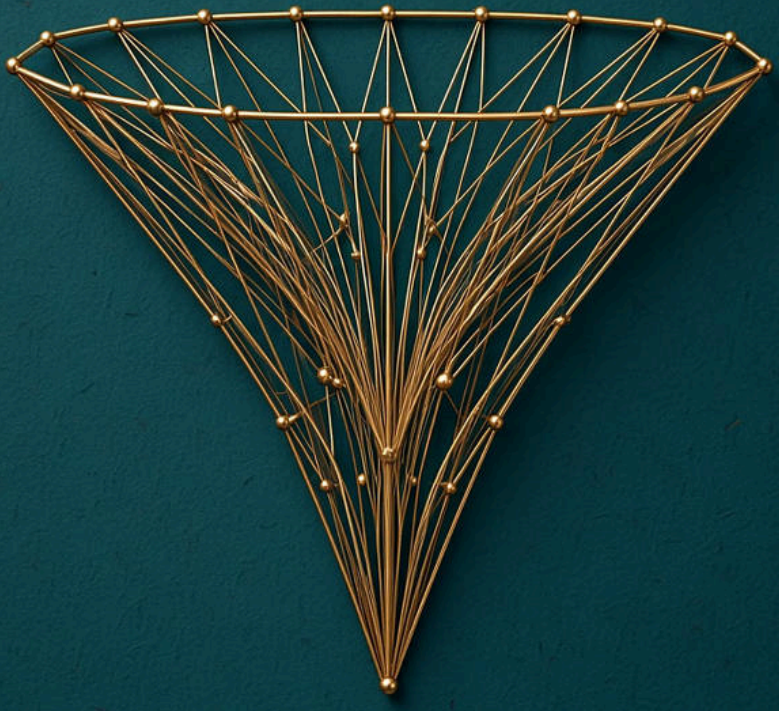
CLEVERINI SERIES

EXTRACTIVITY
PRACTITIONER GUIDE



Text, sound and image

DAVID PETROSIAN MKERVALI

MINDCRAFT INC.

Extractivity Practitioner Guide

Text, sound and image

David Petrosian Mkervali

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Author's preface

I HAVE ALWAYS BEEN CURIOUS. For as long as I can remember, I have tried to take in as much information as I could find. There was always another page to read and another question to follow.

Not all of it stayed with me. Much of what I took in could not be kept or saved for later, however interested I had been at the time. That gap between what reaches us and what we can keep is what drew me to extractivity.

Extractivity is the word this series uses for taking in information from the world. I wanted to understand how we could get the most out of what we take in, so that more of it is still there when we need it.

At school, this was harder than it sounds. My attention could break away from a lesson, my memory was unreliable, and following a chain of reasoning was difficult. I wanted to learn, yet the effort I put in often produced very little I could rely on afterward.

My family worked in science and education, and I grew up believing that helping someone learn was worthwhile work. My father built the earliest predecessors of Cleverini on computers that used magnetic tapes and floppy disks. One of his systems, TTK Intellect, was a testing and training complex for mental abilities.



A wooden desk by a window, covered with open books, a folded newspaper and a pair of headphones, the afternoon light falling across the pages.

With the help of learning tools and a better understanding of my own difficulties, I gradually caught up. It took work, and progress was uneven. Still, the experience changed what I believed was possible for myself.

In my PhD research into the foundations of learning, I proposed a hierarchy of learning in which foundational mental abilities receive attention first. Within that model, I distinguished the abilities involved in taking in and retaining information from those used to reason through problems.

This book concentrates on the taking in. It asks how you can take in information in a way that leaves you with something you can use, and with more than scraps.

Bring something real to it. Choose material you actually need to understand, such as a report for work, a textbook chapter or a talk you want to follow. Write down what you took in, and check it again a few days later.

Cleverini is our latest project. Its games are free, with no advertising or paywalls, and we do not sell users' personal information. I believe a person who wants to learn should be able to get started without having to prove they can afford it.

There is no need to rush through these pages. I would be happier to know that you took in one chapter well and kept it than that you hurried through the whole book. Begin with something you want to understand, and give yourself time to make it your own.

David Petrosian Mkervali

How to Use This Book

THIS BOOK HAS ONE aim, which is to **train extractivity through regular practice**. You can start with no background, using the articles, talks and pictures you already meet each day.

> **Key Concept:**
> Extractivity. In this series, extractivity is **your skill at taking in information fast, clearly and systematically**, whether it reaches you as text, sound or image. Those are its three channels. It is the same idea the Memory book describes as speed, depth and accuracy.

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

The ten modules move **from understanding extractivity to a training plan of your own**. Each module builds on the one before it.

1. Understanding Extractivity
2. How Extractivity Works with Attention, Memory, Intellect and Creativity
3. Developing the Core Skills of Extractivity

4. Methods and Exercises for Developing Extractivity
5. Training Extractivity in Different Fields
6. Sleep, Movement and Food
7. Keeping Extractivity Active Over Time
8. Extractivity at Different Ages
9. Technology, AI and Cleverini Games
10. Your Training Program, Practice Plan and Practitioner Levels



An open book and a pair of headphones on a wooden table beside a window.

Module 1 explains what extractivity is and what training can change. **Module 2 shows how extractivity works with attention, memory, intellect and creativity.** Modules 6 to 9 cover sleep, movement and food, keeping the skill active over time, the different ages of life, and screens, AI and Cleverini games.

Modules 3, 4 and 5 and section 10.2 are the core of the training, with methods and exercises for the sources you meet every day. Module

10 sets your starting point and weekly routine. Read a section, then do its exercises the same day.

> **Exercise:**
>
> Getting the most from each exercise.
>
> 1. Read the whole section first.
> 2. Use a real source of your own, such as an article or a talk, 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 your notes. The journal and the Module 10 levels 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. The book says where each claim comes from and when the research is weak or mixed.

The seven appendices at the back hold **the tools you will reach for most often**. Appendix C writes out every exercise in the book in full, so you can practise without hunting through the modules.

- A. A Simple Weekly Practice Planner and Method Chooser
- B. Sleep, Movement and Meal Planning Worksheets
- C. Exercise Bank, Cleverini Game Guide and Offline Alternatives
- D. Practice Tasks with Worked Examples
- E. Progress Journal and Practitioner-Level Rubrics

- F. A Short Glossary
- G. Further Reading and Method Origins

Key idea:

Extractivity grows with regular practice, so bring a real source of your own to every exercise.



Module

1

Understanding Extractivity

1.1.1 Extractivity, Attention, Memory and Understanding: How Taking In Information Fits With Its Partners

You stand in a busy station with ten minutes to spare. A voice on the speakers names a platform, the board above you flickers with new times, and a map on the wall shows the lines. **Three kinds of information are coming at you at once**, and in a few seconds you need to know where to walk.

Somehow you manage it. You catch the platform number, check it against the board and set off. I want to look closely at that small feat, because **taking in information is a skill**, and like any skill it can be trained.

Three kinds of information at once



A voice on the speakers names a platform



The board above you flickers with new times

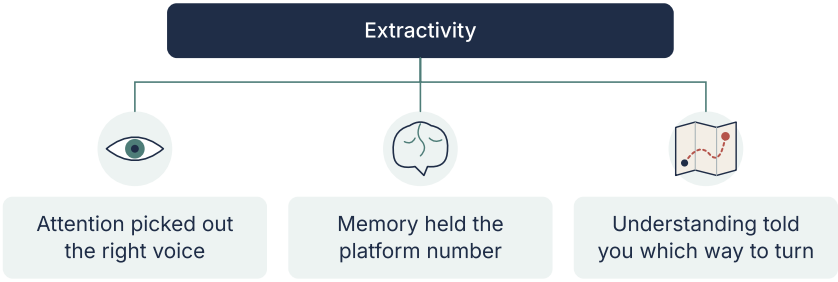


A map on the wall shows the lines

This series gives that skill a name. **We call it extractivity**, and section 1.1.2 defines it and says where the word comes from. The Attention book explains it in plain terms, saying it comes "from 'extract', which means to pull something out". The word belongs to this series.

Extractivity never works alone. **Three partners help it at every step**, and they are attention, memory and understanding. In the station, attention picked out the right voice, memory held the platform number, and understanding told you which way to turn.

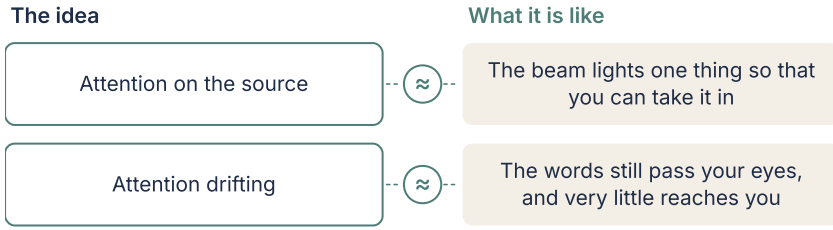
Three partners help it at every step



> **Key Concept:**
> Four partners. **Extractivity takes information in.** Attention chooses what to take in, memory holds and keeps it, and understanding builds its meaning.

Attention is the first partner. It works like **the beam of a torch in a dark room**, lighting one thing so that you can take it in. When the beam drifts, the words still pass your eyes, and very little of them reaches you.

A torch in a dark room



Your eyes show where the beam is pointing. One review of twenty years of research found that eye movements reflect the mind's work from moment to moment, across many tasks (Rayner, 1998). In plain words, **where your eyes stop tells researchers what your mind is working on** at that moment.

> **Key Concept:**
> A torch beam. **Attention lights one thing at a time** so that you can take it in. Your eyes follow the beam, so where they stop shows what your mind is working on.

What the eyes tell researchers

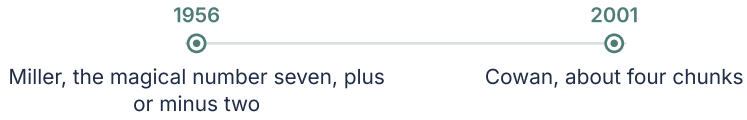


Memory is the second partner. While you read a sentence, you have to **hold its first words in mind** until the last ones arrive. That short hold is called short-term memory, a small space where information waits for a few seconds while you use it.

That small space is smaller than many people think. A paper from 1956 spoke of "the magical number seven, plus or minus two" (Miller, 1956),

and the number became popular. **Seven was a rough guess**, and later work put the true figure lower.

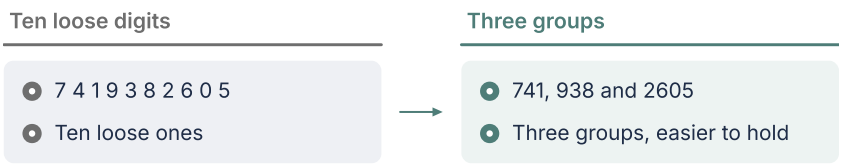
From seven to about four



> **Science Says:**
>
> A review of the research found that Miller's seven "was meant more as a rough estimate and a rhetorical device" (Cowan, 2001). It concluded that the real limit averages "about four chunks". A chunk is **one unit of meaning**, such as a word or a familiar phrase.

Chunks are the way round this small space. Miller himself wrote that organising input "into a sequence or chunks" lets us "break (or at least stretch) this informational bottleneck" (Miller, 1956). A phone number read as **three groups of digits** is easier to hold than ten loose ones.

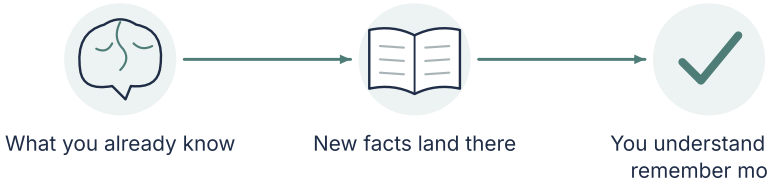
Ten loose digits or three groups



> **Exercise:**
>
> Try it. Read this string once, then cover it and write it down. 7 4 1 9 3 8 2 6 0 5. Now read it as three groups, 741, 938 and 2605, and try again. Notice **how much easier the groups feel**.

Memory also helps in a second way. **What you already know helps you understand and remember what you take in**, because new facts have somewhere to land. The Memory book looks at this link from the other side, in its section "Memory as the Engine of Extractivity".

New facts have somewhere to land



> **Science Says:**
>
> A study of 64 junior high school students, strong and weak readers alike, found that prior knowledge made a clear difference on every measure (Recht & Leslie, 1988). They found no sign that this effect differed between strong and weak readers, so **knowing the topic helped both groups**. It was one classic study, so the evidence is still mixed.

Understanding is the third partner. A reader does more than collect words. One model of reading says that comprehension "involves constructing a representation of a discourse upon which various computations can be performed" (Kintsch, 1988). Comprehension simply means **understanding what you read or hear**.

Prior knowledge in one classic study

Who	What it found
64 junior high school students	Prior knowledge made a clear difference on every measure
Strong and weak readers alike	Knowing the topic helped both groups

That long sentence has a simple meaning. **You build a small model of the text in your head**, a bit like a model ship built from a kit. Once it is built, the same paper says you can "answer questions about it, recall or summarize it" (Kintsch, 1988).

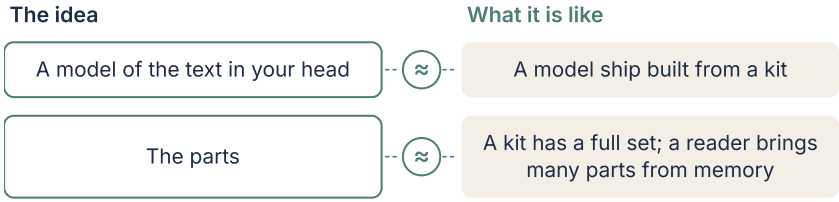


A pair of hands fitting the last piece onto a small wooden model ship, with the open instruction sheet beside it on the table.

The model ship picture stops at one point. A real kit comes with a full set of parts, while **a reader brings many of the parts from memory**. Two people can read the same page and build slightly different models, because they started with different knowledge.

The three partners work as a team. **Attention picks, memory holds and understanding builds**, and extractivity is the whole act of moving information from the world into your mind.

A model ship from a kit



> Exercise:
>
> Spot the partners.
>
> 1. Starter. Read one short news item. Write **which partner worked hardest**, attention, memory or understanding.
> 2. Middle. Before you read a new article, write three things you already know about its topic. Afterwards, note whether those facts made any part easier.
> 3. Advanced. Listen to a two-minute news clip once. Write its main point in one sentence, then listen again and check what your three partners missed.

Key idea:

Extractivity is taking information in, and it leans on attention, memory and understanding to do it.

From the world into your mind



Quick check:

About how many chunks can **short-term memory** hold, according to Cowan? Answer: about four. Why does knowing a topic help you read about it? Answer: new facts have somewhere to land, so you understand and remember more.

1.1.2 Definitions of Information Intake, and This Book's Definition

EVERY DAY YOU TAKE in more than you could ever list. You read a label, hear a name, glance at a weather map and skim a message. **Most of this happens without a single thought about how**, and that makes intake easy to overlook.

Researchers have studied pieces of this work for more than a century. **Each field uses its own word for its own piece**, such as reading, listening, visual search or comprehension. This section looks at one of those words first, then sets out the word this book uses.

Each field uses its own word

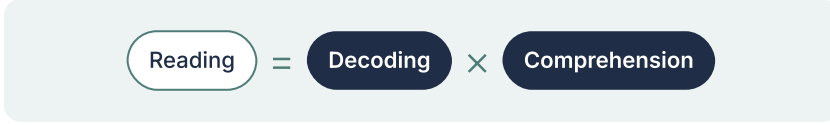


Two researchers wrote that "reading equals the product of decoding and comprehension" (Gough & Tunmer, 1986). This is known as **the simple view of reading**. Decoding means turning written marks into

words, the way a child sounds out c, a, t, and the word product comes from maths, where you multiply two numbers.

Multiplying matters here. **If either number is zero, the answer is zero.** A child who can sound out every word of a page in a language she does not know reads nothing, and a clever listener who cannot decode the letters reads nothing either.

The simple view of reading



> **Science Says:**
> The simple view also explains reading problems. Gough and Tunmer wrote that three kinds of reading disability follow from it (Gough & Tunmer, 1986). **A weak part pulls the whole result down**, so Reading = Decoding × Comprehension.

The simple view covers reading only. It says nothing about listening to a talk or **reading a chart on a screen**. For those you need a wider word.

The simple view and a wider word

	The simple view	A wider word
Covers	Reading only	Listening to a talk and reading a chart on a screen

Extractivity is that wider word, and **no use of it in psychology turned up**. A search of a large database of research papers, made for this book,

found the word only in other fields, such as economics, farming research and computer programs that summarise text.

> **Key Concept:**
>
> The series' own word. **Extractivity belongs to this series.** When this book cites a study, the study used its own terms, such as reading or comprehension.

Found only in other fields



Economics



Farming research



Computer programs that summarise text

This book can therefore define extractivity in its own way. **The definition below is this book's own**, built for training, and it does not claim to match any research term.

> **Definition:**
>
> **EXTRACTIVITY:** taking in information from the outside world, whether visual, audio or text, fast, clearly and systematically.

Each part of the definition does a job

Part	Job
Visual, audio or text	Names the three channels
Fast	Speed
Clearly	Understanding and accuracy
Systematically	A method you can repeat

Each part of that line does a job. **Visual, audio or text names the three channels**, and 1.1.3 looks at each one. Fast is about speed, clearly is about understanding and accuracy, and systematically means using a method you can repeat.

The Memory book describes the same skill. It says that extractivity covers "speed, depth and accuracy, in fast reading, careful listening and close watching". **The two wordings name the same idea**, with fast matching speed and clearly matching depth and accuracy.



A fishing net with wide holes sweeping quickly through the water beside a fine net drawn slowly, its mesh full of small silver fish.

The Memory book adds a picture that helps. Someone who reads fast and keeps little is "like a net with big holes, which sweeps fast and catches little". **Speed alone is not the goal.** A good net is quick enough to cover the water and fine enough to keep the catch.

The next example is an illustration, made up to show the idea and taken from no study. **Two readers each spend 40 minutes on the same**

hard text. A week later one of them can still describe how it fits together, and the other keeps only scraps.

Two readers, 40 minutes each

	The first reader	The second reader
A week later	Can still describe how it fits together	Keeps only scraps
Took in	The structure of the text	Loose pieces

Both readers spent the same time, so speed does not explain the gap. **The first reader took in the structure of the text**, while the second collected loose pieces. Training extractivity means learning to take in information like the first reader.

> **Exercise:**
>
> Try it. Read one paragraph of a newspaper article at your normal pace. Then write **one sentence that says what it was about**, and one detail you remember. Those two lines test clearly and fast at the same time.

Two wordings, one idea

This book	The Memory book
Fast	Speed
Clearly	Depth and accuracy

There is a limit on how far speed can go. **Reading involves a trade-off between speed and accuracy** (Rayner et al., 2016), so pushing one

usually costs some of the other. Section 1.3.1 looks at that trade-off in detail.

> Exercise:
>
> Test the definition.
>
> 1. Starter. Pick one thing you took in today. Write whether it was **visual, audio or text**.
> 2. Middle. Read a short article twice, once fast and once slowly. After each reading, write its main point and compare.
> 3. Advanced. Choose a hard text and give it 20 minutes. Write how it fits together, then check your notes again after a week, as in the two readers above.

A trade-off between speed and accuracy



Key idea:

In this book, **extractivity is taking in information fast, clearly and systematically**, whether visual, audio or text.

Quick check:

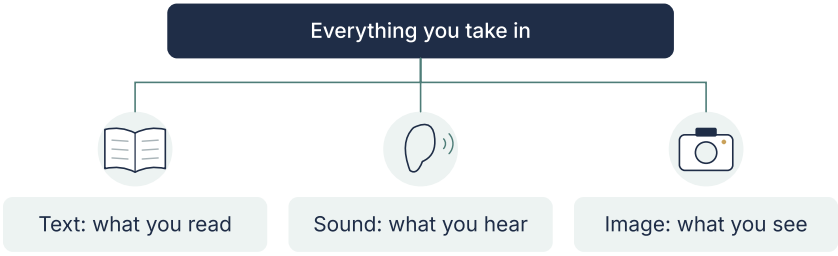
What does the simple view of reading say reading equals? Answer: decoding multiplied by comprehension. Is extractivity a term from psychology research? Answer: no, it is this series' own word.

1.1.3 Text, Sound and Image: The Three Channels of Extraction

THINK OF THE LAST recipe you followed. You may have read the list of ingredients, watched a short video of the tricky step and listened to a friend on the phone who said to add less salt. **One meal, three channels of information**, and each one brought something the others did not.

This book groups everything you take in into three channels. **Text is what you read, sound is what you hear, and image is what you see**, from a photo to a chart or a face. The channels overlap all the time, and each has its own strengths and limits.

Three channels



Text and sound carry the same words, so it is natural to ask how reading and listening compare. **For adults, the two are closely matched in**

speed. A study that combined 190 studies with 18,573 people found that adults read silently at about 238 words per minute (wpm) for non-fiction and 260 wpm for fiction (Brysbaert, 2019).

> **Science Says:**
>
> The same review found that adults read aloud at about 183 wpm. It also noted that "the reading rates are in line with maximum listening speed" (Brysbaert, 2019). In plain words, **silent reading runs at about the top speed at which we can follow speech**.

Adult reading rates (Brysbaert, 2019)



Children follow a different path. In a study of 612 students from grade 2 to grade 8, the link between reading and listening comprehension "becomes stronger after decoding mastery" (Diakidoy et al., 2005). **Once sounding out words is easy, understanding by eye and by ear start to move together.**

The same study found that "reading comprehension levels were higher than listening comprehension levels in Grade 8". The link was also weaker for expository text, the kind that **explains facts**, such as a science chapter. The two channels grow closer with age, and some gaps between them remain.

Eye and ear move together



> **Exercise:**
>
> Try it. Ask a friend to tell you about their day while you time one minute. Then read a page of a novel for one minute. Write **which one you could repeat back more easily**, and why you think so.

The speaker sets the pace when you listen. A study of speaking rate in conversation found that speaking rate "rises rapidly for turns from one to seven words" (Yuan et al., 2006). **Short answers come out fast**, and longer turns slow down.

Who sets the pace

	Short turns	Longer turns
Speech	Comes out fast	Slows down

> **Science Says:**
>
> The same study found that strangers and some topics bring "longer turns but slower speech rates", and that "older people have a slower speech" (Yuan et al., 2006). **How fast you must listen depends on who is talking and about what**, so a talk from a stranger may give you more time than a quick chat with a friend.

Images are the third channel, and they hold a surprise. **People remember pictures very well.** In one study, recognition memory for pictures was “almost limitless, when measured under appropriate conditions” (Standing, 1973).

Learning 10,000 pictures

10,000

Pictures in the title of Standing, 1973

Recognition means **knowing something again when you see it**, the way you know a friend’s face in a crowd. The same paper said that the superiority of pictures over words “is well established” (Standing, 1973). Its title was Learning 10,000 pictures, which gives a sense of the scale.



A long wall covered in hundreds of small photographs, with a woman pointing to one of them as if she has spotted a friend.

Many people say they are a visual learner or an auditory learner. **The idea that you learn best when lessons match your preferred channel is a myth.** A major review found "no adequate evidence base to justify incorporating learning-styles assessments into general educational practice" (Pashler et al., 2008).

> **Science Says:**
>
> The same review noted that many versions of learning-style ideas "have simply not been tested at all" (Pashler et al., 2008). **So there is no good evidence that matching lessons to a favourite channel helps people learn more.**

Channels and learning styles

Myth	Fact
You learn best when lessons match your preferred channel	No good evidence that matching lessons to a favourite channel helps (Pashler et al., 2008)

The channel you choose should fit **the job and the material**, and preference comes second. A map is easier to follow as an image, a poem may sound best read aloud, and a long list of facts is easier to check as text.

The three channels also work well together. The recipe at the start used all three, and each covered a gap. **Choosing the right channel for each part of a task** is a skill you can practise, and Module 3 trains each channel in turn.

Fit the channel to the job

Material	Easier as
A map	An image
A poem	Sound, read aloud
A long list of facts	Text

> Exercise:
>
> Choose the channel.
>
> 1. Starter. List five things you took in today. Mark each one as **text, sound or image**.
> 2. Middle. Learn one short set of directions twice, once by reading and once by listening. Note which you remember better after an hour.
> 3. Advanced. Pick one topic and take it in through all three channels, an article, a talk and a chart. Write what each channel gave you that the others did not.

Key idea:

Text, sound and image are the three channels, and the best choice depends on the task and the material.

One meal, three channels



The list of ingredients: text



A short video of the tricky step: image



A friend on the phone: sound

Quick check:

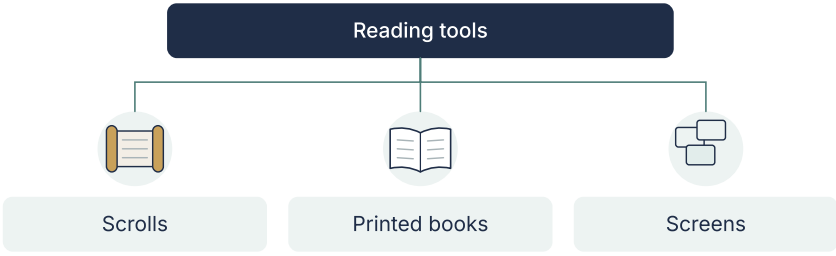
How fast do adults read non-fiction silently, on average? Answer: about 238 words per minute. Does matching lessons to a learning style help people learn more? Answer: there is no good evidence that it does.

1.2.1 From Scribes and Scholars to Speed-Reading Courses: A Short History of Reading and Study Methods

Picture a reader in ancient Rome holding a scroll. Was the room silent, or could you hear the words being spoken aloud? **Even this simple question about the past is still argued over**, and it shows how hard the history of reading can be to pin down.

People have tried to take in information better for as long as they have written things down. **The methods changed with the tools**, from scrolls to printed books to screens. This section walks through a few of the turning points that still shape how we read and study today.

The methods changed with the tools





A man in a simple Roman tunic sits on a stone bench, a half-open scroll across his knees and a lamp beside him.

Back to the Roman reader. For a long time, the accepted view was that Greeks and Romans “always, or nearly always, read aloud” (as cited in Gavrilov, 1997). That view is still debated, so treat it as an open question. The evidence is mixed, so I leave **the question without a verdict**.

Scientific study of how people read came much later. **Eye movements during reading were described in 1879**, by two researchers named Hering and Lamare (Wade, 2010). The work had begun on how the eyes move across a page.

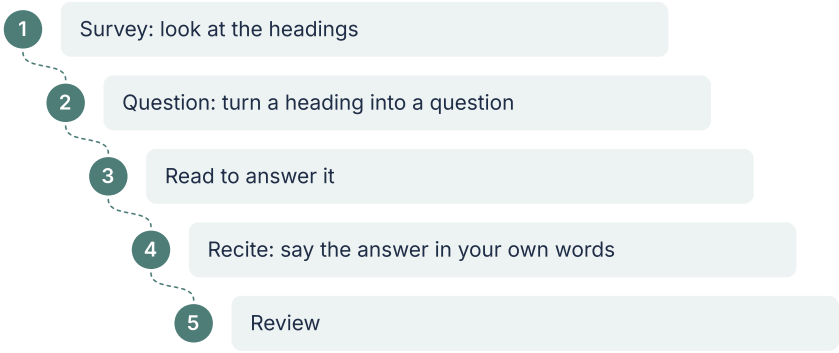
How eye research began



> **Science Says:**
>
> A history of eye research records that "eye movements during reading were described by Hering and by Lamare in 1879" (Wade, 2010). It adds that "photographic records of eye movements during reading were made by Dodge early in the 20th century". **Cameras let researchers see each jump of the eye**, and section 1.2.2 explains what they found.

Study methods arrived next. In 1946, Robinson published SQ3R, a method for studying a textbook (Robinson, 1946). The letters stand for **survey, question, read, recite and review**. The five steps turn a reader from a passenger into a driver.

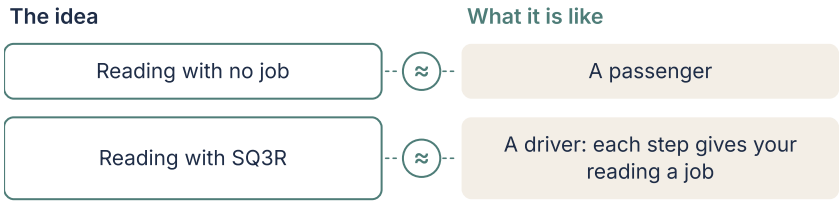
SQ3R in five steps (Robinson, 1946)



The steps are easy to try. You survey the chapter by looking at its headings, turn a heading into a question, read to answer it, say the answer in your own words and then review. **Each step gives your reading a job to do.**

> Exercise:
>
> Try it. Take one heading from any book or article. **Turn it into a question**, then read that part only to answer it. Say the answer aloud without looking. This uses the question and recite steps of SQ3R (Robinson, 1946).

From passenger to driver



Other methods followed over the next decades. Buzan made mind maps popular in 1974 (Buzan, 1974). A mind map puts **one topic in the middle of the page** with branches for its parts. Palincsar and Brown described reciprocal teaching in 1984, where readers in small groups take turns leading four moves, predicting, questioning, clarifying and summarising (Palincsar & Brown, 1984).

Ogle described KWL in 1986 (Ogle, 1986). The letters stand for **what I know, what I want to know and what I learned**, three columns a reader fills in before, during and after reading. Each of these methods asks the reader to do something with the text.

Methods that ask the reader to do something

Method	What the reader does
Mind maps (Buzan, 1974)	One topic in the middle of the page, branches for its parts
Reciprocal teaching (Palincsar & Brown, 1984)	Takes turns leading: predicting, questioning, clarifying, summarising
KWL (Ogle, 1986)	What I know, what I want to know, what I learned

A different promise arrived in 1959. Rayner and colleagues date the modern interest in reading faster to Evelyn Wood's Reading Dynamics programme of that year (Rayner et al., 2016). **Speed reading had become a method people could pay to learn.**

Teachers did not agree about speed training. In 1959 Marvel studied training with a tachistoscope, a machine that **flashes words on a screen for a split second**. The value of this kind of training was affirmed by some teachers and questioned by others (Marvel, 1959).

Speed reading for sale



1959: Reading Dynamics, Evelyn Wood



1959: tachistoscope training (Marvel)

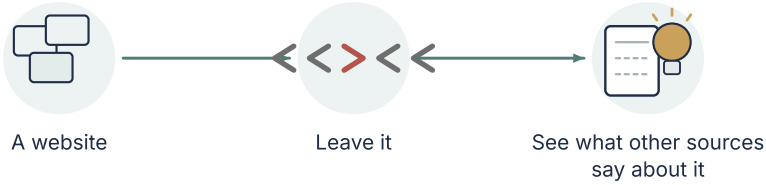


Affirmed by some teachers, questioned by others

> **Science Says:**
>
> Claims about speed reading grew bolder over time. In 1993 a system called PhotoReading claimed very high page rates (Scheele, 1993). **The evidence on speed-reading methods is mixed at best**, and section 1.2.3 describes one test of a PhotoReader. Section 1.3.1 explains why big speed claims run into limits.

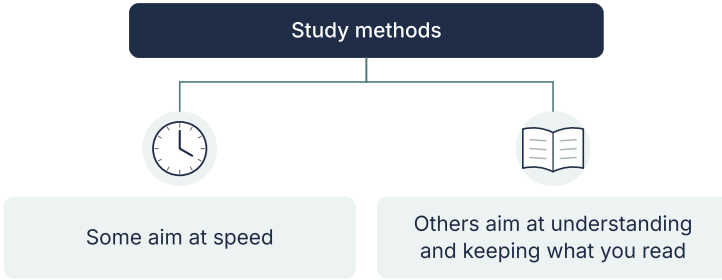
The newest chapter in this history is about screens. The open web holds good sources and bad ones side by side. **Lateral reading** is a newer study skill, where you leave a website to see what other sources say about it (Wineburg & McGrew, 2019).

Lateral reading



Looking back, two kinds of method keep appearing. **Some methods aim at speed**, and others aim at understanding and keeping what you read. Module 4 checks both kinds against the research, one method at a time.

Two kinds of method



Exercise:

Try a method from history.

1. Starter. Before you read an article, write **one question** its title raises. Read to answer it.
2. Middle. Fill in a KWL sheet for one chapter, following Ogle (1986). Write what you know, what you want to know and, afterwards, what you learned.
3. Advanced. Study one textbook chapter with all five SQ3R steps (Robinson, 1946). Note which step helped you most.

Turning points in reading and study

- 1879 — eye movements during reading described
- 1946 — SQ3R
- 1959 — Reading Dynamics
- 1974 — mind maps
- 1984 — reciprocal teaching
- 1986 — KWL
- 1993 — PhotoReading claims

Key idea:

Study methods have long aimed **either at speed or at understanding**, and each claim deserves a check.

Quick check:

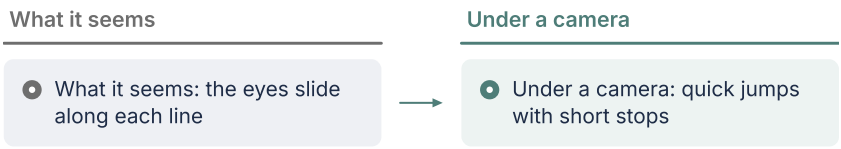
When were eye movements during reading described, according to Wade? Answer: in 1879, by Hering and by Lamare. What do the letters KWL stand for? Answer: what I know, what I want to know and what I learned.

1.2.2 How the Eyes Read and the Ears Listen: Fixations, Spans and Speech Rates

WATCH SOMEONE READ ON a train and their eyes seem to slide along each line. **That smooth slide is an illusion.** Under a camera, the eyes move in quick jumps with short stops in between.

This section looks at **how the eyes and ears actually take in words**. Knowing how they work helps you judge which training claims make sense and which ask your body to do something it cannot.

A smooth slide is an illusion

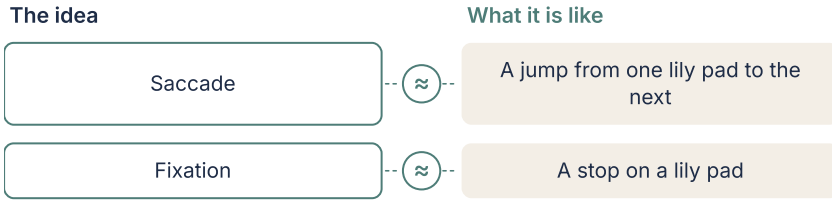


Researchers have studied reading eyes for decades. Two major reviews cover "the characteristics of eye movements, the perceptual span, integration of information across saccades, eye movement control" (Rayner, 1998). A later review adds "preview benefit" (Rayner, 2009). **These terms sound hard, and each has a simple meaning.**

Key Concept:

Stops and jumps. A saccade is **a quick jump of the eye** from one spot to the next. A fixation is the short stop between jumps, when the eye holds still long enough to take in the words. Reading is a chain of stops and jumps, like a frog crossing a pond on lily pads.

A frog crossing a pond

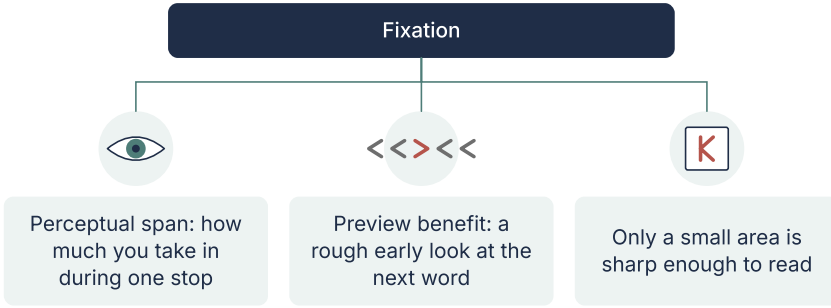


The perceptual span is **how much you can take in during one stop**. Preview benefit means you get a rough early look at the next word before your eye lands on it. That early look gives the next stop a head start.

Science Says:

The useful span in each fixation is small, and it is limited by how sharp your vision is away from the centre of your gaze (McConkie & Rayner, 1975). **Only a small area around the point you look at is sharp enough to read.** This is why no one can take in a whole page in one glance.

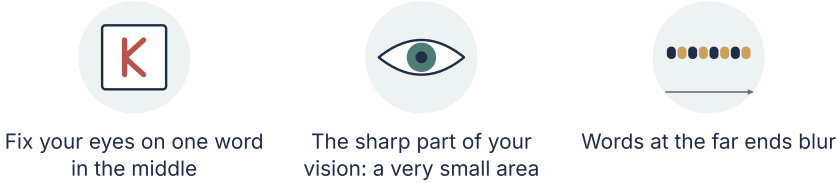
One stop of the eye



You can feel this limit yourself. **Fix your eyes on one word in the middle of this line** and, without moving them, try to read the words at the far ends. They blur, because the sharp part of your vision covers a very small area.

> Exercise:
>
> Try it. Hold a finger under one word on this page and stare at it. **Count how many words on each side you can still read** without moving your eyes. Note the number, and try again on another line.

Why the ends of the line blur



Readers also jump backwards. A jump back to an earlier word is called a regression, and it can look like a sign of a weak reader. **Regressions**

help you understand. In one study, stopping readers from rereading words hurt their comprehension (Schotter et al., 2014).

Some speed-reading courses teach you to stop going back. **The study above suggests that this habit has a job**, which is checking and repairing your understanding as you go. Cutting it out may save a little time and cost you some meaning.

Jumping back to an earlier word

Regressions	Cutting them out
⊕ Help you understand	⊖ May save a little time
⊕ Check and repair understanding	⊖ Cost you some meaning



A hiker on a mountain path glancing back over her shoulder at a trail marker she has just passed.

How fast do eyes and mind read together? Section 1.1.3 gave the average silent reading rates from one large review (Brysbaert, 2019). The same review adds a new point, which is that **the estimates are lower than the numbers often cited** in scientific and popular writing.

> **Science Says:**
>
> In that review, most adults read non-fiction at 175 to 300 words per minute and fiction at 200 to 320 (Brysbaert, 2019). **A rate inside these ranges is normal.** If a course tells you that a typical adult reads far slower or far faster, be cautious.

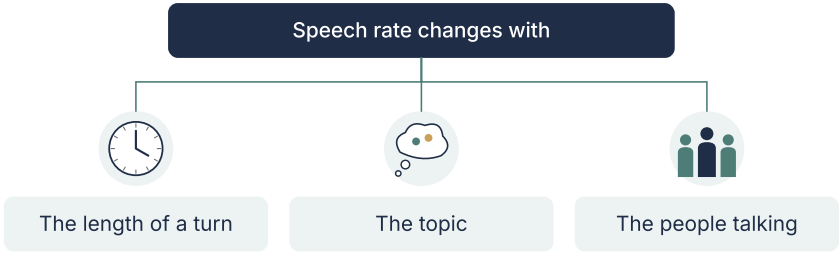
Normal reading ranges (Brysbaert, 2019)

Text	Words per minute
Non-fiction	175 to 300
Fiction	200 to 320

The ears work at a pace set by the speaker. Speech rate changes with the length of a turn, the topic and the people talking. In one study of conversation, "males tend to speak slightly faster than females", and older people spoke more slowly (Yuan et al., 2006). **No single number describes how fast people talk.**

Listeners can adapt. **Ears adjust to very fast speech** over a number of sentences. In one study, listeners adapted to highly compressed speech, which is speech squeezed into a shorter time, as they heard more of it (Dupoux & Green, 1997).

No single number for talking speed



Science Says:

In a study of lecture videos, playing them at 1.5 times and 2 times normal speed cost little comprehension (Murphy et al., 2022). **Fast playback of a talk can work**, at least for recorded lectures like those in the study. Section 1.3.1 looks at where the limit lies.

Eyes and ears share one lesson. **Each has a natural pace**, and pushing too far past it costs some meaning. Knowing the stops, jumps and speeds gives you a fair yardstick for your own practice.



Exercise:

Measure your own pace.

1. Starter. Read a page of an easy novel for one minute. Count the words and **note your words per minute**.
2. Middle. Do the same with a page of non-fiction. Compare both rates with the ranges above.
3. Advanced. Play a recorded talk at 1.5 times normal speed for five minutes. Write its main points, then check them at normal speed.

Key idea:

The eyes read in stops and jumps, and both eyes and ears have a natural pace that sets limits on speed.

Stops, jumps and speeds

> - Eyes: stops and jumps
> - Ears: a pace set by the speaker
> - Both: a natural pace

Quick check:

What is a fixation? Answer: the short stop between eye jumps, when the eye takes in words. Do regressions hurt reading? Answer: no, stopping them hurt comprehension in one study.

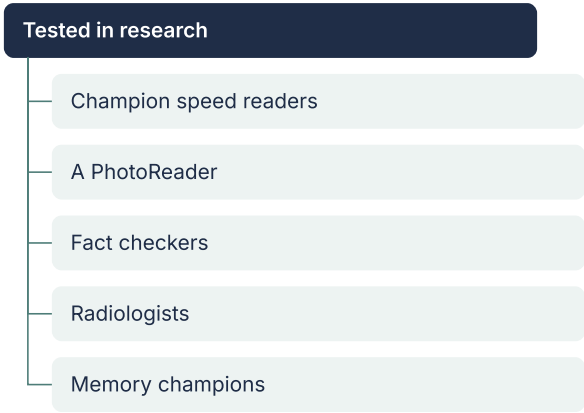
1.2.3 Remarkable Readers, Listeners and Observers, and What They Actually Do

EVERY SO OFTEN A story goes round about someone who reads a whole book in an hour. Other stories tell of doctors who spot an illness in a glance, or memory champions who learn a deck of cards in minutes. **Stories like these make great headlines**, and they raise a fair question about what those people really do.

This section looks at **five kinds of skilled reader, listener and observer** who have been tested in research. In each case, the skill turns out to be real and narrower than the story suggests. Their methods still have plenty to teach.

Start with champion speed readers. In 1985, Carver tested people who claimed very fast reading and compared them with other skilled groups (Carver, 1985). **The speed readers mostly skimmed.** They "typically choose to skim at rates higher than 1,000 words per minute and accept the lowered comprehension".

Five kinds of skilled reader, listener and observer



Carver, 1985

Group	What they did
Speed readers	Skimmed at rates higher than 1,000 words per minute
Strong readers, 75% comprehension required	Read easy material at around 300-600 words per minute

Skimming means **moving quickly through a text to catch its general drift**, without reading every word. It is a useful skill, and it is a different skill from reading. In the same study, the speed readers were "worst at recalling the book's important details" (Carver, 1985).

> **Science Says:**
>
> Carver also tested four groups of strong readers, 16 people in all. When at least 75% comprehension was required, they read relatively easy material "at rates around 300-600 words per minute" (Carver, 1985). **That is fast, and it is far from a book an hour.** It was a small study, so treat the numbers as a guide.

Carver's strong readers



Four groups, 16 people in all



Easy material, at least 75% comprehension



A small study: treat the numbers as a guide

> **Science Says:**
>
> A newer claim came from PhotoReading, a method that promised very high page rates (Scheele, 1993). In the one checked test, an expert PhotoReader **took longer and understood less** (McNamara, 2000). It was a single report, and it found no sign of the promised speed.

Fact checkers are a different kind of expert, and they hold a useful lesson. In one study, historians and students were fooled by logos and official-looking web addresses. **Fact checkers read laterally** (Wineburg & McGrew, 2019), leaving a website early to see what other sources said about it.

Fooled or not

	Historians and students	Fact checkers
Judged a site by	Logos and official-looking web addresses	What other sources said about it

That is the surprise. **The best readers of the web judged a site by looking beyond it.** The study's own title sums it up, "reading less and learning more when evaluating digital information".

> **Exercise:**
>
> Try it. Pick a website you have not used before. Before reading its content, **open a new tab and search for the site's name**. Spend two minutes reading what other sources report about it. This follows lateral reading (Wineburg & McGrew, 2019).

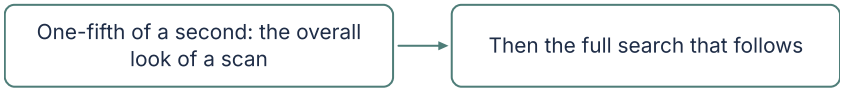
Look beyond the site



Doctors who read X-rays and scans are called radiologists, and they are expert observers. In one review, experts judged scans with accuracy "above that expected by chance" after "one-fifth of a second" (Drew et al., 2013). **That is a very short look.**

> **Science Says:**
>
> The same review described a "nonselective pathway" that "extracts information from global or statistical information" (Drew et al., 2013). In plain words, **experts pick up the overall look of a scan** before studying any one part. That quick look is a start, and it is no replacement for the full search that follows.

How experts read a scan



Experts also look at scans in a more orderly way. In one study, expert radiologists did view more systematically, and how much of the image they covered did not predict how well they diagnosed (Kok et al., 2016). **Students taught to copy the orderly viewing gained nothing from it.**

That last point matters for training. **Copying what an expert's eyes do** did not make the students better. Watching how experts look is a clue to their skill, and it is no shortcut to it.

Copying an expert's eyes

Hypothesis	Test	Result
Copying the orderly viewing makes students better	Students taught to copy the orderly viewing	They gained nothing from it



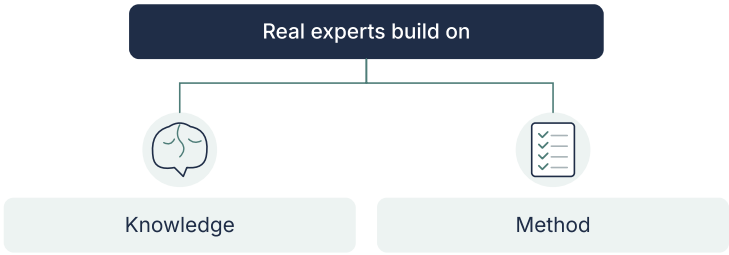
A doctor in a dim room studying a chest X-ray on a lit screen, one hand resting on her chin.

Memory champions are the last group. In one study, people new to memory training practised for six weeks and improved their memory,

and the gains were linked to changes in brain networks (Dresler et al., 2017). **Their skill came from training a method**, the kind of method Module 4 explains.

Put the five cases together and a pattern appears. **Real experts build on knowledge and method**, and none of them breaks the limits of the eye described in 1.2.2. The tricks that promise magic speed have mixed evidence at best.

A pattern across the five cases



Exercise:

Learn from the experts.

1. Starter. Skim one news article in 30 seconds. Write **its general drift**, then read it fully and check.
2. Middle. Check one website laterally before you trust it, following Wineburg and McGrew (2019). Note what you found.

3. Advanced. Glance at a busy photo for one second, then write your first impression. Study it for a minute and compare what you saw.

Key idea:

Skilled readers and observers rely on knowledge and method, and the evidence for magic speed is mixed at best.

Six weeks of memory training



Quick check:

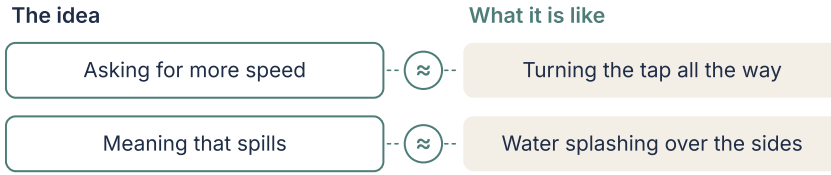
What did Carver's speed readers mostly do? Answer: they skimmed and accepted lower comprehension. How do fact checkers judge a website? Answer: they read laterally, checking what other sources say about it.

