you produce for one task.	3.1.1
Fourth-grade slump	A fourth-grade slump is a dip in creative-thinking scores around the fourth grade of school, found in some children in Torrance's sample.	8.1.1
Generative AI	Generative AI is software that produces new text, pictures or sound in answer to a typed request.	9.2.1
Heritability	Heritability is a fact about differences in a group, never a fixed share locked inside one person.	1.3.1
Homogenisation	Homogenisation is the drift of many people's work towards the same ideas and wording.	9.2.4
How-might-we question	A how-might-we question is a question rewritten from one need card that keeps the person and the limit and leaves every fix off the page.	4.8.2
Idea capture	Idea capture is putting an idea into a notebook, a sketch or a voice note at the moment it arrives, so that it is kept for later.	9.1.1
Ideate	Ideate is making many different ideas for one framed task, with the judging held back until later.	4.1.2
Implement	Implement is putting a chosen idea into the world, starting with a small try.	4.1.4
Implementation intention	An implementation intention is a plan written in the form "when this happens, I will do that".	10.1.3

Term	Meaning	From
Informational feedback	Informational feedback is a comment that says what to try next, with no score or ranking.	7.4.2
Labelled pass	A labelled pass is one run through a task with a single named job, such as gathering or checking.	10.3.2
Learning goal	A learning goal is an aim measured by the number of methods you discover.	10.1.1
Level review	A level review is a dated check of a person's evidence against the criteria for a level, held at a set interval.	10.4.3

The second table runs from M to W. **The training program's terms gather here**, from Maintenance plan to Weekly challenge.

Table F.2: Terms from M to W

Term	Meaning	From
Maintenance plan	A maintenance plan is the set of written arrangements that keeps practice running between two level reviews.	10.4.3
Mastery step	A mastery step is one small rise in the difficulty of a task you already handle well.	7.2.3
Method chain	A method chain is a run of methods in which an idea made by one becomes the starting point for the next, so each method works on the last one's result.	4.11.5
Method family	A method family is a set of methods built for the same kind of trouble, whose members differ in speed, cost and the number of people they need.	4.12.1
Method mismatch	A method mismatch is using a method from one family on a difficulty that belongs to another, and the real difficulty stays where it was.	4.12.1
Method pair	A method pair is two idea methods run one after the other on the same problem, with the same time for each, so their lists can be laid side by side.	4.11.5
Mind map	A mind map is a page with one problem written in the middle and linked words growing out from it.	4.9.1
Minimum bout	A minimum bout is the shortest session that still counts as practice, kept for times when life leaves little room.	10.2.6
Moderate intensity	Moderate intensity is effort in the middle of your own range, harder than a stroll and well short of your hardest.	6.2.1

Term	Meaning	From
Monthly project	A monthly project is one finished piece of work planned to be completed over about four weeks.	10.2.4
Open project	An open project is a piece of work where you set the problem, the limits and the point at which it is finished, so nothing is decided by anyone else.	4.12.7
Open-ended prompt	An open-ended prompt is a question or task with more than one acceptable answer.	8.1.1
Opportunity statement	An opportunity statement is a short line that names who it is for, what they lack and what a better answer could be.	5.6.1
Originality	Originality is how rare your ideas are compared with the answers most people give.	3.1.3
Pace goal	A pace goal is a target for how slowly or steadily to work, set before the session begins.	8.4.2
Practice season	A practice season is a stretch of weeks given to one challenge, with its own start, cue and end.	10.4.4
Practitioner level	A practitioner level is one of five named steps in this book’s practice structure, each described by the evidence a person can show.	10.4.2
Problem finding	Problem finding is the work of finding and shaping the question before you try to answer it.	3.2.2
Problem worth solving	In this book, a problem worth solving is one whose answer would change something you or others care about, that you can act on, and that leaves room for new ideas.	3.4.1
Proficiency standard	A proficiency standard is the level a finished piece must reach, described so that another person could check it.	10.1.1
Progress chart	A progress chart is a dated table that sets each measure in its own column, week by week.	10.4.1
Qualification criterion	A qualification criterion is a kind of evidence that a level asks you to show, such as a finished project or a review note.	10.4.2
Quick prototype	A quick prototype is a rough stand-in for one idea, cheap enough to throw away and clear enough for a user to react to.	4.8.3