1.3.1 Speed, Accuracy and Understanding: The Trade-Off at the Heart of Extractivity

IMAGINE FILLING A GLASS from a tap. Turn the tap a little and the glass fills slowly and cleanly. Turn it all the way and the glass fills faster, and **water splashes over the sides**. Reading and listening work in much the same way.

The more speed you ask for, the more meaning tends to spill. **This trade-off is central to extractivity**, because this book's definition asks for information taken in fast and clearly at once. This section shows where the balance lies and how to choose it.

A tap and a glass



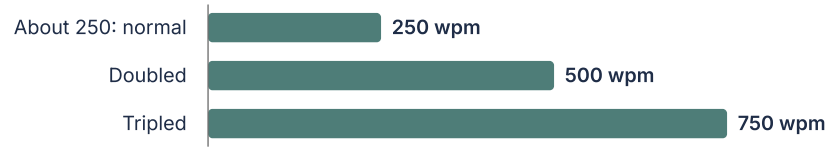


A glass under a kitchen tap turned on full, water splashing over the rim onto the steel sink.

A large review of reading research set out the trade-off plainly. **Reading involves a trade-off between speed and accuracy** (Rayner et al., 2016). Accuracy here means taking in what the text really says.

> **Science Says:**
>
> The same review found that doubling or tripling reading speed, from about 250 to 500 or 750 words per minute, without a loss in comprehension is unlikely (Rayner et al., 2016). It also found that skimming gives moderate comprehension when full understanding is not the goal. **Speed has a price**, and skimming is useful when you can pay it.

Doubling or tripling reading speed



Normal reading already sits in a fairly narrow range for most adults (Brysbaert, 2019). **Your own normal rate is a healthy starting point**, and the question is how far you can push it before meaning starts to spill.

The best readers in Carver's study, described in 1.2.3, give a useful marker. When at least 75% comprehension was required, they read "at rates around 300-600 words per minute" (Carver, 1985). **That was easy material and a small group of 16 people**, so it marks a high point for skilled readers.

Two markers for speed

	Your normal rate	Carver's best readers
Is	A healthy starting point	A high point for skilled readers
Note	Most adults sit in a fairly narrow range	Easy material and a small group of 16 people

> Exercise:
>
> Try it. Read one paragraph as fast as you can, then write what you remember. Read a second paragraph at your normal pace and do the same. **Compare how much each version kept.**

Some apps promise more by flashing one word at a time in the same spot. This is called RSVP, which stands for **rapid serial visual presentation**. It removes eye jumps, so there is no chance to look back at a word you missed.

RSVP removes eye jumps



> **Science Says:**
>
> In one test, RSVP at 700 and 1,000 words per minute **hurt comprehension compared with ordinary static text** (Acklin & Papesh, 2017). The evidence on RSVP claims is contested, and this study found no free speed.

Skimming deserves a fair hearing, because sometimes it is the right tool. In one study, skimmers favoured text earlier in paragraphs and pages (Duggan & Payne, 2009). **Skimming had no advantage over simply reading the first or second half of every paragraph.**

Skimming tested (Duggan & Payne, 2009)

Skimmers favoured	Compared with half of every paragraph
Text earlier in paragraphs and pages	No advantage

That gives you a simple rule. When you only need the general drift, **read just part of each paragraph** and move on. In one study, skimming did no better than reading the first or the second half of every paragraph (Duggan & Payne, 2009). When you need details, slow down and read every line, because skimming will not catch them.

Listening has the same kind of trade-off. Section 1.2.2 showed that lecture videos at 1.5 and 2 times normal speed cost little comprehension. **Beyond 2 times, performance fell** (Murphy et al.,

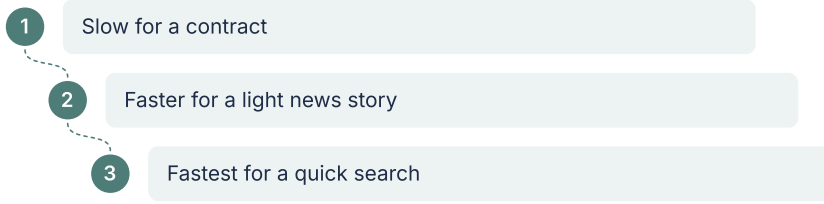
2022). The same pattern of a safe zone and then a drop appears for the ears as well as the eyes.

A safe zone, then a drop



The real skill is choosing. **Choose your speed for your purpose**, slow for a contract, faster for a light news story and fastest for a quick search. You may change gear many times in one day.

Change gear for your purpose

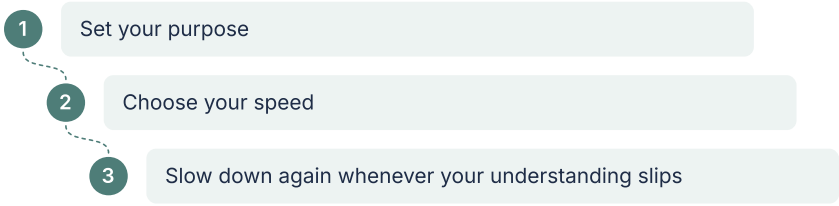


> **Key Concept:**
>
> Speed for purpose. **Set your purpose first, then your speed.** Read fully when you need details, skim the start of each paragraph when you need the drift, and slow down again whenever your understanding slips.

> **Exercise:**
>
> Change gears.
>
> 1. Starter. Before reading anything today, **say your purpose aloud**, details or drift. Choose your speed to match.

2. Middle. Skim an article by reading only the first half of each paragraph, which matched skimming in one study (Duggan & Payne, 2009). Then read it fully and note what you missed.
3. Advanced. Listen to the same short talk at normal speed, 1.5 times and 2 times. Write the main points after each and compare.

Speed for purpose



Key idea:

Speed and understanding trade off, so set your purpose first and choose your speed to fit it.

Quick check:

Is doubling or tripling reading speed without losing comprehension likely?
Answer: no, the review found it unlikely. When does skimming make sense?
Answer: when you only need the general drift.

1.3.2 What Training Can Improve and What It Cannot

You may have seen adverts for brain games that promise a sharper mind in ten minutes a day. **The promise is that practice on one task spreads to everything else.** It is a lovely idea, and research has tested it many times.

This section sorts the promises into two piles. **Some kinds of training work well**, and others give smaller gains than claimed or none at all. Knowing which is which saves you time for the practice that pays.

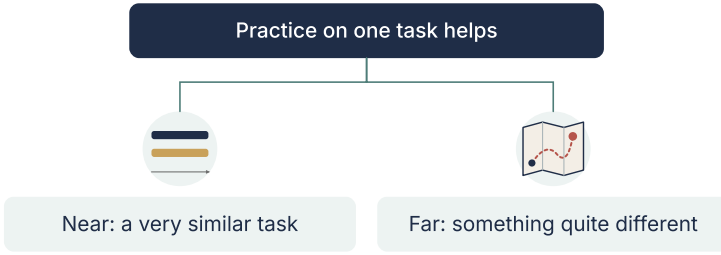
Two piles of promises

Some kinds of training	Others
⊕ Work well	⊖ Smaller gains than claimed ⊖ Or none at all

Start with the big question, which is called transfer. Near transfer means **practice on one task helps a very similar task**. Far transfer means it helps something quite different, such as a memory game making you better at reading reports.

> **Science Says:**
> A review of training in chess, music and working memory found small to moderate effects that were "inversely related to the quality of the experimental design" (Sala & Gobet, 2017). In plain words, **the better the study, the smaller the effect**. The authors concluded that "far transfer of learning rarely occurs".

Transfer



Working memory is the small space from 1.1.1 where you hold information while you use it. Many programs try to train it with games. **A study that combined many studies** found "short-term, specific training effects that do not generalize" (Melby-Lervåg & Hulme, 2013). Generalise means spreading to other tasks.

Even large trials show the same pattern. In one big trial, training improved the abilities that were trained, and it had no effect on everyday function at two years (Ball et al., 2002). The practised skill got better, and daily life stayed the same. **Training works best on the task you actually need.**

One big trial



> **Exercise:**
>
> Try it. Name one real task where you take in information, such as reading emails or listening in meetings. Write **one way to practise that exact task** this week, using real material from your own life.

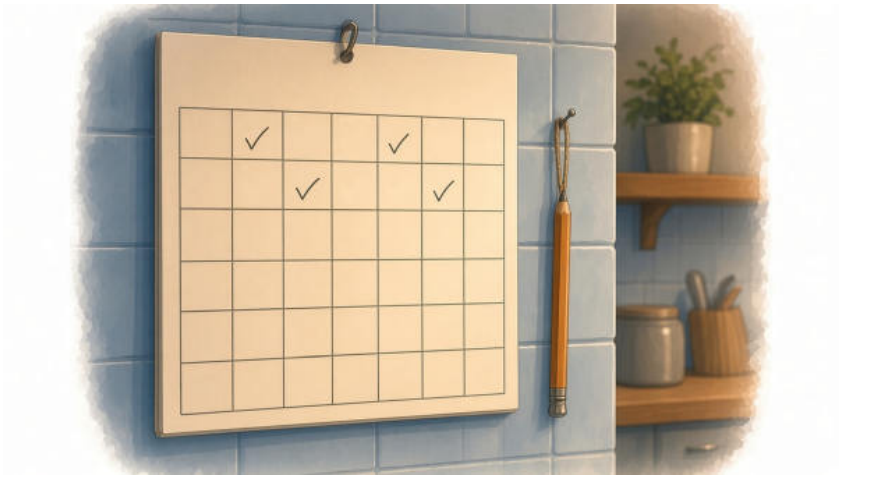
Some reading skills clearly respond to practice. Repeated reading, where a reader reads the same passage several times, builds fluency and comprehension in developing readers (Therrien, 2004). Fluency means **reading smoothly and at a steady pace**. The evidence is strong for developing readers and much thinner for skilled adults.

Repeated reading

Developing readers	Skilled adults
⊕ Builds fluency and comprehension	⊖ Evidence much thinner
⊕ Strong evidence	

Speed-reading apps sit on the weaker side. In one study, speed rose less than claimed, and **comprehension stayed the same** (Klimovich et al., 2023). Training that taught readers to think about their own reading did as well as the app.

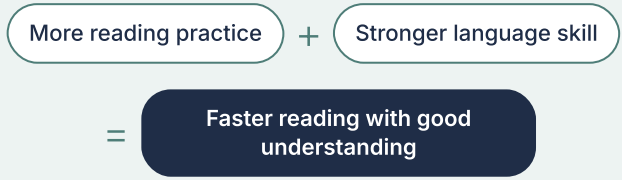
> **Science Says:**
>
> A major review rated common learning techniques. It gave **practice testing and distributed practice** a high rating for usefulness (Dunlosky et al., 2013). Practice testing means testing yourself, and distributed practice means spreading study over several sessions with gaps between them.



A calendar on a kitchen wall with small ticks on four days spread across two weeks, a pencil hanging from a string beside it.

What does help you read faster with good understanding? **The reliable route is more reading practice and stronger language skill**, such as a bigger vocabulary (Rayner et al., 2016). Language skill grows with use, so reading itself is part of the training.

The reliable route



Some skills can also be taught quickly. In one study, two 75-minute lessons improved university students' judgement of online sources, compared with a group who did not get the lessons (McGrew et al., 2019). **Checking sources is a skill with a clear method.**

> **Key Concept:**
>
> Train the real task. **Practise the task you want to improve**, with real material. Test yourself on what you took in, spread your practice over several days, and read widely to grow your vocabulary.

Two 75-minute lessons



> **Exercise:**
>
> Build a training habit.
>
> 1. Starter. After reading one article today, **close it and write three points** from memory. Then check.

2. Middle. Pick one passage at a comfortable level and read it three times over a week, following repeated reading (Therrien, 2004). Note how it changes.
3. Advanced. Choose a real reading task from work or study. Practise it on four days spread over two weeks, testing yourself each time.

Key idea:

Training improves the task you practise, so practise real tasks, test yourself and spread your practice out.

Rated high for usefulness (Dunlosky et al., 2013)

Technique	Means
Practice testing	Testing yourself
Distributed practice	Spreading study over several sessions with gaps

Quick check:

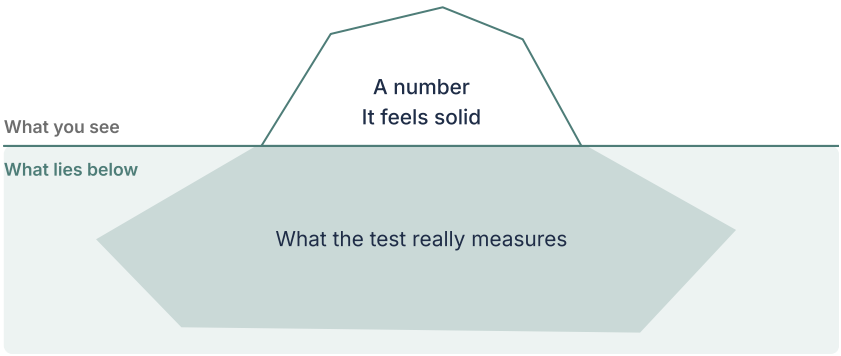
What is far **transfer**? Answer: practice on one task helping a quite different task. What is the reliable route to faster reading with good comprehension? Answer: more reading practice and stronger language skill.

1.3.3 What a Reading or Listening Test Can and Cannot Tell You

Online you can find dozens of quick tests that promise to measure your reading speed or tell you what kind of learner you are. **A test feels solid because it gives you a number.** The number is only as good as what the test really measures.

This section looks at **what reading and listening tests can measure** and where they mislead. It will help you read your own scores with care, including the ones you will record in Module 10.

A number and what the test really measures



Even professional reading tests do not all measure the same thing. One team compared several widely used comprehension tests. **"Modest**

intercorrelations among the tests suggested that they were measuring different skills" (Keenan et al., 2008).

> Science Says:
>
> In that study, decoding, which means sounding out written words, played the biggest part in two of the tests, the PIAT and the WJPC. Listening comprehension played the biggest part in two others, the GORT and the QRI (Keenan et al., 2008). **Two tests with the same label can reward different skills.**

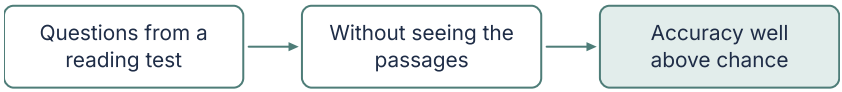
Two tests with the same label

Biggest part played by	Tests
Decoding	PIAT and WJPC
Listening comprehension	GORT and QRI

That has a plain meaning for you. **A score on one reading test describes your result on that test.** Another test might rank you higher or lower, because it leans on a different part of the skill.

Some tests have a second problem. In one study, people answered the questions from a reading test called the Nelson-Denny, **without seeing the passages at all**. Their accuracy was "well above chance" (Coleman et al., 2010).

The Nelson-Denny questions alone



> **Science Says:**
>
> The authors wrote that this raises "serious questions about the validity" of the test (Coleman et al., 2010). Validity means **whether a test measures what it claims to measure**. If you can answer without reading, the test is partly measuring something other than reading. It was a single study, so treat it as a warning sign.

Answer without reading



You can answer without reading

Validity: does it measure what it claims?

The test partly measures something other than reading

> **Exercise:**
>
> Try it. Before reading a short article, try to answer three questions about it from its title alone. Then read it and check. **Notice how much you could guess**, and what only the reading gave you.

Speed tests have their own traps. **Words per minute depends on the text.** In the review described in 1.1.3, fiction was read faster than non-fiction, and the difference was explained by word length (Brysbaert, 2019).

Words per minute depends on the text

Text	Read	The difference
Fiction	Faster	Explained by word length
Non-fiction	Slower	Explained by word length

A speed score only makes sense **with the text type beside it**. A rate on a light novel and a rate on a science chapter are two different numbers, and comparing them tells you little.



Two open books side by side on a table, a thin paperback novel and a heavy science textbook, a stopwatch resting between them.

A speed score also needs a comprehension check. Carver's speed readers, described in 1.2.3, wrote their best summary only at 1,500 words per minute, and **they were worst at recalling important details at all four rates** they tried (Carver, 1985). Speed with no check of understanding can hide a big loss.

This fits the wider trade-off between speed and accuracy (Rayner et al., 2016). **A fair speed test always asks what you understood.** If a test only times you, the number may reward skipping.

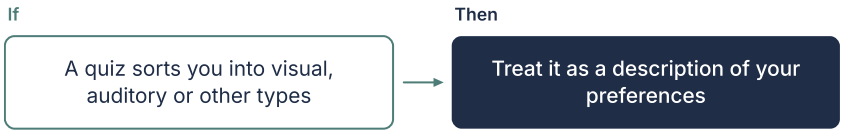
A fair speed test

- [x] The text type beside the score
- [x] A check of what you understood
- [x] More than a timer

> **Key Concept:**
>
> Reading a score. **Ask three questions of any score.** What did the test measure, and what kind of text or talk did it use? Did it check what you understood, or only how fast you went?

Learning-style quizzes sort you into visual, auditory or other types. **The evidence does not justify matching lessons to these types** (Pashler et al., 2008). A quiz result is a description of your preferences and no guide to how you learn best.

A learning-style quiz result



Your own records in this book follow the same rules. **Use the same kind of text each time**, add a short comprehension check, and treat each number as a snapshot. A trend over several weeks tells you far more than any single result.

> Exercise:
>
> Make a fair test.
>
> 1. Starter. Time yourself reading one page of a novel. Write your **words per minute and the text type**.
> 2. Middle. Repeat with non-fiction, then write three main points from memory and check them.
> 3. Advanced. Set up a weekly test with the same kind of text, a timer and five comprehension questions. Record the results for four weeks.

Set up a weekly fair test

- [x] The same kind of text each time
- [x] A timer
- [x] Five comprehension questions
- [x] Record the results for four weeks

Key idea:

A score means little without its text and a comprehension check, so test fairly and watch the trend.

Quick check:

Do all reading comprehension tests measure the same skills? Answer: no, one study found they measure different skills. Why should a speed score name the text type? Answer: fiction is read faster than non-fiction, so rates depend on the text.



Module

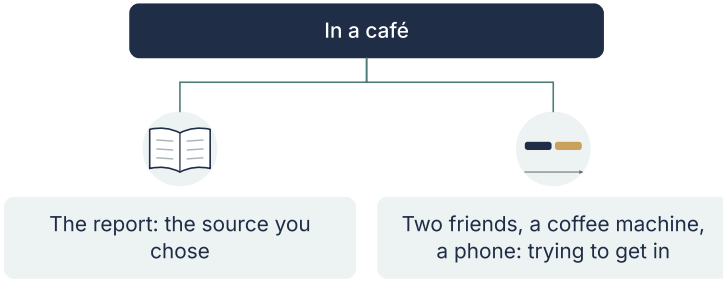
2

How Extractivity Works with Attention, Memory, Intellect and Creativity

2.1.1 Focusing on the Source and Ignoring Distraction

You sit in a café with a report to read. At the next table two friends are planning a holiday, a coffee machine hisses, and your phone lights up twice. **The report is the source you chose**, and everything else is trying to get in as well.

The source and the rest



Module 1 showed that attention is the partner that picks what you take in. This module looks at each partner in turn, starting with attention. **The Attention book covers attention in full**, so here we look only at how it shapes intake.



A woman at a small café table reading a stapled report, a coffee cup at her elbow and two people chatting at the table behind her.

Attention has two jobs when you read or listen. It has to **stay on the source** and keep the rest out. Some distractions are easy to ignore, and others slip through however hard you try.

One review found a pattern in which distractions get through. **A busy, detailed task for the eyes can help focus**, because it leaves little room for anything else. Focus gets worse when the load falls on the mind's control system, such as working memory (Lavie, 2010).

Two kinds of load (Lavie, 2010)

	A busy, detailed task for the eyes	Load on the mind's control system
Focus	Can help	Gets worse

> **Science Says:**
>
> Put simply, a task that fills the eyes with detail can hold your focus, while a task that makes you **juggle facts in your head** leaves you more open to distraction (Lavie, 2010). Working memory is the small space where you hold information while you use it, and section 2.2.1 looks at it closely.

Some sounds get through more easily than others. Earlier studies found that "approximately 33% of subjects report hearing their own name in an unattended, irrelevant message" (Moray, 1959, as cited in Conway et al., 2001). **About a third of people caught their own name** in speech they were told to ignore.

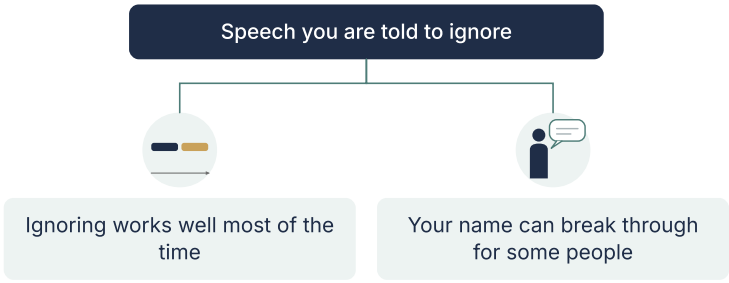
About a third caught their own name



The other two thirds did not notice it. **Ignoring works well most of the time**, and a few things that matter to you, like your name, can still break through for some people. That is useful at a party and less useful when you are trying to read.

> **Exercise:**
>
> Try it. Read a page while a radio talks quietly in the room. Then read a similar page in silence. **Write one sentence about each page** from memory, and note which was easier.

What gets through



The skill of following one voice among several has been studied for a long time. In early experiments, people listened to speech with one ear and with two ears (Cherry, 1953). **These experiments tested the skill**, and they were never designed to train it.

That matters for practice. A test shows where you stand, and a training plan has to come from somewhere else. **Following one voice is a skill you can notice and measure**, and later modules give methods to practise it with real talks.

Following one voice



Distraction also comes from inside. Your mind can drift away from the page while your eyes keep moving. A study that combined 25 texts and

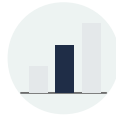
73 results found a link of r = -0.21 between mind wandering and reading comprehension (Bonifacci et al., 2023). **More wandering went with less understanding.**

> **Science Says:**
>
> The letter r measures **how strongly two things go together**, and the minus sign means that as one rises, the other falls. The same review found the link was stronger with age, and it found no link when wandering was measured by a general questionnaire (Bonifacci et al., 2023).

Mind wandering and understanding



25 texts and 73 results combined



r = -0.21: a modest link



A link alone does not show which drives the other

A link of -0.21 is modest, and a link alone does not show which one drives the other. **Catching the drift early** is still worth practising, because every drifted line is a line you have to read again.

Every drifted line costs a reread



Notice the drift early

Return to the source

Fewer lines to read again

> Exercise:
>
> Focus on the source.
>
> 1. Starter. Before reading, put your phone in another room and **name your source aloud**.
> 2. Middle. Read for ten minutes and make a small tick each time you notice your mind has drifted. Count the ticks.
> 3. Advanced. Read a page with a talk playing in the background, then the next page in silence. Write the main point of each and compare.

Attention's two jobs

> - Stay on the source
> - Keep the rest out

Key idea:

Attention keeps intake on the source you chose, and a busy mind lets more distraction through.

Quick check:

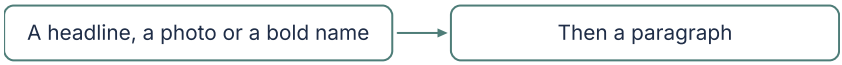
About what share of people heard their own name in speech they were told to ignore? Answer: about a third. Which kind of load makes distraction worse? Answer: load on the mind's control system, such as working memory.

2.1.2 Scanning and Searching: Where the Eyes and Ears Go First

Open a newspaper and watch where your eyes land. They jump to a headline, a photo or a bold name, and only then settle into a paragraph. **Your eyes have already chosen** before you decide to read anything.

This section looks at **where the eyes go first** and how that first choice shapes what you take in. Some of these habits help you, and a few of them can trip you up.

Where the eyes land first



Searching starts with what you expect to find. One study found that "target rarity leads to disturbingly inaccurate performance in target detection" (Wolfe et al., 2005). In plain words, **when a target is rare, people often miss it**.

> **Science Says:**
> The study used a lab search task with people who were not trained screeners (Wolfe et al., 2005). **It did not test airport screeners**, so it shows a risk and does not measure how experts do. The lesson for readers is that a rare but important detail is easy to skip.

When a target is rare



Think of a contract with one unusual clause on page nine. **Rare items hide well**, because your eyes settle into the rhythm of the common ones. A slower check of the pages that matter most is a fair defence.

> **Science Says:**
> Experts search differently. One review found that guidance by basic features "requires no learning, whereas guidance by complex scene properties is learned" (Drew, Evans, et al., 2013). **Knowing where things usually are is a learned skill.**

Two kinds of guidance (Drew, Evans, et al., 2013)

Guidance by	Learning
Basic features	Requires no learning
Complex scene properties	Is learned

A trained reader of scans has learned where to look, and a reader who knows how reports are built may have learned something similar. **Experience can teach the eyes where to look first**, and that helps on every new page.

> **Exercise:**
>
> Try it. Take a report or article of a kind you read often. Before reading, **write where you expect the main point to be**, such as the first paragraph or the summary box. Then check.

Rare items hide well



A contract



One unusual clause on page nine



A slower check of the pages that matter most

In ordinary text, the eyes also skip. One study found that predictable words are skipped more often and looked at for less time (Rayner et al., 2011). **A word you can guess from the sentence** often gets only a brief look, or none at all.

> **Science Says:**
>
> Readers get a rough early look at the next word before the eyes land on it, which researchers call preview benefit (Rayner, 2009). **Prediction and preview work together**, so a familiar phrase moves past quickly and a surprising word gets a longer stop.

Predictable and surprising words

	A predictable word	A surprising word
Gets	A brief look, or none at all	A longer stop

Skimmers also have habits. Section 1.3.1 showed that skimmers favour text early in paragraphs and pages (Duggan & Payne, 2009). **The first lines get the most attention**, so writers who put the key point first help skimmers most.

The ears also have a starting point. Section 2.1.1 showed that your own name can break through for about a third of people. **Words that matter to you pull the ear first**, the way a headline pulls the eye.



A crowded train platform, a woman turning her head sharply towards a voice calling across the crowd.

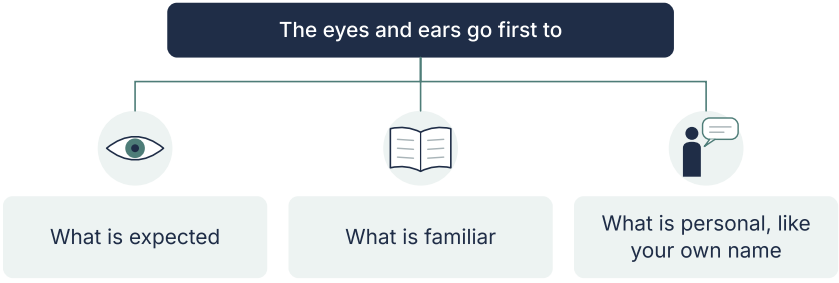
Scanning can also be taught as an orderly sweep. Experts tend to view more systematically, and yet students taught to copy that sweep gained nothing from it (Kok et al., 2016). **Copying the sweep alone did not help**, so knowing what to look for may be the part that counts.

Exercise:

Search with a purpose.

1. Starter. Before you open a long email, **write the one thing you need** from it. Search for that first.
2. Middle. Scan a page for one rare word you have chosen. Time yourself, then check the page slowly for misses.
3. Advanced. Read only the second half of each paragraph, which matched skimming in one study (Duggan & Payne, 2009). Then read fully and spot the misses.

What pulls first



Key idea:

The eyes and ears go first to what is expected, familiar or personal, so search on purpose for what is rare.

Quick check:

What happens to targets that are rare? Answer: people often miss them. Which words do readers skip more often? Answer: words they can predict from the sentence.

2.1.3 When Attention Fails: Skipped Lines, Missed Words and Overload

You reach the bottom of a page and realise you have no idea what it said. Your eyes moved along every line, and **nothing went in**. Everyone has had this moment, and it shows what happens when attention slips.

This section looks at **three kinds of failure**. You can miss something in plain view, your mind can drift away from the text, and too much load can push meaning out.



A young man at a library desk staring at an open book, his chin on his hand and his eyes somewhere far beyond the page.

The first failure is missing what is in plain sight. In a classic study of what people notice in a busy video, the authors concluded that "without attention, we may not even perceive objects" (Simons & Chabris, 1999). **What you do not attend to can go unseen.**

> **Science Says:**
>
> Whether people noticed depended on how similar the unexpected object was to the other objects, and on **how hard the counting task was** (Simons & Chabris, 1999). A hard task and an unusual object made noticing less likely.

Three kinds of failure



Experts are not immune. In one study, 24 radiologists searched scans in which a small gorilla had been placed. **"Eighty-three percent of the radiologists did not see the gorilla"**, and most who missed it "looked directly at its location" (Drew, Võ, & Wolfe, 2013).

A real-world version of the test made the same point. "At night only 35% of subjects noticed the fight; during the day 56% noticed", and more load cut noticing further (Chabris et al., 2011). **Load and conditions change what gets through.**

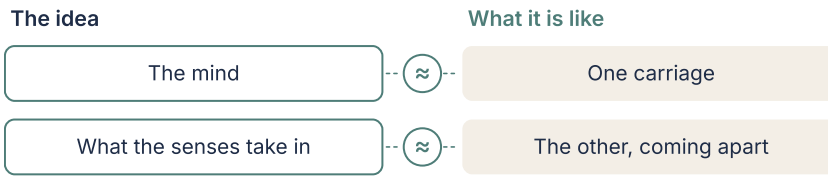
Who noticed the fight (Chabris et al., 2011)



> Exercise:
>
> Try it. Ask a friend to move one object in a room while you look away. Then **search for what changed** and time yourself. Notice how long it takes when you do not know what to look for.

The second failure is drift. One review describes mind wandering as a state in which **the mind decouples from what the senses take in**, with the control system helping to manage it (Smallwood & Schooler, 2015). Decouple means to come apart, like two train carriages unhooked.

Two train carriages unhooked



The eyes keep moving, and the meaning stays behind. The same review notes that wandering has **costs and benefits**, so it is not always a fault. While you read, though, the cost is the line you have to go back to.

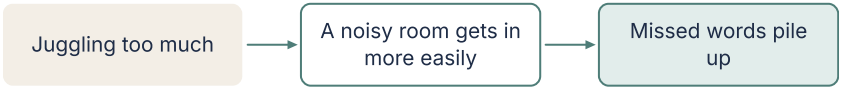
Going back is not a failure in itself. Section 1.2.2 showed that rereading supports understanding (Schotter et al., 2014). **A quick look back after a skipped line is repair**, and it is better than pressing on with a gap.

After a skipped line

Look back	Press on
⊕ Repair ⊕ Rereading supports understanding	⊖ A gap

The third failure is overload. Section 2.1.1 showed that load on working memory makes distraction worse (Lavie, 2010). **When you are juggling too much**, a noisy room gets in more easily, and missed words start to pile up.

Overload



> **Key Concept:**
>
> Three failures. **Missed in plain sight, drifted away and overloaded.** Each has its own fix, which is to search on purpose, to catch the drift early and to lower the load before you read.

> **Exercise:**
>
> Catch the failure.
>
> 1. Starter. At the end of each page, **say one sentence** about what it said. If you cannot, look back.
> 2. Middle. Read for ten minutes and note each drift and what pulled you away.

3. Advanced. Before a hard reading task, write down everything on your mind to clear the load. Then read and compare with a day when you skipped this step.

A first fix for each failure



Missed: search on purpose



Drifted: catch the drift early



Overloaded: lower the load before you read

Key idea:

Attention fails by missing, drifting or overloading, and each failure has a simple first fix.

Quick check:

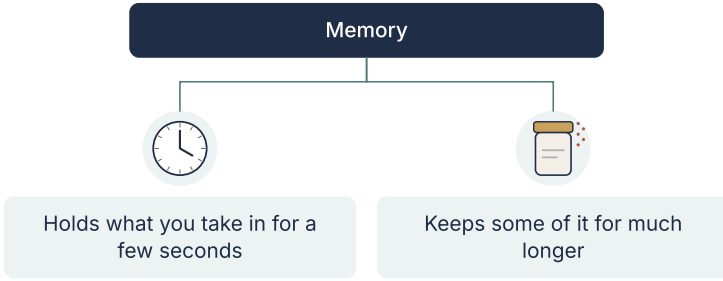
What share of radiologists missed the gorilla? Answer: eighty-three percent. What should you do after a skipped line? Answer: look back, because rereading supports understanding.

2.2.1 Working Memory: How Much You Can Hold While Reading or Listening

Someone reads you a long phone number and an address, one after the other. By the time they reach the postcode, **the start of the phone number has slipped away**. You held it for a moment, and then there was no more room.

Memory is the second partner of extractivity, and it does two jobs. **It holds what you take in for a few seconds**, and it keeps some of it for much longer. This section looks at the short hold, and 2.2.3 looks at keeping.

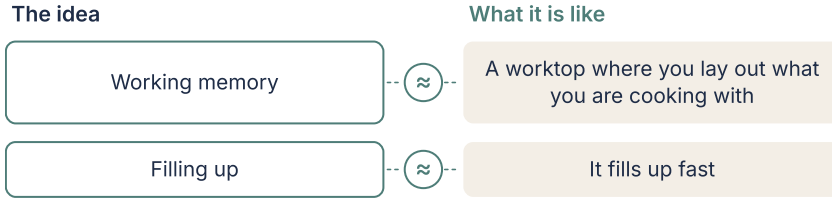
Two jobs of memory



The short hold is called working memory. It is **the small space where you hold information while you use it**, like a kitchen worktop where you lay out what you are cooking with right now. A worktop is useful, and it fills up fast.

> Definition:
>
> **WORKING MEMORY:** the small space in the mind that holds information for a few seconds while you use it.

A kitchen worktop



Reading leans on this space all the time. **You hold the start of a sentence** until its end arrives, and you hold the last sentence while you read the next. Researchers built a test for this, called the reading span task.

> Science Says:
>
> The reading span task comes from a 1980 study of differences in working memory and reading between people (Daneman & Carpenter, 1980). **It measures holding and reading together**, which is closer to real reading than a list of numbers is.

The reading span task (Daneman & Carpenter, 1980)

It measures	Compared with a list of numbers
Holding and reading together	Closer to real reading

How big is the worktop? Section 1.1.1 showed that the usual limit averages about four chunks (Cowan, 2001). **For reading, the new point is what fills those four places.** A long sentence with many new names can use them up before it ends.

That is why some texts feel heavy. **Each new term takes a place**, and a sentence that introduces three new ideas at once leaves little room to link them. Breaking it into steps frees space for meaning.

Why some texts feel heavy



Each new term takes a place



Three new ideas at once leave little room



Breaking it into steps frees space for meaning

> **Exercise:**
>
> Try it. Read a long sentence from a textbook once. Cover it and **say it back in your own words**. Then split it into two shorter sentences and try again. Notice which was easier to hold.

Listening is harder on working memory in one way. You cannot look back at speech, so **everything you need must be held** as the speaker moves on. Notes and pauses work like extra worktop space.

Reading and listening on the worktop

Reading	Listening
You can look back	You cannot look back at speech, so it must be held

Load also affects focus. Section 2.1.1 showed that when working memory is busy, distraction gets in more easily (Lavie, 2010). **A full worktop leaves the door open**, which is one more reason to keep the load light while you read.



A cluttered kitchen worktop covered with bowls, jars and chopping boards, with no clear space left to work.

Can you make the worktop bigger? Many programs promise to. A study that combined many studies found "short-term, specific training effects that do not generalize" (Melby-Lervåg & Hulme, 2013). **Gains stayed with the trained task.**

Training the worktop



Many programs promise a bigger one



Short-term, specific training effects



Gains stayed with the trained task

Key Concept:

Work around the limit. **You cannot easily stretch working memory**, so lighten what it carries. Group words into chunks, write down what you need to hold, and use what you already know to make new information fit.

Exercise:

Lighten the load.

1. Starter. While listening to a talk, **write one key word** each minute so you do not have to hold everything.
2. Middle. Before reading a dense page, list its new terms with a short meaning for each.
3. Advanced. Take a long paragraph and rewrite it as short steps. Compare how easily you can explain it afterwards.

Work around the limit



Key idea:

Working memory is a small worktop for intake, so lighten its load with chunks, notes and what you already know.

Quick check:

What does working memory do? Answer: it holds information for a few seconds while you use it. Does working memory training spread to other tasks? Answer: the gains stayed with the trained task.

2.2.2 Prior Knowledge: Why What You Already Know Helps You Understand and Remember

Hand a page about cricket to two readers. One has played for years, and the other has never seen a match. **They read the same words and take in very different things.** The difference sits in what each of them brought to the page.

What you already know is called prior knowledge. It is **the store of facts and experience you bring to new information**. This section shows how it helps you understand and remember what you take in, and where its help stops.

A page about cricket



One reader has played for years



The other has never seen a match



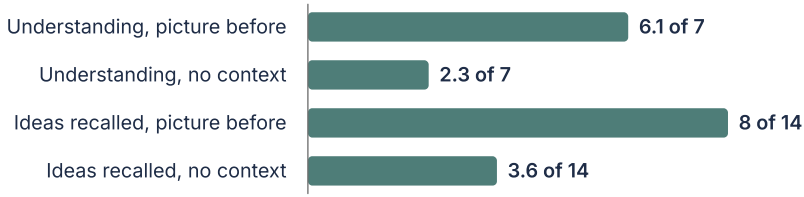
They take in very different things

Section 1.1.1 described a study of 64 students who read about baseball (Recht & Leslie, 1988). **Prior knowledge helped on every measure**,

for strong and weak readers alike. The new point here is what kind of help it gave, which was better memory and understanding of the text.

A classic experiment shows how strong this help can be. People met a passage that was hard to follow without its context. **A picture shown before the passage changed everything.** With it, understanding scored 6.10 out of 7 and people recalled 8.00 of 14 ideas (Bransford & Johnson, 1972).

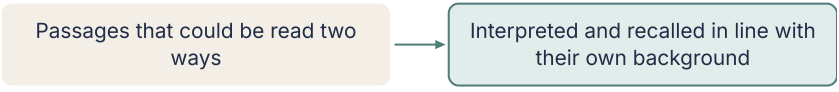
Context before the passage (Bransford & Johnson, 1972)



> **Science Says:**
>
> Without any context, the same passage scored 2.30 for understanding and 3.60 ideas recalled. **A picture shown after the passage did not help** (Bransford & Johnson, 1972). Knowledge works best when it arrives before the information it has to organise.

Prior knowledge also shapes what you think a text means. In one study, students read passages that could be read two ways, and they **interpreted and recalled them in line with their own background**, usually without noticing the other reading (Anderson et al., 1977).

Your background shapes the meaning



That is a warning as well as a help. **Your knowledge fills gaps automatically**, and sometimes it fills them in a direction the writer never meant. Checking the text against your first reading keeps that in view.

> Exercise:
>
> Try it. Before reading an article, **look at one picture, chart or heading** that gives its topic. Write two things you already know about it. Then read, and note where those two facts helped.

Knowledge fills gaps

A help	A warning
⊕ Fills gaps automatically	⊖ Sometimes in a direction the writer never meant

Expert studies show the same effect. In a study of chess players, a master recalled real game positions far better after a five-second look, and **the advantage did not hold for random positions** (Chase & Simon, 1973). It was a small study of three players.

> Science Says:
>
> Experts also sort problems differently. In one classic study, experts grouped problems by **the deep principles behind them**, while novices grouped them by surface features (Chi et al., 1981). Knowledge changes what a reader sees as the point.

Experts and novices

	Experts	Novices
Grouped problems by	The deep principles behind them	Surface features

Does knowing a topic make you read faster? **The evidence shows one small speed effect.** Section 2.1.2 showed that readers skip predictable words more often and look at them for less time (Rayner et al., 2011). The studies of understanding and recall above did not measure reading speed.

The honest claim is about meaning. **Prior knowledge helps you understand and remember**, and its only shown speed effect is the skipping of predictable words. The Memory book looks at the same link from memory's side, in its section "Memory as the Engine of Extractivity".



A bookshelf with a few well-worn books on one subject, a new book on the same subject being slid in beside them.

Exercise:

Use what you know.

1. Starter. Before reading, **write three things you already know** about the topic.
2. Middle. Look at the pictures, headings or summary of a text before reading it, following the order in Bransford and Johnson (1972). Note what was easier.
3. Advanced. Read two short texts on a topic, one you know well and one you do not. Write what you remember from each a day later.

The honest claim about prior knowledge



Helps you understand



Helps you remember



Its only shown speed effect: skipping predictable words

Key idea:

What you already know helps you understand and remember new information, especially when it comes first.

Quick check:

Did the context picture help when shown after the passage? Answer: no, it helped only when shown before. Does prior knowledge make reading faster? Answer: the only shown effect is that readers skip predictable words more often.

2.2.3 From Intake to Long-Term Memory: Retrieval, Spacing and Review

You read a chapter carefully on Sunday and feel you understand it well. By Thursday **much of it has gone**, and you are not sure where. Taking something in is the first step, and keeping it needs a second one.

This section looks at **how intake turns into lasting memory**. The methods with the best support are simple, and most people use them far less than they could.

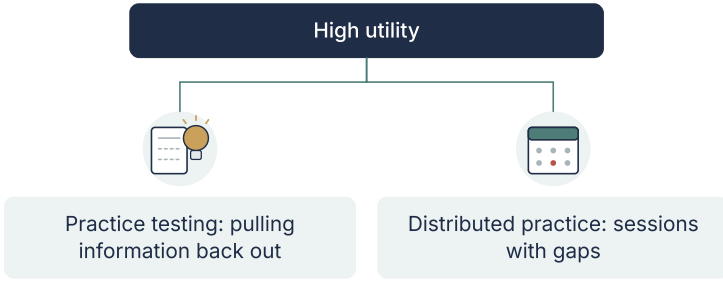


A student at a desk on a Thursday evening, flipping back through a chapter she read on Sunday.

The best-supported methods were named in a major review of learning techniques. “Practice testing and distributed practice received high utility assessments” (Dunlosky et al., 2013). **Testing yourself and spreading your study out** came top.

Practice testing means **pulling information back out of your own head**, by answering questions or writing what you remember. This act of pulling it out is called retrieval. Distributed practice means spreading study over several sessions with gaps between them.

Two methods came top (Dunlosky et al., 2013)



> **Science Says:**
> In one study, students either studied material again or took a test on it. **After 5 minutes, restudy did better.** After 2 days and after 1 week, the students who had been tested kept substantially more (Roediger & Karpicke, 2006).

That result is easy to misread in the moment. **Rereading feels better on the day**, because the words look familiar. Testing feels harder, and it is the one that pays off later.

Restudy or test (Roediger & Karpicke, 2006)

After	Did better
5 minutes	Restudy
2 days	Testing
1 week	Testing

A study that combined many studies found that testing helps retention. It also found that **recall tests give larger benefits than recognition tests** (Rowland, 2014). Recall means producing the answer yourself, and recognition means picking it out from choices.

> Exercise:
>
> Try it. Read one page of something you want to keep. Close it and **write everything you remember** without looking. Then open it and check what you missed.

Recall and recognition

	Recall	Recognition
Means	Producing the answer yourself	Picking it out from choices
Benefit (Rowland, 2014)	Larger	Smaller

Spacing also has strong support. A review of verbal recall studies supports spreading practice out over time (Cepeda et al., 2006). **Study spread across days** is the pattern this review supports.

Most students do not use these tools. In a survey of 177 students, **most reread and relatively few tested themselves** (Karpicke et al., 2009). Rereading is the habit, and testing is the better tool.

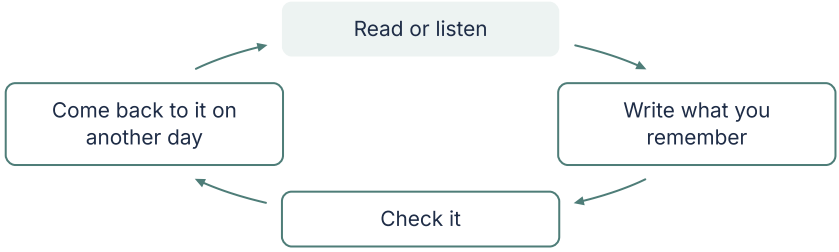
Rereading and testing

Rereading	Testing
⊕ Feels better on the day	⊖ Feels harder
⊕ The habit of most students	⊖ Pays off later

> 🔑 **Key Concept:**
>
> Keep what you take in. **Test yourself, then space it out.** After reading or listening, write what you remember, check it, and come back to it on another day.

The Memory book gives a full set of practice for this link, in its section "Extractivity Exercises: Building the Memory-Intake Connection". **Here the point is simple**, which is that intake is not finished until you have tried to bring it back.

Keep what you take in



Exercise:

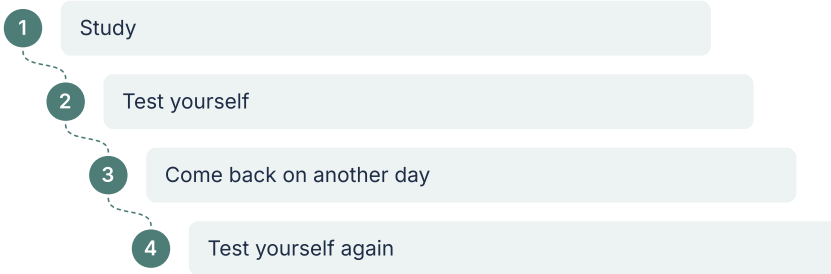
Turn intake into memory.

1. Starter. After a talk or podcast, **write three points** from memory.
2. Middle. Make five questions on a chapter and answer them two days later, following Roediger and Karpicke (2006).
3. Advanced. Plan three review sessions for one topic, spread across a week, as the spacing research suggests (Cepeda et al., 2006). Test yourself at each one.

Key idea:

Intake lasts when you test yourself and space your review, and rereading alone keeps far less.

Spread across days



Quick check:

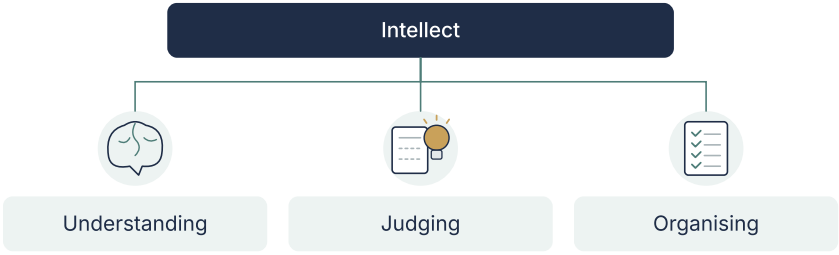
After a week, which kept more, restudy or testing? Answer: testing. Which tests give larger benefits, recall or recognition? Answer: recall tests.

2.3.1 Comprehension: Building Meaning From Words, Sounds and Images

Read the sentence "She put the cake in the oven and set the timer." You did not just collect eleven words. **You pictured a kitchen, a cake and a wait**, and you could answer a question about what happens next. That picture is comprehension at work.

Intellect is the third partner of extractivity. In this book it covers **understanding, judging and organising** what you take in. The Intellect book covers the whole ability, and this unit looks only at how it shapes intake, starting with understanding.

Three jobs of intellect in intake



Section 1.1.1 introduced one model of comprehension, which says that a reader builds a representation of the text (Kintsch, 1988). **The new point here is how that building happens in layers.** An earlier paper by the same researcher and a colleague looked at how readers condense a text (Kintsch & van Dijk, 1978).

> **Science Says:**
>
> That paper is the origin of three rules for **condensing a text**, which are to delete minor details, to generalise, and to build topic statements (Kintsch & van Dijk, 1978). Those rules turn many sentences into one short gist.

Rules for condensing a text (Kintsch & van Dijk, 1978)



Think of a jigsaw puzzle. **Each sentence is a piece**, and the gist of the whole text is the finished picture on the box. You need the pieces, and you also need a sense of the picture to know where each one goes.

Reading has two parts, as the simple view of reading in 1.1.2 set out (Gough & Tunmer, 1986). **For intake, the new point is that decoding comes first**, and comprehension can only work on words that have been decoded.

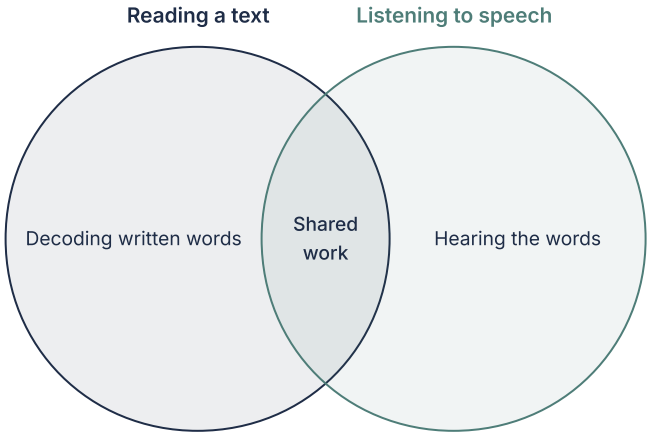
Decoding comes first



> **Exercise:**
>
> Try it. Read one short article. Write **one sentence for the whole thing**, its gist. Then write one sentence for each paragraph. Check that the first sentence fits the others.

Listening uses the same comprehension once the words are heard. **Much of the understanding work seems to be shared** between reading and listening, once decoding is easy (Diakidoy et al., 2005).

Reading and listening share the work



Images are the third channel. **What you see has to fit the same model in your head** as what you read and hear.



A jigsaw puzzle half finished on a table, its box lid propped up behind it showing the full picture of a harbour.

Comprehension draws on all three channels. **Words, sounds and images feed one model** in your head, and intellect is the partner that builds it and checks it fits. The next two sections look at the other two jobs, judging and organising.

One model in your head



> **Exercise:**
>
> Build the meaning.
>
> 1. Starter. After a short video, **say its main point** in one sentence.
> 2. Middle. Read an article and draw one simple picture that sums it up. Explain the picture to someone.

3. Advanced. Take a long report. Write the gist first, then one line per section, and mark any section that does not fit the gist.

Build the meaning



Say the main point in one sentence



Draw one simple picture that sums it up



Write the gist first

Key idea:

Comprehension builds one model from words, sounds and images, sentence by sentence and as a whole.

Quick check:

What do the rules for condensing a text produce? Answer: one short gist. What must a reader do before comprehension can begin? Answer: decode the written words.

2.3.2 Evaluating Sources and Claims While You Take Them In

A FRIEND SHARES A STRIKING health story with a smart logo and a confident headline. It looks official, and **it would be easy to take it in whole**. Taking in information also means deciding how much of it to believe.

This is the second job of intellect in intake, **judging what comes in**. Good judging happens while you read, before a claim settles into memory as fact.

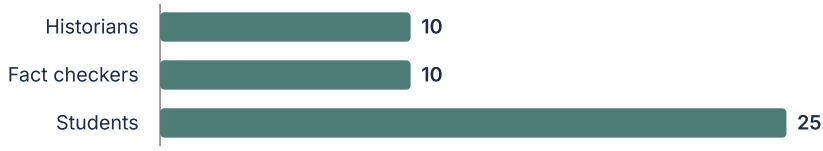
Judge before it settles



Section 1.2.3 described a study of how experts judge websites (Wineburg & McGrew, 2019). The new point is who took part. **The study compared 10 historians, 10 fact checkers and 25 students.** Historians and students fell for logos and domain names, and the fact checkers read laterally.

Reading laterally means **leaving the site to see what others say about it**. Historians are expert readers of old documents, and yet on the open web they trusted the look of a site. Judging a source on the web is its own skill.

Who took part (Wineburg & McGrew, 2019)



> **Science Says:**
>
> Lateral reading can be taught. Two 75-minute lessons improved university students against a control group (McGrew et al., 2019). In an online course, **students improved and read laterally more often** (Breakstone et al., 2021).

Games can also help. In one study, about 15,000 players of an online fake news game **improved at spotting fake news** (Roozenbeek & van der Linden, 2019). The study had no randomly chosen control group, so the evidence is mixed.

Lateral reading can be taught



A small nudge can change what you pass on. **Shifting attention to accuracy** raised the quality of news people later shared (Pennycook et

al., 2021). The study measured sharing, and it did not test how well people understood the news.

> **Exercise:**
>
> Try it. Before you share or save the next article you see, **ask yourself how accurate its headline is**. Then open a new tab and search for what other sources say about it. This uses lateral reading (Wineburg & McGrew, 2019).

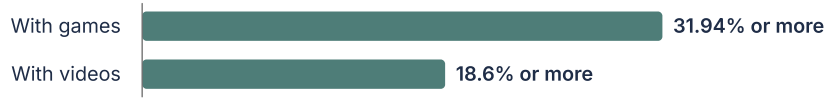
Two more ways to judge

Method	What it showed
A fake news game, about 15,000 players	Improved at spotting fake news; no randomly chosen control group
Shifting attention to accuracy	Raised the quality of news people shared

Bias is another thing intellect can catch. In one study, a single training session cut bias, by 31.94% or more with games and 18.60% or more with videos, and **the effects held for at least two months** (Morewedge et al., 2015).

> **Science Says:**
>
> Bias here means a habit of thinking that tilts judgement in one direction (Morewedge et al., 2015). **The training took a single session.** It was one study, so treat the numbers as a guide.

Bias cut by one session (Morewedge et al., 2015)



These methods share one move. **They slow you down at the point of belief**, just long enough to check. You still take the information in, and you take it in with a label of how far to trust it.



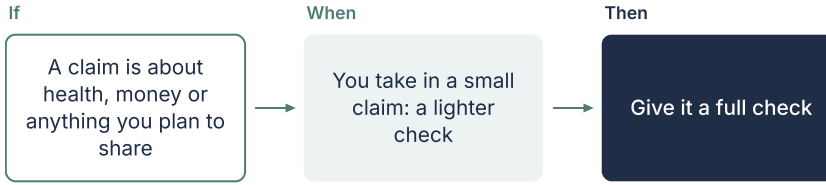
A magnifying glass resting on a printed news article, with a few lines circled in pencil.

Judging does not mean doubting everything. **A good judge saves doubt for the claims that matter**, such as health, money or anything you plan to share. Small claims can pass with a lighter check.

> Exercise:
>
> Judge as you read.
>
> 1. Starter. For one article today, **find who wrote it** and who published it.
> 2. Middle. Check one striking claim by reading laterally, following McGrew et al. (2019). Write what other sources said.

3. Advanced. Play an online fake-news game like the one in Roozenbeek and van der Linden (2019). Then judge three real headlines and note what you checked.

Save doubt for what matters



Key idea:

Judge sources while you take them in, by checking what others say before a claim settles as fact.

Quick check:

What did the fact checkers do that the historians did not? Answer: they read laterally, checking what other sources said. Can lateral reading be taught? Answer: yes, two 75-minute lessons improved students.

2.3.3 Structuring Information: Outlines, Maps and Tables

You leave a long meeting with three pages of notes. A week later you open them and **cannot find the one decision that matters**. The information was taken in, and it was never organised.

Organising is the third job of intellect in intake. It turns a stream of facts into **a shape you can find your way around**, such as an outline, a map or a table. This section sets out the evidence for each.



A notebook open on a desk with three pages of dense handwriting, a pen lying across it and a cold cup of tea nearby.

Concept maps have the strongest support. A concept map is **a diagram of ideas joined by labelled links**, such as "causes" or "is part of". A study that combined 55 studies with 5,818 people linked concept maps to better knowledge retention (Nesbit & Adesope, 2006).

> **Science Says:**
>
> The effects in that review ranged **from small to large depending on how the maps were used** (Nesbit & Adesope, 2006). A concept map is a good bet, and the way you use it counts.

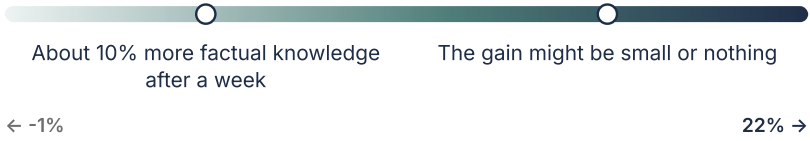
A concept map



Mind maps are a looser cousin, with a topic in the middle and branches around it. In one study, mind maps gave about 10% more factual knowledge after a week, with a 95% confidence interval of -1% to 22%, and **lower motivation** (Farrand et al., 2002).

A confidence interval is **the range in which the true effect probably lies**. This one runs from slightly below zero to well above it, so the gain might be small or might be nothing. Mind maps are worth trying, and the evidence is mixed.

Mind maps: small gain or nothing



> **Exercise:**
>
> Try it. After reading a short article, draw **five boxes for its main ideas**. Join them with arrows and write a word on each arrow that says how they are linked.

Guided notes give you a handout with gaps to fill as you listen. A review found that guided notes **increase note accuracy and performance** in school-age learners (Konrad et al., 2009). Adults can try the same idea as a template prepared before a meeting or lecture.

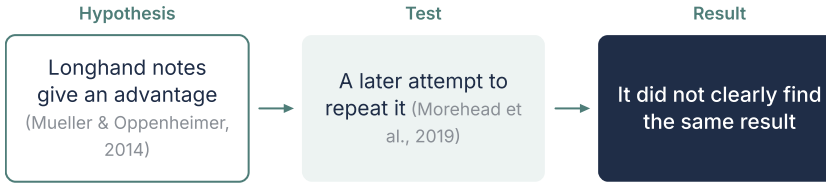
Guided notes (Konrad et al., 2009)

What they are	What they do
A handout with gaps to fill as you listen	Increase note accuracy and performance

Many people ask whether to take notes by hand or on a laptop. **An early study found an advantage for longhand** (Mueller & Oppenheimer, 2014). A later attempt to repeat it did not clearly find the same result (Morehead et al., 2019).

> **Key Concept:**
>
> Pick a structure. **A concept map shows links, a table compares, and an outline shows order.** Choose the shape that fits what you need to find later.

Longhand or laptop



The Cornell method splits a page into notes and a cue column for review (Pauk, n.d.). **As a named method its support is weak.** Its cue column works as self-testing, which section 2.2.3 showed is well supported.

The outline method has no verified study behind it in this book's research. **Outlines and tables are still useful shapes** when the information has an order or needs comparing. A table of three options with the same rows makes the differences easy to see.

How well each method is supported

Method	Support
Concept maps	The strongest support
Mind maps	Mixed
Guided notes	Increase note accuracy and performance
Cornell method	Weak as a named method
Outline method	No verified study in this book

> ✎ **Exercise:**
>
> Structure what you take in.
>
> 1. Starter. After a meeting, write **one line per decision**, in the order they were made.

2. Middle. Turn one chapter into a concept map, following Nesbit and Adesope (2006). Label every link.
3. Advanced. Prepare guided notes before a talk, following Konrad et al. (2009), with gaps for key points. Fill them in as you listen.

Three ways to structure intake



One line per decision



A concept map with every link labelled



Guided notes with gaps

Key idea:

Structure turns intake into something you can find and use, and concept maps have the strongest support.

Quick check:

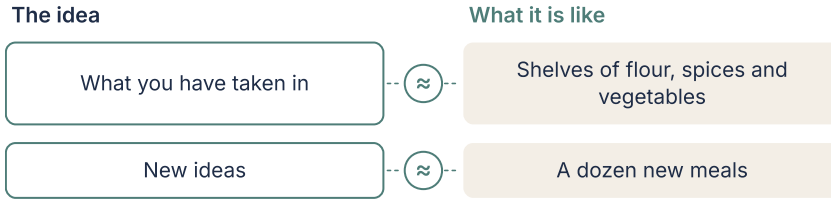
Which structuring method has the strongest support? Answer: concept maps. Did later work clearly repeat the longhand advantage? Answer: no, it was not clearly found again.

2.4.1 Gathering Raw Material for New Ideas

A COOK WITH AN EMPTY cupboard can only make so much. Fill the shelves with flour, spices and vegetables, and **the same cook can invent a dozen meals**. New ideas work in a similar way, because they are built from what you have already taken in.

Creativity is the fourth partner of extractivity. The Creativity book covers it in full, and this unit looks at **how intake feeds new ideas**. This section is about gathering the raw material.

A cook and a cupboard



New ideas tend to follow what we already know. In one study, 385 students imagined animals from another galaxy, and their creatures had **structures similar to animals on Earth** (Ward, 1994). Even invention leans on stored knowledge.

> **Science Says:**
>
> The way people are asked to think can change what they draw on. In one study, **specific versus abstract thinking instructions changed what people produced** within a session (Ward et al., 2004). This was a change within one session, and it is not a long-term training gain.

Animals from another galaxy (Ward, 1994)



385 students



Imagined animals from another galaxy



Structures similar to animals on Earth

That points to a practical rule. **The wider your stock of material**, the more there is to combine. Section 2.2.2 showed that what you already know helps you understand and remember new information (Bransford & Johnson, 1972; Recht & Leslie, 1988), so each new piece you take in also makes the next one easier to use.

Intake for creativity has a different aim from intake for an exam. You are not trying to keep everything. **You are collecting pieces worth combining**, such as a striking fact, an odd example or a method from another field.

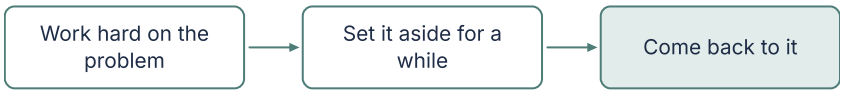
Pieces worth combining



> **Exercise:**
>
> Try it. Read one article from a field you know nothing about. **Write down one idea, fact or method** from it that you might borrow for your own work or hobby.

Time away also helps. A study that combined many studies found "a positive incubation effect, with divergent thinking tasks benefiting more" (Sio & Ormerod, 2009). Incubation means **setting a problem aside for a while** before coming back to it, and divergent thinking means producing many possible ideas.

Incubation



> **Science Says:**
>
> The same review found that "longer preparation periods gave a greater incubation effect" (Sio & Ormerod, 2009). In plain words, **a break helps most after you have worked hard on the problem** first. Gathering material is part of that preparation.

Gathering and resting work as a pair. **Take in widely first, then step away**, and let the material settle before you try to make something with it.



A woman walking a dog along a beach path, a small notebook sticking out of her coat pocket.

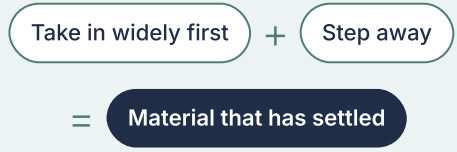
> **Exercise:**
>
> Stock the cupboard.
>
> 1. Starter. Each day this week, **note one interesting thing** you read, heard or saw.
> 2. Middle. Read about one topic from two different fields. Write one link between them.

3. Advanced. Gather material on a problem for an hour, then take a day off it, as the incubation research suggests (Sio & Ormerod, 2009). Come back and write five ideas.

Key idea:

New ideas are built from what you take in, so gather widely and give the material time to settle.

Gathering and resting work as a pair



Quick check:

What did the imagined alien animals tend to look like? Answer: they had structures similar to animals on Earth. When does an incubation break help most? Answer: after a longer period of preparation.

2.4.2 Noticing the Unexpected Detail

Many new ideas begin with something small that did not fit. A strange result, an odd remark or a detail in the corner of a photo can **start a whole line of thinking**. To use it, you first have to notice it.

This section looks at **why unexpected details are easy to miss** and how intake can be tuned to catch them. It brings together several findings from earlier in this module.

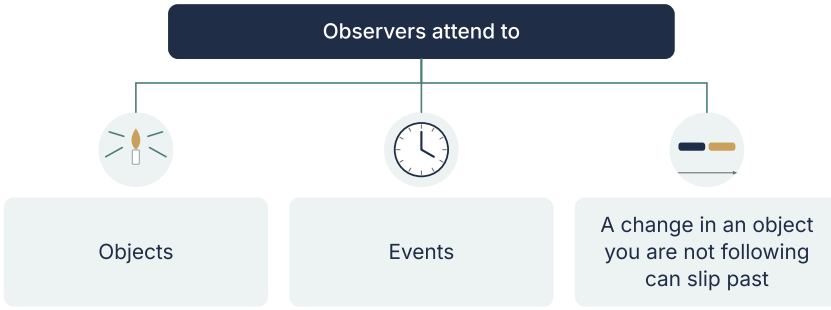


A crowded market scene, with one small red umbrella in the far corner standing out against the grey ones.

People miss more than they think. One classic paper reported that "we often do not detect large changes to objects and scenes" (Simons & Chabris, 1999). **A change in plain view can go unseen** when attention is elsewhere.

> **Science Says:**
>
> The same paper found that observers attend to "objects and events", which helps explain why a change in **an object you are not following** can slip past (Simons & Chabris, 1999). What you track is what you see.

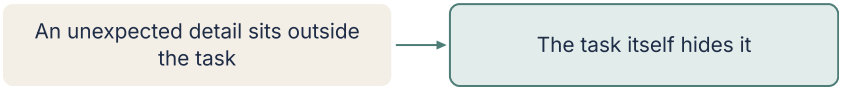
What you track is what you see



Section 2.1.3 showed that most radiologists in one study missed a gorilla placed in a scan (Drew, Võ, & Wolfe, 2013). **For creativity, the new point is what that means for discovery.** An unexpected detail sits outside the task you are doing, so the task itself hides it.

Rarity adds to the problem. Section 2.1.2 showed that rare targets are often missed (Wolfe et al., 2005). **An unexpected detail is rare by nature**, so your eyes are least ready for the very thing that could spark an idea.

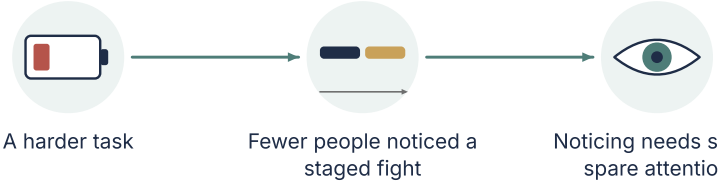
Why discovery is hard



> ✎ Exercise:
>
> Try it. Walk a route you take every day. **Look for three things you have never noticed** before, and write them down. Ask yourself whether any could be useful.

Load also plays a part. In a real-world test, fewer people noticed a staged fight when their task was harder (Chabris et al., 2011). **A busy mind sees less of what lies outside the task**, so noticing needs some spare attention.

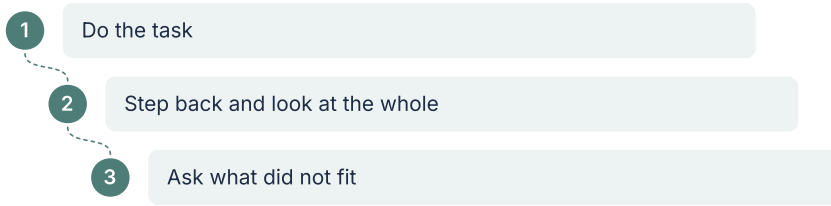
Spare attention



Experts have one advantage (Drew, Evans, et al., 2013). **Their quick sense of the whole may help an odd detail stand out**, because it does not fit the usual pattern.

Noticing is a skill of timing. **Do the task, then step back and look at the whole**, asking what did not fit. That second, open look is when unexpected details have their best chance.

The second look



Key Concept:

The second look. **First look for what you need, then look for what you did not expect.** The first look serves the task, and the second serves new ideas.

Exercise:

Train the second look.

1. Starter. After reading an article, **write one detail that surprised you**.
2. Middle. Study a photo for one minute, cover it, and write what you saw. Look again and note what you missed.
3. Advanced. After finishing a work task, spend five minutes reviewing it only for oddities. Write each one and what it might mean.

Two looks, two jobs



Key idea:

Unexpected details hide outside the task, so add a second, open look to catch them.

Quick check:

Why are unexpected details easy to miss? Answer: they are rare and sit outside the task you are doing. What helps them stand out? Answer: a step back to look at the whole, with some spare attention.

2.4.3 When You Need Which: Matching Extraction to the Task

You have a train timetable, a contract to sign, a novel for the holiday and a lecture to revise. **Each one asks for a different kind of intake**, and reading all four the same way would waste time on some and miss things in others.

This last section of Module 2 brings the four partners together. It shows **when you need which**, so you can match the way you take in information to the job in front of you.

Four jobs, four kinds of intake



A train timetable



A contract to sign



A novel for the holiday

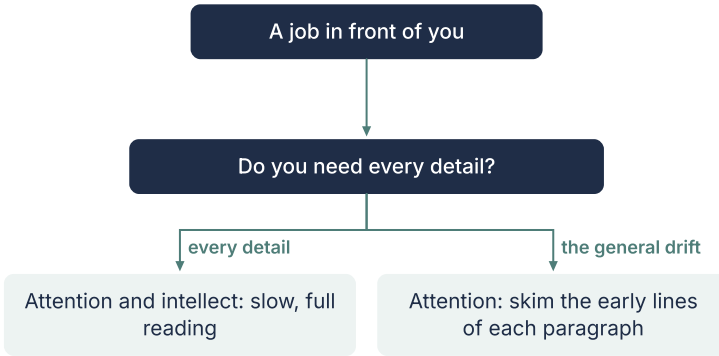


A lecture to revise

Some jobs only need the general drift. Skimming gives moderate comprehension when full understanding is not the goal (Rayner et al., 2016). **This is a job for attention**, pointed at the early lines of each paragraph where skimmers look (Duggan & Payne, 2009).

Other jobs need every detail. A contract or a medicine label calls for slow, full reading. Section 1.3.1 showed where the best readers sit when they need good comprehension (Carver, 1985). **Here attention and intellect work together**, one holding the line and the other judging each clause.

Drift or details



> **Science Says:**
>
> In the same study, the speed readers chose to skim at over 1,000 words per minute (Carver, 1985). **Choosing to skim is fine for the drift**, and it is the wrong choice for a contract. The skill is knowing which job you have.

Listening jobs have their own settings. **Fast playback suits review**, and normal speed suits first meetings with hard material (Murphy et al., 2022).

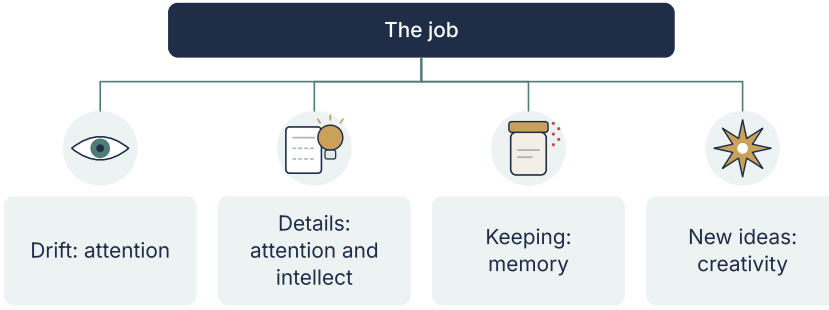
Listening settings (Murphy et al., 2022)

Job	Speed
Review	Fast playback
First meetings with hard material	Normal speed

Some jobs are about keeping. For a lecture you must revise, **memory is the lead partner**. Testing yourself and spacing your review have the strongest support (Dunlosky et al., 2013).

> Exercise:
>
> Try it. List three things you will read or hear this week. For each one, **write the job**, drift, details, keeping or new ideas, and the partner that should lead.

Which partner leads



Some jobs are about making something new. **Creativity leads when you gather material**, and the second, open look from 2.4.2 helps you catch the odd detail worth using. Wide intake and a break come before the idea.



A car's gear stick in a quiet country lane, the dashboard showing a gentle speed.

Notice what decides the choice. **The task decides, and personal style does not** (Pashler et al., 2008), so the right channel and speed come from the job itself.

The task decides

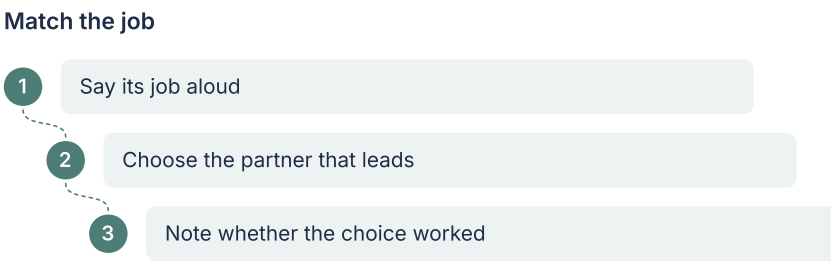
The job in front of you	→	The right channel and speed

> **Key Concept:**
>
> When you need which. **For drift, attention leads with skimming, and for details, attention and intellect read slowly.** For keeping, memory leads with testing and spacing. For new ideas, creativity leads with wide intake and a second look.

Exercise:

Match the job.

1. Starter. Before reading anything today, **say its job aloud**, drift, details, keeping or new ideas.
2. Middle. Take one long document. Skim it first for drift, then read only the parts you need in full.
3. Advanced. For one week, log each reading or listening task, the job you chose, and whether the choice worked.



Key idea:

Match intake to the job, and let the task decide which partner leads.

Quick check:

Which partner leads when you need to keep information? Answer: memory, with testing and spacing. What should decide how you read something? Answer: the task, and personal learning style should not.



Module

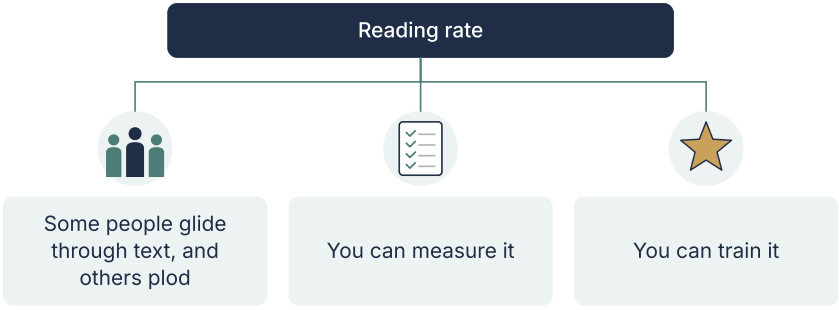
3

Developing the Core Skills of Extractivity

3.1.1 Reading Rate and Fluency

You open a long article and wonder how long it will take. Some people seem to glide through text, and others plod. **Reading rate is a skill you can measure and train**, and this module turns the ideas of Modules 1 and 2 into practice, starting with how fast you read.

Reading rate is a skill



The first step is knowing your own rate. Section 1.2.2 gave **the normal adult ranges**, 175 to 300 words per minute for non-fiction (Brysbaert, 2019). Time yourself on one page, and you have a starting point to measure any training against.



A man in an armchair reading a long magazine article, a small kitchen timer on the arm of the chair beside him.

Fluency means reading smoothly and at a steady pace, and **fluency can be trained**. One well-studied method is repeated reading, which means reading the same passage several times (Therrien, 2004).

> **Science Says:**
>
> Repeated reading **helps students both with and without learning disabilities** (Therrien, 2004). That makes it a method a wide range of readers can try.

Repeated reading builds fluency



Read the same passage several times



Fluency: reading smoothly at a steady pace



Helps students with and without learning disabilities

Section 1.3.2 named the reliable route to faster reading as **more reading practice and stronger language skill** (Rayner et al., 2016). This section turns that route into a habit you can keep.

A habit needs a plan. **Set a time each day for reading** in a field you find a little hard, and keep a list of new words. Before paying for any speed course, keep its promises in proportion (Klimovich et al., 2023).

The reliable route to faster reading



> Exercise:
>
> Try it. Choose a passage of about 200 words at a comfortable level. Read it aloud three times in one sitting, timing each reading. **Note how your time changes.** This draws on repeated reading (Therrien, 2004).

Two popular tips have mixed evidence. Inner speech, hearing the words in your head as you read, is part of skilled reading. **Suppressing it does not give faster reading with full comprehension** (Rayner et al., 2016).

Two popular tips, checked

Tip	What the evidence says
Suppress inner speech	Suppressing it does not give faster reading with full comprehension
Widen your eye span	There is no support for training the span wider

The second tip is to widen your eye span. **There is no support for training the span wider** for reading (McConkie & Rayner, 1975; Rayner et al., 2016). The evidence on both tips is mixed.

> **Key Concept:**
>
> Reading rate. **Know your normal rate, read widely, and build language skill.** Treat any promise of a much faster rate with care, and always check what you understood.

Three habits for reading rate



Know your normal rate



Read widely



Build language skill

> **Exercise:**
>
> Build fluency.
>
> 1. Starter. Time one page of a novel and **work out your words per minute**.
> 2. Middle. Do repeated reading three times a week for two weeks, drawing on Therrien (2004). Record your times.

3. Advanced. Read one article a day in a field you find hard. Note five new words each week and use them.

Key idea:

Reading speed grows with language skill and practice, and the evidence on shortcut tricks is mixed.

Normal adult rate for non-fiction



Quick check:

Does suppressing inner speech give faster reading with full comprehension? Answer: no. Who were the targets of the repeated reading research? Answer: students, both with and without learning disabilities.

3.1.2 Listening Rate and Following Fast Speech

A PODCAST HOST TALKS QUICKLY, a lecturer races through the last slides, and a colleague explains a plan in a rush. **Following fast speech is a skill**, and it can be trained like reading.

Before you train, notice the speakers you most need to follow. **A fast talker on a familiar topic** needs a different effort from a slow talker on a new one (Yuan et al., 2006). Write down the two or three voices you find hardest.

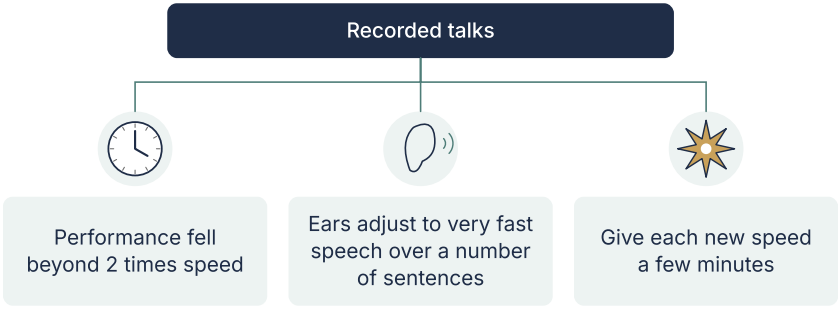


A woman on a crowded bus with earbuds in, her eyes half closed as she listens closely to a talk.

Recorded talks can be sped up. Section 1.3.1 showed that **performance fell beyond 2 times speed** (Murphy et al., 2022). That makes two times a sensible ceiling for your practice.

Listeners also adjust with practice. Section 1.2.2 showed that **ears adjust to very fast speech** over a number of sentences (Dupoux & Green, 1997). Give each new speed a few minutes before you judge it.

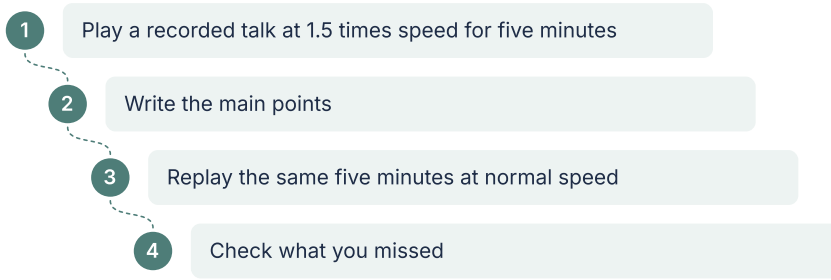
Speeding up recorded talks



> Exercise:
>
> Try it. Play a recorded talk at 1.5 times speed for five minutes. **Write the main points**, then replay the same five minutes at normal speed and check what you missed.

Research on fast speech is not new. **A classic review of accelerated-speech research** appeared in 1969 (Foulke & Sticht, 1969). Language learning adds methods of its own.

Try it at 1.5 times speed



Shadowing means repeating speech aloud as you hear it. In a study of 43 Japanese learners of English, **phoneme perception improved at both levels**, and only the lower-level learners improved on comprehension (Hamada, 2016). A phoneme is a single speech sound.

> **Science Says:**
> In a 13-week study, reading while listening gave **more consistent gains in listening fluency** than reading only or listening only (Chang & Millett, 2014). It was a single study, so the evidence is mixed.

Two listening methods tested

Method	What the study found
Shadowing (Hamada, 2016)	Phoneme perception improved at both levels
Reading while listening (Chang & Millett, 2014)	More consistent gains in listening fluency

Thinking about how you listen is a further aid. Learners taught to think about how they listen **beat a control group on comprehension**, and

the less skilled listeners gained most (Vandergrift & Tafaghodtari, 2010). The evidence is mixed to strong for second-language learners.

These methods share one thread. **Practice with real speech at a slightly harder pace**, and check what you understood each time. The checking turns listening time into training time.

Practice with real speech



A slightly harder pace



Check what you understood each time



Listening time becomes training time

> Exercise:
>
> Follow fast speech.
>
> 1. Starter. Listen to a news bulletin and **write its three main stories**.
> 2. Middle. Read along with an audiobook for 15 minutes, as in reading while listening (Chang & Millett, 2014). Note any new words.
> 3. Advanced. Shadow one minute of a podcast, repeating it aloud as you hear it, following Hamada (2016). Then summarise it.

Key idea:

Fast speech becomes easier with practice, and two times speed is a sensible ceiling for recorded talks.

Follow fast speech

- [x] Starter: write the three main stories of a news bulletin
- [x] Middle: read along with an audiobook for 15 minutes
- [x] Advanced: shadow one minute of a podcast

Quick check:

Which learners improved on comprehension after shadowing? Answer: only the lower-level learners. Who gained most from metacognitive listening training? Answer: the less skilled listeners.

3.1.3 Visual Intake: Spotting Targets and Reading Displays

A pilot glances at a panel of dials, a shopper scans a shelf for one brand, and a reader checks a chart in a report. **Each one takes in information by eye**, often in a few seconds. This section looks at how far that skill can be trained.

Searching by eye improves with practice. One study of visual search practice described the learning as **fast and lasting** (Sireteanu & Rettenbach, 1995).



A supermarket aisle with long rows of cereal boxes, a hand reaching for one red box among dozens.

Training gains tend to stay close to the trained task. Section 1.3.2 showed this in **a big trial where everyday function did not change** (Ball et al., 2002). Visual search training transfers only weakly to daily life.

> **Science Says:**
>
> A study that combined many studies of action video games found an effect of g = 0.34 on thinking skills, clearest for top-down attention, the kind you steer on purpose, and for spatial skills. Published effects were **about 30% larger than the full body of research** (Bediou et al., 2018), so the evidence is mixed.

Action video games



An effect of g = 0.34 on thinking skills



Clearest for top-down attention and spatial skills



Training gains stay close to the trained task

The letter g is a measure of effect size, **how big a difference a training makes**. A g of 0.34 is the review's estimate across all the studies it combined.

Rare targets remain hard. Section 2.1.2 showed that rare targets are often missed (Wolfe et al., 2005). **The practical rule is to slow down** when the thing you need is rare and the cost of missing it is high.

What the letter g means

> Definition
>
> **The letter g**
>
> A measure of effect size: how big a difference a training makes

> **Exercise:**
>
> Try it. Pick a busy page of a newspaper. Choose one rare word and **scan for it against a timer**. Then read the page slowly to check whether you found every one.

Orderly scanning sounds like a good habit. **Before you drill a fixed scanning order**, know that its evidence is mixed (Kok et al., 2016). Practise on the real displays you use instead.

Train with a rare word



Web pages have their own scanning habits. An industry eye-tracking report described an **F-shaped pattern** of how people scan web pages (Nielsen, 2006). That pattern describes behaviour, and it was not tested as a training method.

Charts are a display many people find hard. On a 13-item graph literacy test, people got **about 9 of 13 items right**, and about a third were low on both graph literacy and numeracy (Galesic & Garcia-Retamero, 2011). It was a test, and it did not train anyone.

A 13-item graph literacy test



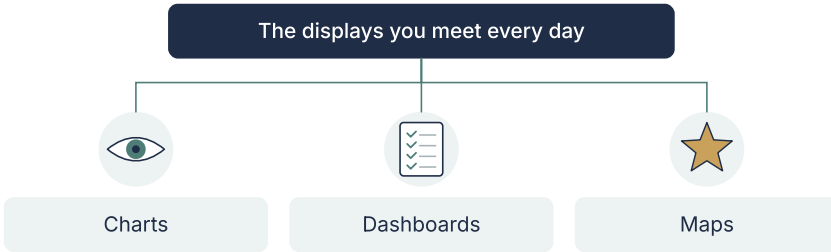
Practice helps the practised task. The best place to train visual intake is therefore the displays you meet every day, such as charts, dashboards and maps.

Exercise:

Train the eyes.

1. Starter. On one web page, **notice where your eyes go first**, and write it down.
2. Middle. Practise a short visual search game for five minutes a day for a week. Note your scores, and treat any gain as specific to the game.
3. Advanced. Take a chart from a report. Write what it shows in one sentence before reading its caption, then check.

Train on real displays



Key idea:

Visual search improves with practice, and the gains stay close to what you practise.

Quick check:

Does visual search training transfer well to daily life? Answer: only weakly. What is the F-pattern? Answer: a description of how people scan web pages, and it was never tested as training.

3.1.4 Keeping Accuracy as Speed Rises

PUSH A CAR HARDER on a winding road and it becomes harder to stay in lane. **Reading works in a similar way.** Speed is useful only as long as you still take in what the text says.

Section 1.3.1 set out the trade-off, including the finding that **doubling or tripling speed without a loss in comprehension is unlikely** and that fast RSVP, which flashes one word at a time in the same spot, hurt comprehension (Rayner et al., 2016; Acklin & Papesh, 2017). This section turns the trade-off into a skill, keeping accuracy as you speed up.



A small car on a winding mountain road, its driver easing off the accelerator before a tight bend.

A pacer, such as a finger moved along the line, **cuts rereading** (Rayner et al., 2016). That sounds helpful until you recall what rereading does.

> **Science Says:**
>
> Section 1.2.2 showed that **regressions**, jumps back to an earlier word, **help you understand** (Schotter et al., 2014). A tool that cuts rereading may therefore cost some understanding, and the evidence on pacers is mixed.

A pacer can cost understanding



Speed tools often hide their cost. **Judge a method by what you recall afterwards** as well as by its speed (Carver, 1985). Test what you remember, every time.

Bold claims need the same test. **Ask for comprehension results** before trying a method that promises whole pages at a glance (McNamara, 2000). The evidence on PhotoReading is mixed.

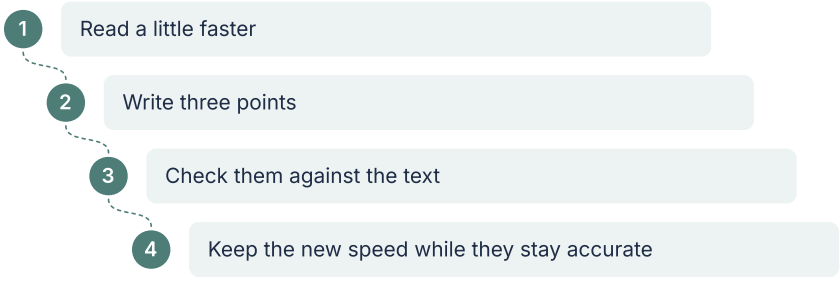
Test a speed method

- [ ] Judge it by what you recall afterwards
- [ ] Test what you remember, every time
- [ ] Ask for comprehension results before trying it

> **Exercise:**
>
> Try it. Read one page at your normal pace and write three points. Read the next page as fast as you can and write three points. **Compare the two lists** with the text.

The safest way to read faster is **to raise speed in small steps** and check comprehension at each step. If your three points stay accurate, the new speed is working. If they slip, step back.

Raise speed in small steps



Accuracy checks can be short. **Three main points from memory** is a quick and honest test. A few questions written before reading can serve too.

> **Key Concept:**
>
> Speed with a check. **Raise speed only while accuracy holds.** Check with three points from memory, and slow down as soon as they slip.

Speed with a check



Exercise:

Keep it accurate.

1. Starter. After each article today, **write three points** and check them.
2. Middle. Read the same kind of text for five days, a little faster each day. Stop raising speed when your points slip.
3. Advanced. Try a finger pacer on one page and normal reading on the next. Compare your points, and note the cost of the pacer.

Key idea:

Speed is useful only while accuracy holds, so raise it in small steps and check each time.

Keep it accurate, level by level

Level	Task
Starter	Write three points after each article
Middle	Read the same kind of text a little faster each day
Advanced	Try a finger pacer on one page and normal reading on the next

Quick check:

What does a pacer cut? Answer: rereading. When should you stop raising your speed? Answer: when your three points from memory start to slip.

3.2.1 Setting a Purpose Before You Start

Two people open the same cookbook. One wants a quick weeknight dinner, and the other is looking for a cake for Saturday. **They will read very different pages**, because each one arrived with a purpose.

A purpose tells attention what to pick and what to pass over. **Setting it before you start** is the first selecting skill, and it takes only a few seconds.



A cookbook open on a kitchen counter, a sticky note marking one page and a shopping list beside it.

Questions are a simple way to set a purpose. With video, **prequestions helped learning of both the questioned material and other material**. With text, readers tend to focus on the prequestioned parts (Carpenter & Toftness, 2017).

> **Science Says:**
>
> The text finding is a useful warning. **A question can narrow reading** to the parts it asks about (Carpenter & Toftness, 2017). The evidence on prequestions is mixed, so use them when the questioned parts are the ones you need.

Prequestions with video and with text

	With video	With text
Effect	Helped learning of questioned and other material	Can narrow reading to the parts it asks about

Two named study systems build on questions. SQ3R (Robinson, 1946) and KWL (Ogle, 1986) are **weak as packages**, with only small classroom studies behind them. The question step and the recite step are supported on their own.

You can borrow the useful parts. **Turn a heading into a question** before you read, and say the answer in your own words afterwards. Each of those two steps has support on its own, even though the full packages are weak.

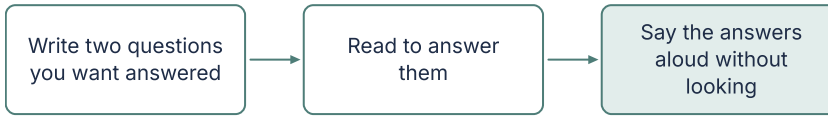
SQ3R and KWL

Weak as packages	Borrow the useful parts
⊕ Only small classroom studies behind them	⊖ Turn a heading into a question ⊖ Say the answer in your own words afterwards

> Exercise:
>
> Try it. Before you read a report, write **two questions you want it to answer**. Read to answer them, then say the answers aloud without looking.

What you already know also sets your purpose. Section 2.2.2 showed that prior knowledge and context before reading **improve comprehension and recall** (Recht & Leslie, 1988; Bransford & Johnson, 1972). A short look at headings and pictures first gives your knowledge a chance to switch on.

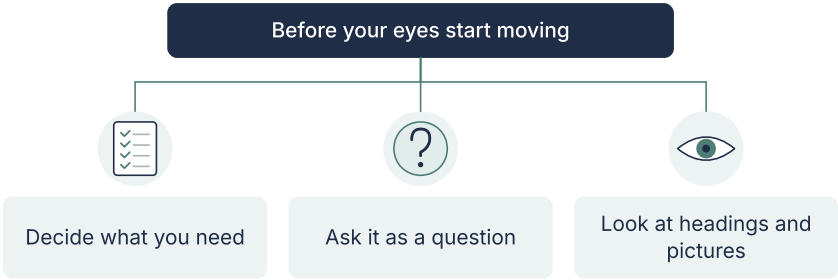
Read with two questions



A purpose can be very short. **"I need the deadline" is a purpose**, and so is "I want the main argument". The point is to decide before your eyes start moving.

> Key Concept:
>
> Purpose first. **Decide what you need, ask it as a question, and look at headings and pictures** before you begin.

Set a purpose first



> **Exercise:**
>
> Set a purpose.
>
> 1. Starter. Before opening any email today, **say what you need from it**.
> 2. Middle. Turn the headings of one chapter into questions, as in the question step of SQ3R (Robinson, 1946). Answer each one after reading.
> 3. Advanced. Watch a short lecture video after writing three prequestions, following Carpenter and Toftness (2017). Note what you learned beyond the questions.

Key idea:

A purpose set before you start tells attention what to take in.

A purpose can be very short



"I need the deadline"



"I want the main argument"



Decide before your eyes start moving

Quick check:

With text, what do prequestions make readers focus on? Answer: the prequestioned parts. Which parts of SQ3R are supported on their own? Answer: the question step and the recite step.

3.2.2 Skimming for Gist and Scanning for Details

You need to know whether a long report is worth reading, and later you need one figure from it. **The first job is skimming and the second is scanning.** Both move quickly, and they look for different things.

Skimming looks for gist, **the general drift of a text**. Scanning looks for one detail, such as a date, a name or a number. Knowing which one you are doing keeps you from using the wrong tool.



A thick printed report on a desk, a hand flicking through its pages and a single figure circled in red on one of them.

Section 1.3.1 showed that **skimming gives moderate comprehension** when full understanding is not the goal (Rayner et al., 2016). The skill lies in choosing it at the right moment.

> **Science Says:**
>
> Section 1.3.1 also showed that skimming had **no advantage over reading half of every paragraph** (Duggan & Payne, 2009). A new point from the same study is that on the web, the benefit of skimming depended on pages being easy to move around.

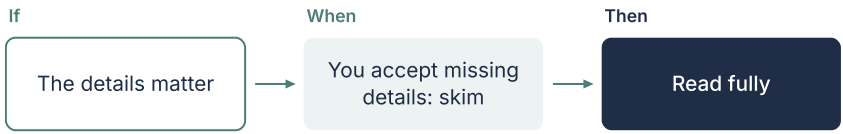
Skimming and scanning

	Skimming	Scanning
Looks for	Gist, the general drift of a text	One detail, such as a date, a name or a number

A simple rule can stand in for skimming. **Read half of each paragraph** and move on. On a web page that is hard to move around, expect skimming to help less.

Skimming is a choice with a cost. **Decide in advance that you are skimming** and accept that you will miss details (Carver, 1985). If the details matter, read fully.