Term	Meaning	From
Reconstruction	A reconstruction is a test of your own study, where the copy you make shows what your notes caught and what they missed.	4.12.2
Reliability	Reliability is getting the same reading twice, like a bathroom scale you can trust.	1.3.3
Restart rule	A restart rule is a rule, set in advance, for how practice resumes after a missed session.	10.2.2
Reverse brainstorming	Reverse brainstorming is listing ways to make a problem worse, then flipping each one into a way to make it better.	4.2.4
Rule sheet	A rule sheet is a written list of how each task will be scored, fixed before the tasks are done.	10.1.2
Second medium	A second medium is a new form of making that carries skills built up in another field.	8.4.1
Skill drill	A skill drill is a short exercise that practises one thinking skill on its own.	10.2.1
Sleep window	A sleep window is the set span of hours kept for sleep each night, written down with a start and an end, so other plans fit around it.	6.1.1
Socially prescribed perfectionism	Socially prescribed perfectionism is believing that other people demand perfection from you.	7.3.2
Source and target domain	The source domain is where a method already works, and the target domain is where you want to try it.	5.8.1
Spaced practice	Spaced practice is practice split into sessions with gaps between them.	10.1.3
Specific goal	A specific goal is an aim that states exactly what will count as done.	10.1.1
Stage-gate	A stage-gate is a path split into small stages, with a gate after each stage, a check written in advance that decides whether you go on.	5.6.2
Starting record	A starting record is a dated set of scores from several tasks, kept as the point that later scores are compared with.	10.1.2
Storyboard	A storyboard is a row of small drawn panels that shows the steps of a scene or process in order.	9.1.2
Thinking mode	A thinking mode is one kind of looking at an idea, kept on its own for a set time, such as facts only or risks only.	4.11.1

Term	Meaning	From
Visual thinking	Visual thinking is working with sketches, shapes and space on a task.	3.3.2
Weekly challenge	A weekly challenge is one creative task with a countable standard to be met within seven days.	10.2.3
What-if	A what-if is a question, opening with the words what if, that imagines one world rule as different.	4.9.2
Worst idea	A worst idea is a solution written on purpose to fail at the real problem.	4.9.3

Key idea:

Look a term up here, then read its section for the example and the evidence that go with it.

G. Further Reading and Method Origins

Many of the methods in this book have a named inventor and a date, and many of its findings come from a handful of long reviews. **This appendix gathers both in one place.** The first table tells where each method came from, as the book tells it, and the tables after it list works worth reading in full.



A canvas tote bag on a library counter, with three borrowed books stacked beside it.

> **Key Concept:**
> How to use this list. **Each work appears in the same form as in the book's reference list**, so you can find it in a library or online. The Used in column names the sections that use it, and the line beside it says what you will find. The method origins come from the book's own pages, with no new detail added.

The method origins follow the order in which the book teaches the methods. **Each row gives the inventor and the date the book names**, with the section that tells the story.

Table G.1: Where the methods came from

Method	Origin as the book tells it	From
Creative problem solving	Work by Osborn in 1953, carried further by Parnes in 1967	4.1.1
Brainstorming	Proposed by Osborn in a book in the 1950s	4.2.1
Brainwriting	Rohrbach wrote about it in a German trade journal in 1969	4.2.3
SCAMPER	Eberle set out the prompts in a 1971 book of games for the imagination, built on questions Osborn had written	4.3.1
Synectics	William Gordon described it in a 1961 book	4.4.1
Biomimicry	The word goes back to at least 1982, and Janine Benyus wrote a book about it in 1997	4.4.2
Lateral thinking	De Bono wrote The Use of Lateral Thinking in 1967	4.5.1
Random entry and provocation	De Bono described both in Serious Creativity in 1992	4.5.2, 4.5.3
Morphological analysis	Pioneered by Fritz Zwicky in the 1930s and 40s, with a book on the subject in 1969	4.6.1
TRIZ	Genrich Altshuller wrote about inventing with R. B. Shapiro in a 1956 article	4.7.1
Mind mapping	Buzan set out the mind map in a 1974 book called Use your head	4.9.1

Method	Origin as the book tells it	From
Six Thinking Hats	Edward de Bono set out the method in his 1985 book Six Thinking Hats	4.11.1

The origin books in Table G.1 are named as the book names them. **The reading tables below hold only works the book cites in its reference list**, sorted by subject and then by author.