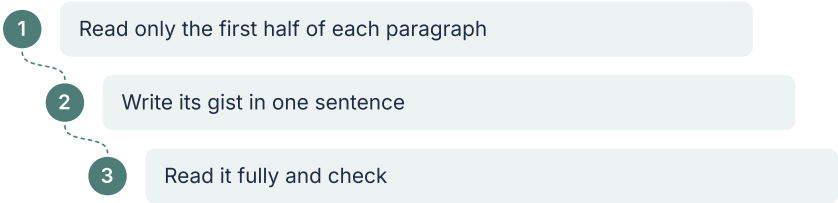
Skim or read fully?



> **Exercise:**
>
> Try it. Skim a long article by reading only the first half of each paragraph. **Write its gist in one sentence.** Then read it fully and check.

Scanning on the web follows habits. An industry eye-tracking report described an **F-shaped pattern** of how people scan web pages (Nielsen, 2006). It describes behaviour and is not a training method.

Skim, then check



Good scanning starts with **a clear picture of the detail you want**. Decide whether it is a number, a name or a date, and let your eyes hunt for that shape on the page.

> **Key Concept:**
>
> Two quick tools. **Skim for gist by reading half of each paragraph. Scan for a detail by knowing its shape first.** Read fully whenever the details matter.

Scan for a detail



Decide its shape: a number, a name or a date

Let your eyes hunt for that shape

Read fully whenever the details matter

> Exercise:
>
> Skim and scan.
>
> 1. Starter. Find **one date** in a news article as fast as you can.
> 2. Middle. Skim three articles by reading half of each paragraph. Rank them by how useful they look, then read the top one. This draws on Duggan and Payne (2009).
> 3. Advanced. Skim a report for gist, then scan it for three figures. Write a five-line summary using both.

Key idea:

Skim for gist and scan for details, and read fully when the details matter.

Skim and scan, level by level

Level	Task
Starter	Find one date in a news article as fast as you can
Middle	Skim three articles by reading half of each paragraph
Advanced	Skim a report for gist, then scan it for three figures

Quick check:

On the web, what did the benefit of skimming depend on? Answer: pages being easy to move around. What is the F-pattern? Answer: a description of how people scan web pages.

3.2.3 Separating Signal From Noise

A colleague is explaining a plan while a phone buzzes and someone laughs at the next desk. **The plan is the signal and the rest is noise.** Separating the two is a selecting skill you use many times a day.

Some noise is outside you, such as sounds and screens. Some is inside, such as a busy mind or a ready-made opinion. **Both kinds compete with the message** you want to take in.



An open-plan office with a woman listening closely to a colleague at her desk, a phone face-down beside her keyboard.

How busy your mind is changes how well you resist distraction. Section 2.1.1 showed that **load on working memory makes distraction worse** (Lavie, 2010). Clear your head of other tasks before an important conversation.

> **Science Says:**
>
> Section 2.1.3 showed that people can miss an unexpected object in plain view. **Noticing depends on how similar the object is to what you are watching and on how hard the task is** (Simons & Chabris, 1999). Focus brings a cost along with its benefit.

What decides whether you notice



Load on working memory makes distraction worse



How similar the object is to what you are watching

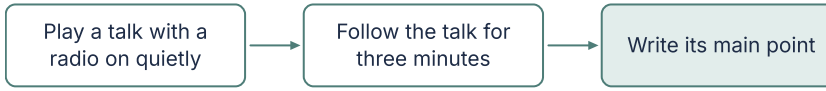


How hard the task is

Picking out one voice among many has a long history in research (Cherry, 1953). **No training research was found** for this skill. Practice in following one voice is a practice choice with no tested evidence behind it.

> Exercise:
>
> Try it. Play a talk with a radio on quietly in the same room. **Follow the talk for three minutes**, then write its main point. This is a practice exercise with no tested evidence behind it.

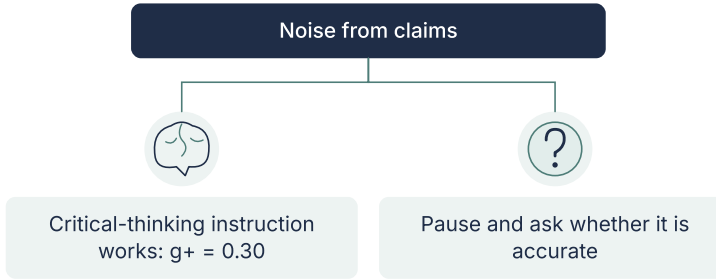
Follow one voice



Noise also comes from claims that look like facts. **Critical-thinking instruction works.** Across 341 effect sizes the average effect was g+ = 0.30, and dialogue, authentic problems and mentoring helped (Abrami et al., 2015).

Short prompts offer another route. **Pause before you share or rely on a story**, and ask whether it is accurate (Pennycook et al., 2021). Make the question a habit.

Claims that look like facts



Our own biases add inner noise. **A short bias-training session is one practical option** (Morewedge et al., 2015). Choose one bias you know you have, and watch for it this week.

Key Concept:

Signal first. **Reduce outer noise, keep your working memory light, and ask whether a claim is accurate** before you take it in.

Keep the signal

- Reduce outer noise
- Keep your working memory light
- Ask whether a claim is accurate

Exercise:

Separate signal from noise.

1. Starter. Before a meeting, **put your phone away** and write the one thing you need to hear.
2. Middle. Before sharing any article this week, ask yourself whether it is accurate, as in accuracy prompts (Pennycook et al., 2021).
3. Advanced. Discuss one news claim with a friend, using dialogue as in Abrami et al. (2015). Each of you names the evidence for and against.

Key idea:

The message is the signal, and focus, a light mind and an accuracy check help you keep it.

Separate signal from noise

- [x] Put your phone away before a meeting
- [x] Ask whether an article is accurate before sharing it
- [x] Discuss one news claim with a friend

Quick check:

Which kind of load makes distraction worse? Answer: high working memory load. How many effect sizes did the review of critical-thinking instruction combine? Answer: 341.

3.3.1 Recognising How a Text, Talk or Image Is Organised

Walk into a new supermarket and you soon spot the pattern of aisles. **Once you see the layout, finding things is easy.** Texts, talks and images have layouts too, and seeing them is a skill.

This section is about **spotting how information is organised** before you try to record it. A layout gives you a frame to hang the details on.



A supermarket from above, its aisles in neat rows with signs hanging over each one.

Structure can be taught. Text structure instruction **improves comprehension of expository texts**, that is, texts that explain or inform. Effects shrink against strong comparisons, and far transfer, the use of a skill on quite different tasks, is small (Hebert et al., 2016).

Section 2.3.1 introduced a model of text comprehension (Kintsch & van Dijk, 1978). **A model describes understanding**, and the method below was tested as training.

Expository texts

> Definition
>
> **Expository texts**
>
> Texts that explain or inform

> **Science Says:**
>
> One teaching method has strong support. Reciprocal teaching (Palincsar & Brown, 1984) was reviewed across 16 studies, with **median effect sizes of .32 on standardised tests and .88 on tests made by the researchers** (Rosenshine & Meister, 1994).

The gap between those two numbers is worth noticing. **The larger number came from tests made by the researchers.** The figure from standardised tests is the more cautious guide.

Two numbers for reciprocal teaching

Measured on	Median effect size
Standardised tests	.32
Tests made by the researchers	.88

> **Exercise:**
>
> Try it. Before reading a chapter, **look only at its headings** and draw a quick box for each one. Then read and add two notes to each box.

Context can make structure visible. Section 2.2.2 showed that context given before a passage **raised comprehension and recall**, and context given after did not (Bransford & Johnson, 1972). The order matters.

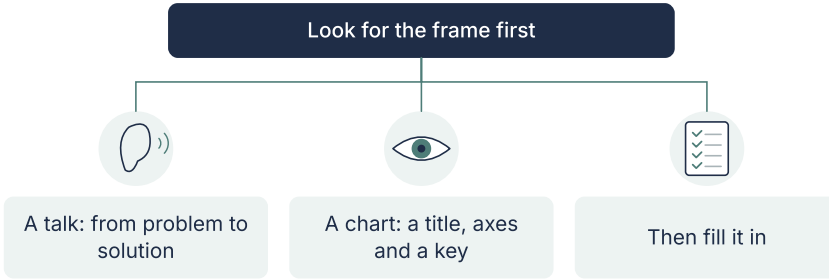
Context before or after



Talks and images have their own organisation. A talk may move from problem to solution, and a chart has a title, axes and a key. **Look for the frame first**, then fill it in.

> **Key Concept:**
>
> See the layout. **Look at headings, openings and labels before the details.** A clear frame makes every later detail easier to place.

Frames in talks and charts



Exercise:

Find the structure.

1. Starter. For one news article, **name its parts**, such as headline, main facts and quotes.
2. Middle. With a partner, take turns leading the talk about a passage. This is a practice version drawing on reciprocal teaching (Palincsar & Brown, 1984).
3. Advanced. Draw the structure of a 20-minute talk as boxes and arrows while you listen.

Key idea:

Seeing how information is organised gives you a frame for the details.

Find the structure



Name the parts of a news article



Take turns leading the talk about a passage



Draw a talk as boxes and arrows

Quick check:

What happens to the effects of text structure instruction against strong comparisons? Answer: they shrink. Did context given after a passage help? Answer: no.

3.3.2 Capturing Key Points in Your Own Words

After a long meeting you look at your notes and find whole sentences copied down, with no sign of what mattered. **Copying is easy, and it does not show what mattered.** Putting key points in your own words takes more effort and gives more back.

This section compares common ways of capturing what you take in. **A few feel useful and do little**, and the rest take effort and repay it.



Two familiar habits rate poorly. Highlighting has **low utility** (Dunlosky et al., 2013). Summarising also rated low, partly because results depend on how skilled the person is at summarising (Dunlosky et al., 2013).

> **Science Says:**
>
> Summarising appears among **eight generative strategies**, activities in which learners actively make sense of new material, in a later review (Fiorella & Mayer, 2016). Its value depends on doing it well, and the evidence is weak to mixed.

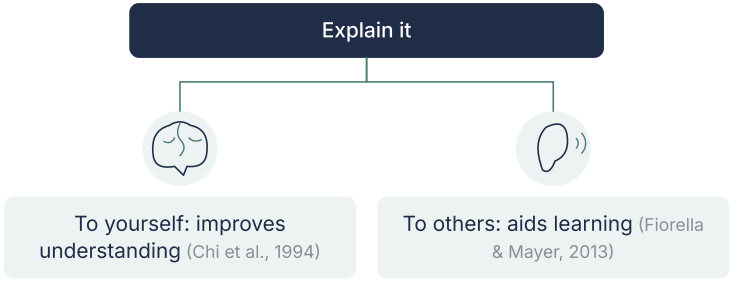
How two familiar habits rate (Dunlosky et al., 2013)

Habit	Utility
Highlighting	Low
Summarising	Low: results depend on skill

Explaining to yourself works better. **Eliciting self-explanations improves understanding** (Chi et al., 1994), and the method was rated moderate utility. The evidence is mixed to strong.

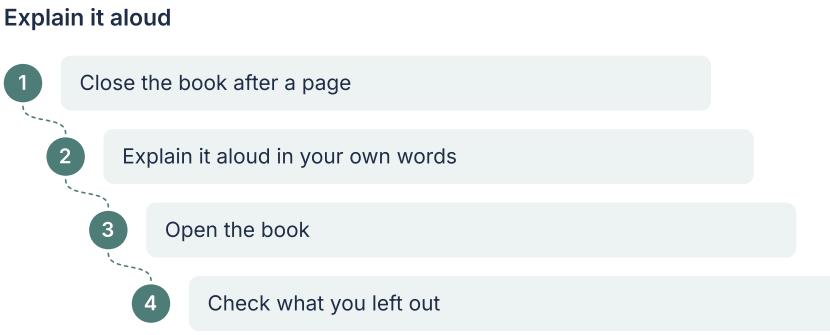
Explaining to others is another option. **Explaining to others aids learning** (Fiorella & Mayer, 2013). The popular Feynman technique has no research under that name, so it is a practice choice built on this idea.

Explaining works better



> Exercise:
>
> Try it. After reading a page, close the book and **explain it aloud in your own words** as if to a friend. Then open the book and check what you left out.

Paraphrasing in conversation has a different effect. In a study of 180 students, paraphrasing **made the listener seem more socially attractive**, with no gain in satisfaction or feeling understood (Weger et al., 2010). The evidence is mixed.



The choice of pen or laptop gets much attention. Section 2.3.3 noted that the longhand advantage **was not clearly replicated** (Mueller & Oppenheimer, 2014; Morehead et al., 2019). The evidence does not settle the choice of tool.



A student explaining a diagram to a friend across a library table, both leaning over the same notebook.

The common thread is **effort spent turning ideas into your own words**. Of the methods here, explaining ideas to yourself has the strongest support.

> **Key Concept:**
>
> Your own words. **Explain it to yourself, explain it to someone else, and keep notes short.** Treat highlighting and summarising as low value on their own.

Your own words



Explain it to yourself



Explain it to someone else



Keep notes short

Exercise:

Capture key points.

1. Starter. After one meeting, **write three points in your own words**.
2. Middle. While studying, stop every page to explain it to yourself, following self-explanation (Chi et al., 1994).
3. Advanced. Teach a topic you have just learned to a friend for five minutes, as in explaining to others (Fiorella & Mayer, 2013). Note the questions you could not answer.

Key idea:

Turning ideas into your own words does more than highlighting or summarising alone.

Capture key points

Low value on their own	Does more
⊕ Highlighting	⊖ Turning ideas into your own words
⊕ Summarising	⊖ Explaining ideas to yourself

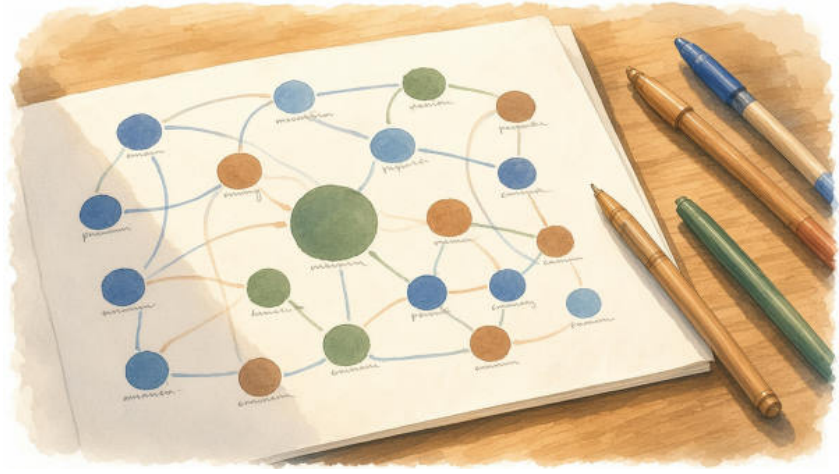
Quick check:

What utility does highlighting have? Answer: low. Is there research on the Feynman technique under that name? Answer: no.

3.3.3 Turning Information Into Maps, Tables and Summaries

A long article can feel like a pile of loose threads. Draw a small map of it and **the threads start to connect**. Maps, tables and drawings turn information into a shape you can see.

This section looks at **visual ways of recording** what you take in. Some have strong support, and some have mixed support.



A large sheet of paper on a table covered with circles and lines joining short labels, a set of coloured pens beside it.

Section 2.3.3 showed that **concept maps have the strongest support** of these forms (Nesbit & Adesope, 2006). Use one whenever ideas link to each other.

> **Science Says:**
>
> Section 2.3.3 gave the mind map result, about 10% more factual knowledge with a 95% confidence interval from minus 1% to 22% (Farrand et al., 2002). **That range includes zero**, so the evidence is mixed.

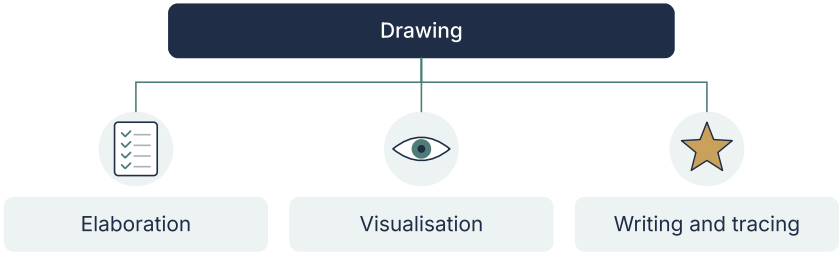
Mind maps: small gain or none



A confidence interval is **the range in which the true effect probably lies**. When the range crosses zero, the study cannot rule out no effect at all.

Drawing is a strong option. **Drawing beat elaboration, visualisation, writing and tracing** for memory of words, pictures and definitions (Fernandes et al., 2018).

Drawing beat four other methods



> **Exercise:**
>
> Try it. After reading a short article, **draw a quick sketch** of its main idea with no words. Then write one sentence explaining the sketch.

Argument maps lay out reasons and objections. In one 8-week study of 74 undergraduates, argument mapping gave **larger gains than a no-instruction control** (Dwyer et al., 2012). It was a single study, so the evidence is mixed.

Argument mapping (Dwyer et al., 2012)



Guided notes are handouts with gaps to fill in. **Before a talk, make your own gapped handout** from the slides or agenda (Konrad et al., 2009). Tables, sometimes called matrix notes, are a handy practice tool for comparing items.

Choose the shape to fit the material. **A map suits ideas that connect, and a table suits items you compare.** A sketch suits anything you want to remember.

Choose the shape to fit the material

Shape	Suits
A map	Ideas that connect
A table	Items you compare
A sketch	Anything you want to remember

Key Concept:

Give it a shape. **Map ideas that connect, tabulate items you compare, and sketch what you want to remember.**

Exercise:

Make it visual.

1. Starter. Draw a **concept map of one news story** with five linked words.
2. Middle. Draw a sketch of each key term in a chapter, following Fernandes et al. (2018).
3. Advanced. Map one argument from an opinion piece, with its reasons and objections, as in argument mapping (Dwyer et al., 2012).

Make it visual



A concept map of one news story



A sketch of each key term



A map of one argument with its reasons

Key idea:

A map, table or sketch turns information into a shape you can see and remember.

Quick check:

What did drawing beat for memory? Answer: elaboration, visualisation, writing and tracing. Why is the mind map evidence mixed? Answer: its confidence interval includes zero.

3.4.1 Monitoring Your Own Understanding

You finish a chapter and feel you understood it. A friend asks a simple question about it, and **you cannot answer**. The feeling of understanding and real understanding are not the same thing.

Monitoring means **checking what you actually understood**, during and after taking something in. It is the first of the checking skills, and it guards against a common illusion.



A woman closing a book on a sofa, looking up with a puzzled frown as if trying to remember what she has just read.

The illusion has a name. Rozenblit and Keil (2002) coined the term **illusion of explanatory depth**, a name for the gap between how well we think we can explain something and how well we can.

> Science Says:
>
> In nine experiments, **"searching the Internet for explanatory knowledge creates an illusion whereby people mistake access to information for their own personal understanding"** (Fisher et al., 2015). The finding is about internet search, and the evidence is mixed.

Illusion of explanatory depth

> Definition
>
> ## Illusion of explanatory depth
>
> The gap between how well we think we can explain something and how well we can

People also misjudge which methods work. Spacing helped 90% of participants, yet **72% believed massing had worked better** (Kornell, 2009). Massing means studying all at once.

Swap one rereading session a week for a self-test (Karpicke et al., 2009). The swap gives you a regular check on what you really understood.

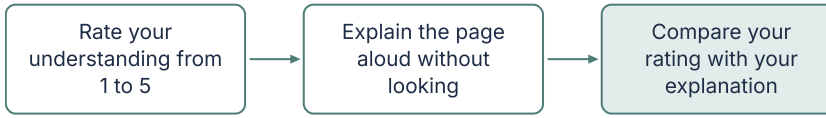
Spacing and what people believed (Kornell, 2009)



> **Exercise:**
>
> Try it. After reading a page, **rate your understanding from 1 to 5**. Then explain the page aloud without looking. Compare your rating with how well you explained it.

Scores can also mislead. Section 1.3.3 showed that questions from the Nelson-Denny, a standard reading test, **could be answered well above chance without reading** the passage (Coleman et al., 2010). A test score is not proof of understanding.

Rate, then explain



Monitoring can be trained. Section 3.1.2 showed that **learners taught to think about how they listen beat a control group** (Vandergrift & Tafaghodtari, 2010). That study was about listening, and the habit of checking is worth trying with reading too.

The best check is simple. **Try to explain or recall it without looking**, then compare with the source. Where you stumble is where your understanding is thin.

The best check is simple



Key Concept:

Check the feeling. **Feeling that you understand is not proof.** Explain or recall without looking, then check against the source.

Exercise:

Monitor understanding.

1. Starter. After one article, **write one question** you could not answer about it.
2. Middle. After looking something up online, close the page and explain it aloud, with the finding of Fisher et al. (2015) in mind.
3. Advanced. For a week, test yourself instead of rereading. Note which felt better and which left more behind.

Monitor understanding

- [ ] Write one question you could not answer
- [ ] Close the page and explain what you looked up
- [ ] Test yourself instead of rereading for a week

Key idea:

The feeling of understanding needs a check, and explaining without looking is the simplest one.

Quick check:

What did searching the internet make people mistake for their own understanding? Answer: access to information. What percentage of participants believed massing had worked better? Answer: 72%.

3.4.2 Questioning Sources and Claims

A SHOCKING HEADLINE APPEARS IN your feed with a link to a site you have never seen. **Before you take it in, you can check who is behind it.** Questioning sources is a checking skill with strong support.

This section is about **judging what you take in** before you accept it. Each method below is a habit you can practise.



A man at a kitchen table with a phone in one hand and a laptop open in front of him, several browser tabs visible at the top of the screen.

Section 2.3.2 showed that fact checkers read laterally and that **short lessons and an online course improved students** (Wineburg & McGrew, 2019; McGrew et al., 2019; Breakstone et al., 2021). Lateral reading means leaving the page to check what other sources say about it.

> **Science Says:**
>
> Lateral reading has **strong evidence**. Click restraint, holding back from the first search result, was described by Wineburg and McGrew (2019), and **no separate test was found**. The evidence on click restraint is mixed.

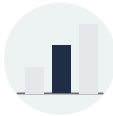
Lateral reading and click restraint

Habit	Evidence
Lateral reading	Strong
Click restraint	No separate test was found

Checklists are popular. SIFT means Stop, Investigate the source, Find better coverage and Trace claims (Caulfield, 2019), and CRAAP scores a source on Currency, Relevance, Authority, Accuracy and Purpose (Blakeslee, 2004). **SIFT has no controlled test as a package**, and CRAAP has no outcome studies. The evidence on SIFT is mixed, and on CRAAP it is weak.

Prebunking warns people about tricks before they meet them. **A prebunking game is a low-cost way to practise** (Roozenbeek & van der Linden, 2019). Its evidence is mixed, so pair it with lateral reading.

Checklists and games



SIFT: no controlled test as a package



CRAAP scores a source

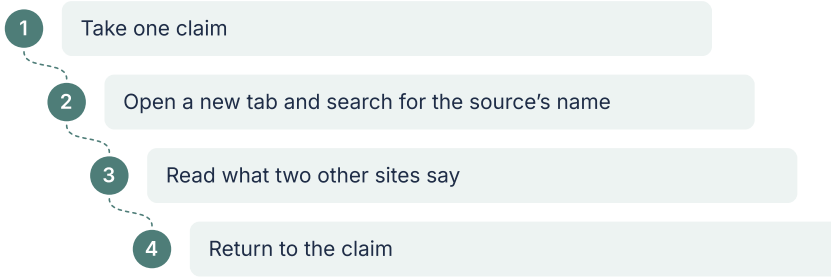


A prebunking game: pair it with lateral reading

> Exercise:
>
> Try it. Take one claim from social media. **Open a new tab and search for the source's name.** Read what two other sites say about it before you return to the claim.

Clear thinking supports all of these. **Discuss claims with others and map their reasons** to sharpen your judgement (Abrami et al., 2015; Dwyer et al., 2012).

Read laterally



The habit itself takes seconds. **Ask who is behind the claim and what other sites say about them.** That one move comes before any close reading.

Key Concept:

Read laterally. **Leave the page, check the source elsewhere, and come back.** Hold back from clicking the first result until you know who is behind it.

Leave, check, come back



Exercise:

Question sources.

1. Starter. For one article today, **find out who published it**.
2. Middle. Check three claims this week by lateral reading, following Wineburg and McGrew (2019).
3. Advanced. Play a prebunking game, as in Roozenbeek and van der Linden (2019), and list the tricks it taught.

Key idea:

Check who is behind a claim before you take it in.

Question sources



Quick check:

Was a separate test of click restraint found? Answer: no. Does SIFT have a controlled test as a package? Answer: no.

3.4.3 Fixing What You Took In So You Can Use It Later

You read a useful article on Monday and by Friday **only a vague memory remains**. Taking something in well is only half the job. The other half is fixing it so it is there when you need it.

This last core skill joins extractivity to memory. **The methods with the strongest support** are simple, and they ask for effort at the right time.



A small stack of handwritten index cards held together with a rubber band beside a mug of tea.

Section 2.2.3 showed that **testing yourself and spacing your review** have the strongest support (Roediger & Karpicke, 2006; Cepeda et al., 2006). Here they become your daily tools.

> **Science Says:**
> A newer review found that practice tests beat restudying and **all other comparison conditions** (Adesope et al., 2017). That makes a short self-test the first tool to reach for after any reading.

The strongest tools for keeping



Flashcards can use spacing. **One large stack beat four small stacks**, because the large stack spaced each card further apart (Kornell, 2009). The Leitner box schedule, which moves cards between boxes, is a practice choice with no tested evidence behind it.

Notes help most when you return to them. **Note-taking and note review have separate functions**, and their combined effects were substantial (Kiewra et al., 1991; Kobayashi, 2006).

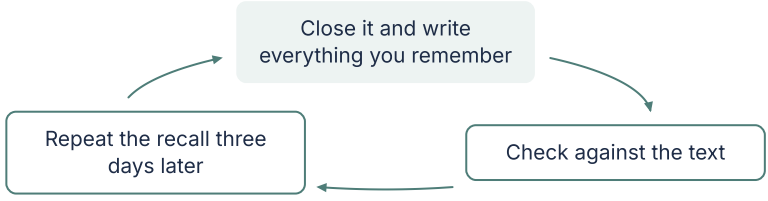
Flashcard stacks (Kornell, 2009)

Before	After
Four small stacks	One large stack: spaces each card further apart, and beat four small stacks

> Exercise:
>
> Try it. After reading an article, **close it and write everything you remember**. Check against the text. Repeat the recall three days later without rereading first.

Asking why is a moderate aid. Elaborative interrogation, asking why a fact is true, has **moderate utility, and its effect depends on the question** (Martin & Pressley, 1991; Dunlosky et al., 2013). The evidence is mixed.

Recall, check, recall again



Rereading feels useful and rates poorly. Rereading has **low utility**, and retrieval beats restudy (Dunlosky et al., 2013). Replace a second reading with a recall attempt.

Put together, the plan is short. **Recall, space it out and review your notes.** Use flashcards in one large stack, and test yourself instead of rereading.

Rereading or recall

Rereading	Recall
⊕ Feels useful	⊖ Retrieval beats restudy
⊕ Low utility	⊖ Replace a second reading with a recall attempt

> **Key Concept:**
>
> Fix it. **Test yourself, space the tests, and review your notes.** Rereading alone has low utility.

> **Exercise:**
>
> Fix what you took in.
>
> 1. Starter. Make **five flashcards** from today's reading.
> 2. Middle. Review your cards in one large stack on three days spread over two weeks, following Kornell (2009).
> 3. Advanced. For one course or project, plan practice tests across a month, following Roediger and Karpicke (2006) and Cepeda et al. (2006).

Fix what you took in

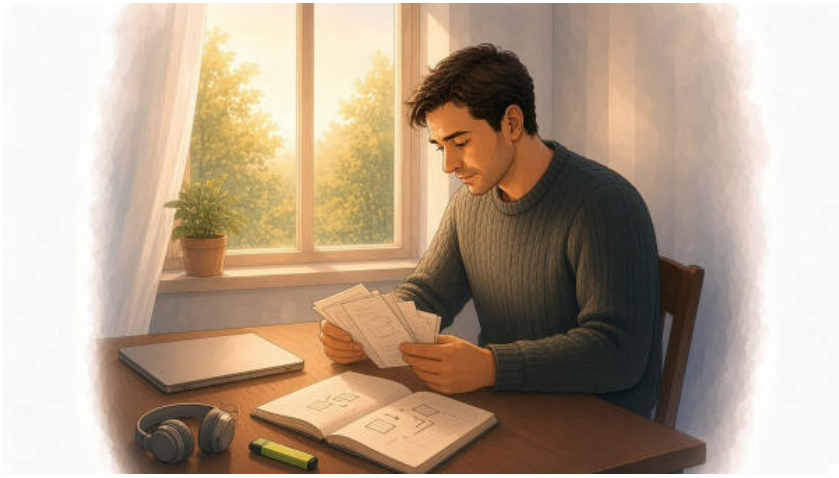
- [x] Make five flashcards from today's reading
- [x] Review them in one large stack on three days
- [x] Plan practice tests across a month

Key idea:

Testing and spacing fix what you took in so you can use it later.

Quick check:

What did practice tests beat in a newer review? Answer: restudying and all other comparison conditions. Which flashcard set-up beat four small stacks? Answer: one large stack.



Module

4

Methods and Exercises for Developing Extractivity

4.1.1 RSVP, Pacing and Eye-Span Methods: Claims and Evidence

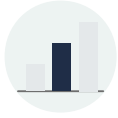
Speed-reading courses promise to double or triple your reading rate. **Most of their methods try to change how your eyes move.** This module sets out the main methods and exercises one by one, with the evidence for each, starting with the eye methods.

Every method in this section has **evidence mixed** in the research gathered for this book. That does not make each one useless. It means the studies do not support the big promises.

Eye methods



They try to change how your eyes move



Evidence mixed



The studies do not support the big promises

RSVP shows **words one at a time at a fixed point**, and it began as a lab method (Forster, 1970). Section 1.3.1 showed that RSVP at 700 and 1,000 words per minute hurt comprehension (Acklin & Papesh, 2017).

Spritz-style apps are a form of RSVP **with one letter of each word marked and lined up** in the same place. The evidence on them is

mixed, and this book draws no detailed result from the one study found.

RSVP



Words one at a time at a fixed point



At 700 and 1,000 words per minute it hurt comprehension



Spritz-style apps are a form of RSVP

> **Exercise:**
>
> Try it. Read one paragraph without letting your eyes go back. Then read the next one normally. **Write one point after each** and compare.

> **Science Says:**
>
> Section 1.2.2 showed that **regressions help you understand** (Schotter et al., 2014). Regression elimination, training the eyes not to go back, may therefore cost comprehension, and its evidence is mixed.

Regression elimination



Pacing uses **a finger, pen or card to lead the eyes**, and suppressing inner speech means trying to stop it (Rayner et al., 2016). Inner speech is the quiet voice in your head that says the words as you read. If you try either, keep a comprehension check beside it.

Phrase reading tries to take in **word groups in each fixation**. In a replication with pupils in grades 5 and 6, earlier gains from phrase training seemed to come from comprehension, and they did not come from rate (Amble & Muehl, 1966).



A finger moving along a line of print in an old hardback book, the rest of the page slightly out of focus.

Tachistoscopic training flashes **words or phrases for shrinking durations**. One report notes that its value was affirmed by some teachers and questioned by others, with most evaluation from classroom use and testimony (Marvel, 1959).

Eye-span and fixation training aims at **widening the span and cutting fixations** (McConkie & Rayner, 1975). Evelyn Wood Reading Dynamics was a hand-pacing course, and its results are a reason to test what you recall after fast reading (Carver, 1985).

Table: Eye methods at a glance

Method	What it does	Evidence
RSVP	Words one at a time at a fixed point	Evidence mixed
Pacing	A finger, pen or card leads the eyes	Evidence mixed
Suppressing inner speech	Trying to stop inner speech	Evidence mixed
Phrase reading	Word groups in each fixation	Evidence mixed for speed
Eye-span training	Wider span, fewer fixations	Evidence mixed
Regression elimination	Eyes trained not to go back	Evidence mixed
Tachistoscope	Words flashed for shrinking times	Evidence mixed

These methods share one feature. **They all aim at how your eyes move** across the page. Use them as experiments, and check comprehension every time.

> Exercise:
>
> Test an eye method.
>
> 1. Starter. Read one page with a finger pacer and one without. **Write three points after each.**
> 2. Middle. Try an RSVP app at your normal speed for one article. Compare your points with a normal reading.
> 3. Advanced. Keep a two-week log of one eye method. Record speed and three points from memory each day.

Test an eye method

- [x] Starter: one page with a finger pacer and one without
- [x] Middle: an RSVP app at your normal speed for one article
- [x] Advanced: a two-week log of one eye method

Key idea:

Eye methods have mixed evidence, so treat them as experiments with a comprehension check.

Quick check:

Where did the gains from phrase training seem to come from in the replication? Answer: comprehension. What does tachistoscopic training do? Answer: it flashes words or phrases for shrinking durations.

4.1.2 Skimming, Scanning and Previewing

Not every text needs a full reading. **Skimming, scanning and previewing are quick methods** for deciding what to read and finding what you need. Section 3.2.2 introduced skimming and scanning as skills, and this section looks at them as methods.

Each one has a different job. **Skimming is fast reading for gist**, scanning searches text for a specific item, and previewing is a brief look at headings and summary first.



A woman at a library table running her eyes down the contents page of a thick textbook, a pencil in her hand.

Skimming has **mixed evidence** (Masson, 1983; Duggan & Payne, 2009). It is a tool for deciding, and it is no substitute for reading.

> **Science Says:**
>
> Nielsen (2006) described **how people scan**, and scanning has not been tested as a training method. As training it is weak, so use it as practice. Previewing has mixed evidence, and it matches the survey step of SQ3R (Robinson, 1946).

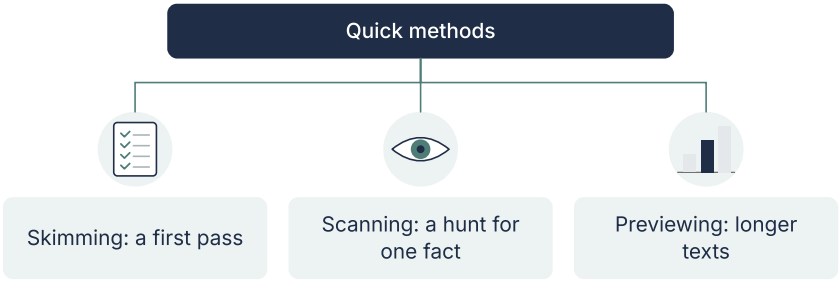
Three quick methods

	Skimming	Scanning	Previewing
Job	Fast reading for gist	Searches text for a specific item	A brief look at headings and summary first
Evidence	Mixed	Weak as training	Mixed

Skimming suits a first pass. **Move through the text until you know whether it is worth your time**, then stop. A full reading can follow.

Scanning suits a hunt for one fact. **Decide what the fact looks like**, such as a date or a name, before your eyes start moving down the page.

When each method suits



> **Exercise:**
>
> Try it. Take a report you have not read. **Spend two minutes previewing** its headings and summary, then write what you expect it to say. Read it and check.

Previewing suits longer texts. **A look at headings, summary and pictures** gives you a map before you start. It is also the moment to set your purpose.

Preview a report

1. Spend two minutes previewing its headings and summary
2. Write what you expect it to say
3. Read it and check

The three methods work together. **Preview to decide, skim for gist, and scan for details.** Then read fully whatever matters most.

> **Key Concept:**
>
> Quick methods. **Skim for gist, scan for one item, preview headings and summary first.** The evidence is mixed for skimming and previewing and weak for scanning as training.

The three together



Exercise:

Practise the quick methods.

1. Starter. Find **one fact** in a news article as fast as you can.
2. Middle. Skim three articles in two minutes each. Pick the most useful one to read in full.
3. Advanced. Preview, skim and scan one long report in 15 minutes. Write a five-line summary.

Key idea:

Preview, skim and scan to decide what to read and find what you need.

Practise the quick methods

- [x] Starter: find one fact in a news article as fast as you can
- [x] Middle: skim three articles in two minutes each
- [x] Advanced: preview, skim and scan one long report in 15 minutes

Quick check:

What is skimming? Answer: fast reading for gist. How strong is scanning as a training method? Answer: weak.

4.1.3 Fluency Building: Repeated, Timed and Extensive Reading

If the eye methods have mixed evidence, what is left? **Fluency building takes a slower road.** It trains reading through reading itself.

The methods here turn **reading practice into a weekly plan** (Rayner et al., 2016). Each one has its own evidence, set out below.

Fluency building



Repeated reading means **rereading a passage to fluency**. Section 3.1.1 covered it, with strong evidence for developing readers (Therrien, 2004). The other methods here suit adults and language learners.

Timed repeated reading suits second-language learners. **Each passage is read five times against time.** Readers gained 47 and 45 words per minute on practised and unpractised texts, against 13 and 7 for

controls, with 13 students per group (Chang & Millett, 2013). The evidence is mixed.

Timed repeated reading



Suits second-language learners



Five reads of each passage



Each read against time

> **Science Says:**
>
> Timed reading means **regular timed reading of easy passages**. Over 13 weeks with 84 students, speed rose by 29 words per minute, which was 25%, and comprehension rose by 4% (Chang, 2010). The evidence is mixed.

Speed-reading courses with graded passages use **short fixed-length passages, timed, with questions**. Small studies suggest the gains transfer to other texts (Macalister, 2010). The evidence is mixed.

Timed reading over 13 weeks (Chang, 2010)



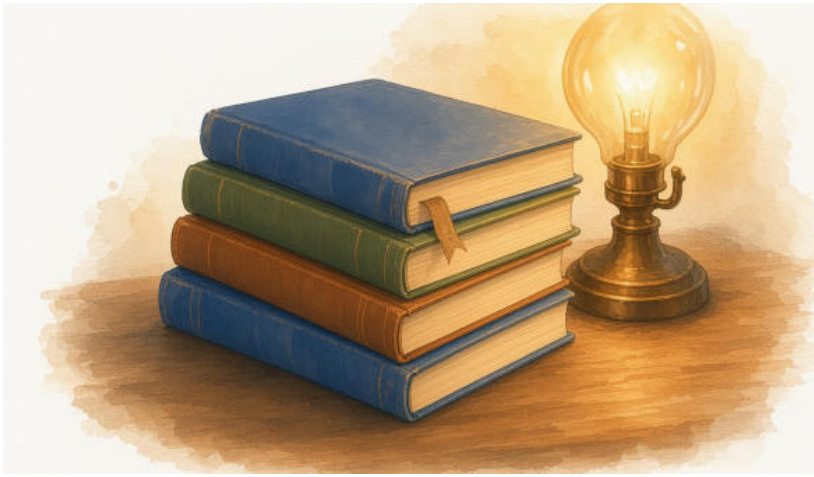
The Reading Acceleration Program makes **text fade at a rate set just above the reader's own speed** (Breznitz et al., 2013). The rating came from a short summary, and the evidence is mixed.

> Exercise:
>
> Try it. Choose an easy passage of about 300 words. **Read it five times against a timer**, as in timed repeated reading (Chang & Millett, 2013). Record each time.

Five reads against a timer

1. Choose an easy passage of about 300 words
2. Read it five times against a timer
3. Record each time

Extensive reading means **large amounts of easy reading**. In a single one-year study of 97 students, pleasure reading groups gained more rate than intensive reading, without loss of comprehension (Beglar et al., 2012). The evidence is mixed.



A stack of easy paperback novels beside a reading lamp, a bookmark in the top one.

Audio-assisted reading means **reading while listening**. Section 3.1.2 covered it, and its evidence is mixed (Chang & Millett, 2014).

> **Key Concept:**
>
> Fluency. **Read more, read easy texts often, and reread for speed.** Repeated reading has strong evidence for developing readers, and the other methods have mixed evidence.

Build fluency



Read more



Read easy texts often



Reread for speed

> **Exercise:**
>
> Build fluency.
>
> 1. Starter. Read **one easy book** for 15 minutes a day for a week.
> 2. Middle. Do timed reading of easy passages twice a week for a month, following Chang (2010). Chart your words per minute.
> 3. Advanced. Read graded speed-reading passages with questions, following Macalister (2010). Track speed and score together.

Key idea:

Fluency grows through reading itself, with timed and extensive reading as practical tools.

Build fluency, level by level

- [x] Starter: one easy book for 15 minutes a day for a week
- [x] Middle: timed reading of easy passages twice a week for a month
- [x] Advanced: graded speed-reading passages with questions

Quick check:

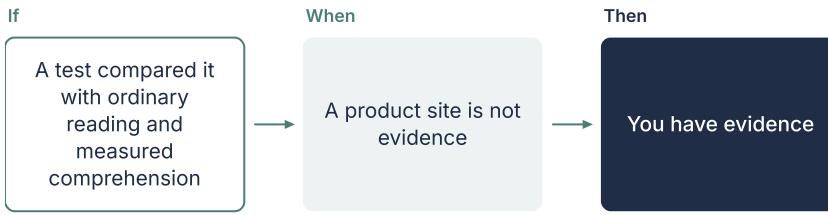
How much did speed rise in the 13-week timed reading study? Answer: 29 words per minute, or 25%. What did pleasure reading groups gain more of than intensive reading? Answer: reading rate.

4.1.4 Typographic Aids, Apps and PhotoReading: A Myth Check

Some products promise faster reading by changing the text itself or the way you look at it. **Bold letters, coloured lines and paid apps** all claim to help. This section checks those claims against the research gathered for this book.

A quick rule helps here. **A product site is not evidence.** Look for a test that compared the product with ordinary reading and measured comprehension.

Judging a product



Bionic Reading prints **the first half of each word in bold**. In a test over 100 paragraphs, it made no difference to reading times (Snell, 2024). The evidence is mixed.

> **Science Says:**
>
> BeeLine Reader colours letters **in gradients across lines**. It gave a small advantage only for grade 2 pupils with dense layouts, was slower on well-set text, and may hamper grade 3 comprehension (Koornneef & Kraal, 2022). The evidence is mixed.

Two typographic aids

Aid	What it does	Result
Bionic Reading	First half of each word in bold	No difference to reading times
BeeLine Reader	Colours letters in gradients across lines	Small advantage only for grade 2 pupils with dense layouts

Speed-reading apps combine **pacing, RSVP and drills**. Section 1.3.2 showed that in one study speed rose less than the app claimed (Klimovich et al., 2023). Speed did rise against a control group, so the app gave some gain.

> **Exercise:**
>
> Try it. Read one article in a bold-start format and one in normal print. **Time both and write three points after each.** Compare the results.

Bold start or normal print

1. Read one article in a bold-start format
2. Read one in normal print
3. Time both and write three points after each
4. Compare the results

PhotoReading asks you to **glance at pages in a "relaxed state"** (Scheele, 1993). Section 1.2.3 described the one checked test, in which an expert took longer and understood less (McNamara, 2000).



A pile of glossy speed-reading course boxes on a shelf, gathering dust beside a well-used library book.

These checks point the same way. **None of these products has strong evidence** in the research gathered for this book.

Table: Aids and apps at a glance

Product or method	What it does	Evidence
Speed-reading apps	Pacing, RSVP and drills	Mixed
PhotoReading	Page glancing in a relaxed state	Evidence mixed
Bionic Reading	First half of each word in bold	Evidence mixed
BeeLine Reader	Letters coloured in gradients	Evidence mixed

> Exercise:
>
> Check a product.
>
> 1. Starter. Find **one claim** on a reading app's website and note whether it cites a test.
> 2. Middle. Use a bold-start format for one week and keep a log of speed and three points per article, as a test of Snell (2024).
> 3. Advanced. Compare a speed-reading app with your normal reading for two weeks. Record speed and comprehension for both.

Key idea:

Typographic aids and apps have mixed evidence, so test them on yourself with a comprehension check.

Check before you buy



A product site is not evidence



None of these products has strong evidence



Test them on yourself with a comprehension check

Quick check:

What did Bionic Reading change in a test over 100 paragraphs? Answer: nothing in reading times. For which pupils did BeeLine Reader give a small advantage? Answer: grade 2 pupils with dense layouts.

4.1.5 Speed-Reading Exercises

Sections 4.1.1 to 4.1.4 described the methods. **This section gathers the exercises** that go with them, with the evidence for each. Many have never been tested on their own, and the table says so plainly.

Read the evidence column before you choose. **Practice only means no study tested the exercise itself.** You can still use it, as long as you check your comprehension and treat the result as your own experiment.



A desk with a stopwatch, a printed passage and a simple line graph of words per minute pinned to a corkboard above it.

The strongest support goes to **checking comprehension after every timed read**. A major review supports that check, though it did not test the drill itself (Rayner et al., 2016). Every exercise below works better with the check added.

> **Science Says:**
>
> Repeated reading with a fluency chart has **strong evidence for developing readers** (Therrien, 2004). Five-times timed repeated reading with questions after reads 1 and 5 has mixed evidence (Chang & Millett, 2013).

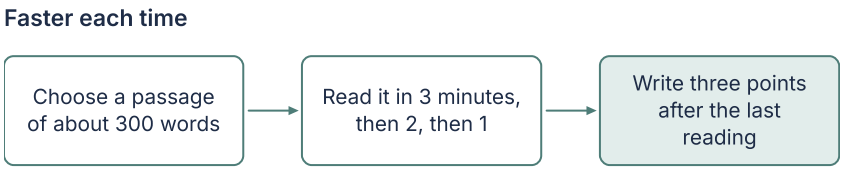
Table: Speed-reading exercises

Exercise	Trains	Evidence	Credit
Number grid (find numbers 1 to 25 while fixing the centre)	Eye span	Practice only	None
Column reading (eyes down the centre of narrow columns)	Eye span, phrase reading	Practice only	None
Z-pattern or S-pattern hand sweeps	Pacing	Practice only	None
Timed one-minute WPM test	Timed reading	Practice only, a measuring tool	Chang (2010) measured gains in words per minute
3-2-1 drill (same passage in 3, 2, then 1 minute)	Timed reading	Practice only	None
Sprint drill (short all-out bursts, then normal reading)	Timed reading	Practice only	None
Flash-card phrase drill	Phrase reading, tachistoscope	Weak	Related, Amble and Muehl (1966)
Index-card pacing (card slides down over lines already read)	Pacing, regression elimination	Practice only	None

Exercise	Trains	Evidence	Credit
Hand-motion patterns (underline, zigzag)	Pacing	Practice only	None
Increasing-rate RSVP drill	RSVP	Evidence mixed	Acklin and Papesh (2017)
Repeated reading with fluency chart	Repeated reading	Strong for developing readers	Therrien (2004)
Five-times timed repeated reading with questions after reads 1 and 5	Timed repeated reading	Mixed	Chang and Millett (2013)
Graded speed-reading passages with a progress graph	Graded passages	Mixed	Macalister (2010)
Tachistoscope flash drill (digits or words at shrinking exposure)	Tachistoscope	Evidence mixed	Marvel (1959)
Word pyramid (tapering lines read with one central fixation)	Eye span	Practice only	None
Humming or counting while reading	Suppressing inner speech	Evidence mixed	Rayner et al. (2016)
Timed first-sentence skim	Skimming	Mixed	Related, Duggan and Payne (2009)
Timed scanning hunt (find a fact or date)	Scanning	Practice only	None
Two-minute preview drill	Previewing	Practice only	None
Comprehension check after every timed read	Timed reading, graded passages	Strong for the check	Rayner et al. (2016)
Bionic-format reading session	Bionic Reading	Evidence mixed	Snell (2024)
Read-while-listening at rising audio speeds	Audio-assisted reading	Practice only, not tested	None
Fading-text drill at self-paced plus rate	Reading Acceleration Program	Mixed	Breznitz et al. (2013)
PhotoReading page-flip (“photofocus”)	PhotoReading	Evidence mixed	McNamara (2000)

A sensible plan picks **two or three exercises with the best evidence**. Repeated reading, timed reading and graded passages are good choices, each with a comprehension check.

> Exercise:
>
> Try it. Choose a passage of about 300 words. **Read it in 3 minutes, then 2, then 1**, and write three points after the last reading. This 3-2-1 drill is a practice exercise with no tested evidence behind it.



The exercises with practice-only status can add variety. **Keep a log of speed and comprehension** so you can see whether an exercise helps you, and drop it if your points slip.

> Exercise:
>
> Build a speed routine.
>
> 1. Starter. Take a **timed one-minute WPM test** and note your rate.
> 2. Middle. Do five-times timed repeated reading twice a week for a month, following Chang and Millett (2013). Answer questions after reads 1 and 5.
> 3. Advanced. Work through graded speed-reading passages with a progress graph, following Macalister (2010). Add a comprehension check after every read.

Build a speed routine

- [x] Starter: a timed one-minute WPM test
- [x] Middle: five-times timed repeated reading twice a week for a month
- [x] Advanced: graded speed-reading passages

Key idea:

Choose exercises with the best evidence, and add a comprehension check to every one.

Quick check:

What does practice only mean? Answer: no study tested the exercise itself. Which exercise has the strongest support? Answer: the comprehension check after every timed read.

4.2.1 SQ3R, PQ4R, KWL and DR-TA

Many students have been handed a study system with a string of letters. **SQ3R, PQ4R, KWL and DR-TA** all ask the reader to do something with a text before, during and after reading. This section sets out each one with its evidence.

Study systems with a string of letters



Section 1.2.1 explained SQ3R as **survey, question, read, recite and review** (Robinson, 1946). Section 3.2.1 added that SQ3R and KWL are weak as packages, while the question step and the recite step are supported on their own.

SQ3R



PQ4R is **an SQ3R variant with a Reflect step** (Thomas & Robinson, 1972). No controlled tests of it were found, so its evidence is weak.

> **Science Says:**
> KWL is a **know, want to know and learned chart** around one reading (Ogle, 1986). Only small classroom studies were found, so its evidence is weak.

PQ4R and KWL

	PQ4R	KWL
What it is	An SQ3R variant with a Reflect step	A know, want to know and learned chart
Evidence	Weak	Weak

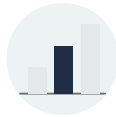
Two further systems have no study behind them in this book's research. **KWL Plus adds a concept map and a written summary** to KWL. DR-TA, the Directed Reading-Thinking Activity, asks you to predict, read a section, then confirm or revise your predictions.

Both are **practice only**. I claim no result for either.

Practice only



KWL Plus adds a concept map and a written summary



DR-TA has no study behind it here



No result is claimed for either

> Exercise:
>
> Try it. Before reading a chapter, write **what you know** about its topic and **what you want to know**. Afterwards, write what you learned. This follows KWL (Ogle, 1986), which has weak evidence.

The useful parts of these systems are easy to keep. **Ask a question before each part and recite the answer afterwards.** The recite step is a form of retrieval practice, which means recalling from memory instead of rereading (Roediger & Karpicke, 2006).



A hand covering the page of a book while its owner looks up, trying to recall what she has just read.

Table: Active reading systems at a glance

System	What it does	Evidence
SQ3R	Survey, question, read, recite, review	Weak as a package
PQ4R	SQ3R with a Reflect step	Weak
KWL	Know, want to know, learned chart	Weak
KWL Plus	KWL with a concept map and summary	Practice only
DR-TA	Predict, read, confirm or revise	Practice only

> **Exercise:**
>
> Use the strong steps.
>
> 1. Starter. Turn **one heading** into a question before you read that part.
> 2. Middle. Recite each section from memory before moving on, as in the recite step of SQ3R (Robinson, 1946).

3. Advanced. Study a chapter with PQ4R, adding a Reflect step after reading (Thomas & Robinson, 1972). Note which step helped most.

Key idea:

Keep the question and recite steps, because the full packages have weak evidence.

Use the strong steps

- Ask a question before each part
- Recite the answer afterwards
- The full packages have weak evidence

Quick check:

What step does PQ4R add to SQ3R? Answer: a Reflect step. What evidence do KWL Plus and DR-TA have in this book? Answer: practice only, with no result claimed.

4.2.2 Reciprocal Teaching and Collaborative Strategic Reading

Reading is often a lonely job. **Two methods turn it into group work**, with readers taking turns to lead. Both were built for classrooms, and both can be adapted for a study group or a book club.

Reciprocal teaching gives group members **turns at predicting, questioning, clarifying and summarising** (Palincsar & Brown, 1984). Section 3.3.1 gave its strong evidence, with median effect sizes of .32 on standardised tests (Rosenshine & Meister, 1994). An effect size is a number that shows how big a difference a method made.

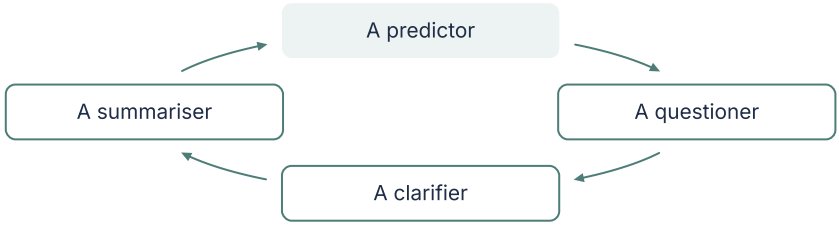


Four adults around a kitchen table with copies of the same short article, one of them reading a question from a card.

The four turns can be shared out as roles. **A predictor, a questioner, a clarifier and a summariser** each lead one part of the talk (Palincsar & Brown, 1984). Rotate the roles so everyone practises all four.

Collaborative Strategic Reading has groups **preview, click and clunk, get the gist, and wrap up** (Klingner & Vaughn, 1998). Click and clunk means checking your understanding as you go. Clicks are parts that make sense, and a clunk is a word or idea that does not, so you fix it by rereading or breaking the word into smaller parts.

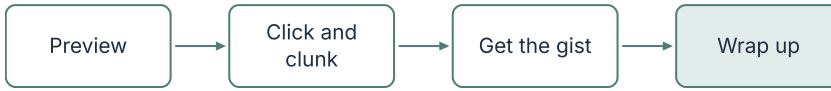
Four roles take turns to lead



> **Science Says:**
>
> Get the gist means naming the most important person, place or thing in a paragraph, then its main idea, as briefly as you can (Klingner & Vaughn, 1998). In grade 4 social studies, the method gave **greater comprehension gains and equal content gains**, and click and clunk and get the gist were used most effectively (Klingner, Vaughn & Schumm, 1998).

The evidence for Collaborative Strategic Reading is **mixed**. Both middle strategies happen during reading, after each paragraph.

Collaborative Strategic Reading



> Exercise:
>
> Try it. Read one article with a friend. **Take turns to predict, question, clarify and summarise** each section. This follows reciprocal teaching (Palincsar & Brown, 1984).

Group methods need little equipment. **A shared text and a set of role cards** are enough to start.

All you need to start



Choose by group size and aim. **Reciprocal teaching suits a small group** working through one text closely. Collaborative Strategic Reading adds a preview and a wrap-up for longer reading.

> Exercise:
>
> Read together.
>
> 1. Starter. With a partner, **summarise one paragraph each** in turn.
> 2. Middle. Use four-role cards for predictor, questioner, clarifier and summariser, following Palincsar and Brown (1984).

3. Advanced. Run a book club session with click and clunk and get the gist, following Klingner, Vaughn and Schumm (1998).

Choose by group size and aim

	Reciprocal teaching	Collaborative Strategic Reading
Suits	A small group working through one text closely	Longer reading, with a preview and a wrap-up

Key idea:

Taking turns to lead the reading builds understanding, and reciprocal teaching has strong evidence.

Quick check:

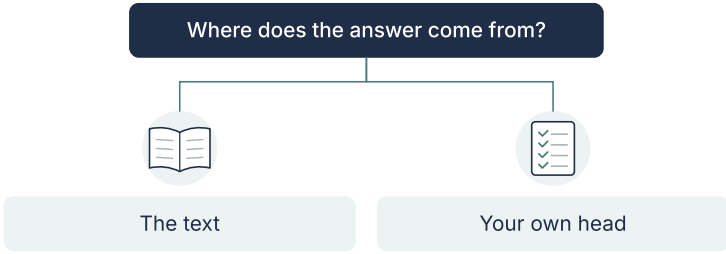
What are the four turns in reciprocal teaching? Answer: predicting, questioning, clarifying and summarising. Which two Collaborative Strategic Reading strategies were used most effectively? Answer: click and clunk, and get the gist.

4.2.3 Question-Answer Relationships, Questioning the Author and Strategy Programmes

Questions sit at the centre of active reading. **Some methods teach readers to ask them, others to sort them**, and some build whole programmes around them. This section sets out each one with its evidence.

Question-Answer Relationships has students **sort questions by where the answer comes from**, the text or their own head. I use it as a practice choice, with no result claimed for it.

Question-Answer Relationships



Questioning the Author uses **teacher queries to push readers to build meaning** from what the author says. In a year-long implementation, teacher questions became richer and students asked

more questions of their own (Beck et al., 1996). Comprehension outcomes were not reported, so the evidence is mixed.

> **Science Says:**
>
> Transactional Strategies Instruction is a **year-long teacher-student dialogue** about using several strategies together. Low-achieving grade 2 pupils showed more strategy use, more learning from text and better standardised scores than with strong conventional teaching (Brown et al., 1996). The evidence is mixed.

Two question programmes

Method	What it does
Questioning the Author	Teacher queries push readers to build meaning
Transactional Strategies Instruction	A year-long dialogue about using several strategies together

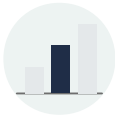
Concept-Oriented Reading Instruction combines **strategy teaching with motivation supports** in science reading. The study's title reports gains in comprehension and engagement (Guthrie et al., 2004). The evidence is mixed.

Whole-class programmes that teach **several strategies at once** have a review behind them. I use them as a practice choice, with no result claimed.

Whole-class programmes



Teach several strategies at once



Have a review behind them



Used here as a practice choice

> **Exercise:**
>
> Try it. Before each section of a long article, write one question. **Read to answer it**, and then check whether you could have answered it before reading.

Section 3.2.1 described prequestions with video and text (Carpenter & Toftness, 2017). **Pretests helped even for items people failed on the pretest** (Richland et al., 2009). A wrong guess before reading is not wasted.

A guess before reading

Before	After
A wrong guess on the pretest	Pretests helped even for those items (Richland et al., 2009)

The Feynman technique asks you to **explain simply, find gaps, return to the source and simplify**. Section 3.3.2 noted that it has no research under that name, so it is practice only.



A young man explaining an idea to his grandmother over tea, a book open on the table between them.

Table: Question methods at a glance

Method	What it does	Evidence
Question-Answer Relationships	Sort questions by answer source	Practice only
Questioning the Author	Queries about what the author says	Mixed
Transactional Strategies Instruction	Year-long strategy dialogue	Mixed
Concept-Oriented Reading Instruction	Strategies plus motivation in science	Mixed
Prequestions	Questions before studying	Mixed
Feynman technique	Explain simply and find gaps	Practice only

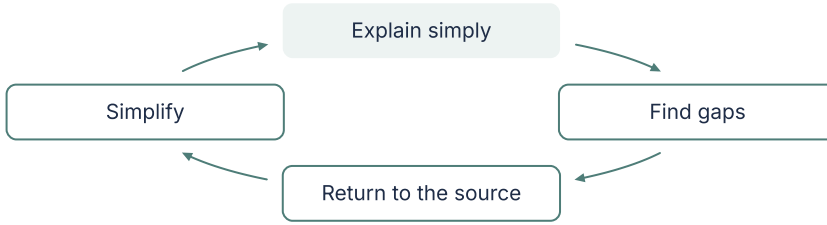
> **Exercise:**
>
> Question the text.
>
> 1. Starter. Before reading, **guess the answer** to one question about the topic.

2. Middle. While reading, ask what the author is trying to say in each section, as in Questioning the Author (Beck et al., 1996).
3. Advanced. Explain a chapter to a novice, find the gaps, return to the source and simplify. This is the Feynman technique, a practice method.

Key idea:

Asking questions before and during reading keeps you active, and prequestions help even when your guess is wrong.

The Feynman technique



Quick check:

What did pretests help, according to Richland et al. (2009)? Answer: even items people failed on the pretest. What evidence does the Feynman technique have? Answer: practice only.

4.2.4 Active Reading Exercises

Sections 4.2.1 to 4.2.3 described the active reading systems. **This section gathers their exercises** with the evidence for each. Some rest on strong research, and others are practice only.

The strongest exercise here is simple. **Pause after each section and recite it from memory.** The recite step of SQ3R is retrieval practice, which has strong support (Robinson, 1946; Roediger & Karpicke, 2006).



A woman on a park bench with a closed book on her lap, her lips moving as she recites what she has just read.

Four-role cards also have **strong evidence**, because they put reciprocal teaching into practice (Palincsar & Brown, 1984). Other exercises follow methods with mixed or weak evidence, and the table shows each one.

> **Science Says:**
>
> Section 2.2.3 showed that people who tested themselves **kept more after 2 days and after 1 week** than people who studied again (Roediger & Karpicke, 2006). That is the evidence behind the recite-from-memory pause.

Table: Active reading exercises

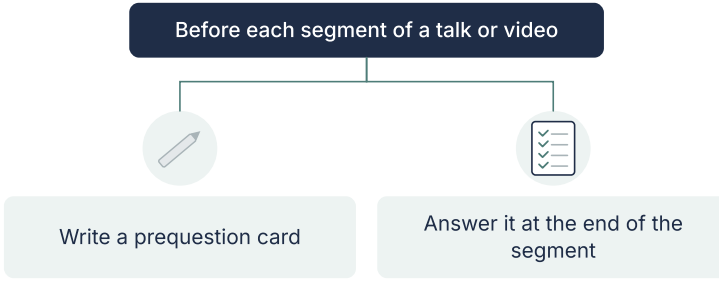
Exercise	Trains	Evidence	Credit
Heading-to-question conversion	SQ3R, PQ4R	Practice only, part of an origin method	Robinson (1946)
Recite-from-memory pause after each section	SQ3R	Strong, as retrieval practice	Robinson (1946); Roediger and Karpicke (2006)
Three-column KWL chart	KWL	Weak	Ogle (1986)
KWL Plus map and summary	KWL Plus	Practice only	None
Predict, read, prove cycle	DR-TA	Practice only	None
Four-role cards (predictor, questioner, clarifier, summariser)	Reciprocal teaching	Strong	Palincsar and Brown (1984)
Click and clunk; get the gist	Collaborative Strategic Reading	Mixed	Klingner, Vaughn and Schumm (1998)
Question sorting by answer source	Question-Answer Relationships	Practice only	None

Exercise	Trains	Evidence	Credit
Author queries during reading	Questioning the Author	Mixed	Beck et al. (1996)
Prequestion card before each segment	Prequestions	Mixed	Carpenter and Toftness (2017)
Explain-to-a-novice drill	Feynman technique	Practice only	Related, Fiorella and Mayer (2013)

A good routine combines **one question exercise and one recall exercise**. A heading turned into a question, followed by a recite pause, covers both.

> **Exercise:**
>
> Try it. Write a prequestion card before each segment of a talk or video. **Answer each card at the end of its segment.** This follows prequestions (Carpenter & Toftness, 2017).

Prequestion cards



Practice-only exercises can still be useful. **Use them as experiments**, and keep the ones that leave you able to recall more.

Exercise:

Build an active reading routine.

1. Starter. Do a **heading-to-question conversion** for one chapter, following Robinson (1946).
2. Middle. Add a recite-from-memory pause after each section, as in Robinson (1946) and Roediger and Karpicke (2006).
3. Advanced. Run four-role cards with a study group for a month, following Palincsar and Brown (1984).

Build an active reading routine

- [x] Starter: turn each heading of one chapter into a question
- [x] Middle: a recite-from-memory pause after each section
- [x] Advanced: four-role cards with a study group for a month

Key idea:

Questions before reading and recall after it are the active reading exercises with the best support.

Quick check:

Which exercise turns the recite step into retrieval practice? Answer: the recite-from-memory pause after each section. What evidence does question sorting by answer source have in this book? Answer: practice only.

4.3.1 Shadowing and Dictation

Language learners often train their ears by using their mouths or their pens. **Shadowing and dictation** both turn listening into an active task. This section sets out what each involves and what the research gathered for this book shows.

Shadowing means **repeating audio aloud a split second behind the speaker**. Section 3.1.2 gave its mixed evidence (Hamada, 2016).



A young woman walking with earbuds in, her lips moving as she repeats what she hears.

> **Science Says:**
> Shadowing **improved phoneme perception**, and comprehension gains appeared only for lower-proficiency learners (Hamada, 2016). A phoneme is one of the small sounds that make up a word, such as the b sound in bat. The evidence is mixed.

Start with shadowing if following speech is still hard for you, since that is where the comprehension gain appeared (Hamada, 2016). Stronger listeners can use it for clearer sounds. A staged version, from listening to mumbling to full shadowing, is practice only.

What shadowing improved (Hamada, 2016)



Phoneme perception



Comprehension, only for lower-proficiency learners



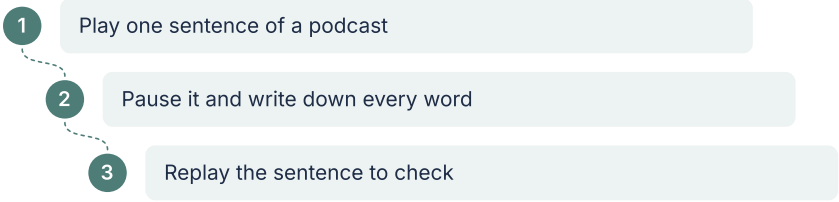
Start with it if following speech is still hard

Dictation means **writing down a heard passage**, and dictogloss means reconstructing it, often with a partner (Wajnryb, 1990). I use both as practice choices, with no result claimed.

Exercise:

Try it. Play one sentence of a podcast, pause it and **write down every word**. Replay the sentence to check. This is sentence-by-sentence dictation, a practice exercise.

Sentence-by-sentence dictation



Your page shows your gaps. Replay any part where words are missing, and write them in.

Dictogloss adds a second step. **After hearing a short passage, rebuild it with a partner** from your notes. Compare the rebuilt version with the original line by line.

Dictogloss

Definition

Dictogloss

Rebuilding a heard passage with a partner from your notes

Key Concept:

Active ears. **Shadowing trains sounds, and dictation shows your gaps.** Shadowing has mixed evidence, and dictation is practice only.

> **Exercise:**
>
> Train with your voice and pen.
>
> 1. Starter. Shadow **30 seconds** of a slow podcast.
> 2. Middle. Shadow two minutes a day for two weeks, drawing on Hamada (2016). Note whether you catch more words.
> 3. Advanced. Do dictogloss pair reconstruction with a friend on a one-minute news clip. This is a practice exercise.

Train with your voice and pen

- [x] Starter: shadow 30 seconds of a slow podcast
- [x] Middle: shadow two minutes a day for two weeks
- [x] Advanced: dictogloss pair reconstruction with a friend

Key idea:

Shadowing and dictation make listening active, and both are best used with a check on what you understood.

Quick check:

What is shadowing? Answer: repeating audio aloud a split second behind the speaker. What evidence does dictation have in this book? Answer: practice only.

4.3.2 Active Listening and the Metacognitive Listening Cycle

GOOD LISTENERS DO MORE than stay quiet. **They check, restate and reflect.** This section covers four listening methods, from conversation to language learning.

Active listening means **restating the speaker's message before replying** (Rogers & Farson, 2015). Section 3.3.2 gave its mixed evidence, a gain in how attractive the listener seemed with no gain in feeling understood (Weger et al., 2010).

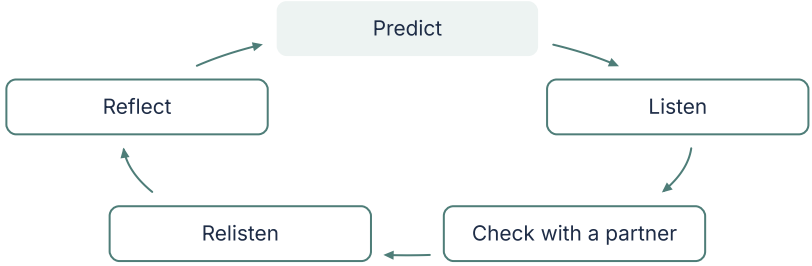


Two colleagues facing each other across a small table, one nodding as the other speaks.

That result shapes **how to use paraphrase**. Use it to check that you heard correctly, and do not expect it alone to make the speaker feel understood.

> Science Says:
>
> The metacognitive listening cycle runs **predict, listen, check with a partner, relisten and reflect**. Section 3.1.2 gave its evidence, with weaker listeners gaining most (Vandergrift & Tafaghodtari, 2010). The evidence is mixed.

The metacognitive listening cycle



Strategy instruction for second-language learners means **explicit teaching of learning strategies**, listening included. A study combining many studies across skills found d = 0.49, and the result was not specific to listening (Plonsky, 2011). Here d is an effect size, a number for how big a difference the teaching made. The evidence is mixed.

> Exercise:
>
> Try it. Before a podcast episode, **write two predictions** about what it will say. Listen, check your predictions, listen to the hardest

part again, and note what you learned. This follows the metacognitive listening cycle (Vandergrift & Tafaghodtari, 2010).

Predict, then check



A selective listening drill asks you to **follow one voice among several** (Cherry, 1953). No training research was found, so it is practice only.

The cycle is the most complete of these methods. **It puts a check at every stage of listening**, from prediction to reflection.

Listen and check



> **Key Concept:**
>
> Listen and check. **Restate to check, predict before you listen, and reflect afterwards.** The evidence for these methods is mixed, and selective listening is practice only.

Exercise:

Listen actively.

1. Starter. In one conversation today, **restate what the other person said** before replying, as in Weger et al. (2010).
2. Middle. Use a predict, check and reflect worksheet for three talks, following Vandergrift and Tafaghodtari (2010).
3. Advanced. Follow one voice in a busy podcast with two speakers talking over each other. This is a practice exercise.

Listen actively



Restate what the other person said



Use a predict, check and reflect worksheet



Follow one voice in a busy podcast

Key idea:

Active listening means checking what you heard before, during and after.

Quick check:

What are the steps of the metacognitive listening cycle? Answer: predict, listen, check with a partner, relisten and reflect. What effect size did the strategy instruction review find? Answer: d = 0.49.

4.3.3 Fast Playback and Lecture Pauses

RECORDED TALKS GIVE YOU control over time. **You can speed them up, and you can stop them.** This section covers fast playback and the lecture pause procedure, two ways of using that control.

Fast playback means **listening at 1.25 to 2 times speed, building up** step by step. Section 1.3.1 showed that performance fell beyond 2 times (Murphy et al., 2022), so 2 times is the top of the ladder.

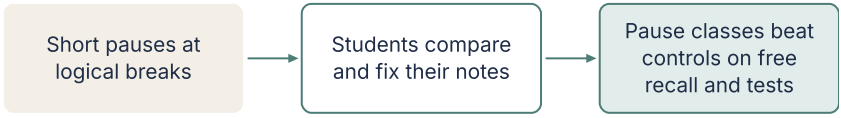


Building up gives your ears time to adjust (Dupoux & Green, 1997). **Start at 1.25 times for a week**, then move to 1.5 times, and stop at 2 times. Research on fast speech goes back to a classic review (Foulke & Sticht, 1969).

Science Says:

The lecture pause procedure adds **short pauses at logical breaks** for students to compare and fix their notes. In a study of 72 students, pause classes beat controls on free recall and tests (Ruhl et al., 1987). The evidence is mixed.

The lecture pause procedure

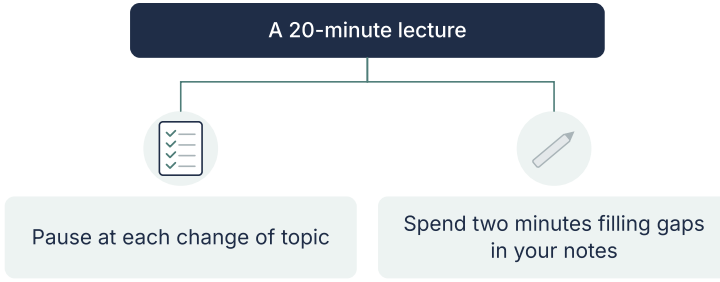


Recorded talks can use the same pauses. **Pause the video at each logical break** and spend two minutes fixing your notes. If you study with a friend, compare notes during the pause.

Exercise:

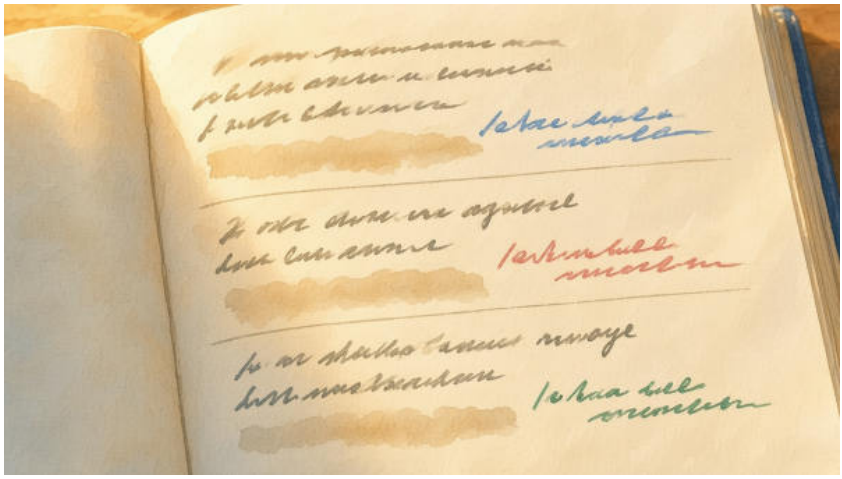
Try it. Watch a 20-minute lecture. **Pause at each change of topic** and spend two minutes filling gaps in your notes. This follows the lecture pause procedure (Ruhl et al., 1987).

Pause a recorded lecture



The two methods pull in different directions. **Fast playback saves time, and pauses spend it.** Try both on the same talk and see which balance suits you.

Choose by goal. **For a talk you only need the gist of**, faster playback suits. For a talk you must learn from, add pauses.



A notebook page split into sections, each ending with a short line of added notes in a different coloured pen.

> **Key Concept:**
>
> Control the clock. **Speed up to 2 times at most, and pause at logical breaks.** Both methods have mixed evidence.

> **Exercise:**
>
> Use the controls.
>
> 1. Starter. Play one podcast at **1.25 times speed**.

2. Middle. Climb a playback rate ladder of 1.25, 1.5 and 2 times over three weeks, stopping at 2 times, drawing on Murphy et al. (2022).
3. Advanced. Take two-minute note comparison pauses with a study partner during a full lecture, following Ruhl et al. (1987).

Speed up or pause

	Fast playback	Pauses
Time	Saves it	Spends it
Suits	A talk you only need the gist of	A talk you must learn from

Key idea:

Speed up within limits, and pause to fix your notes.

Quick check:

What did pause classes beat controls on? Answer: free recall and tests. What is the top of the playback ladder? Answer: 2 times speed.

4.3.4 Listening Exercises

Sections 4.3.1 to 4.3.3 described the listening methods. **This section gathers their exercises** with the evidence for each. None has strong evidence, and several are practice only.

Mixed evidence still gives you **a reasonable starting point**. Practice-only exercises are worth trying too, as long as you check what you understood.



A pair of headphones on a desk beside a notebook with a short list of exercises and ticks next to two of them.

Three exercises have mixed evidence and are easy to start. **The playback rate ladder, the paraphrase-back pair drill and the predict, check,**

reflect worksheet each follow a tested method (Murphy et al., 2022; Weger et al., 2010; Vandergrift & Tafaghodtari, 2010).

> Science Says:
>
> Section 2.4.3 showed that fast playback had **little cost up to 2 times speed** (Murphy et al., 2022). The top rung of the playback rate ladder in this section is therefore 2 times speed.

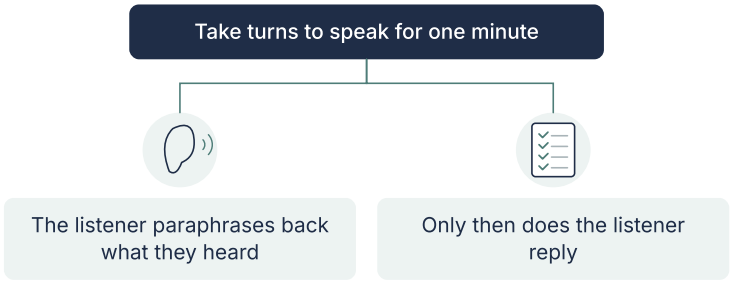
Table: Listening exercises

Exercise	Trains	Evidence	Credit
Staged shadowing (listen, mumble, full shadow)	Shadowing	Practice only	None
Playback rate ladder (1.25x, 1.5x, 2x)	Fast playback	Mixed, stop at 2x	Murphy et al. (2022)
Paraphrase-back pair drill	Active listening	Mixed	Weger et al. (2010)
Sentence-by-sentence dictation	Dictation	Practice only	Wajnryb (1990)
Dictogloss pair reconstruction	Dictogloss	Practice only	Wajnryb (1990)
Predict, check, reflect worksheet	Metacognitive listening cycle	Mixed	Vandergrift and Tafaghodtari (2010)
Two-voice selective listening	Selective listening	Practice only	Cherry (1953)
Two-minute note comparison pauses	Lecture pause procedure	Mixed	Ruhl et al. (1987)

A weekly plan can mix both kinds. **Pick one mixed-evidence exercise and one practice-only exercise**, and keep a short note of what you understood after each.

> Exercise:
>
> Try it. With a partner, take turns to speak for one minute. **The listener paraphrases back** what they heard before replying. This is the paraphrase-back pair drill, drawing on Weger et al. (2010).

The paraphrase-back pair drill



Practice-only exercises such as dictation give **a clear record of your gaps**. That record tells you which part to replay.

> Exercise:
>
> Build a listening routine.
>
> 1. Starter. Do **sentence-by-sentence dictation** on one minute of audio, a practice exercise.
> 2. Middle. Use the predict, check, reflect worksheet for one talk a week, following Vandergrift and Tafaghodtari (2010).
> 3. Advanced. Combine the playback rate ladder with two-minute note comparison pauses on a long lecture, following Murphy et al. (2022) and Ruhl et al. (1987).

Build a listening routine

- [x] Starter: sentence-by-sentence dictation on one minute of audio
- [x] Middle: a predict, check, reflect worksheet for one talk a week
- [x] Advanced: the playback rate ladder with two-minute note comparison pauses

Key idea:

Mix a tested listening exercise with a practice one, and check what you understood after each.

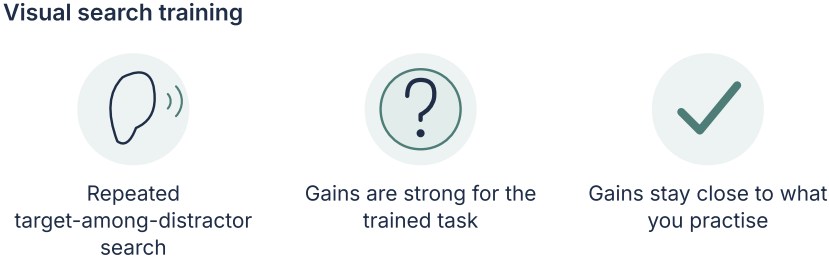
Quick check:

What evidence does staged shadowing have in this book? Answer: practice only. Where should the playback rate ladder stop? Answer: at 2 times speed.

4.4.1 Visual Search and Systematic Scanning

Some jobs depend on spotting things by eye, from checking a scan to finding a typo. **Four methods claim to train visual search.** This section sets out each one with its evidence.

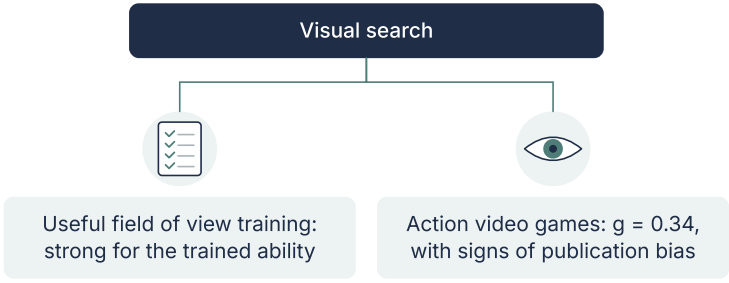
Visual search training means **repeated target-among-distractor search**. Section 3.1.3 noted that its gains are strong for the trained task (Sireteanu & Rettenbach, 1995), while transfer to daily life is weak.



Useful field of view and speed-of-processing training uses **timed central and peripheral target drills** (Ball et al., 2002). Its evidence is strong for the trained ability.

> **Science Says:**
>
> Section 3.1.3 gave the action video game result, an effect of g = 0.34 with signs of publication bias (Bediou et al., 2018). Here g measures the size of an effect, and publication bias means studies that find nothing get published less often. Action video game play means **regular play of fast action games**, and its evidence is mixed.

Two further methods



Systematic scanning patterns ask you to **inspect images in a fixed order**. Their evidence is mixed (Kok et al., 2016). Treat a fixed order as a personal habit to test.

> **Exercise:**
>
> Try it. Print a page of random letters. **Find every letter Q against a timer**, then repeat with a new page tomorrow. This is a visual search drill (Sireteanu & Rettenbach, 1995).

A visual search drill



These methods share a limit. **Gains stay close to what you practise.** Choose a drill that looks like the real task you care about.



A proofreader at a desk with a long printed document, a ruler held under one line.

Table: Visual search methods at a glance

Method	What it does	Evidence
Visual search training	Repeated target-among-distractor search	Strong for the trained task
Systematic scanning	Images inspected in a fixed order	Evidence mixed
Useful field of view training	Timed central and peripheral drills	Strong for the trained ability
Action video games	Regular play of fast action games	Mixed

Exercise:

Train your search.

1. Starter. Do a **timed odd-one-out search grid** once, following Sireteanu and Rettenbach (1995).
2. Middle. Practise peripheral flash identification for a week, drawing on Ball et al. (2002), and treat any gain as specific to the drill.
3. Advanced. Proofread one document with a quadrant checklist scan, as in Kok et al. (2016), and one without. Compare what you found.

Key idea:

Visual search drills train the drill, so practise on tasks like the ones you need.

Train your search

- Gains stay close to what you practise
- Choose a drill that looks like the real task
- Proofread with a quadrant checklist scan

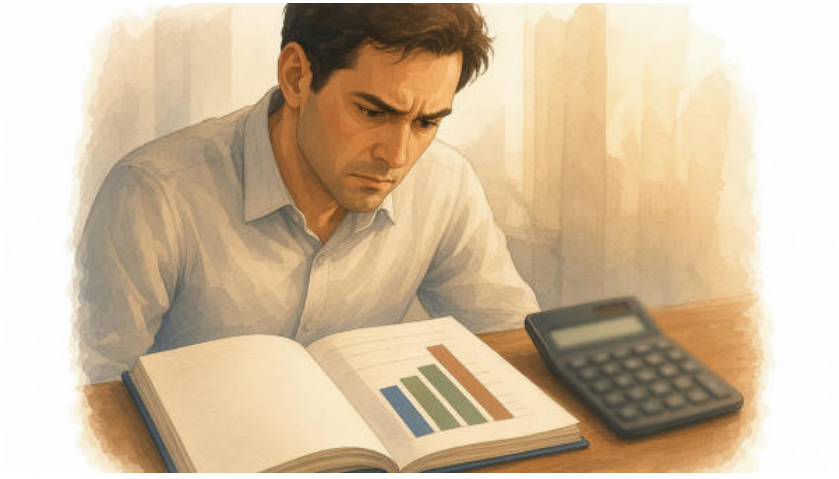
Quick check:

What is visual search training? Answer: repeated target-among-distractor search. What does useful field of view training use? Answer: timed central and peripheral target drills.

4.4.2 Reading Graphs, Charts and Diagrams

A chart can say in one glance what a page of text says slowly. **That only works if you can read the chart.** This section covers methods for reading graphs, diagrams and other images.

Section 3.1.3 gave the result of a graph literacy test, **about 9 of 13 items right** on average (Galesic & Garcia-Retamero, 2011). That paper is a test, and it is not a training.



A man at a desk frowning at a bar chart in a printed report, a calculator beside it.

Graph literacy training means **teaching how to read common graph formats**. A review of graph comprehension research exists (Shah & Hoeffner, 2002), and no training trial was found, so graph literacy training is practice only in this book.

> **Science Says:**
>
> Diagram self-explanation means **explaining to yourself what each part of a diagram shows**. In a study of 20 students, diagram learners self-explained more and did better than text learners (Ainsworth & Loizou, 2003). The evidence is mixed.

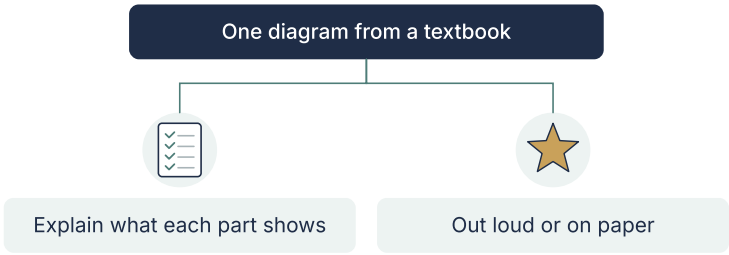
Diagrams or text (Ainsworth & Loizou, 2003)



Art observation training uses **guided open-ended looking at artworks** to sharpen observation. In one study, medical students improved their observation of art and of physical findings, a result read from a summary only (Naghshineh et al., 2008). The evidence is mixed.

> Exercise:
>
> Try it. Take one diagram from a textbook. **Explain to yourself what each part shows**, out loud or on paper. This follows diagram self-explanation (Ainsworth & Loizou, 2003).

Diagram self-explanation



A looking session built on open questions is one practice exercise. **Ask what is going on, what makes you say that, and what more you can find.** It is a practice choice, with no result claimed.

Questions at three levels are another practice exercise. **Read the data, read between the data, and read beyond the data.** It is a practice choice, with no result claimed.

Questions at three levels



Key Concept:

Read the picture. **Explain each part of a diagram to yourself**, and ask questions at more than one level. Diagram self-explanation has mixed evidence, and graph training is practice only.

Exercise:

Read charts and diagrams.

1. Starter. For one chart in the news, **say in one sentence what it shows**.
2. Middle. Use diagram self-explanation prompts on three diagrams, following Ainsworth and Loizou (2003).
3. Advanced. Ask three-level graph questions about five charts from a report. This is a practice exercise, with no study claimed.

Read charts and diagrams



Say in one sentence what a chart shows



Explain three diagrams to yourself



Ask three-level questions about five charts

Key idea:

Explaining a diagram to yourself helps you read it, and graph training remains untested.

Quick check:

On average, how many of 13 graph literacy items did people get right? Answer: about 9. What evidence does graph literacy training have in this book? Answer: practice only.

4.4.3 Learning From Video: Segmenting, Signalling and Expert Gaze

Video brings pictures, words and movement together, and it keeps moving whether you are ready or not. **Four methods try to make video easier to learn from.** This section sets out each one with its evidence.

Segmenting means **breaking a video or animation into parts the learner controls**. Its evidence is mixed (Mayer & Chandler, 2001; Rey et al., 2019).



A student watching an animation on a laptop, one finger resting on the pause key.

> **Science Says:**
>
> Learner-paced segments **improved transfer**, and they did not improve retention (Mayer & Chandler, 2001). Transfer means using what you learned in a new situation. Segmenting may therefore help you apply what a video shows, even when it does not help you remember more of it. The evidence is mixed.

Eye-movement modelling examples let you **watch a video overlay of an expert's gaze** before viewing. The method rests on a single study (Jarodzka et al., 2013), and its evidence is mixed.

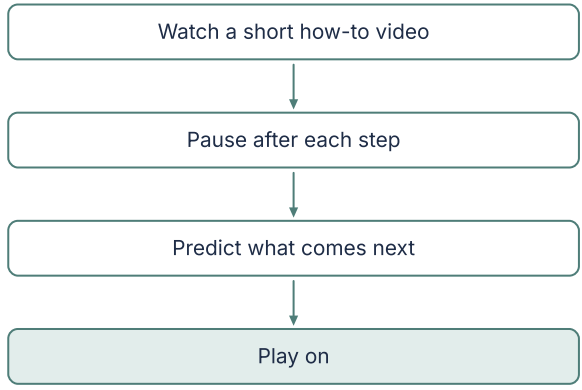
Segmenting and expert gaze

	Segmenting	Eye-movement modelling
What it is	Parts of a video the learner controls	A video overlay of an expert's gaze
Evidence	Mixed: improved transfer, not retention	Mixed: a single study

Signalling uses **arrows, colour or labels to direct attention** to key parts of a visual. I use it as a practice choice, with no result claimed for it.

> **Exercise:**
>
> Try it. Watch a short how-to video. **Pause after each step** and predict what comes next before you play on. This follows segmenting (Mayer & Chandler, 2001).

Pause and predict



Video note-taking with timestamps means **pausing a video and logging notes against time codes**. No research was found, so it is practice only. The time codes let you jump back to any part you need to see again.

Pausing is the common thread. **Segmenting, pause-and-predict and timestamped notes** all turn a stream of video into parts you can handle.

Video in parts you can handle



Key Concept:

Take control of video. **Pause at each segment, predict, and log notes with time codes.** Segmenting has mixed evidence, and signalling and timestamped notes are practice only.

Exercise:

Learn from video.

1. Starter. Watch one video in **three segments**, pausing between each.
2. Middle. Pause and predict after each video segment for a whole lecture, following Mayer and Chandler (2001).
3. Advanced. Watch an expert-gaze video before a viewing task, as in Jarodzka et al. (2013), and compare what you notice with a task done without it.

Learn from video



Watch one video in three segments



Pause and predict for a whole lecture



Watch an expert-gaze video before a viewing task

Key idea:

Break video into parts you control, and the parts become easier to use.

Quick check:

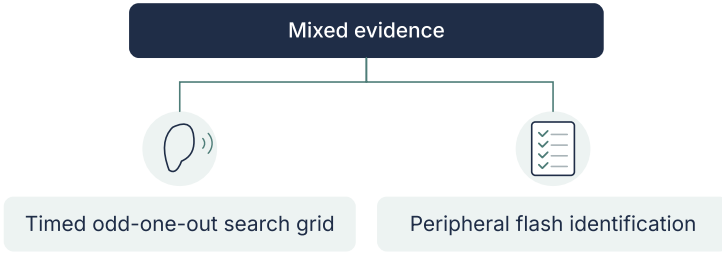
What did learner-paced segments improve? Answer: transfer. What evidence does signalling have in this book? Answer: practice only.

4.4.4 Visual Extraction Exercises

Sections 4.4.1 to 4.4.3 described the visual methods. **This section gathers their exercises** with the evidence for each. Most have mixed evidence, and several are practice only.

Two exercises here each rest on a single study, **the timed odd-one-out search grid and peripheral flash identification**, so their evidence is mixed (Sireteanu & Rettenbach, 1995; Ball et al., 2002). Both improve the task you practise, so choose them when the drill looks like your real task.

Two exercises from single studies



Several exercises have **mixed evidence**. Expert-gaze video, pause and predict, and diagram self-explanation prompts each follow a method with mixed evidence.

> **Science Says:**
>
> In one big trial, useful field of view training **improved the trained abilities** (Ball et al., 2002). Section 1.3.2 gave the limit of that trial for everyday tasks.

Table: Visual extraction exercises

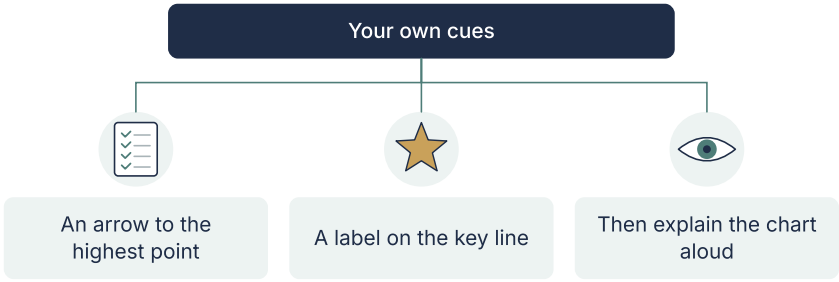
Exercise	Trains	Evidence	Credit
Timed odd-one-out search grid	Visual search training	Mixed for the trained task	Sireteanu and Rettenbach (1995)
Quadrant checklist scan	Systematic scanning	Evidence mixed	Kok et al. (2016)
Peripheral flash identification	Useful field of view training	Mixed for the trained ability	Ball et al. (2002)
Three-level graph questions (read the data, between, beyond)	Graph literacy training	Practice only	None
Open-question looking session (what is going on, what makes you say that, what more)	Art observation	Practice only	None
Expert-gaze video then own viewing	Eye-movement modelling	Mixed	Jarodzka et al. (2013)
Pause and predict after each video segment	Segmenting	Mixed	Mayer and Chandler (2001)
Mark the signal (add cues to a chart before studying it)	Signalling	Practice only	None
Diagram self-explanation prompts	Diagram self-explanation	Mixed	Ainsworth and Loizou (2003)
Timestamped video log	Video note-taking	Practice only	None

Three-level graph questions, the open-question looking session and marking the signal are practice only. A balanced routine takes **one exercise for the eyes and one for meaning**. A search grid trains the

eyes, and diagram self-explanation trains understanding of what you see.

> **Exercise:**
>
> Try it. Before studying a chart, **add your own cues**, such as an arrow to the highest point and a label on the key line. Then explain the chart aloud. Marking the signal is a practice exercise.

Cue a chart before you study it



Video exercises suit online learning. **Pause and predict, and keep a timestamped log**, and every lecture becomes a set of parts you can return to.



A laptop playing a lecture video beside a notebook with time codes down the left margin.

Exercise:

Build a visual routine.

1. Starter. Do one **timed odd-one-out search grid**, following Sireteanu and Rettenbach (1995).
2. Middle. Use diagram self-explanation prompts for every diagram in one chapter, following Ainsworth and Loizou (2003).
3. Advanced. Keep a timestamped video log for a full online course module. This is a practice exercise.

Key idea:

Train the eyes on tasks like your own, and train meaning by explaining what you see.