Table G.2: Creativity and its methods

Work	Why read it	Used in
Beghetto, R. A., & Kaufman, J. C. (2007). Toward a broader conception of creativity: A case for "mini-c" creativity. Psychology of Aesthetics, Creativity, and the Arts, 1(2), 73-79. https://doi.org/10.1037/1931-3896.1.2.73	The paper behind mini-c, learning something in your own way	1.1.3, 8.1.1
Diehl, M., & Stroebe, W. (1987). Productivity loss in brainstorming groups: Toward the solution of a riddle. Journal of Personality and Social Psychology, 53(3), 497-509. https://doi.org/10.1037/0022-3514.53.3.497	Why talking groups make fewer ideas than the same people working alone	4.2.1, 4.12.1
Guilford, J. P. (1950). Creativity. American Psychologist, 5(9), 444-454. https://doi.org/10.1037/h0063487	An early paper arguing that creativity extends well beyond what intelligence tests measure	1.1.2
Puccio, G. J., Firestien, R. L., Coyle, C., & Masucci, C. (2006). A review of the effectiveness of CPS training: A focus on workplace issues. Creativity and Innovation Management, 15(1), 19-33. https://doi.org/10.1111/j.1467-8691.2006.00366.x	A review of how creative problem solving has been taught and used at work	4.1.1
Ritchey, T. (2006). Problem structuring using computer-aided morphological analysis. Journal of the Operational Research Society, 57(7), 792-801. https://doi.org/10.1057/palgrave.jors.2602177	A description of morphological analysis and how its tables are built and read	4.6.1, 4.6.2
Wallas, G. (1926). The art of thought. Harcourt, Brace and Company. Retrieved November 4, 2026, from https://archive.org/details/artofthought0000grah	The book that named four stages of creative work, Preparation, Incubation, Illumination and Verification	1.3.2

The second reading table holds the reviews behind the training. **These works ask which kinds of training and practice help, and by how much.** Several of them pool many studies into one answer.

Table G.3: Training, practice and judging work

Work	Why read it	Used in
Haase, J., Hanel, P. H. P., & Gronau, N. (2025). Creativity enhancement methods for adults: A meta-analysis. Psychology of Aesthetics, Creativity, and the Arts, 19(4), 708-736. https://doi.org/10.1037/aca0000557	A recent review of methods for enhancing creativity in adults	1.1.2, 10.2.4
Hennessey, B. A. (1994). The consensual assessment technique: An examination of the relationship between ratings of product and process creativity. Creativity Research Journal, 7(2), 193-208. https://doi.org/10.1080/10400419409534524	How ratings by appropriate observers are used to judge finished work	5.1.1, 10.4.1
Macnamara, B. N., Hambrick, D. Z., & Oswald, F. L. (2014). Deliberate practice and performance in music, games, sports, education, and professions: A meta-analysis. Psychological Science, 25(8), 1608-1618. https://doi.org/10.1177/0956797614535810	A review of how much practice explains, and where it stops	1.3.1, 10.4.4
Sala, G., & Gobet, F. (2017). Does far transfer exist? Negative evidence from chess, music, and working memory training. Current Directions in Psychological Science, 26(6), 515-520. https://doi.org/10.1177/0963721417712760	A review that asks whether skills trained in one game carry over to other tasks	9.3.1, 9.3.2
Scott, G., Leritz, L. E., & Mumford, M. D. (2004). The effectiveness of creativity training: A quantitative review. Creativity Research Journal, 16(4), 361-388. https://doi.org/10.1080/10400410409534549	A large review of which kinds of creativity training worked better	1.2.2, 10.2.1

Start a long review with its summary. **Then read the parts that match the sections you use most**, and note the page of any table you want to find again.

The last table holds the works behind the training program. **Goals, if-then plans, habits and spaced practice each have one work here.** Each one backs a part of the training program.

Table G.4: Goals, habits and practice plans

Work	Why read it	Used in
Bjork, R. A., & Bjork, E. L. (2020). Desirable difficulties in theory and practice. Journal of Applied Research in Memory and Cognition, 9(4), 475-479. https://doi.org/10.1016/j.jarmac.2020.09.003	A short account of desirable difficulties, the hard parts of practice that help learning last	10.2.1, 10.2.5
Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. Advances in Experimental Social Psychology, 38, 69-119. https://doi.org/10.1016/s0065-2601(06)38002-1	The review behind if-then plans for starting practice at a set moment	10.1.3, 10.2.6
Lally, P., van Jaarsveld, C. H. M., Potts, H. W. W., & Wardle, J. (2010). How are habits formed: Modelling habit formation in the real world. European Journal of Social Psychology, 40(6), 998-1009. https://doi.org/10.1002/ejsp.674	A study of how everyday habits form, and what one missed day does	10.2.2, 10.4.3
Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. American Psychologist, 57(9), 705-717. https://doi.org/10.1037/0003-066x.57.9.705	A long review of goal-setting research, the source of the book's specific, difficult goals	10.1.1, 10.2.3

Key idea:

Every work in the reading tables is one the book cites, picked so a general reader can follow it, with a pointer to the sections that use it.

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