Build a visual routine

- One exercise for the eyes
- One exercise for meaning
- Train the eyes on tasks like your own

Quick check:

Which two visual exercises rest on a single study each, with mixed evidence for the trained task? Answer: the timed odd-one-out search grid and peripheral flash identification. What evidence does marking the signal have in this book? Answer: practice only.

4.5.1 Cornell, Outline, Sentence and Boxing Methods

OPEN ANY STUDY GUIDE and you will find a favourite note layout. **Each layout arranges the page in a different way.** This section sets out four layouts and the pen-or-laptop question, with the evidence for each.

The Cornell method splits the page into **a notes column, a cue column and a summary strip** (Pauk, n.d.). Only small classroom studies were found, so its evidence as a package is weak.

The Cornell page



A notes column



A cue column



A summary strip

One part of the Cornell method is stronger than the whole. **Covering the notes and quizzing yourself from the cue column** is retrieval practice (Roediger & Karpicke, 2006). That step is worth keeping even if you drop the rest.

> **Science Says:**
>
> Section 2.2.3 showed that people who tested themselves **kept more after 2 days and after 1 week** than people who studied again (Roediger & Karpicke, 2006). The cue-column quiz puts that kind of self-test into your notes.

Studying again or testing yourself

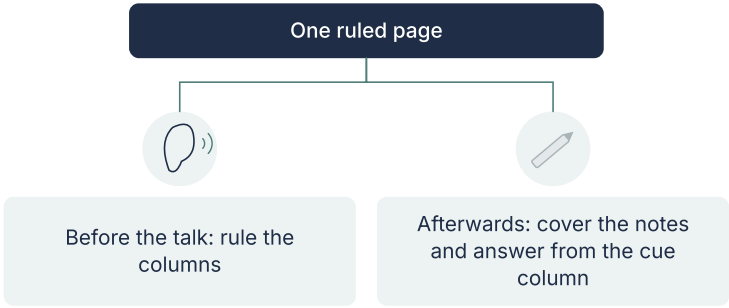


The outline method uses an indented hierarchy of points, the sentence method writes **one numbered line per new point**, and the boxing method groups related notes in drawn boxes. All three are practice only in this book.

> **Exercise:**
>
> Try it. Rule one page into Cornell columns before a talk. Afterwards, **cover the notes and answer from the cue column**.

This uses the retrieval step of the Cornell method (Pauk, n.d.; Roediger & Karpicke, 2006).

Cornell columns for a talk



Should you write by hand? Section 2.3.3 described **the early longhand result** and the later replication that did not clearly confirm it (Mueller & Oppenheimer, 2014; Morehead et al., 2019). The evidence is mixed.



A laptop and a paper notebook side by side on a lecture-hall desk, both open to notes from the same talk.

The useful idea behind longhand is **writing in your own words**. A paraphrase-only rule, with no word-for-word lines, applies that idea on any device, and it shares the method's mixed evidence.

> **Key Concept:**
>
> Layout and recall. **Pick any layout you like, and add a self-quiz.** The Cornell cue-column quiz is the strongest part of these methods.

Layout and recall



> **Exercise:**
>
> Try the layouts.
>
> 1. Starter. Take notes on one talk with the **sentence method**, a practice exercise.
> 2. Middle. Write a bottom-strip summary in your own words after each Cornell page, drawing on Pauk (n.d.).
> 3. Advanced. For one week, follow a paraphrase-only rule in all notes, drawing on Mueller and Oppenheimer (2014). Note how it changes what you write.

Key idea:

Build a self-quiz into whatever layout you use.

Try the layouts

- [x] Starter: notes on one talk with the sentence method
- [x] Middle: a summary in your own words after each Cornell page
- [x] Advanced: a paraphrase-only rule in all notes for one week

Quick check:

What are the three parts of a Cornell page? Answer: a notes column, a cue column and a summary strip. What evidence does the outline method have in this book? Answer: practice only.

4.5.2 Mind Maps, Charts and Matrix Notes

Notes can look less like a list and more like a picture. **Mind maps, matrix notes and sketches** lay information out in space. This section sets out each one with its evidence.

Mind mapping draws **a radial key-word map around a central topic** (Buzan, 1974). Section 2.3.3 gave its mixed evidence from one study, including **lower motivation** (Farrand et al., 2002).

Mind mapping



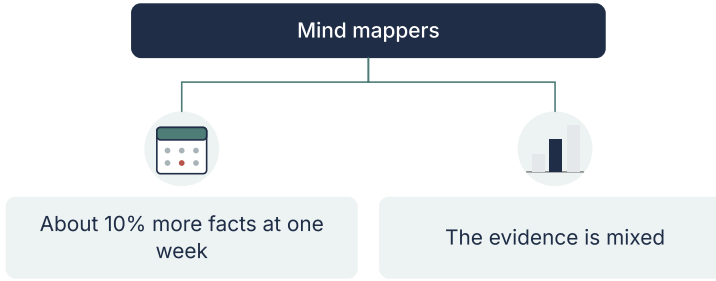


A large mind map on a sheet of paper, a central circle with coloured branches spreading out to short key words.

A mind map can be made from memory after reading. That version adds a recall step to the map.

> **Science Says:**
>
> In the mind-map study, mind mappers recalled **about 10% more facts at one week** (Farrand et al., 2002). The evidence is mixed.

The mind-map study



Charting and matrix notes put **topics as rows and attributes as columns** (Kiewra et al., 1988; Jairam et al., 2012). Their evidence is mixed.

Drawing and sketchnoting mean **drawing what you must remember**. Section 3.3.3 gave the drawing result, with strong evidence (Fernandes et al., 2018). A sketch-the-concept card applies it to one idea at a time.

Matrix notes and drawing

Method	What it does
Matrix notes	Topics as rows and attributes as columns; mixed evidence
Drawing and sketchnoting	Drawing what you must remember; strong evidence

> Exercise:
>
> Try it. Build a **3 by 4 comparison matrix** for three things you are choosing between, such as three phones or three courses. Use four features as columns. This draws on matrix notes, which have mixed evidence (Jairam et al., 2012).

A matrix suits **items you compare on the same features**. A mind map suits ideas spreading from one topic, and a sketch suits a single idea you need to keep.

Choose by the shape of the material



A matrix: items compared on the same features



A mind map: ideas spreading from one topic



A sketch: a single idea you need to keep



A small index card with a simple drawing of the water cycle and one word under each part.

Choose by the shape of the material. **If the items share features, use a matrix.** If they branch from one topic, use a map.

> 🗝 **Key Concept:**
>
> Draw it out. **Sketch to remember, map to connect, and use a matrix to compare.** Drawing has strong evidence, and mind maps and matrix notes have mixed evidence.

Draw it out



Exercise:

Lay it out.

1. Starter. Make a **sketch-the-concept card** for one key term, following Fernandes et al. (2018).
2. Middle. Make a mind map from memory after reading a chapter, drawing on Farrand et al. (2002).
3. Advanced. Turn a long report into a comparison matrix, drawing on Jairam et al. (2012).

Key idea:

Drawing helps you remember, and maps and matrices help you see links and comparisons.

Lay it out

- [x] Starter: a sketch-the-concept card for one key term
- [x] Middle: a mind map from memory after reading a chapter
- [x] Advanced: a long report turned into a comparison matrix

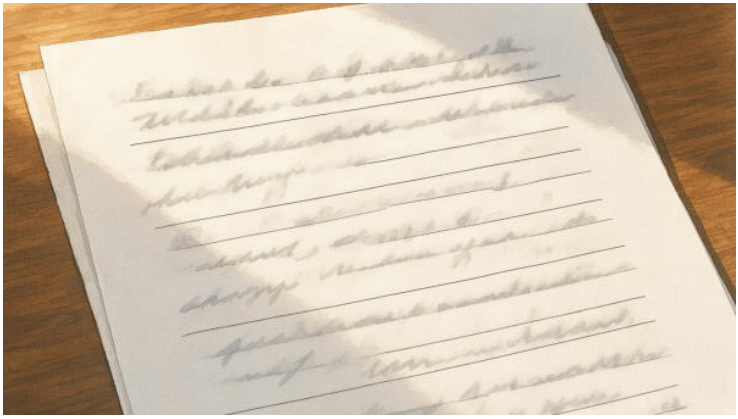
Quick check:

What kind of map does mind mapping draw? Answer: a radial key-word map around a central topic. How do matrix notes arrange information? Answer: topics as rows and attributes as columns.

4.5.3 Guided Notes, Note Review and the Slip-Box

Taking notes is only the first half of the job. **What happens to the notes afterwards** decides how useful they are. This section covers guided notes, note review, the slip-box and note revision.

Guided notes give you **an instructor outline with blanks**. Section 2.3.3 gave their strong evidence for school-age learners (Konrad et al., 2009). Adults can ask a speaker for slides in advance and make their own gapped outline.



A printed handout with gaps in every second line, some filled in with neat handwriting.

Note review means **reworking notes after the session**. Section 3.4.3 showed that note-taking and note review have separate functions with substantial combined effects (Kiewra et al., 1991; Kobayashi, 2006). The evidence is strong. Same-day review is one way to apply it, and the timing is a practice choice.

> Science Says:
>
> Guided notes led to **better note accuracy and better performance** for school-age learners (Konrad et al., 2009). The evidence is strong.

Guided notes

> Definition
>
> **Guided notes**
>
> An instructor outline with blanks

The slip-box, or Zettelkasten, keeps **one idea per linked, permanent note** (Ahrens, 2017). No research was found, so it is practice only.

Note revision with partners and pauses means **revising lecture notes during pauses**, alone or with a partner. I use it as a practice choice, with no result claimed for it.

Two practice choices

Method	What it does
The slip-box, or Zettelkasten	One idea per linked, permanent note
Note revision with partners and pauses	Revising lecture notes during pauses

> Exercise:
>
> Try it. On the evening after a meeting or lecture, **spend ten minutes reworking your notes**. Fill gaps, fix errors and add one question you still have. This follows note review (Kobayashi, 2006), and the timing is a practice choice.

Review and slip-box notes work well together. **Review your notes the same day**, then copy the best ideas into single linked notes you can find later.

Notes after notes



> Key Concept:
>
> Notes after notes. **Review the same day, fill the gaps, and keep the best ideas as linked notes.** Note review has strong evidence, and the slip-box is practice only.

> Exercise:
>
> Work your notes.
>
> 1. Starter. Fill in a **guided-notes handout** during one talk, following Konrad et al. (2009).
> 2. Middle. Do same-day note review after every lecture for two weeks, following Kobayashi (2006).

3. Advanced. Start a slip-box with ten atomic notes, each with one link to another note, drawing on Ahrens (2017). This is a practice exercise.

Work your notes



Fill in a guided-notes handout during one talk



Same-day note review for two weeks



Start a slip-box with ten atomic notes

Key idea:

Reviewing your notes has strong evidence, so build it into every week.

Quick check:

What evidence does note review have? Answer: strong. What does a slip-box note hold? Answer: one idea, linked to other notes.

4.5.4 Note-Taking Exercises

Sections 4.5.1 to 4.5.3 described the note methods. **This section gathers their exercises** with the evidence for each. Four have strong evidence, and the rest range from mixed to practice only.

The strong exercises share one thing. **Each makes you recall, draw or rework** what you took in. The cue-column quiz, the guided-notes fill-in, same-day note review and the sketch-the-concept card all have strong support.

Four strong note exercises

- Cue-column quiz
- Guided-notes fill-in
- Same-day note review
- Sketch-the-concept card

Three exercises are practice only with **no study claimed**. They are outline from headings first, the partner revision pause and the atomic note plus link.

> **Science Says:**
>
> Section 2.3.3 showed that covering your notes and answering from the cues is **retrieval practice** (Roediger & Karpicke, 2006). This exercise puts that quiz on every page you write. The rest of the Cornell layout, such as the bottom-strip summary, has weak evidence.

Table: Note-taking exercises

Exercise	Trains	Evidence	Credit
Cover-the-notes cue-column quiz	Cornell method	Strong, as retrieval	Pauk (n.d.); Roediger and Karpicke (2006)
Bottom-strip summary in your own words	Cornell method	Weak	Pauk (n.d.)
Outline from headings first	Outline method	Practice only	None
Mind map from memory after reading	Mind mapping	Mixed	Farrand et al. (2002)
Build a 3 by 4 comparison matrix	Matrix notes	Mixed	Jairam et al. (2012)
Guided-notes fill-in	Guided notes	Strong	Konrad et al. (2009)
Same-day note review	Note review	Strong, timing a practice estimate	Kobayashi (2006)
Paraphrase-only rule (no verbatim lines)	Longhand instead of laptop	Evidence mixed	Mueller and Oppenheimer (2014)
Sketch-the-concept card	Drawing	Strong	Fernandes et al. (2018)
Atomic note plus link	Slip-box	Practice only	Ahrens (2017)
Partner revision pause	Note revision	Practice only	None

A good weekly routine uses **one exercise during and one after**. A guided-notes fill-in during a talk and same-day review afterwards cover both.

> **Exercise:**
>
> Try it. After reading one chapter, **make a sketch-the-concept card** for its key idea. Draw it with no words, then write one sentence underneath. This follows Fernandes et al. (2018).

A sketch-the-concept card



After reading one chapter



Draw its key idea with no words



Write one sentence underneath

The practice-only exercises can still help **if you test them on yourself**. Keep a note of what you can recall a week later, and keep the exercises that leave you with more.



A stack of index cards, each with a small drawing and a single line of text, held by a bulldog clip.

Exercise:

Build a note routine.

1. Starter. Do one **cover-the-notes cue-column quiz**, following Pauk (n.d.) and Roediger and Karpicke (2006).
2. Middle. Do same-day note review for every lecture this week, following Kobayashi (2006).
3. Advanced. Make a 3 by 4 comparison matrix for a topic you are studying, drawing on Jairam et al. (2012).

Key idea:

Recall, draw and rework your notes, because those exercises have the strongest support.

Build a note routine

- One exercise during a talk
- One exercise after it
- Recall, draw and rework your notes

Quick check:

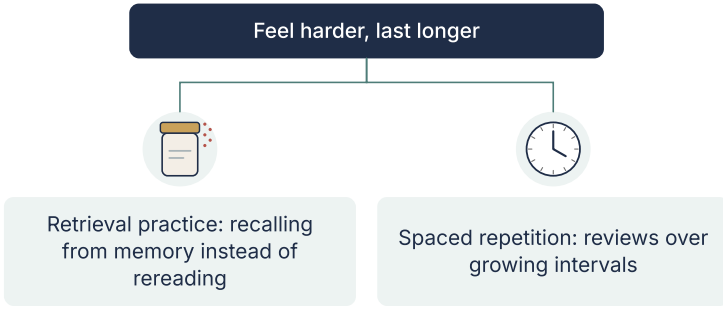
Name one note exercise with strong evidence. Answer: the cue-column quiz, guided-notes fill-in, same-day note review or the sketch-the-concept card. What evidence does outline from headings first have in this book? Answer: practice only.

4.6.1 Retrieval Practice, Spacing and Successive Relearning

A FEW STUDY METHODS FEEL productive and leave little behind. **The methods in this section feel harder and last longer.** This section covers the methods with the strongest support for keeping what you take in, and one newer method built on them.

Retrieval practice means **recalling from memory instead of rereading**, and spaced repetition means spreading reviews over growing intervals. Section 3.4.3 gave the strong evidence for both (Roediger & Karpicke, 2006; Adesope et al., 2017; Cepeda et al., 2006).

Two methods that last



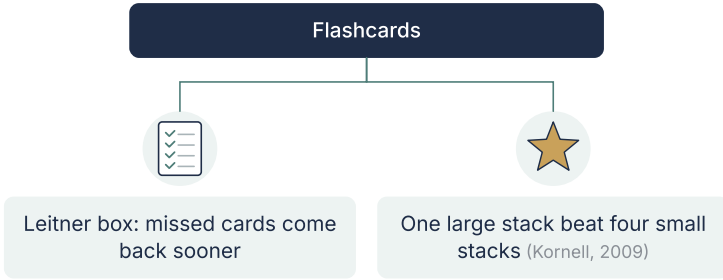


A young woman at a kitchen table writing on a blank page from memory, a closed textbook pushed to one side.

A blank page is the simplest tool. **Write everything you remember**, then check against the source and fill the gaps. A review calendar at growing intervals adds the spacing, and the exact intervals are practice estimates.

> **Science Says:**
>
> Leitner box flashcards send **missed cards back sooner** (Leitner, n.d.). Section 3.4.3 showed that one large stack beat four small stacks (Kornell, 2009). Spacing within flashcards has strong support, and the exact Leitner schedule is practice only.

Two flashcard findings



Successive relearning means **retrieving to a set standard, then relearning across sessions** (Rawson et al., 2013). As a single study, its evidence is mixed.

> Exercise:
>
> Try it. Make ten flashcards on one topic. **Go through them until you get each one right once.** Repeat the same routine two days later and again a week later. This draws on successive relearning (Rawson et al., 2013).

Successive relearning

> Definition
>
> **Successive relearning**
>
> Retrieving to a set standard, then relearning across sessions

Successive relearning **joins retrieval and spacing** in one routine. Each session asks you to recall until you succeed, and the sessions are spread out.

These three methods fit together. **Recall first, space the sessions, and relearn what you missed.** A small daily habit covers all three.

Three methods that fit together



Key Concept:

Recall and space. **Recall from memory, spread your reviews, and relearn what you miss.** Retrieval and spacing have strong evidence.

Exercise:

Keep what you learn.

1. Starter. Do a **blank-page brain dump** after one article, following Roediger and Karpicke (2006).
2. Middle. Set a review calendar at growing intervals for one topic, following Cepeda et al. (2006). Treat the intervals as practice estimates.
3. Advanced. Use relearn-to-criterion over three sessions for a set of course terms, following Rawson et al. (2013).

Keep what you learn

- [x] Starter: a blank-page brain dump after one article
- [x] Middle: a review calendar at growing intervals for one topic
- [x] Advanced: relearn-to-criterion over three sessions

Key idea:

Recall and spacing are the strongest tools for keeping what you take in.

Quick check:

What do Leitner box flashcards do with missed cards? Answer: send them back sooner. What does successive relearning join in one routine? Answer: retrieval and spacing.

4.6.2 Elaborative Interrogation, Self-Explanation and Generation

Reading a fact is easy, and so is forgetting it. **Asking why, explaining how and producing the answer yourself** all make you work with the material. This section sets out four such methods with their evidence.

Elaborative interrogation means **asking and answering why each fact is true**. Section 3.4.3 gave its moderate utility, with an effect that depends on the question (Martin & Pressley, 1991; Dunlosky et al., 2013). The evidence is mixed.

Asking why and explaining how

Method	What it asks	Utility
Elaborative interrogation	Why each fact is true	Moderate
Self-explanation	How each step follows	Moderate



A student with a textbook, writing the word “why” in the margin beside an underlined sentence.

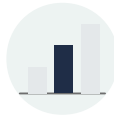
Self-explanation means **explaining how each step follows**. Section 3.3.2 gave its moderate utility (Chi et al., 1994). A review that pooled many studies also looked at it (Bisra et al., 2018), and the evidence stays mixed.

> **Science Says:**
>
> The generation effect means **producing items, such as completing or answering them, instead of reading them** (Slamecka & Graf, 1978). A study combining 86 studies found a benefit of about .40 standard deviations, a result read from a summary (Bertsch et al., 2007). The evidence is strong.

The generation effect



Producing items instead of reading them



A study combining 86 studies

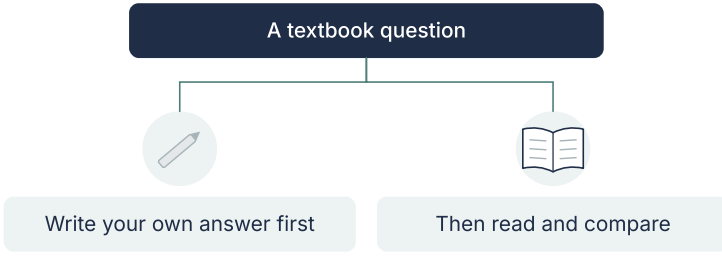


A benefit of about .40 standard deviations

A standard deviation is **a measure of how spread out scores are**. A benefit of .40 standard deviations means the generating groups scored about four tenths of a standard deviation higher on average.

> Exercise:
>
> Try it. Before reading the answer to a question in a textbook, **write your own answer first**. Then read and compare. This draws on the generation effect (Bertsch et al., 2007).

Answer before you read



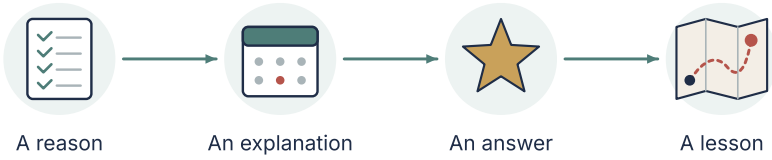
Learning by teaching means **preparing and teaching material to others**. The evidence found was a single study comparing teaching with expecting to teach, and it is mixed (Fiorella & Mayer, 2013).



A fill-in-the-gap card with a sentence missing its last word, a pencil resting on top.

The four methods share one demand. **You have to produce something**, whether a reason, an explanation, an answer or a lesson. Generation has the strongest support of the four.

Produce something



> **Key Concept:**
>
> Produce, then check. **Ask why, explain how, and fill gaps yourself** before looking. Generation has strong evidence, and the others have mixed evidence.

Exercise:

Make it your own.

1. Starter. Write a **why-question for each of five facts**, following Martin and Pressley (1991).
2. Middle. Explain each step of a worked example aloud, following Chi et al. (1994).
3. Advanced. Teach a topic to a peer and answer their questions, as in Fiorella and Mayer (2013).

Make it your own



A why-question for each of five facts



Explain each step of a worked example aloud



Teach a topic to a peer

Key idea:

Producing the answer yourself fixes it better than reading it.

Quick check:

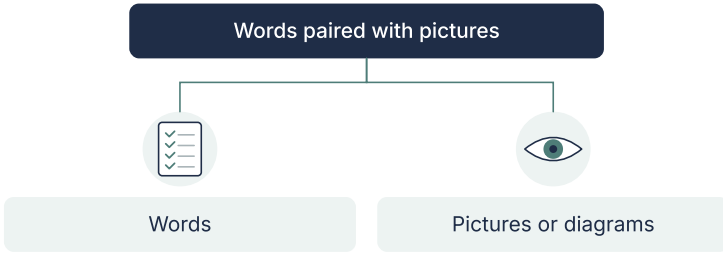
How many studies did the generation effect review combine? Answer: 86.
What does elaborative interrogation ask? Answer: why each fact is true.

4.6.3 Dual Coding, Mnemonics and Interleaving

Some memory methods use pictures and places, and some practice plans mix question types together. **Four methods work this way.** This section sets out dual coding, two mnemonics and interleaving, with the evidence for each.

Dual coding means **pairing words with pictures or diagrams** (Paivio, 1971). The main support is a theory review (Clark & Paivio, 1991). The evidence is mixed.

Dual coding



The keyword mnemonic links a new word to **a sound-alike keyword and an image**. In one study of Russian words, learners using it recalled 72% against 46% (Atkinson & Raugh, 1975). One major review rates

the keyword method low utility overall (Dunlosky et al., 2013), so the evidence is mixed.

> **Science Says:**
>
> The method of loci means **placing items along a familiar route in imagination**. Section 1.2.3 described a study in which six weeks of training improved memory (Dresler et al., 2017). The evidence is mixed.

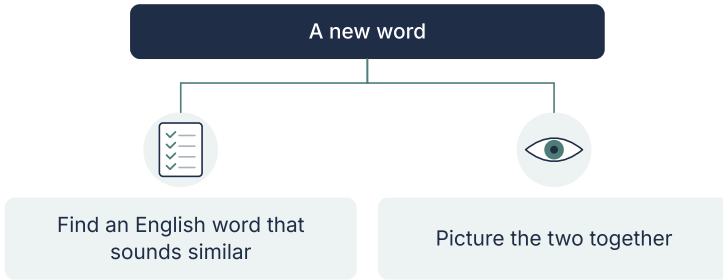
The keyword mnemonic with Russian words



The keyword result came from word learning. The low overall rating is a reason to keep mnemonics for jobs like new words and lists of items.

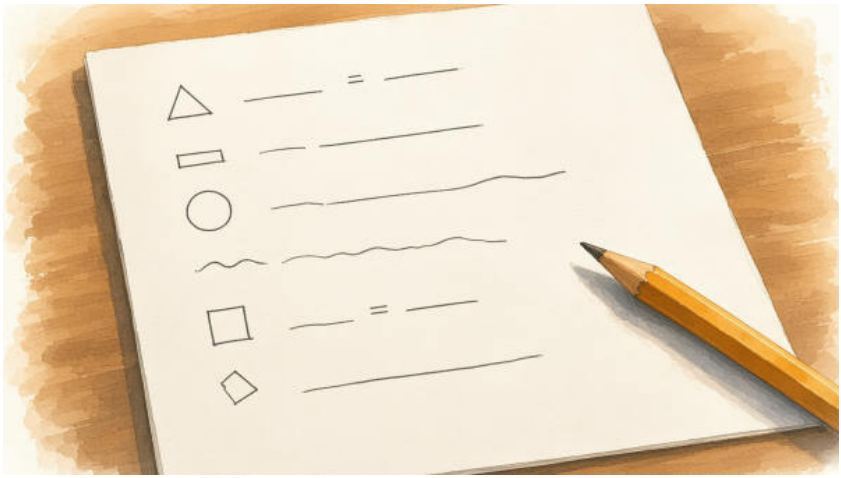
> **Exercise:**
>
> Try it. Learn five new words in another language. For each, **find an English word that sounds similar** and picture the two together. This follows the keyword mnemonic (Atkinson & Raugh, 1975).

Learn five new words



Interleaving means **mixing problem or category types in one session**. Mixed practice beat blocked practice in one set of experiments, a result read from a summary (Rohrer & Taylor, 2007). A study combining many studies found it helps inductive learning and urged caution for expository texts, which explain or inform, and for words (Brunmair & Richter, 2019).

Inductive learning means **learning a category from examples**. Interleaving suits that kind of task, and it is less certain for reading texts.



A worksheet of maths problems where each line shows a different type of problem, shuffled together.

> 🗝 **Key Concept:**
>
> Pictures, places and mixing. **Pair words with images, use mnemonics for lists, and mix problem types.** All four methods have mixed evidence.

> **Exercise:**
>
> Use memory tools.
>
> 1. Starter. Draw a **word plus sketch pair** for three new terms, drawing on Clark and Paivio (1991).
> 2. Middle. Take a memory palace walk to learn a ten-item list, drawing on Dresler et al. (2017).
> 3. Advanced. Make a shuffled problem set from three chapters of a maths or science book, following Rohrer and Taylor (2007).

Use memory tools

- [x] Starter: a word plus sketch pair for three new terms
- [x] Middle: a memory palace walk to learn a ten-item list
- [x] Advanced: a shuffled problem set from three chapters

Key idea:

Keep mnemonics for words and lists, and use interleaving for learning categories from examples.

Quick check:

What did learners using the keyword mnemonic recall for Russian words? Answer: 72% against 46%. What kind of learning does interleaving help? Answer: inductive learning.

4.6.4 Methods With Weak Support: Highlighting, Rereading and Imagery

Three of the most popular study habits have **weak support** in the research gathered for this book. They feel easy and familiar. This section sets them out plainly so you can choose better.

Highlighting and underlining mean **marking key phrases**, and rereading means reading again. Section 3.3.2 and section 3.4.3 gave their low utility (Dunlosky et al., 2013). A later review is also listed for highlighting (Ponce et al., 2022).



A textbook page almost entirely coloured with yellow highlighter, a cap-less pen lying across it.

> **Science Says:**
>
> Imagery for text means **forming mental images while reading**. A large review of study methods rated it low utility (Dunlosky et al., 2013).

Each upgrade below adds a recall step, which has strong support (Roediger & Karpicke, 2006). A highlighter can **mark what to test yourself on**. After reading, turn each highlighted phrase into a question and answer it from memory.

Three popular habits

Habit	Support
Highlighting and underlining	Low utility
Rereading	Low utility
Imagery for text	Low utility

> **Exercise:**
>
> Try it. Take a page you highlighted in the past. **Turn each highlight into a question**, close the book and answer them. Check which answers you got right.

A second reading can become **a check on your recall**. Recall first, then reread only the parts you missed. The reading then has a clear job.

A second reading with a job



Imagery can pair with drawing. **Turn the image in your head into a quick sketch** on paper, which links it to drawing, a method with strong evidence (Fernandes et al., 2018).

> Key Concept:
>
> Weak habits, better use. **Turn highlights into questions, recall before rereading, and sketch your mental images.** On their own, these habits have weak support.

Weak habits, better use



> Exercise:
>
> Upgrade a habit.
>
> 1. Starter. Highlight **no more than one phrase** per page in the reading you do today.
> 2. Middle. Before rereading any chapter this week, write what you remember first.
> 3. Advanced. For one week, replace all rereading with a blank-page brain dump, and note what you recall a week later.

Key idea:

Highlighting, rereading and imagery have weak support, so pair each one with a stronger method.

Upgrade a habit

- [x] Starter: highlight no more than one phrase per page
- [x] Middle: write what you remember before rereading any chapter
- [x] Advanced: replace all rereading with a blank-page brain dump for one week

Quick check:

What utility do highlighting and rereading have? Answer: low. How can you upgrade a highlight? Answer: turn it into a question and answer it from memory.

4.6.5 Comprehension and Retention Exercises

Sections 4.6.1 to 4.6.4 described the methods. **This section gathers their exercises** with the evidence for each. Three rest on strong evidence, and the rest have mixed evidence.

The strong exercises are **the blank-page brain dump, a review calendar at growing intervals and the fill-the-gap generation card** (Roediger & Karpicke, 2006; Cepeda et al., 2006; Bertsch et al., 2007). Start with these.



A blank sheet of paper half filled with handwritten notes from memory, a pen and a cup of tea beside it.

One large flashcard stack is **simple to run**. Keep all your cards in one stack and go through it in full each time. For the review calendar, the exact intervals are a practice choice, so pick gaps that grow and fit your week.

> Science Says:
>
> Section 3.4.3 showed that in one flashcard study, **spacing beat both small stacks and cramming** (Kornell, 2009). Keeping one large stack builds that spacing into every review.

Table: Comprehension and retention exercises

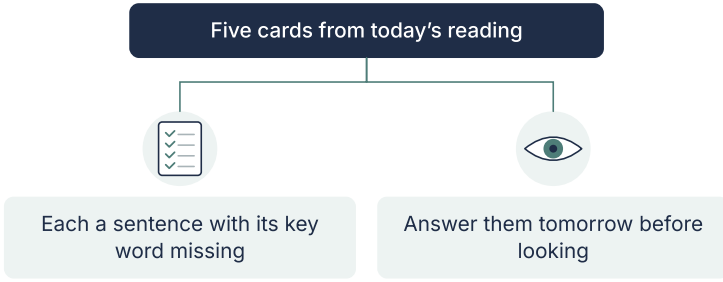
Exercise	Trains	Evidence	Credit
Blank-page brain dump	Retrieval practice	Strong	Roediger and Karpicke (2006)
One large flashcard stack	Leitner box flashcards	Mixed	Kornell (2009)
Review calendar at growing intervals	Spaced repetition	Strong, intervals a practice estimate	Cepeda et al. (2006)
Relearn-to-criterion over three sessions	Successive relearning	Mixed	Rawson et al. (2013)
Shuffled problem set	Interleaving	Mixed	Rohrer and Taylor (2007)
Why-question per fact	Elaborative interrogation	Mixed	Martin and Pressley (1991)
Step-by-step self-explanation aloud	Self-explanation	Mixed	Chi et al. (1994)
Fill-the-gap generation card	Generation effect	Strong	Bertsch et al. (2007)
Word plus sketch pair	Dual coding	Mixed	Clark and Paivio (1991)
Keyword link card	Keyword mnemonic	Mixed	Atkinson and Raugh (1975)

Exercise	Trains	Evidence	Credit
Memory palace walk	Method of loci	Mixed	Dresler et al. (2017)
Teach-back to a peer	Learning by teaching	Mixed	Fiorella and Mayer (2013)

A simple daily routine joins **recall, spacing and generation**. A brain dump after reading, a flashcard stack for key terms and a review calendar cover all three.

> Exercise:
>
> Try it. Make five fill-the-gap cards from today's reading, each **a sentence with its key word missing**. Answer them tomorrow before looking. This follows the generation effect (Bertsch et al., 2007).

Fill-the-gap cards



Mixed-evidence exercises add variety. **Pick one that suits your material**, such as a keyword link card for new words or a shuffled problem set for maths.

Exercise:

Build a retention routine.

1. Starter. Do a **blank-page brain dump** after one article, following Roediger and Karpicke (2006).
2. Middle. Keep one large flashcard stack for a course and go through it in full three times a week, following Kornell (2009).
3. Advanced. Plan a review calendar at growing intervals for a whole term, following Cepeda et al. (2006), and add teach-back to a peer, as in Fiorella and Mayer (2013).

Build a retention routine

- A brain dump after reading
- A flashcard stack for key terms
- A review calendar

Key idea:

Recall, spacing and generation are the retention exercises with the strongest support.

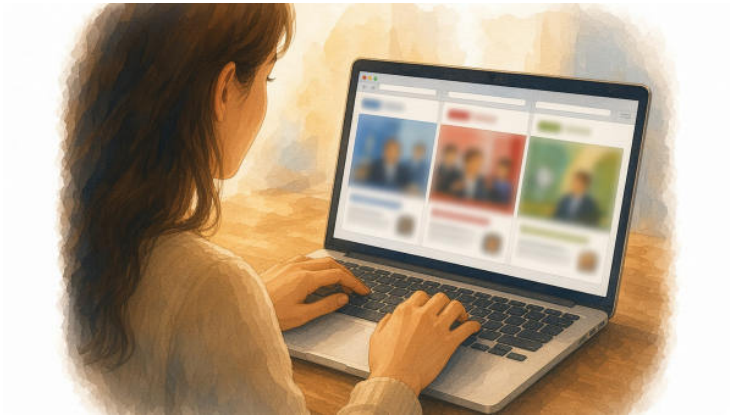
Quick check:

What did spacing beat in the flashcard study? Answer: small stacks and cramming. Are the intervals in a review calendar fixed by research? Answer: no, they are practice estimates.

4.7.1 Lateral Reading, Click Restraint and SIFT

Before you take in a claim, you can check where it comes from. **Three methods help you check a source fast.** This section sets out lateral reading, click restraint and SIFT, with the evidence for each.

Lateral reading means **leaving the site to check what other sites say about it**. Section 3.4.2 gave its strong evidence, from fact checkers and from short lessons for students (Wineburg & McGrew, 2019; McGrew et al., 2019; Breakstone et al., 2021).

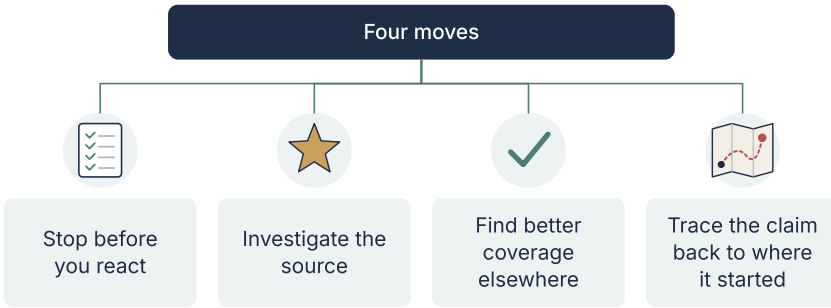


A woman with three browser tabs open side by side, each showing a different site about the same news story.

Click restraint means **scanning the results page before choosing** (Wineburg & McGrew, 2019). Section 3.4.2 noted that no separate test of it was found, so its evidence is mixed.

> **Science Says:**
>
> SIFT stands for **Stop, Investigate, Find better coverage and Trace** (Caulfield, 2019). It builds on lateral reading, and no test of SIFT as a package was found. The evidence is mixed.

SIFT



Each SIFT move is a small action. **Stop before you react**, investigate the source, find better coverage elsewhere, and trace the claim back to where it started.

> **Exercise:**
>
> Try it. Take one surprising post from social media. **Work through the four SIFT moves** and write one line for each. This follows SIFT (Caulfield, 2019).

Try SIFT on one post



The three methods fit together. **Click restraint comes at the results page**, lateral reading checks the source, and SIFT gives you a sequence to follow.

Lateral reading has the strongest evidence of the three. **If you only have one minute**, open a new tab and check who is behind the site.

If you only have one minute



> **Key Concept:**
>
> Check sideways. **Scan the results, leave the site, and trace the claim.** Lateral reading has strong evidence, and click restraint and SIFT have mixed evidence.

Exercise:

Check the source.

1. Starter. Do a **new-tab check** on one site today, asking who is behind it, following McGrew et al. (2019).
2. Middle. Scan the whole results page before one click for every search this week, as in Wineburg and McGrew (2019).
3. Advanced. Keep a SIFT four-move card by your screen for a week and use it on five claims, following Caulfield (2019).

Check the source



A new-tab check on one site today



Scan the whole results page before one click



A SIFT four-move card by your screen for a week

Key idea:

Leave the page to check the source, and use SIFT as a sequence to follow.

Quick check:

What does SIFT stand for? Answer: Stop, Investigate, Find better coverage and Trace. Which of the three methods has the strongest evidence? Answer: lateral reading.

4.7.2 Checklists, Curricula and Prebunking Games

Schools, libraries and researchers have built many tools for spotting false information. **Some are checklists, some are courses and some are games.** This section sets out each one with its evidence.

The CRAAP test is **a five-criterion source checklist** (Blakeslee, 2004). No outcome studies were found, so its evidence is weak. Digital media literacy tips give **a short list of tips for spotting false news**.



A school library poster listing tips for checking a news story, pinned above a row of computers.

In one study, media literacy tips raised the ability to tell true from false news by 26.5% in the United States and 17.5% in an online sample in India, with no effect in a rural Indian sample (Guess et al., 2020). **The evidence is mixed.**

> Science Says:
>
> Inoculation videos are **short videos naming manipulation techniques**. They have strong evidence from six randomised controlled trials with 6,464 people and a YouTube field study with 22,632 people (Roozenbeek et al., 2022).

Media literacy tips: gains in telling true from false news



A randomised controlled trial is a study in which people are split by chance into groups. **Six such trials** sit behind the rating for inoculation videos.

Prebunking games such as Bad News have you **play the role of a misinformation producer** (Roozenbeek & van der Linden, 2019), and their evidence is mixed. Go Viral! is a short COVID-19 game. It raised how manipulative people judged misinformation to be and their confidence in spotting it, and it lowered their willingness to share it (Basol et al., 2021).

Inoculation and prebunking

Tool	What it does	Evidence
Inoculation videos	Short videos naming manipulation techniques	Strong
Prebunking games such as Bad News	You play the role of a misinformation producer	Mixed

> Exercise:
>
> Try it. Watch one short video about a manipulation technique. **Then rate five posts** in your feed for that technique. This follows inoculation videos (Roozenbeek et al., 2022).

The first two Go Viral! effects **lasted at least a week** (Basol et al., 2021). Its evidence is mixed.

Watch, then rate



Watch one short video about a manipulation technique



Rate five posts in your feed for that technique



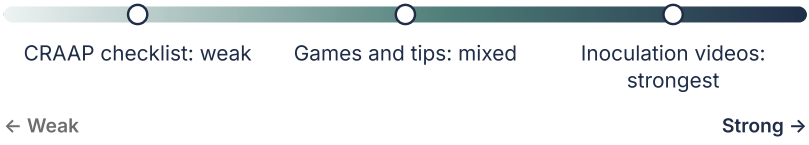
Go Viral! effects lasted at least a week

The Civic Online Reasoning curriculum offers **free lessons and assessments teaching lateral reading**. It was tried in a district-wide high school field study (Wineburg et al., 2022). The evidence is rated mixed.

Key Concept:

Practise in advance. **Inoculation videos have the strongest evidence**, games and tips have mixed evidence, and the CRAAP checklist has weak evidence.

Evidence for filtering tools



Exercise:

Train your filter.

1. Starter. Watch **one inoculation video**, then rate three posts, as in Roozenbeek et al. (2022).
2. Middle. Play a Bad News session, following Roozenbeek and van der Linden (2019), and list the techniques it showed.
3. Advanced. Work through Civic Online Reasoning assessment tasks with a friend, drawing on Wineburg et al. (2022).

Key idea:

Short videos that name manipulation techniques have the strongest evidence among these tools.

Train your filter

- [x] Starter: one inoculation video, then rate three posts
- [x] Middle: a Bad News session
- [x] Advanced: Civic Online Reasoning assessment tasks

Quick check:

How many people took part in the YouTube field study of inoculation videos? Answer: 22,632. What evidence does the CRAAP test have? Answer: weak.

4.7.3 Bias Checks: Consider the Opposite and Claim, Evidence, Reasoning

THE HARDEST CLAIMS TO check are the ones you already agree with. **Bias checks turn the questioning inward.** This section sets out methods for checking your own judgement as you take information in.

Consider the opposite means **asking how the opposite conclusion could be true**. It corrected judgement better than instructions to be fair (Lord et al., 1984). The evidence is mixed.

Consider the opposite (Lord et al., 1984)



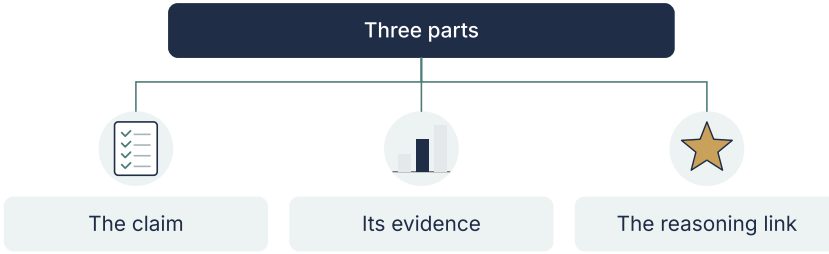


A man at a desk writing two short lists side by side on a notepad, one headed “for” and one headed “against”.

Claim, evidence, reasoning means **separating the claim, its evidence and the reasoning link** between them. Learners made gains on all three parts, and scaffolds that faded over time worked best (McNeill et al., 2006). The evidence is mixed.

> **Science Says:**
>
> Section 3.2.3 gave the strong evidence for explicit critical-thinking instruction, **direct teaching with dialogue and real problems** (Abrami et al., 2015). Section 2.3.2 showed that accuracy prompts, nudges to judge accuracy before sharing, raised the quality of news shared (Pennycook et al., 2021). Debiasing training teaches decision biases through a game or video (Morewedge et al., 2015).

Claim, evidence, reasoning



A scaffold is **support that is gradually taken away**. Once it has faded, you do the work alone.

> Exercise:
>
> Try it. Take one opinion you hold strongly. **Write three ways the opposite could be true.** This follows consider the opposite (Lord et al., 1984).

Scaffold

> Definition
>
> **A scaffold**
>
> Support that is gradually taken away

Data and statistics scepticism means **spotting misleading numbers, charts and claims about cause** (Bergstrom & West, 2020). No outcome research was found, so it is practice only.



A three-column sheet headed claim, evidence and reasoning, with one row filled in by hand.

Signal versus noise triage means **deciding quickly what to ignore, skim or read closely**. No research was found, so it is practice only too. Both make useful habits to test on yourself.

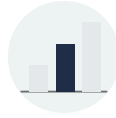
Two practice-only habits



Data and statistics scepticism



Signal versus noise triage



Test both on yourself

> **Key Concept:**
>
> Check yourself. **Argue the opposite, split claim from evidence, and pause to judge accuracy.** Critical-thinking instruction has strong evidence, and the other checks have mixed evidence or are practice only.

Exercise:

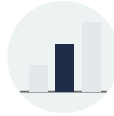
Check your own judgement.

1. Starter. Before sharing one post, **rate its accuracy** from 1 to 5, as in Pennycook et al. (2021).
2. Middle. Fill a three-column claim, evidence and reasoning sheet for one article, following McNeill et al. (2006).
3. Advanced. For one week, use an opposite-case prompt on every strong claim you meet, following Lord et al. (1984).

Check your own judgement



Rate a post's accuracy from 1 to 5 before sharing



Fill a claim, evidence and reasoning sheet



Use an opposite-case prompt for one week

Key idea:

Checking your own judgement is part of taking information in well.

Quick check:

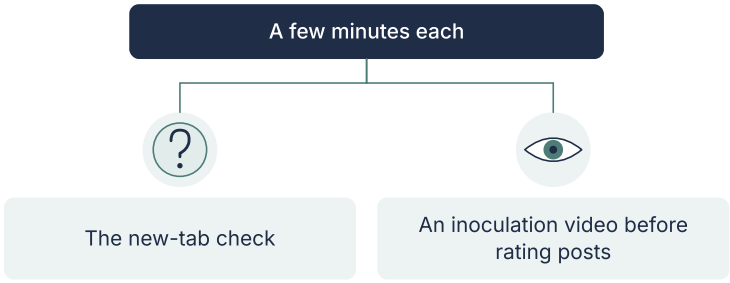
What did consider the opposite beat? Answer: instructions to be fair.
Which scaffolds worked best in the claim, evidence, reasoning study? Answer: scaffolds that faded over time.

4.7.4 Filtering Exercises

Sections 4.7.1 to 4.7.3 described the filtering methods. **This section gathers their exercises** with the evidence for each. Two have strong evidence, and most of the rest have mixed evidence.

The two strong exercises are **the new-tab check and watching an inoculation video before rating posts** (McGrew et al., 2019; Roozenbeek et al., 2022). Both take only a few minutes.

The two strong filtering exercises



Several exercises have **mixed evidence**. Scanning the whole results page, the SIFT four-move card, the Bad News play session and the accuracy rating before sharing all follow methods with mixed evidence.

> **Science Says:**
>
> Section 3.4.2 showed that in one study, **short lessons in lateral reading improved students** (McGrew et al., 2019). The exercises below break those lessons into small steps. Inoculation videos were tested in six trials that split people into groups by chance, and in a YouTube field study (Roozenbeek et al., 2022).

Table: Filtering exercises

Exercise	Trains	Evidence	Credit
New-tab check (who is behind this site?)	Lateral reading	Strong	McGrew et al. (2019)
Scan the whole results page before one click	Click restraint	Mixed	Wineburg and McGrew (2019)
SIFT four-move card	SIFT	Mixed	Caulfield (2019)
CRAAP scoring sheet	CRAAP test	Weak	Blakeslee (2004)
Civic Online Reasoning assessment tasks	Civic Online Reasoning	Mixed	Digital Inquiry Group (n.d.)
Bad News play session	Prebunking games	Mixed	Roozenbeek and van der Linden (2019)
Watch an inoculation video, then rate posts	Inoculation videos	Strong	Roozenbeek et al. (2022)
Accuracy rating before sharing	Accuracy prompts	Mixed	Pennycook et al. (2021)
Opposite-case prompt	Consider the opposite	Mixed	Lord et al. (1984)
Three-column CER sheet	Claim, evidence, reasoning	Mixed	McNeill et al. (2006)
Reverse image search check	SIFT (trace)	Practice only	None
Ignore, skim or read sort	Signal versus noise triage	Practice only	None

A daily filter can be short. **A new-tab check on any unfamiliar source** and an accuracy rating before sharing take only a few minutes together.

> Exercise:
>
> Try it. Take your next ten emails or messages. **Sort each into ignore, skim or read.** This is the ignore, skim or read sort, a practice exercise.

Sort your next ten messages



The reverse image search check and the ignore, skim or read sort are practice only. Exercises like these **fill a gap the tested methods leave**. A picture can be traced back to where it first appeared.



A laptop showing a reverse image search, with several older copies of the same photo listed below it.

Exercise:

Build a filtering routine.

1. Starter. Do one **new-tab check**, following McGrew et al. (2019).
2. Middle. Use an accuracy rating before sharing anything for a week, following Pennycook et al. (2021).
3. Advanced. Fill a three-column CER sheet for three opinion pieces on the same topic, following McNeill et al. (2006).

Key idea:

A quick source check and an accuracy pause are the filtering exercises to use every day.

Build a filtering routine

- A new-tab check on any unfamiliar source
- An accuracy rating before sharing
- Only a few minutes together

Quick check:

Which two filtering exercises have strong evidence? Answer: the new-tab check and watching an inoculation video before rating posts. What evidence does the CRAAP scoring sheet have? Answer: weak.

4.8.1 Summarising: Macrorules and GIST

Summarising sounds like the obvious way to capture a text. **It is harder than it looks**, and its evidence is weaker than many people expect. This section sets out two summarising methods and what the research gathered for this book shows.

Summarisation with macrorules means **deleting, generalising and building topic statements** to condense a text (Brown & Day, 1983). The rules trace back to a model of text comprehension (Kintsch & van Dijk, 1978).

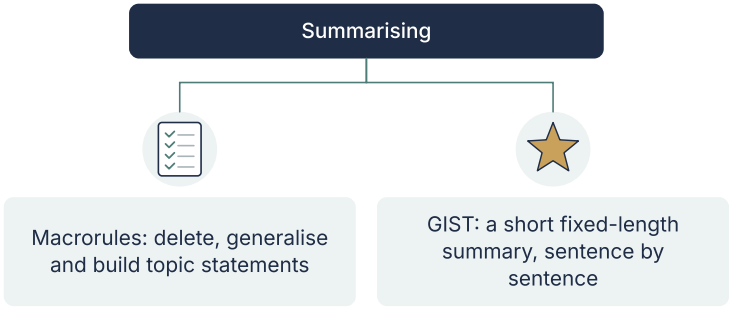


A printed paragraph with several sentences crossed out in pencil and a single short sentence written in the margin.

> Science Says:
>
> Section 3.3.2 gave **the low utility rating for summarising**, partly because results depend on summarising skill (Dunlosky et al., 2013). The evidence for summarising is weak.

GIST summarising builds **a short fixed-length summary sentence by sentence**. It is practice only in this book.

Two summarising methods



Because results depend on skill, **practice with feedback** is the sensible way to use summarising. Compare your summary with the text, or with a friend's summary, and look for what you left out.

> Exercise:
>
> Try it. Take one paragraph. **Cross out what is minor or repeated**, replace lists with a general word, and write one topic sentence. This

macrorule drill follows Brown and Day (1983), and its evidence is weak.

A macrorule drill



Cross out what is minor or repeated



Replace lists with a general word

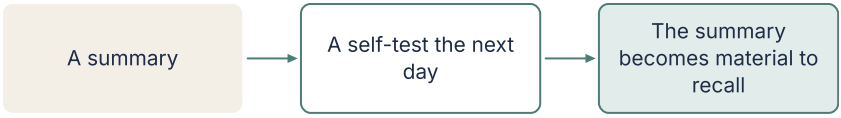


Write one topic sentence

A fixed-length gist sentence is another practice exercise. **Write a summary of 20 words, no more and no less,** for one article. The limit forces you to choose.

Summarising can be **paired with stronger methods**. Pair a summary with a self-test the next day, and the summary becomes material to recall (Roediger & Karpicke, 2006).

Pair it with a self-test



Key Concept:

Summarise with care. **Delete, generalise and state the topic**, then check your summary against the text. Summarising has weak evidence on its own.

Exercise:

Summarise well.

1. Starter. Write a **one-sentence summary** of a news article.
2. Middle. Do a macrorule drill on three paragraphs, following Brown and Day (1983). Compare your topic sentences with a friend's.
3. Advanced. Write a fixed-length gist sentence for each section of a chapter. This is a practice exercise, with no study claimed.

Summarise well



A one-sentence summary of a news article



A macrorule drill on three paragraphs



A fixed-length gist sentence for each section

Key idea:

Summarising depends on skill, so practise it with feedback and pair it with a self-test.

Quick check:

What are the macrorules? Answer: deleting, generalising and building topic statements. What evidence does GIST have in this book? Answer: practice only.

4.8.2 Concept Maps, Argument Maps and Graphic Organisers

A GOOD DIAGRAM CAN HOLD a whole chapter on one page. **Three methods turn text into structured visuals.** This section sets out concept maps, argument maps and graphic organisers, with the evidence for each.

Concept mapping draws **node-link maps of concepts and labelled relations** (Novak & Gowin, 1984). Section 2.3.3 gave its strong evidence across 55 studies (Nesbit & Adesope, 2006).

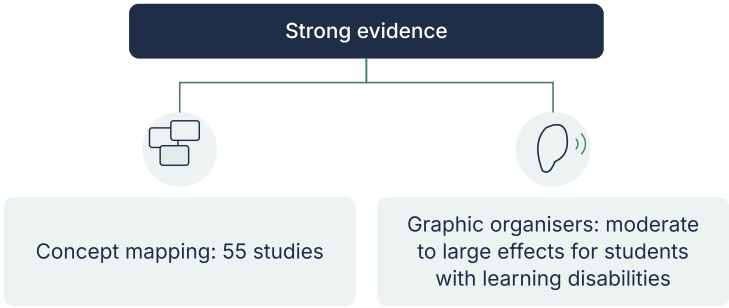


A concept map on a whiteboard, with circled words joined by arrows, each arrow carrying a short label.

The labels on the links **state how two ideas relate**. Write a word or two on every line, such as “causes” or “is part of”.

> **Science Says:**
>
> Graphic organisers are **structured visual frames you fill in for content**. They have strong evidence, with moderate to large effects for students with learning disabilities (Dexter & Hughes, 2011).

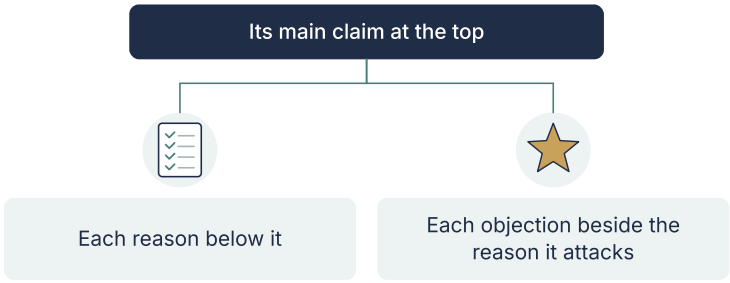
Two methods with strong evidence



Argument mapping means **diagramming claims, reasons and objections**. Section 3.3.3 gave its mixed, single-study evidence (Dwyer et al., 2012). Use it for opinion pieces and debates.

> **Exercise:**
>
> Try it. Pick an editorial. **Write its main claim at the top**, then add each reason below it and each objection beside the reason it attacks. This follows argument mapping (Dwyer et al., 2012).

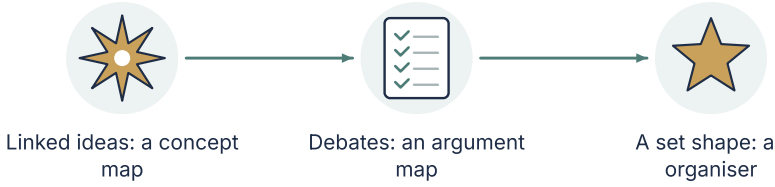
Map an editorial



A compare and contrast organiser is **one such frame**. Two items sit at the top, and rows below list how they are alike and how they differ.

Choose the visual by the material. **Concept maps suit linked ideas**, argument maps suit debates, and organisers suit content with a set shape, such as comparisons or sequences.

Choose the visual by the material



Key Concept:

Structure on one page. **Label your links, map the reasons, and fill a frame.** Concept maps and graphic organisers have strong evidence, and argument maps have mixed evidence.

Exercise:

Map it.

1. Starter. Draw a **concept map with linking words** for one short article, following Nesbit and Adesope (2006).
2. Middle. Map an editorial's argument with its reasons and objections, following Dwyer et al. (2012).
3. Advanced. Fill a compare and contrast organiser for two theories in a subject you study, following Dexter and Hughes (2011).

Map it



A concept map with linking words for one short article



An editorial's argument with its reasons and objections



A compare and contrast organiser

Key idea:

Structured visuals hold a whole text on one page, and concept maps and organisers have strong evidence.

Quick check:

What do graphic organisers ask you to fill in? Answer: structured visual frames for content. For whom did graphic organisers show moderate to large effects? Answer: students with learning disabilities.

4.8.3 Question Generation and Text Structure Training

Asking your own questions and spotting how a text is built are two of the best-supported ways to read for understanding. **Both have strong evidence.** This section sets them out with practical ways to use them.

Question generation means **readers write their own questions about the text**. A review found median effects of 0.36 on standardised tests and 0.86 on tests made by the researchers (Rosenshine et al., 1996). The evidence is strong.



A student reading a chapter with a notebook beside her, three questions written under each section heading.

The smaller number is **the safer guide**, because it comes from standardised tests. Even so, writing your own questions is one of the simplest strong methods in this module.

> **Science Says:**
>
> Text structure training teaches readers to **spot and use expository text patterns**. Section 3.3.1 gave its evidence, with comprehension gains and small far transfer (Hebert et al., 2016). Far transfer means using a skill in a very different setting. The evidence is strong.

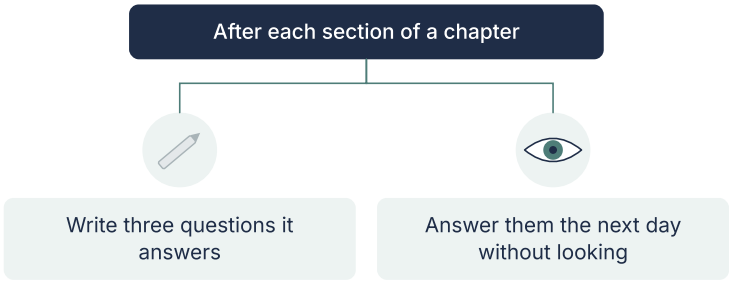
Question generation: median effects



Expository texts are **texts that explain or inform**, such as textbooks and reports. Learning to see their patterns is the aim of the training.

> **Exercise:**
>
> Try it. After each section of a chapter, **write three questions** that the section answers. Answer them the next day without looking. This follows question generation (Rosenshine et al., 1996).

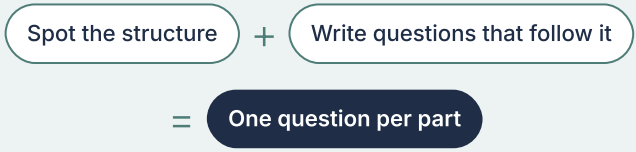
Write three questions



Signal words point to a text's structure. **A signal-word hunt** looks for them, drawing on text structure training (Hebert et al., 2016). Keep a list of the signal words you find.

The two methods work well together. **Spot the structure first**, then write questions that follow it, such as one question per part.

Structure, then questions



Key Concept:

Question and structure. **Write your own questions, and find the pattern the text follows.** Both methods have strong evidence.

Exercise:

Read for structure.

1. Starter. Circle **every signal word** in one news article, drawing on Hebert et al. (2016).
2. Middle. Write three questions per section for one chapter, following Rosenshine et al. (1996).
3. Advanced. For a report, name its main structure, draw it as a diagram, and write one question for each part.

Read for structure

- [x] Starter: circle every signal word in one news article
- [x] Middle: three questions per section for one chapter
- [x] Advanced: name the main structure of a report

Key idea:

Write your own questions and find the text's pattern, two methods with strong evidence.

Quick check:

What median effect did question generation show on standardised tests? Answer: 0.36. What does text structure training teach? Answer: to spot and use expository text patterns.

4.8.4 Reading Programmes: Reading Recovery, Success for All and SRSD

Some methods are **whole programmes run by schools**, built around a fixed routine. This section sets out three programmes with their evidence.

Reading Recovery is **a one-to-one early literacy intervention** (Clay, 1993). A trial with 6,888 students, split into groups by chance, reaffirmed its immediate impacts (Sirinides et al., 2018). The evidence is strong.



A teacher and a young child sitting side by side at a small table, the child pointing at a word in a picture book.

Success for All is **a whole-school reading reform programme**. A field trial with schools split into groups by chance found school-level effects of up to one third of a standard deviation (Borman et al., 2007). The evidence is strong.

> Science Says:
>
> Self-Regulated Strategy Development is **an explicit strategy plus self-regulation teaching model** (Harris & Graham, 1996). A study combining many studies found an effect size of 1.17 for writing quality (Graham et al., 2012). That is a writing measure and not a reading measure, so the evidence for reading is mixed.

Three school programmes

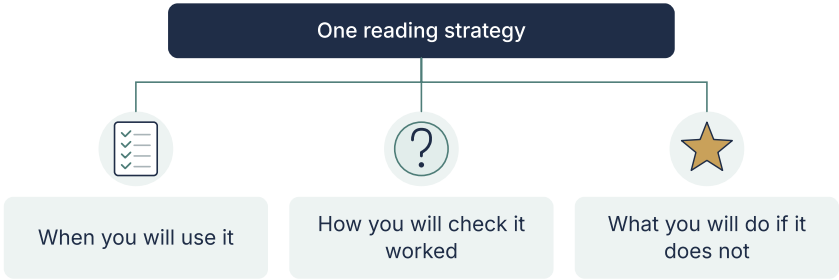
Programme	What it is
Reading Recovery	A one-to-one early literacy intervention
Success for All	A whole-school reading reform programme
Self-Regulated Strategy Development	An explicit strategy plus self-regulation teaching model

These programmes are built for children and schools. **Adults can borrow their principles**, such as one-to-one support, a whole routine and teaching yourself to manage your own strategy use.

> Exercise:
>
> Try it. Pick one reading strategy from this module. **Write a short plan** for when you will use it, how you will check it worked, and what you will do if it does not. This draws on the self-regulation

idea in Self-Regulated Strategy Development (Harris & Graham, 1996).

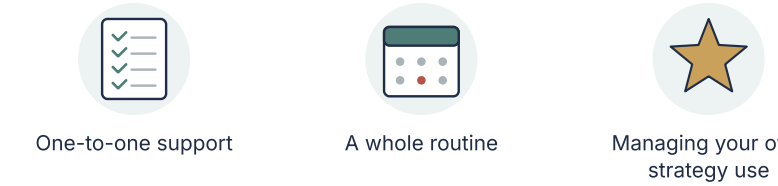
Write a short plan



Self-regulation here means **managing your own strategy use**. A written plan is a simple way to start.

The common thread is **system**. Each programme runs on a clear routine, and the same is true of any personal training plan.

Principles adults can borrow



> **Key Concept:**
>
> Systems at scale. **Reading Recovery and Success for All have strong evidence**, and SRSD has a large writing effect and mixed evidence for reading.

Exercise:

Borrow from the programmes.

1. Starter. Ask a friend to **listen to you read** one page aloud and note where you stumble.
2. Middle. Set a weekly reading routine for a month, with the same days and times.
3. Advanced. Write a self-regulation plan for one strategy and review it each week, drawing on Harris and Graham (1996).

Borrow from the programmes



Ask a friend to listen to you read one page aloud



A weekly reading routine for a month



A written plan for one strategy

Key idea:

Systematic programmes work at scale, and their routines can shape your own training.

Quick check:

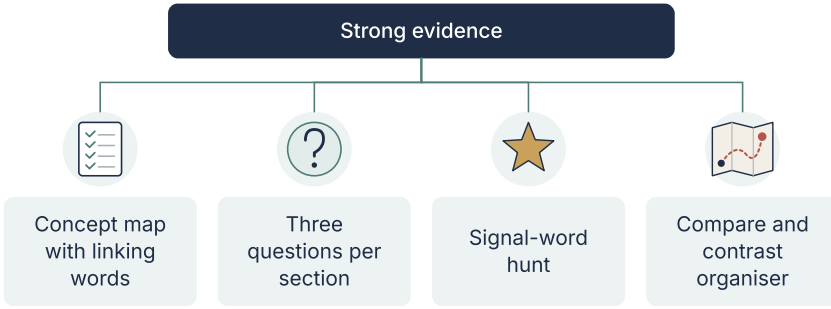
How many students took part in the Reading Recovery trial? Answer: 6,888. What did the SRSD effect size of 1.17 measure? Answer: writing quality.

4.8.5 Systematic Extraction Exercises

Sections 4.8.1 to 4.8.4 described the systematic methods. **This section gathers their exercises** with the evidence for each. Four of the seven have strong evidence.

The strong exercises are **the concept map with linking words, three questions per section, the signal-word hunt and the compare and contrast organiser** (Nesbit & Adesope, 2006; Rosenshine et al., 1996; Hebert et al., 2016; Dexter & Hughes, 2011). Each one makes you work with the shape or content of a text.

Four strong systematic exercises



Two exercises have weaker support. **The macrorule drill has weak evidence** (Brown & Day, 1983), and mapping an editorial's argument has mixed evidence (Dwyer et al., 2012).

> Science Says:
>
> Section 2.3.3 showed that concept mapping gave **retention gains across 55 studies** (Nesbit & Adesope, 2006). Graphic organisers also had moderate to large effects for students with learning disabilities (Dexter & Hughes, 2011).

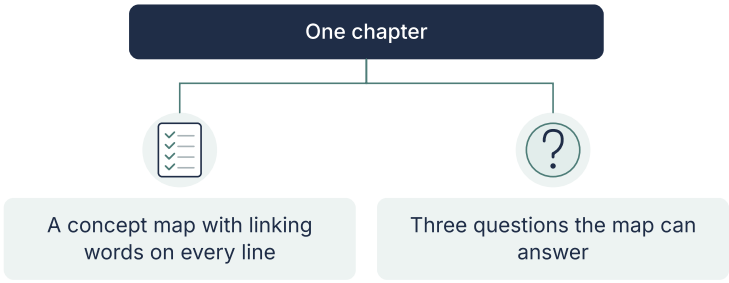
Table: Systematic extraction exercises

Exercise	Trains	Evidence	Credit
Macrorule drill on one paragraph	Summarisation with macrorules	Weak	Brown and Day (1983)
Fixed-length gist sentence	GIST summarising	Practice only	None
Concept map with linking words	Concept mapping	Strong	Nesbit and Adesope (2006)
Map an editorial's argument	Argument mapping	Mixed	Dwyer et al. (2012)
Write three questions per section	Question generation	Strong	Rosenshine et al. (1996)
Signal-word hunt for text structure	Text structure training	Strong	Hebert et al. (2016)
Fill a compare and contrast organiser	Graphic organisers	Strong	Dexter and Hughes (2011)

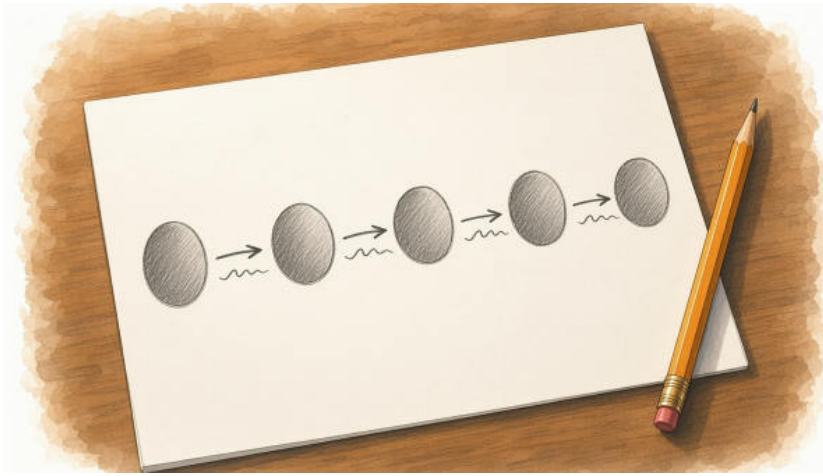
A good routine pairs **one structure exercise with one question exercise**. A signal-word hunt followed by three questions per section covers both.

> **Exercise:**
>
> Try it. For one chapter, **draw a concept map with linking words** on every line. Then write three questions the map can answer. This follows Nesbit and Adesope (2006) and Rosenshine et al. (1996).

One chapter, two exercises



Summary exercises still have a place. **Use the macrorule drill to practise**, and check each summary against the text before you rely on it. The fixed-length gist sentence is practice only.



A concept map drawn in pencil, each arrow carrying a small handwritten label.

Exercise:

Build a systematic routine.

1. Starter. Do one **signal-word hunt** on a short article, following Hebert et al. (2016).
2. Middle. Fill a compare and contrast organiser for two products or ideas, following Dexter and Hughes (2011).
3. Advanced. Map an editorial's argument, then write three questions per section of the editorial, following Dwyer et al. (2012) and Rosenshine et al. (1996).

Key idea:

Maps, questions and structure hunts are the systematic exercises with strong evidence.

Build a systematic routine

- One structure exercise
- One question exercise
- A signal-word hunt, then three questions per section

Quick check:

How many of the seven systematic exercises have strong evidence? Answer: four. What evidence does the macrorule drill have? Answer: weak.

4.9.1 Choosing a Method for the Source and the Goal

This module has set out dozens of methods. **No one uses them all.** The skill now is choosing the right one for the source in front of you and the goal you have for it.

Two questions guide the choice. **What kind of source is it**, such as text, talk, image or web page? And what do you need from it, such as the gist, a fact, deep understanding or something to keep?



A woman at a crossroads of library shelves, a book in one hand and a phone in the other, looking at a signpost.

When the gist is enough, **skim and move on** (Rayner et al., 2016). When you need to keep what you take in, choose by evidence.

> **Science Says:**
>
> Section 2.2.3 gave the utility ratings from one major review (Dunlosky et al., 2013). **Practice testing and distributed practice rated high**, so use them for anything you need to keep.

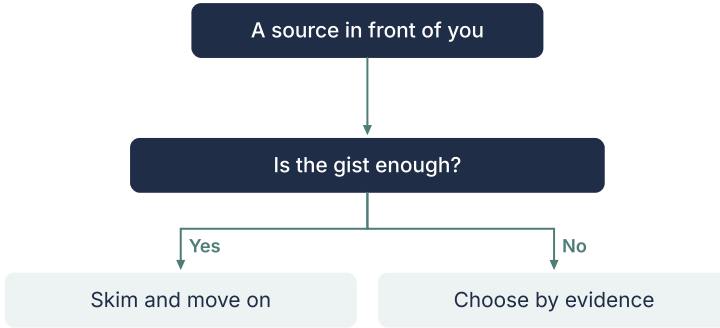
Utility ratings (Dunlosky et al., 2013)



For a web source, **check the source first** with lateral reading, and skip checklists with weak evidence (Wineburg & McGrew, 2019). For a video, section 3.2.1 showed that prequestions helped with both the questioned material and other material (Carpenter & Toftness, 2017).

Choose by the task and the source, and not by a learning style (Pashler et al., 2008). The table below starts from the task.

Choose by the task



> **Exercise:**
>
> Try it. List the next three things you need to read, watch or hear. **Write the goal for each**, such as gist, fact, understanding or keeping. Then pick one method from the table below for each.

Table: Choosing a method

Goal	Source	Method to try first
Gist only	Text	Skimming
One fact	Text or web page	Scanning
Understanding	Text	Question generation, text structure
Understanding	Talk	Metacognitive listening cycle
Keeping	Any	Retrieval practice and spacing
Trusting	Web page	Lateral reading
Learning	Video	Prequestions, segmenting

The table is **a starting point**. Try the first method, check what you took in, and switch if it does not suit the material.

Key Concept:

Goal and source. **Decide what you need and what kind of source you have**, then pick the method with the best evidence for that pair.

Goal and source



Decide what you need

Name the kind of source

Pick the method with the best evidence

Exercise:

Choose well.

1. Starter. Before reading one article, **write your goal** in three words.
2. Middle. For a week, note the goal and method for every important text you read.
3. Advanced. Plan methods for a whole course or project, matching each source to a goal and a method.

Key idea:

Choose by goal and source, using the methods with the best evidence for each.

Choose well

- Write your goal first
- Note the goal and method for every important text
- Choose by goal and source, not by a learning style

Quick check:

Which two methods did one major review rate high utility? Answer: practice testing and distributed practice. Should you choose methods by learning style? Answer: no.

4.9.2 Combining Methods: Two or Three Methods on One Source

One method rarely covers everything you need from a source. **Two or three methods together** can take you from first look to lasting memory. This section shows combinations built from parts with good support.

The first rule is to **keep the strong parts of a package**. SQ3R is weak as a package, and its question step and recite step are supported on their own (Robinson, 1946; Roediger & Karpicke, 2006).

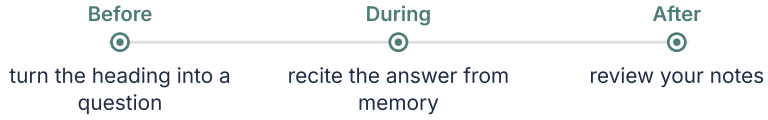


A student at a desk with a textbook, a stack of flashcards and a notebook, each in use for the same chapter.

A combination can follow the order of reading. **Question before, recall during and review after** is a simple pattern for any text.

> **Science Says:**
>
> Reciprocal teaching is itself a combination of **four strategies in one routine**, and section 4.2.2 gave its strong evidence (Palincsar & Brown, 1984; Rosenshine & Meister, 1994). A package of strong parts can have strong support as a whole.

Question, recall, review



Notes are a natural place to pair methods. **Take notes, then review them**, because the combination has strong support (Kobayashi, 2006; Kiewra et al., 1991). A Cornell page with a cue-column quiz builds the review into the layout (Pauk, n.d.).

For listening, **read while you listen** when a transcript is available. Section 4.1.3 noted its mixed, single-study evidence (Chang & Millett, 2014).

Pairs with support



Take notes, then review them: strong support



Read while you listen: mixed evidence



Keep the strong parts of a package

> Exercise:
>
> Try it. Take one textbook section. **Turn the heading into a question**, read to answer it, recite the answer from memory, and review your notes the next day. This combines the SQ3R question and recite steps with note review (Robinson, 1946; Kobayashi, 2006).

Three methods are usually enough. **More steps take more time**, and each one should earn its place by adding something the others do not.

Table: Combinations to try

Source	Combination
Textbook chapter	Heading questions, recite pause, next-day review
Article for a group	Reciprocal teaching roles, then a blank-page brain dump
Lecture	Cornell notes, cue-column quiz, same-day review
Podcast with transcript	Read while listening, then three points from memory
Web claim	Lateral reading, then an accuracy rating before sharing

> Key Concept:
>
> Combine with care. **Use two or three methods with good support**, one for before, one for during and one for after.

> Exercise:
>
> Combine methods.
>
> 1. Starter. Add a **recite pause** to your normal reading of one article.

2. Middle. Use Cornell notes with a cue-column quiz and same-day review for one lecture, following Pauk (n.d.) and Kobayashi (2006).
3. Advanced. Run reciprocal teaching roles with a group, then each write a brain dump, following Palincsar and Brown (1984) and Roediger and Karpicke (2006).

Combine methods

- [x] Starter: a recite pause in your normal reading of one article
- [x] Middle: Cornell notes with a cue-column quiz and same-day review
- [x] Advanced: reciprocal teaching with a group

Key idea:

Two or three well-supported methods on one source take you from first look to lasting memory.

Quick check:

Which parts of SQ3R are supported on their own? Answer: the question step and the recite step. What pair of note methods has strong support? Answer: taking notes, then reviewing them.

4.9.3 Daily Extraction Drills: Ten-Minute Exercises for Each Skill

A method only helps if you keep using it. **Short daily drills** turn methods into habits. This section offers a ten-minute drill for each skill and the research on how habits form.

The ten-minute length is **a practice choice**. No study tests ten-minute extraction drills as such, so treat the length as a starting point you can change.



A kitchen timer set to ten minutes beside an open book and a notebook on a breakfast table.

Habits take time to form. In one study, **the median time to reach 95% of its plateau was 66 days**, with a range from 18 to 254 days (Lally et al., 2010). The time varies widely between people, so do not count on a fixed number of days.

> **Science Says:**
>
> In the same study, **missing one opportunity did not materially affect** the habit formation process (Lally et al., 2010). A missed day is no reason to give up.

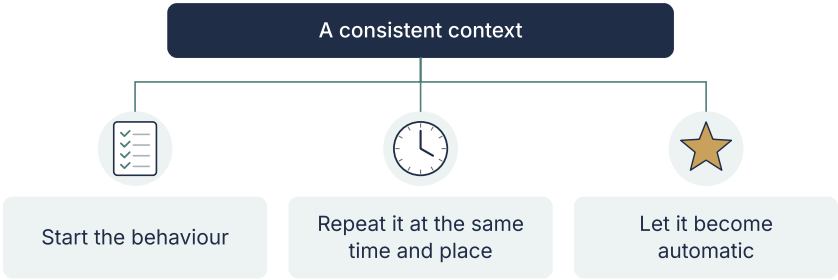
Days to form a habit (Lally et al., 2010)



A review advises you to start the behaviour, **repeat it in a consistent context** and let it become automatic (Lally & Gardner, 2013). Do your drill at the same time and place each day, such as after breakfast.

Tracking helps. A study combining many studies found that prompting progress monitoring **improved goal attainment, with d = 0.40**, and more so when progress was recorded or shared (Harkin et al., 2016).

Make the drill automatic



> Exercise:
>
> Try it. Choose one drill from the table below. **Do it for ten minutes at the same time** each day for a week, and tick a box each day you do it.

Table: Ten-minute drills

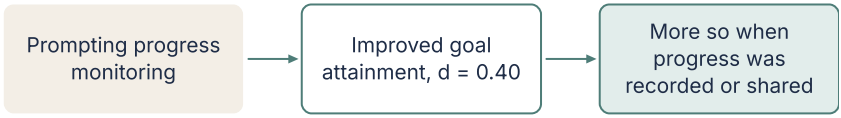
Skill	Ten-minute drill
Reading rate	Timed reading of an easy passage with three points after
Listening	One podcast segment at 1.25 to 1.5 times speed, then a summary
Visual intake	One chart explained aloud in your own words
Selecting	Preview, skim and scan one long article
Recording	One concept map with linking words
Keeping	One blank-page brain dump on yesterday's reading
Filtering	New-tab checks on two unfamiliar sources

Short sessions also allow **spacing**, which has strong support (Cepeda et al., 2006; Kornell, 2009). Daily drills spread your practice across the week.

Key Concept:

Small and steady. **Ten minutes at the same time each day**, with a tick on a chart, helps build the habit. The length is a practice choice, and spacing and tracking have strong support.

Track your progress



Exercise:

Build a daily drill.

1. Starter. Do **one ten-minute drill** today and tick it off.
2. Middle. Do the same drill daily for three weeks in the same place, drawing on Lally and Gardner (2013).
3. Advanced. Rotate drills across the week and share your chart with a friend, drawing on Harkin et al. (2016).

Key idea:

Short daily drills in a steady context, tracked on a chart, turn methods into habits.

Build a daily drill

- [x] Starter: one ten-minute drill today, ticked off
- [x] Middle: the same drill daily for three weeks in the same place
- [x] Advanced: rotate drills across the week and share your chart

Quick check:

What was the median time to reach 95% of a habit's plateau in one study? Answer: 66 days. Did missing one opportunity materially affect habit formation? Answer: no.

4.9.4 Extraction Challenges of Rising Difficulty

Once a drill feels easy, it is time to make it harder. **Rising difficulty keeps practice useful.** This last section of the module sets out challenges that grow step by step, and the limits of what they can do.

Graded passages give a ready-made ladder. **Short timed passages with questions** get harder as you go, and small studies suggest gains transfer to other texts (Macalister, 2010). The evidence is mixed.

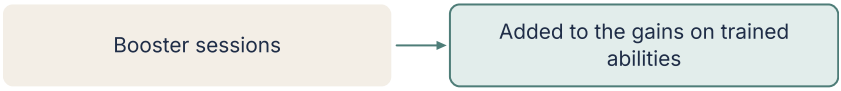
Two ready-made ladders



Timed repeated reading offers a second ladder. **Read each passage five times against time**, then move to a harder one (Chang & Millett, 2013). Section 4.1.3 gave its mixed evidence.

> **Science Says:**
>
> In one big trial, **booster sessions added to the gains** on trained abilities (Ball et al., 2002). Section 1.3.2 gave the limit of that trial for everyday tasks.

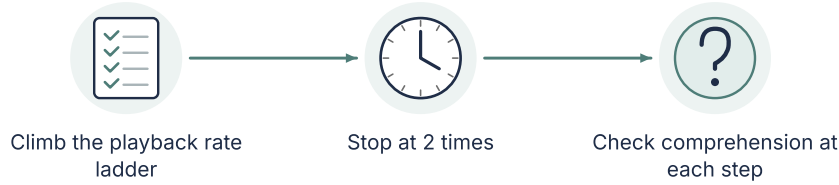
Booster sessions (Ball et al., 2002)



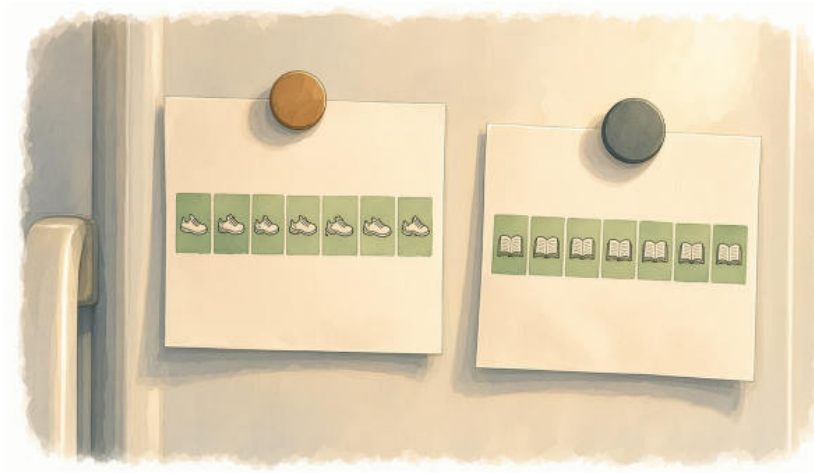
Choose challenges that look like the real tasks you face (Sala & Gobet, 2017). That way the skill you build is the one you need.

For listening, **climb the playback rate ladder** and stop at 2 times (Murphy et al., 2022). For every challenge, check comprehension at each step (Rayner et al., 2016).

Every challenge



> **Exercise:**
>
> Try it. Take a passage you read easily at your normal speed. **Read a harder passage at the same speed**, then write three points. Step back if your points slip.



A runner's training plan pinned to a fridge, next to a reading plan laid out in the same weekly pattern.

A good challenge is **a little beyond your current level**. If you fail every time, step back, and if it feels easy, step up.

Table: Challenges of rising difficulty

Skill	Easier	Harder	Hardest
Reading rate	Easy graded passage	Harder graded passage	Unfamiliar field at the same speed
Listening	1.25 times speed	1.5 times speed	2 times speed, no transcript
Visual intake	One simple chart	A chart with several lines	A dense dashboard
Recording	Concept map of an article	Concept map of a chapter	Concept map of a whole book

Skill	Easier	Harder	Hardest
Filtering	One new-tab check	SIFT on a viral post	Tracing a claim to its first source

Key Concept:

Step up with care. **Raise difficulty a little at a time**, and check comprehension at each step.

Exercise:

Climb the ladder.

1. Starter. Read **one graded passage** a level above your usual, drawing on Macalister (2010).
2. Middle. Do timed repeated reading with a harder passage each week for a month, following Chang and Millett (2013).
3. Advanced. Plan a month of challenges across three skills from the table, with a comprehension check at every step.

Climb the ladder

- [x] Starter: one graded passage a level above your usual
- [x] Middle: timed repeated reading with a harder passage each week
- [x] Advanced: a month of challenges across three skills

Key idea:

Rising difficulty keeps practice useful, and the gains stay close to what you practise.

Quick check:

What did booster sessions add to? Answer: gains on trained abilities. How often does far transfer occur? Answer: rarely.



Module

5

Training Extractivity in Different Fields

5.1.1 Reading a Textbook Chapter for Understanding

This module takes the skills and methods of the last two modules into **the places where you meet information every day**. It starts with the most familiar one, a textbook chapter you need to understand and keep.

Many of us read a chapter from the first line to the last, colour half of it and hope it stays. **A better plan has three stages**, before, during and after reading. Each stage uses methods with some research behind them.

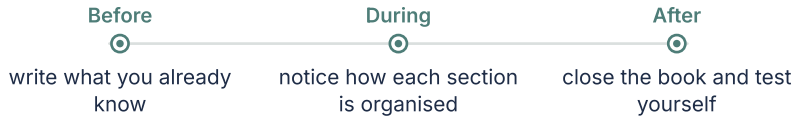


A student at a desk with a textbook open at a new chapter, a notebook and a pencil beside it, and no highlighter in sight.

Before you read, spend two minutes **writing down what you already know** about the topic (Recht & Leslie, 1988). Then turn the chapter headings into a few questions you want answered.

> **Science Says:**
>
> Section 3.2.1 showed that questions asked before reading steer what you take in. **With text, readers tend to focus on the prequestioned parts** (Carpenter & Toftness, 2017). The evidence is mixed, and your questions should cover the parts of the chapter that matter to you.

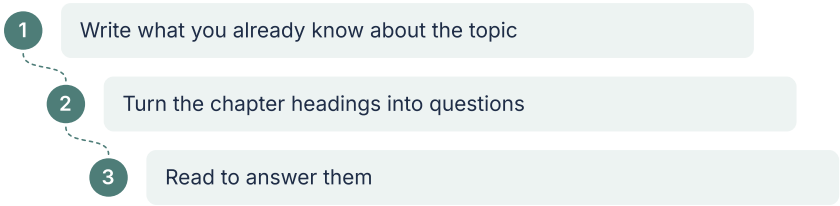
Read a chapter in three stages



While you read, **notice how each section is organised**, which draws on teaching about text structure (Hebert et al., 2016). The evidence for that teaching is strong, with limits.

At the end of each section, stop and **explain to yourself how each step follows** from the one before. This is self-explanation, putting into your own words why each step leads to the next (Chi et al., 1994; Bisra et al., 2018), and the evidence is mixed.

Questions from headings



> Exercise:
>
> Try it. Before your next chapter, **write three questions from the headings**. After each section, say in two sentences how it links to the section before.

Leave the highlighter in the drawer (Dunlosky et al., 2013). **Skip full study routines** such as SQ3R and KWL, which ask the reader to do something with a text before, during and after reading. Both are weak as packages (Robinson, 1946; Ogle, 1986).

Leave the highlighter in the drawer

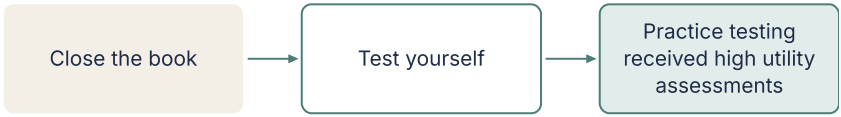


Their parts still help. Section 3.2.1 also noted that **the question step and the recite step are supported on their own**, so keep those two and treat the other steps of each routine as optional.

After you read, close the book and test yourself. Section 2.2.3 quoted a review that found **"Practice testing and distributed practice received high utility assessments"** (Dunlosky et al., 2013). Utility

here means usefulness, and distributed practice means spreading your study over several sessions, so answer your questions today and again a few days later.

Test yourself after reading



> **Key Concept:**
>
> Before, during, after. **Ask before, explain during and test after.** Leave the highlighter out.

> **Exercise:**
>
> Read a chapter for understanding.
>
> 1. Starter. Before one chapter, **write five lines on what you already know** about its topic.
> 2. Middle. Turn the headings into questions and answer them after reading, using the question step of SQ3R (Robinson, 1946).
> 3. Advanced. After each section, explain how it follows from the last (Chi et al., 1994). Two days later, answer your questions from memory.

Before, during, after

- Ask before you read
- Explain as you read
- Test yourself after, and skip the highlighter

Key idea:

Ask before you read, explain as you read and test yourself after, and skip the highlighter.

Quick check:

Which steps of SQ3R are supported on their own? Answer: the question step and the recite step. Is SQ3R strong as a package? Answer: no, it is weak as a package.

5.1.2 A Study Project From First Reading to Exam

A course runs over weeks, from the first reading of the material to the exam. **This section turns the methods of Module 4 into a study plan** you can follow. The plan itself is a practice choice, and I will show which parts rest on research.

Most students fall back on rereading. Section 2.2.3 described a survey of 177 students in which **most reread and relatively few self-test** (Karpicke et al., 2009). That leaves plenty of room to change how you study.

How most students study



A survey of 177 students



Most reread



Relatively few self-test

The first stage is reading each chapter well, with questions before, explanation during and a short test after. **Section 5.1.1 sets out that routine**, and it applies to every chapter in the course.

The second stage is review. **Make each review session a test**, with flashcards or a blank page. This is retrieval practice, recalling from

memory instead of rereading, and the evidence is strong (Roediger & Karpicke, 2006; Adesope et al., 2017).

A study project



> **Science Says:**
>
> Spaced repetition means **spreading reviews over growing intervals**, and it has strong support (Cepeda et al., 2006). Successive relearning goes a step further. You retrieve each item until you get it right, then relearn it across later sessions (Rawson et al., 2013), and the evidence for it is mixed.

The third stage mixes topics. Interleaving means **mixing problem or category types in one session**, and it helps inductive learning, where you work out a rule from examples (Rohrer & Taylor, 2007; Brunmair & Richter, 2019). The evidence is mixed and calls for caution with expository texts, which explain facts and ideas, and with words.

Spacing and mixing



> Exercise:
>
> Try it. Pick one chapter you read last week. **Write everything you remember on a blank page**, then check the chapter and mark what you missed.

Judge your spacing plan by your test results (Kornell, 2009). Keep a short log of your scores after each session, so you can see which schedule worked for you.

Judge your spacing by results



Keep your review at the same time each week, and **do not count on a fixed number of days** before the routine feels like habit (Lally et al., 2010). Pick a slot you can keep, such as Sunday morning.

Table: A study project in five stages (practice choice)

Stage	What you do	Evidence
First reading	Questions before, explanation during, a short test after	Mixed to strong
Spaced review	Short tests on earlier chapters over growing gaps	Strong
Relearning	Retrieve each item to a correct answer, then again later	Mixed
Mixed practice	Several problem types in one session	Mixed
Final weeks	Full practice tests from memory	Strong

No source fixes the number of weeks or sessions for a plan like this. **The stages and their timing are a practice choice**, and you can stretch or shrink them to fit your course.



A stack of handwritten flashcards sorted into three piles marked today, next week and later.

> **Key Concept:**
>
> Test, space, mix. **Test yourself instead of rereading**, spread the tests out and mix topics late in the course.

> **Exercise:**
>
> Plan a study project.
>
> 1. Starter. List the chapters of one course and **book one short review session** a week.
> 2. Middle. Turn each review into a practice test (Roediger & Karpicke, 2006).

3. Advanced. In the final weeks, retrieve each item until it is right, then again in a later session, as in successive relearning (Rawson et al., 2013).

Plan a study project

- [x] Starter: list the chapters and book one short review session
- [x] Middle: turn each review into a practice test
- [x] Advanced: mix topics late in the course

Key idea:

Build a study project on spaced tests, add mixed practice near the end and set the timing yourself.

Quick check:

What does retrieval practice replace? Answer: rereading. Is the number of weeks in the plan set by research? Answer: no, it is a practice choice.

5.2.1 Triage: What to Read, Skim or Skip

A working day brings more reports and emails than anyone can read closely. **Triage means deciding quickly** what to ignore, what to skim and what to read closely. Done well, it saves your close reading for the items that need it.

Triage is **a practice choice**, and I claim no study for it. Treat the steps below as a routine to test on your own work, and keep what helps.

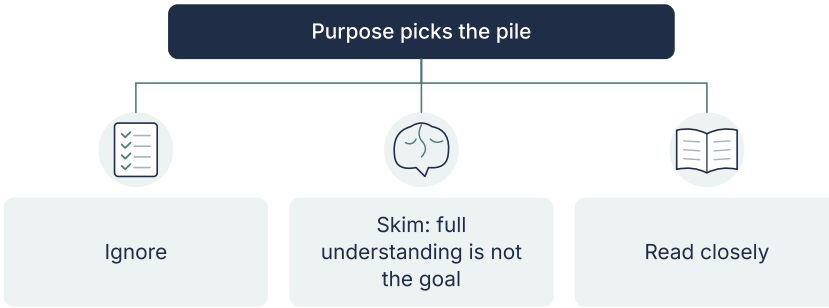


An office worker at a laptop with an inbox of forty unread emails, sorting them into three folders on the screen.

Your purpose comes first. Ask what you need from each item today, and **let the answer pick the pile**. Section 3.2.1 showed how to set a purpose before you start reading.

Skimming is the middle pile. **Skim when full understanding is not the goal** (Rayner et al., 2016), such as a report you need only to know about. Read closely when you must act on the details.

Three piles for a working day



> **Science Says:**
>
> In a study of sales professionals, with a survey of 365 and a diary study of 212, **irrelevant email interruptions were linked to lower performance** through workload. Relevant ones were linked to better performance through mindfulness (Addas & Pinsonneault, 2018). It covers one profession, so the evidence is mixed.

One practical response is **sorting by relevance first**, so the relevant messages get your attention and the rest wait for a set time. This response is a practice choice, since the study looked at links with performance and tested no sorting routine.

Email interruptions at work

Irrelevant email interruptions → Linked to lower performance

Email pulls attention around the screen. When 13 workers went without email, **the average time on one window rose from 75.5 to 131.9 seconds** (Mark et al., 2012). With only 13 workers, the evidence is mixed.

> **Exercise:**
>
> Try it. Take this morning's inbox and **sort each item into ignore, skim or read**. Read only the third pile closely. The sort is a practice choice.

Seconds on one window, with and without email



A sort works best with a time limit. Give yourself a few minutes for the whole inbox, and **decide each item in one look**. If you cannot decide, it goes in the skim pile for later.

The same sort works for long reports. Skim the summary and headings, then **read closely only the parts you must act on**. Section 1.3.1 showed that skimmers favour text earlier in paragraphs, higher on the page and on earlier pages (Duggan & Payne, 2009), so check the later pages before you file a report away.

The same sort for long reports



Key Concept:

Ignore, skim, read. **Purpose picks the pile, and only the read pile gets close reading.** The routine is a practice choice.

Exercise:

Triage your reading.

1. Starter. Sort **ten emails into ignore, skim or read** in five minutes.
2. Middle. For one week, check email at set times and sort by relevance first.
3. Advanced. Triage a long report, skimming the summary and reading closely only the parts you must act on (Rayner et al., 2016). Then check its later pages.

Ignore, skim, read

- Purpose picks the pile
- Decide each item in one look
- Only the read pile gets close reading

Key idea:

Decide quickly what to ignore, skim or read, and save close reading for the items you must act on.

Quick check:

In the study of 13 workers, what happened to time on one window without email? Answer: it rose from 75.5 to 131.9 seconds on average. Is triage a tested method? Answer: no, it is a practice choice.

5.2.2 Extracting Decisions and Actions From Long Documents

Minutes, reports and long email threads often hide the few lines that matter, who will do what and by when. **Extracting decisions and actions** turns a long document into a short list you can act on.

The method below applies general extraction research to work. **The template itself is a practice choice**, and I claim no study for it.



A printed thirty-page report with three short lines underlined in pencil and a sticky note listing names and dates.

Before you open the document, **write the questions you need answered**, such as what was decided and what you must do. Asking questions before reading has mixed evidence (Carpenter & Toftness, 2017).

Bring what you know to the page. **Recall the project and the people** before you read, drawing on prior knowledge and context (Recht & Leslie, 1988; Bransford & Johnson, 1972).

Before you open the document



Write the questions you need answered



Recall the project and the people

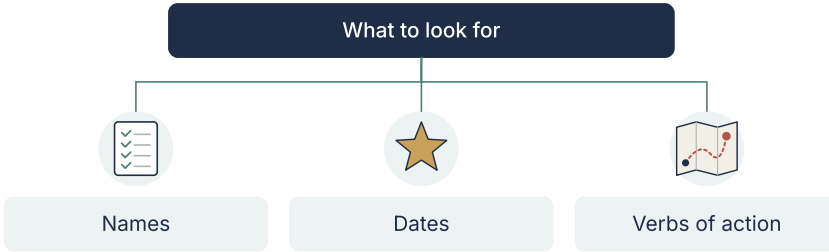


Then read

> **Science Says:**
>
> Section 4.8.1 described macrorules, **deleting, generalising and building topic statements**, and the low utility of summarising (Dunlosky et al., 2013). Here the rules help you shorten each decision while keeping who will act and by when. This use in a work template is a practice choice.

Scan for the lines that carry decisions and actions. **Look for names, dates and verbs of action** as you move through the text, then read those passages closely. This scan is a practice choice.

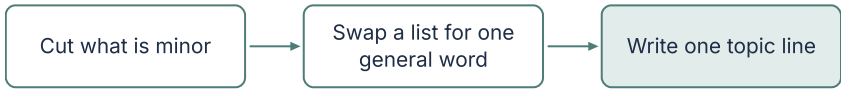
Scan for decisions and actions



> Exercise:
>
> Try it. Take the minutes of your last meeting. **Write every decision on one line each**, with who will act and by when.

Condense what you find with those rules. **Cut what is minor, swap a list for one general word and write one topic line** for each passage you marked.

Condense what you find



For a document with many actions, a matrix helps. **Topics go in rows and attributes in columns** (Kiewra et al., 1988, 1991; Jairam et al., 2012), and the evidence for charting notes this way is mixed.

Table: Decision and action template (practice choice)

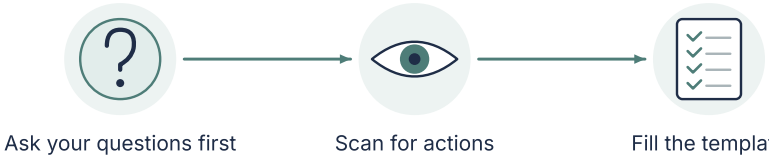
Field	What to write
Decision	One line in your own words
Owner	The person who will act
Deadline	The date, or "none given"

Field	What to write
Where	Page or paragraph in the document
Open point	Anything left unclear

When you can, **send the list to the people involved** and ask them to correct it. This step is a practice choice, and it gives others a chance to fix anything you misread.

> **Key Concept:**
>
> Decisions, owners, dates. **Ask your questions first, scan for actions and fill the template.** The template is a practice choice.

Decisions, owners, dates



> **Exercise:**
>
> Extract decisions and actions.
>
> 1. Starter. From one email thread, **list each decision** in your own words.
> 2. Middle. Fill the template for a ten-page report, writing your questions before you open it.

3. Advanced. For a project with many actions, build a matrix with topics in rows and owners and dates in columns, as in charting notes (Kiewra et al., 1988).

Key idea:

Questions first, then a scan for names, dates and actions, turn a long document into a list you can act on.

Extract decisions and actions

- [x] Starter: list each decision from one email thread in your own words
- [x] Middle: fill the template for a ten-page report
- [x] Advanced: send the list to the people involved to correct

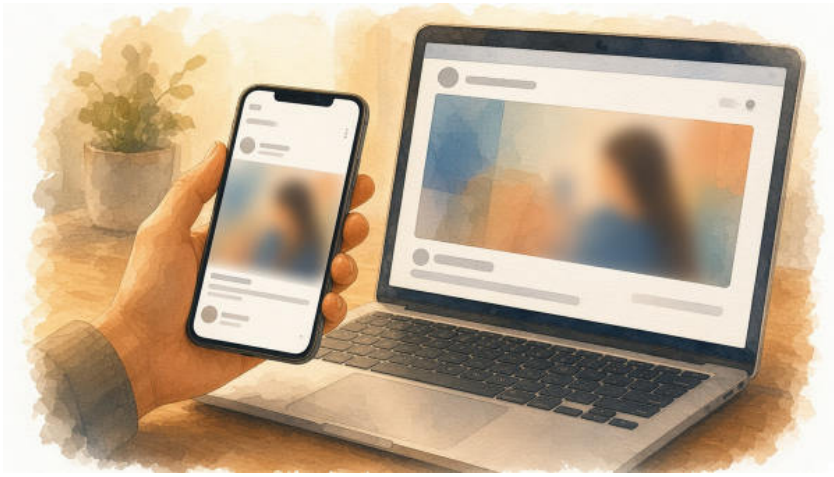
Quick check:

What do the macrorules ask you to do? Answer: delete, generalise and build topic statements. Is the decision and action template based on a study? Answer: no, it is a practice choice.

5.3.1 Checking a Story Before You Believe or Share It

A FRIEND SHARES A SHOCKING story, and your thumb is already over the share button. **A short check before you believe or share** is a habit worth building. This section turns the methods of Section 4.7.1 into a routine for everyday news.

The routine follows SIFT, whose letters stand for **Stop, Investigate, Find better coverage, Trace** (Caulfield, 2019). SIFT builds on lateral reading, and the evidence for it as a package is mixed.

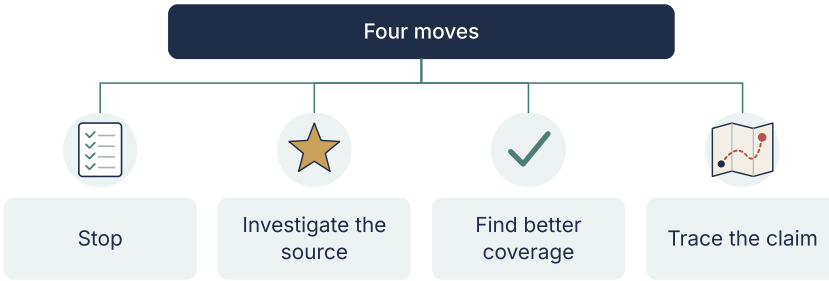


A phone in someone's hand showing a shared news post, with a second browser tab open beside it on a laptop.

Stop first. **Pause and judge whether the story is accurate** before you share it. Accuracy prompts, short nudges to do this, have mixed evidence (Pennycook et al., 2021).

Investigate the source by leaving the page. Lateral reading means you **open a new tab and check what others say about the site** (Wineburg & McGrew, 2019). It has strong support, and it can be taught (McGrew et al., 2019; Breakstone et al., 2021).

SIFT before you share



> **Science Says:**
>
> When you search, **scan the results page before choosing** a link. This habit is called click restraint (Wineburg & McGrew, 2019). The evidence for it is mixed, and you can try it on your next search.

Find better coverage next. Search for the claim itself and see **which trusted outlets report it**, and how they word it. If no one else has the story, treat it with care.

Find better coverage



Trace the claim, quote or image back to where it began. For images, **a reverse image search** helps with this step. It is a practice choice, and I claim no study for it.

> **Exercise:**
>
> Try it. Take the next surprising post you see. **Open a new tab and find out who is behind it** before you read the rest.

Check the source first



Some people use a checklist on the page itself. The CRAAP test is a **five-criterion source checklist** (Blakeslee, 2004), and the evidence for it is weak.

You do not need all four moves for every story. **Start with the first two moves** on stories you plan to share, and add the others as they become familiar.

Two ways to judge a source

	CRAAP checklist	Lateral reading
Where you work	On the page itself	In a new tab
Evidence	Weak	Strong

Key Concept:

Stop, Investigate, Find, Trace. **Pause, leave the page, look for better coverage and trace the claim.**

Exercise:

Check before you share.

1. Starter. For one shared post, **stop and check who is behind it** in a new tab (Wineburg & McGrew, 2019).
2. Middle. Run all four SIFT moves on three stories this week (Caulfield, 2019).
3. Advanced. Trace one viral image with a reverse image search and note where it first appeared. This step is a practice choice.

Check before you share

- Start with the first two moves
- Pause before you share
- Leave the page to see who is behind it

Key idea:

Pause and read laterally before you believe or share a story.

Quick check:

What do the letters SIFT stand for? Answer: Stop, Investigate, Find better coverage, Trace. How strong is the evidence for the CRAAP test? Answer: weak.

5.3.2 A Week of Deliberate News Intake

Most of us take in news by accident, from whatever the feed shows next. **A deliberate week** means choosing when, where and how you read news, and practising one checking skill each day.

The plan below is **a practice choice**, and I claim no study for it. The days, times and number of sources are mine, and you can change them to suit your life.

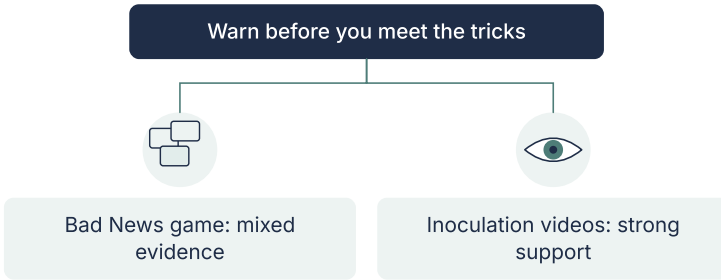


A kitchen table with a cup of tea, a tablet showing a news site and a printed weekly plan with one task for each day.

Some parts of the plan rest on research. Section 4.7.2 described Bad News, a game where you **play the role of a misinformation producer**. Section 2.3.2 gave its scale, about 15,000 players and no randomised control group, and the game showed pre-post gains, meaning scores rose from before to after playing (Roozenbeek & van der Linden, 2019).

A randomised control group is a comparison group chosen by chance, so **the evidence for the game is mixed**. Prebunking like this aims to warn you about tricks before you meet them.

Two kinds of prebunking



> **Science Says:**
>
> Inoculation videos are short videos **naming manipulation techniques**, and they have strong support (Roozenbeek et al., 2022). A short list of tips for spotting false news has mixed support (Guess et al., 2020). Both fit a weekday slot in the plan.

Table: A one-week news plan (practice choice)

Day	Task	Evidence
Monday	List your news sources and pick two to keep	Practice choice
Tuesday	Play a prebunking game	Mixed

Day	Task	Evidence
Wednesday	Watch one inoculation video	Strong
Thursday	Read laterally on one shared story	Strong
Friday	Consider the opposite on one opinion piece	Mixed
Weekend	Review the week and tick your chart	Strong (tracking)

On Friday, **ask how the opposite conclusion could be true** (Lord et al., 1984). Debiasing training, a game or video teaching decision biases, is a related method with mixed evidence (Morewedge et al., 2015).

> Exercise:
>
> Try it. Tonight, **write down every place you saw news today**. Circle the two you would keep in a deliberate week.

Map your news day



Every place you saw news today



The two you would keep

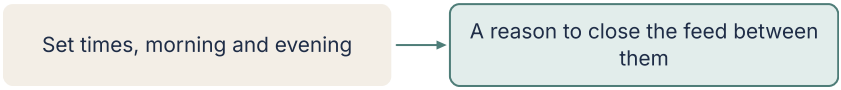


Set times for reading them

Keep a simple chart of what you did each day. **Prompting progress monitoring** has strong support (Harkin et al., 2016), and a tick on a chart is an easy way to do it.

Choose set times for news, such as one in the morning and one in the evening. **Fixed times give you a reason to close the feed** between them. The times are a practice choice.

Fixed times for news



At the end of the week, look back at your chart. **Keep the tasks that helped** and repeat the plan with new stories, or move on to your usual routine with one or two checks built in.

> **Key Concept:**
>
> Deliberate intake. **Set times, a few sources and one check a day**, with a chart to track it.

A deliberate week

- Set times
- A few sources
- One check a day, with a chart

> **Exercise:**
>
> Plan a news week.
>
> 1. Starter. **Pick two news sources** and two set times for reading them.
> 2. Middle. Follow the one-week plan and tick a chart each day (Harkin et al., 2016).

3. Advanced. Add a daily consider-the-opposite note on one opinion piece (Lord et al., 1984), and compare your views at the start and end of the week.

Key idea:

A planned week of news, with a check each day and a chart to track it, turns accidental intake into practice.

Plan a news week

- [x] Starter: pick two news sources and two set times
- [x] Middle: follow the one-week plan and tick a chart each day
- [x] Advanced: keep the tasks that helped and repeat the plan

Quick check:

Was the Bad News game tested with a randomised control group? Answer: no. Is the one-week plan based on a study? Answer: no, it is a practice choice.

5.4.1 Listening and Note-Taking in Real Time

A lecture, a meeting or a podcast moves at the speaker's pace. **You cannot turn back a page**, so listening asks you to take in, select and record at the same time. This section shows how to do that well.

Research has compared listening with reading for some time. Section 1.1.3 described how **the link between reading and listening comprehension becomes stronger after decoding mastery**, once children can turn written words into sounds with ease (Diakidoy et al., 2005). A newer study compared formats directly with adults.

Listening in real time



Set a goal before you listen



Pen or laptop: mixed evidence



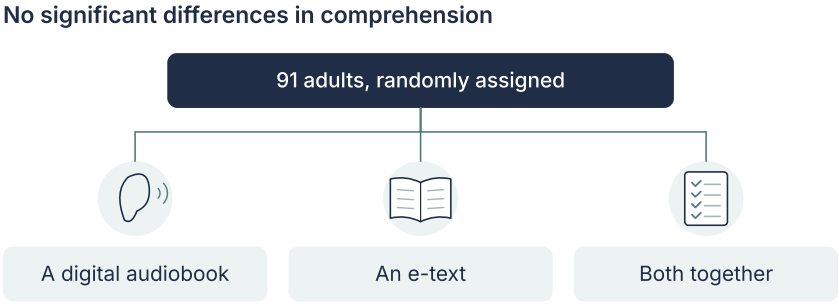
Guided notes: strong support



A commuter on a train wearing headphones, with a small notebook open on one knee and a pen in hand.

> **Science Says:**
>
> In one study, 91 adults were randomly assigned to a digital audiobook, an e-text or both together, all with the same non-fiction material. **There were no statistically significant differences in comprehension**, meaning no gap bigger than chance could explain, immediately or two weeks later (Rogowsky et al., 2016). It is a single study, so the evidence is mixed.

Randomly assigned means chance decided who got which format. The result supports **listening as a fair route for this kind of text**. It is not a claim about all material, so judge each source and goal on its own.



Podcasts and recorded talks let you choose the speed. **Build up from 1.25x towards 2x** and stop there (Murphy et al., 2022). The evidence for faster playback is mixed.

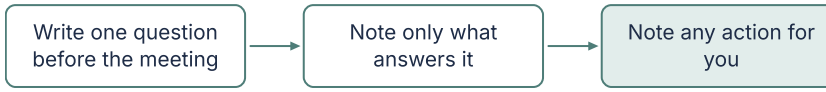
> Exercise:
>
> Try it. Before your next meeting, **write one question you want answered**. During the meeting, note only what answers it and any action for you.



Live talks need a plan. **Set a goal for what you want to hear** before the talk, and check your understanding afterwards. Metacognitive listening, thinking about how you listen, has mixed to strong evidence in second-language learners (Vandergrift & Tafaghodtari, 2010).

For notes, the choice of pen or laptop is evidence mixed (Mueller & Oppenheimer, 2014; Morehead et al., 2019). **Use the tool you can manage**, and put your effort into what you write down.

Listen with one question



When a speaker gives an outline with blanks to fill in, use it. **Guided notes have strong support** in school-age learners (Konrad et al., 2009).

The Cornell layout has notes and cue columns plus a summary strip (Pauk, n.d.). Its evidence is weak. **Its cue review works as retrieval practice**, recalling from memory. Where a lecturer pauses for students to compare and fix notes, take part, since the lecture pause procedure has mixed evidence (Ruhl et al., 1987).

Notes from a speaker

	Guided notes	Cornell layout
What it is	An outline with blanks to fill in	Notes and cue columns plus a summary strip
Evidence	Strong for school-age learners	Weak

> 🗝 **Key Concept:**
>
> Listen with a goal. **Set a question first and note what answers it.**

> Exercise:
>
> Listen and take notes.
>
> 1. Starter. Before one podcast, **write one question** and note only what answers it.
> 2. Middle. Raise playback to 1.25x, then 1.5x over a week, stopping at 2x (Murphy et al., 2022).
> 3. Advanced. Take notes in a Cornell layout during a lecture and use the cue column to test yourself that evening (Pauk, n.d.).

Listen and take notes

- [x] Starter: write one question before a podcast
- [x] Middle: raise playback to 1.25x, then 1.5x over a week
- [x] Advanced: stop at 2x and note what matters

Key idea:

Set a goal, keep playback at 2x or below and note what matters.

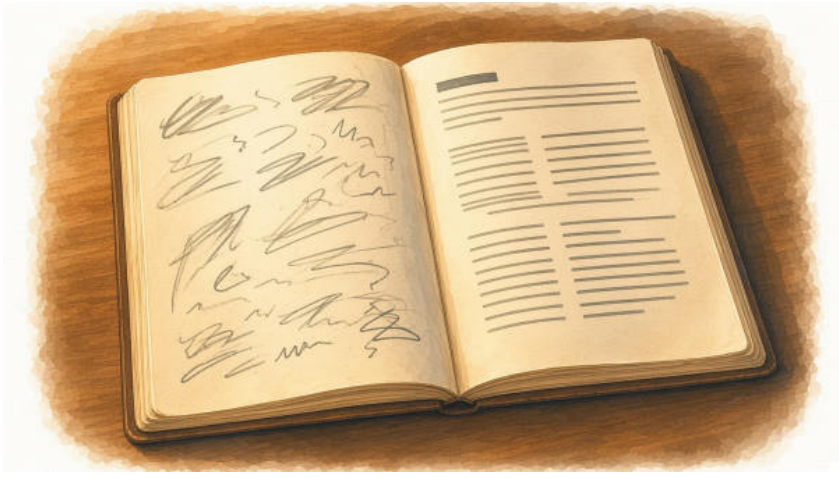
Quick check:

How many adults took part in the audiobook study? Answer: 91. Did audiobook, e-text and both together differ significantly in comprehension? Answer: no.

5.4.2 Turning a Talk Into a Usable Summary

Notes from a talk are only half the job. A week later, raw notes are hard to use, and **a short summary you can trust** is far easier to use. This section shows how to turn notes into that summary.

Review comes next. Section 3.4.3 noted that **combined note-taking and reviewing effects were substantial** (Kobayashi, 2006). Notes are a starting point, and the review is where you put them to work.

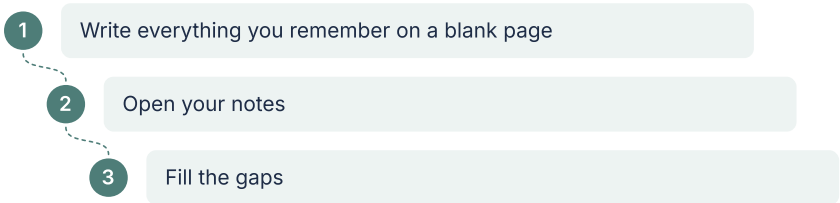


A notebook with messy notes from a talk on the left page and a neat half-page summary on the right.

Review the same day if you can. **Same-day note review** has strong support, and the same-day timing is a practice estimate (Kobayashi, 2006). Pick a set slot after each talk, such as the trip home.

Start the review without looking. **Write everything you remember on a blank page**, then open your notes and fill the gaps. This brain dump is retrieval practice, recalling from memory instead of rereading, and the evidence is strong (Roediger & Karpicke, 2006; Adesope et al., 2017).

Review without looking first



> **Science Says:**
> Section 2.2.3 showed that people who tested themselves **kept more after 2 days and after 1 week** than people who studied again (Roediger & Karpicke, 2006). That is why the brain dump comes before you open your notes.

To write the summary, condense your notes. With macrorules, you **delete, generalise and build topic statements** (Kintsch & van Dijk, 1978; Brown & Day, 1983). The evidence is weak, so keep the summary short and use it for testing.

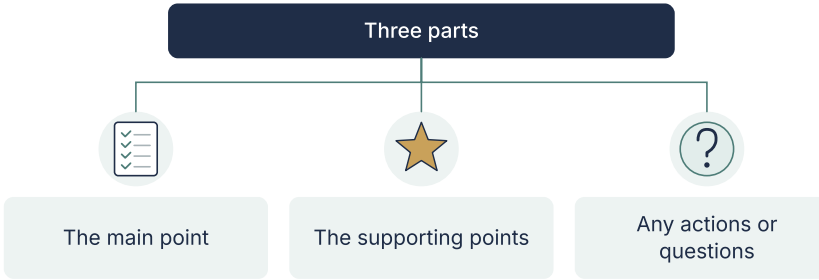
Condense with macrorules



> Exercise:
>
> Try it. After your next talk or podcast, **write five lines from memory** before you look at your notes. Then add what you missed in a different colour.

A usable summary has a fixed shape. **Give it three parts**, the main point, the supporting points and any actions or questions. This shape is a practice choice.

A usable summary



Turn the summary into questions you can answer later. **A summary used for testing** brings in retrieval practice (Roediger & Karpicke, 2006). Answer the questions again a few days later.

Key Concept:

Notes, review, summary. **Brain dump first, fill the gaps, then write a short summary** you turn into questions.

From summary to test



Exercise:

Turn a talk into a summary.

1. Starter. **Review your notes the same day** as the talk (Kobayashi, 2006).
2. Middle. Write a blank-page brain dump before reviewing (Roediger & Karpicke, 2006).
3. Advanced. Write a three-part summary, turn it into five questions and answer them a week later.

Key idea:

Review your notes with a brain dump, then write a short summary you turn into questions.

Notes, review, summary

- Review the same day
- Brain dump first, then fill the gaps
- Turn the summary into questions

Quick check:

What comes first in the review, the brain dump or your notes? Answer: the brain dump. Is the same-day timing for review a research finding? Answer: no, it is a practice estimate.

5.5.1 Reading a Chart for Its Real Message

Charts fill reports, news sites and work dashboards. **A chart can say a lot in one look**, yet many of us glance at the shape and move on. This section shows a slower way to read a chart for what it really says.

Section 3.1.3 described a graph literacy test, a measure of how well people read graphs, on which people got **about 9 of 13 items right** (Galesic & Garcia-Retamero, 2011). The authors concluded that the test shows that "not everyone profits from standard visual displays". It was a test and trained no one, so the evidence is mixed.

A graph test



About 9 of 13 items correct



Visual characteristics, graph knowledge and expectations shape the reading



Graph literacy training: a practice choice

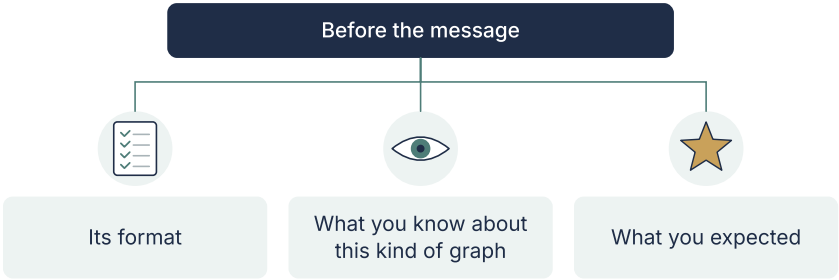


A work dashboard on a large screen with four charts, one of them a line climbing steeply over the last month.

> **Science Says:**
>
> A review of **how viewers comprehend graphs** looks at three factors. They are the visual characteristics of a graph, the viewer's knowledge about graphs and the viewer's knowledge and expectations about the content of the data (Shah & Hoeffner, 2002). The review offers presentation guidelines, and the evidence is mixed.

Those three factors give you three things to check. **Look at the format first**, then ask what you know about this kind of graph, then ask what you expected the data to show. These checks are a practice choice built on the review.

Three things to check on a graph



Graph literacy training means teaching how to read common graph formats. **Here it is a practice choice**, and I claim no study for it.

> Exercise:
>
> Try it. Pick one chart from today's news. **Say aloud what the axes show**, then say the main message in one sentence.

Say the chart aloud



A set of three questions helps you move from the numbers to their meaning. **Read the data, read between the data and read beyond the data.** Treat this format as a practice choice.

The first question asks what one value is. **The second asks how values compare**, and the third asks what the chart suggests beyond what it shows. Work through them in order.

Three questions for a chart



Read the data: what one value is



Read between the data: how values compare

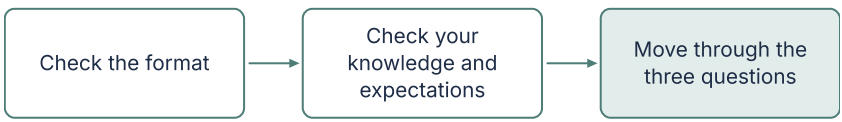


Read beyond the data: what it suggests

Explaining a diagram to yourself is another route. **Diagram self-explanation** means explaining to yourself what each part of a diagram shows (Ainsworth & Loizou, 2003). The evidence is mixed.

> **Key Concept:**
>
> Read slowly. **Check the format, your knowledge and your expectations**, then move through the three questions.

Check, then question



> **Exercise:**
>
> Read a chart for its message.
>
> 1. Starter. For one chart, **name what each axis shows** before you look at the shape.
> 2. Middle. Answer the three questions on two charts at work. This format is a practice choice.

3. Advanced. Explain a complex diagram to yourself part by part, following diagram self-explanation (Ainsworth & Loizou, 2003).

Key idea:

Slow down on charts, checking format, knowledge and expectations before you trust the message.

Read a chart for its message

- [x] Starter: name what each axis shows first
- [x] Middle: answer the three questions on two charts
- [x] Advanced: explain each part of a diagram to yourself

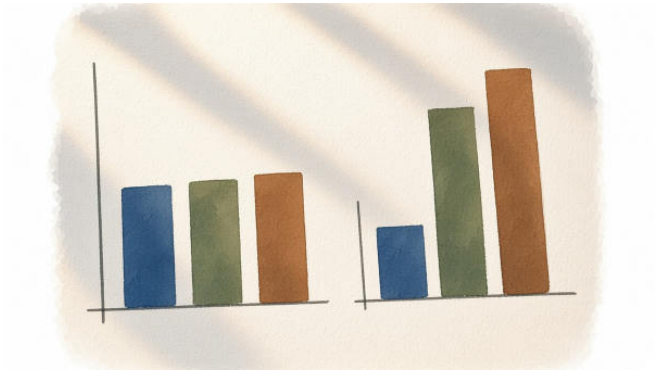
Quick check:

Is the graph literacy test a training? Answer: no, it is a test. Which three factors does the review name? Answer: the graph's visual characteristics, knowledge about graphs and expectations about the data.

5.5.2 Spotting Misleading Numbers and Graphics

Some charts and numbers are built to mislead, and others mislead by accident. **Spotting the problem before you believe the message** is a skill you can practise on almost any news story or report.

Deceptive charts can mislead. In a crowdsourced study, which gathers its many participants online, **four deceptive visualisations built with common distortion techniques** were tested (Pandey et al., 2015). The study showed how deceptive each technique was and for what kind of questions the misinterpretation occurred.

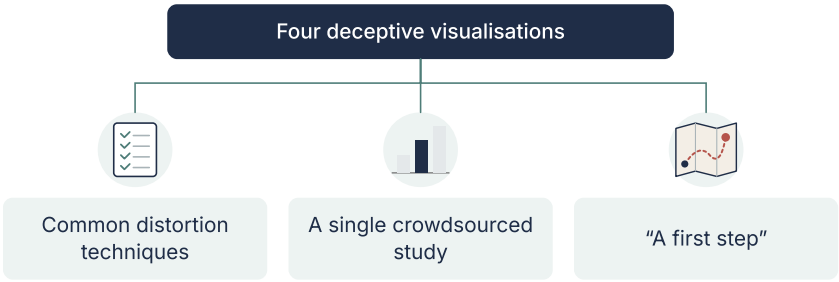


Two bar charts of the same figures side by side, one of them making a small rise look like a huge jump.

> **Science Says:**
> The authors call their study **"a first step"** (Pandey et al., 2015). It is a single crowdsourced study, so the evidence is mixed.

Scepticism about data is a practice with a source. The method of **spotting misleading numbers, charts and claims of cause** traces to Bergstrom and West (2020), and it is a practice choice. The checks below follow from that method.

Deceptive charts (Pandey et al., 2015)



The checks are simple. **Read the axis labels and the scale** before the shape. Ask what each number is compared with, and ask whether a claim of cause rests only on two things moving together.

> Exercise:
>
> Try it. Find one chart in the news today. **Write down the scale on each axis** and whether the chart leaves anything out.

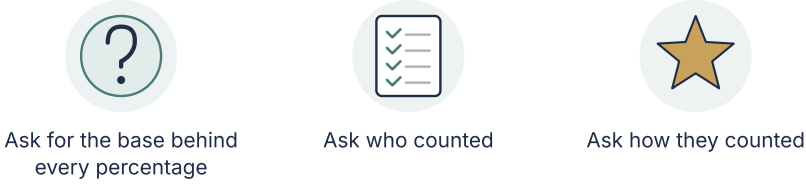
Check a news chart



Numbers in words need the same care as charts. **Ask for the base** behind every percentage, and ask who counted and how. These questions are practice choices.

Biases shape how we read numbers. Section 2.3.2 described debiasing training, where **games or videos teach decision biases**, with effects lasting two months (Morewedge et al., 2015). The evidence is mixed.

Numbers in words

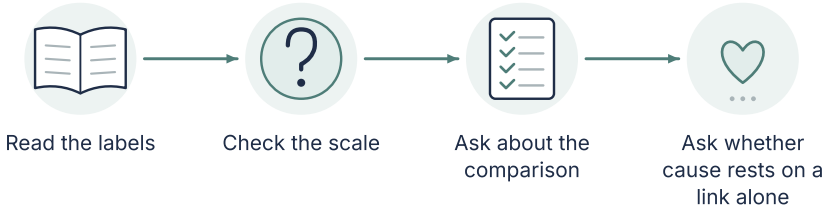


Keep the checks short so you use them. **Pick two or three questions per chart** for everyday reading, and use the full set for charts that matter to a decision. The number is a practice choice.

Key Concept:

Check before you trust. **Labels, scale, comparison and cause.** These checks are practice choices.

Check before you trust



Exercise:

Spot misleading numbers.

1. Starter. For one chart, **read both axis labels** before the shape.
2. Middle. For three news percentages, find the base number behind each.
3. Advanced. Try a game or video on decision biases, as in debiasing training (Morewedge et al., 2015), and note any change in how you read charts.

Key idea:

Read labels, scale and comparison first, and ask whether a claim of cause rests on a link alone.

Spot misleading numbers

- [x] Starter: read both axis labels before the shape
- [x] Middle: find the base number behind three news percentages
- [x] Advanced: use the full set of checks on a chart that matters

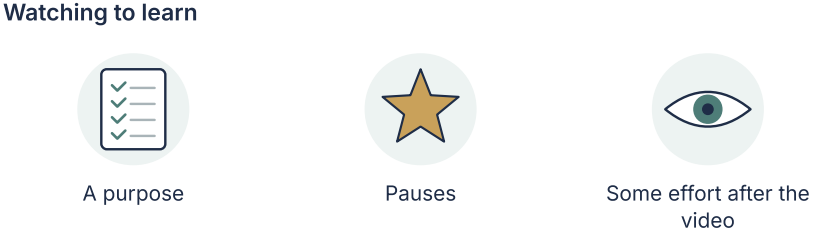
Quick check:

How many deceptive visualisations did the crowdsourced study test? Answer: four. What do the authors call their study? Answer: a first step.

5.6.1 Watching to Learn Rather Than Watching to Pass Time

We all watch video to relax, and that is fine. **Watching to learn is a different activity**, with a purpose, pauses and some effort after the video ends. This section shows how to switch from one to the other.

Before you press play, **write one or two questions** you want the video to answer. Section 3.2.1 showed that learners who answered questions before each of three video segments beat a control group on a later test, on both the asked and the unasked material (Carpenter & Toftness, 2017). The evidence from this single study is mixed.



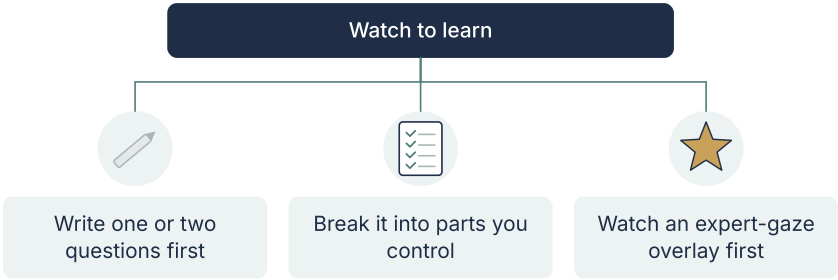


A person at a kitchen table watching a how-to video on a tablet, with a notebook open and two questions written at the top.

Break the video into parts you control. Section 4.4.3 described segmenting, **breaking a video into learner-controlled parts**, where learner-paced segments improved transfer, the use of learning in new problems, with no gain in retention (Mayer & Chandler, 2001). The evidence is mixed.

> **Science Says:**
>
> Eye-movement modelling examples let you **watch a video overlay of an expert's gaze** before viewing (Jarodzka et al., 2013). The overlay shows where the expert looked. It is a single study, so the evidence is mixed.

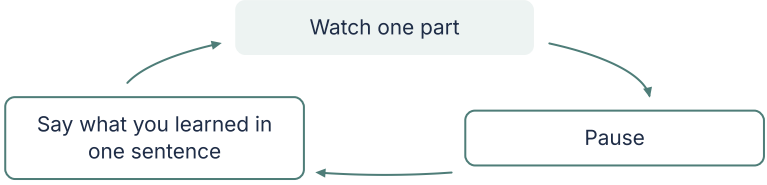
Before and during a learning video



Speed is your choice on most platforms. **Build up from 1.25x towards 2x** and stop there (Foulke & Sticht, 1969; Dupoux & Green, 1997; Murphy et al., 2022). The evidence for faster playback is mixed.

> Exercise:
>
> Try it. Watch a ten-minute learning video in **three parts**. At each pause, say what you just learned in one sentence.

Watch in parts



Watch for drifting attention (Bonifacci et al., 2023). **The pause points in a video give you a chance to notice it** and come back.

A learning video needs a few habits to match its purpose. **Close other tabs, keep your notebook open** and decide in advance when you will stop. These habits are practice choices.

Habits for a learning video



Close other tabs



Keep your notebook open



Decide in advance when you will stop

After the video, recall what you learned before you rewatch. **A short recall from memory** shows what stayed with you, and the next section builds this step into a full project.

> **Key Concept:**
>
> Purpose, pauses, recall. **Question first, pause often and recall after.**

Purpose, pauses, recall



> **Exercise:**
>
> Watch to learn.
>
> 1. Starter. Before one video, **write one question** you want answered.
> 2. Middle. Pause a video at each new idea and summarise it in one sentence, following segmenting (Mayer & Chandler, 2001).

3. Advanced. Raise playback to 1.5x on a familiar topic, stopping at 2x (Murphy et al., 2022), and check your recall after.

Key idea:

A question before, pauses during and recall after turn passive watching into learning.

Watch to learn

- [x] Starter: write one question before one video
- [x] Middle: pause at each new idea and summarise it in one sentence
- [x] Advanced: recall what you learned before you rewatch

Quick check:

What did learner-paced segments improve? Answer: transfer. Where should you stop on playback speed? Answer: 2x.

5.6.2 A Video Learning Project From First Viewing to Notes

Some topics are best learned from a series of videos, such as a course on a new software tool or a set of cookery lessons. **A video project** gives that series a shape, from the first viewing to notes you can use.

The stages below are **a practice choice**. No source sets viewing passes, segment lengths or session counts for a video project, so use the plan as a starting point.

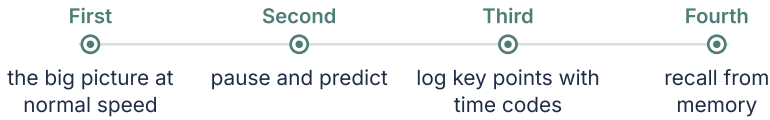


A laptop on a desk showing a playlist of twelve short course videos, three of them ticked as watched.

The first viewing is about the big picture. Watch at normal speed with a question in mind, then on later viewings **build up the playback rate** to 1.25x, 1.5x and 2x. The ladder has mixed evidence, and the advice is to stop at 2x (Murphy et al., 2022).

The second pass is for detail. **Pause after each video segment and predict** what comes next, then check (Mayer & Chandler, 2001). The exercise follows segmenting, and the evidence is mixed.

Four passes through a video series



> **Science Says:**
>
> Retrieval practice means recalling from memory instead of rereading, and Section 3.4.3 described how **practice tests beat restudying and other conditions** (Roediger & Karpicke, 2006; Adesope et al., 2017). That is why the project ends with recall.

Table: A video project in four stages (practice choice)

Stage	What you do	Evidence
First viewing	Watch with a question, normal speed	Practice choice
Second pass	Pause after each segment and predict	Mixed
Notes	Log key points against time codes	Practice choice
Recall	Answer your questions from memory	Strong

The third pass is for notes. **Log each key point against its time code**, so you can jump back to the moment it was made. This is a practice choice.

> **Exercise:**
>
> Try it. Pick one video you watched this week. **Write three time codes** and a one-line note for each.

Three time codes



Pick one video from this week



Write three time codes

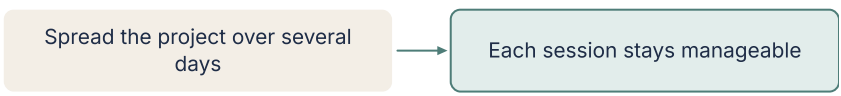


Add a one-line note for each

The last stage is recall. **Answer your questions from memory** before you look at your notes. This is retrieval practice, recalling from memory instead of rereading, and the evidence is strong (Roediger & Karpicke, 2006; Adesope et al., 2017).

Spread the project over several days. **Short sessions on separate days** keep each one manageable. The number of sessions is a practice choice.

Short sessions on separate days



At the end, keep one page of notes with time codes for the whole series. **A single page** is quicker to review than the full playlist.

> **Key Concept:**
>
> View, pause, log, recall. **Each stage has a job**, and the stages are a practice choice.

View, pause, log, recall

- Each stage has a job
- One page of notes with time codes
- The stages are a practice choice

Exercise:

Run a video project.

1. Starter. Watch one video with **one question** in mind.
2. Middle. On a second pass, pause and predict after each segment (Mayer & Chandler, 2001), logging notes with time codes.
3. Advanced. A few days later, answer your questions from memory (Roediger & Karpicke, 2006), then rewatch only the parts you missed.

Key idea:

A video project moves from viewing to pausing, logging and recall, spread over several days.

Run a video project

- [x] Starter: watch one video with one question in mind
- [x] Middle: pause and predict after each segment on a second pass
- [x] Advanced: keep one page of time-coded notes for the series

Quick check:

Is there a study claimed for timestamped video notes? Answer: no, it is a practice choice. Where should you stop on the playback ladder? Answer: 2x.

5.7.1 Reading and Listening in a Second Language

You put on a podcast in the language you are learning and lose the thread after a minute. **Intake in a second language** asks for its own routine, and this section builds one from methods with research behind them.

The language itself comes first. **Build reading practice and vocabulary into your week** (Rayner et al., 2016). The evidence is strong.

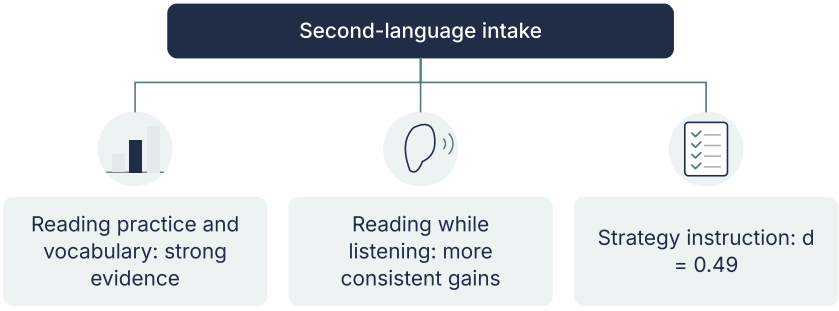


A learner at a café table with a short book in Spanish, earphones in and a pencil marking new words in the margin.

Reading while listening joins the two channels. Section 3.1.2 described a 13-week study in which **reading while listening gave more consistent gains in listening fluency** than either alone (Chang & Millett, 2014). It is a single study, so the evidence is mixed.

> **Science Says:**
>
> Section 4.3.2 described strategy instruction, the explicit teaching of learning strategies, with **d = 0.49 across skills** (Plonsky, 2011). The letter d measures effect size, how big a difference something makes. The result was not specific to listening, so the evidence is mixed.

Language and listening



Shadowing means you **repeat audio aloud a split second behind the speaker** (Hamada, 2016). The evidence is mixed. Try it while your level is still low (Hamada, 2016).

> **Exercise:**
>
> Try it. Choose a one-minute clip in the language you are learning. **Play it while reading the transcript**, then play it again without the text.

Read along, then without



A weekly routine can mix these methods. **Read while listening** on two days, shadow a short clip on two others and read something easy for pleasure at the weekend. The mix is a practice choice.

Keep the material at a level you mostly understand, which is **a practice choice** you can adjust as you go. The next section looks at graded and extensive input in detail.

A weekly routine for a second language

Days	Method
Two days	Read while listening
Two other days	Shadow a short clip
The weekend	Read something easy for pleasure

Measure progress in small ways. **Note how much of a clip you catch** on first listening each week, or how many pages you read in ten minutes. These measures are practice choices.

Key Concept:

Build the language. **More reading, stronger vocabulary and listening joined to the text.**

Measure progress in small ways



How much of a clip you catch on first listening



Pages read in ten minutes



Material at a level you mostly understand

Exercise:

Read and listen in a second language.

1. Starter. **Read along with one short audio clip** each day for a week (Chang & Millett, 2014).
2. Middle. Shadow a one-minute clip three times a week (Hamada, 2016).
3. Advanced. Learn one listening strategy from a course book or teacher and use it on each clip, as in strategy instruction (Plonsky, 2011).

Key idea:

Language skill and reading practice are the route to faster intake in a second language.

Build the language

- More reading
- Stronger vocabulary
- Listening joined to the text

Quick check:

What does the letter d measure? Answer: effect size, how big a difference something makes. For whom did shadowing give comprehension gains? Answer: lower-proficiency learners.

5.7.2 Building Fluency With Graded and Extensive Input

Fluency in a new language grows with **large amounts of input you can understand**. This section looks at extensive reading, graded speed reading and repeated reading, and at the evidence for each.

Extensive reading means large amounts of easy reading. **The evidence here is strong.** A study combining 34 studies, with 43 effect sizes and 3,942 participants, found a medium effect of d = 0.46 for group contrasts and a larger one of d = 0.71 for pre-post contrasts (Nakanishi, 2015).



A shelf of short graded readers in English, sorted by level with coloured stickers on their spines.

The letter d measures effect size, how big a difference something makes. **Group contrasts compare readers with others** who did not read extensively, and pre-post contrasts compare the same readers before and after.

Pleasure reading can raise reading rate. Section 4.1.3 described a one-year study of 97 students in which **pleasure reading groups gained more rate than intensive reading**, without loss of comprehension (Beglar et al., 2012). It is a single study, so the evidence is mixed.

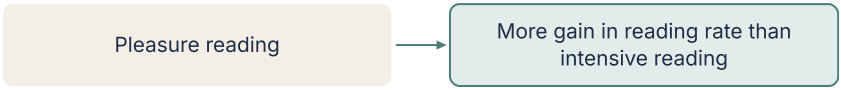
Three routes to second-language speed

	Extensive reading	Graded speed reading	Timed repeated reading
What it is	Large amounts of easy reading	Short timed passages with questions	Each passage read five times
Evidence	Strong	Mixed	Mixed

> **Science Says:**
>
> Graded speed reading courses use **short fixed-length passages, timed, with questions**, and small studies suggest the gains transfer to other texts (Macalister, 2010). The evidence is mixed. Millett's speed reading courses can be downloaded from Paul Nation's website (Nation, n.d.).

Repeated reading is a third route. In timed repeated reading, **each passage is read five times against time** (Chang & Millett, 2013), and the evidence is mixed.

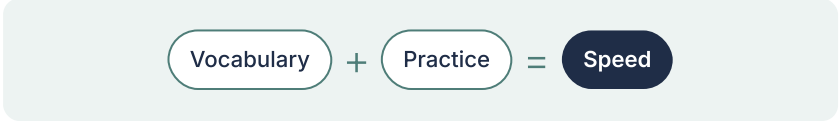
Pleasure reading (97 students, one year)



> Exercise:
>
> Try it. Pick a graded reader one level below your current level. **Read for fifteen minutes** without a dictionary and note how many pages you covered.

Behind all three methods lies the same point. **Vocabulary and practice are the route to speed** (Rayner et al., 2016), and extensive reading is one way to get that practice.

The route to speed



Choose the level with care. **Text you mostly understand without help** suits extensive reading. The level is a practice choice, and you can adjust it as you go.

Keep a simple log of pages and minutes. **A rising number of pages in the same time** shows progress you can see. The log is a practice choice.

Choose and track your level



Text you mostly understand without help



A log of pages and minutes



A rising number of pages in the same time

Key Concept:

Read a lot, read easy. **Extensive reading has strong support**, and the other two methods have mixed evidence.

Exercise:

Build fluency.

1. Starter. **Read one easy graded reader** a week (Nakanishi, 2015).
2. Middle. Do one timed passage from a graded speed reading course three times a week (Macalister, 2010).
3. Advanced. Read one short passage five times against time, then a new passage, and compare your speeds (Chang & Millett, 2013).

Build second-language fluency

- [x] Starter: one easy graded reader a week
- [x] Middle: one timed passage from a graded speed reading course
- [x] Advanced: a log of pages and minutes for a month

Key idea:

Large amounts of easy reading build second-language fluency, and the evidence for it is strong.

Quick check:

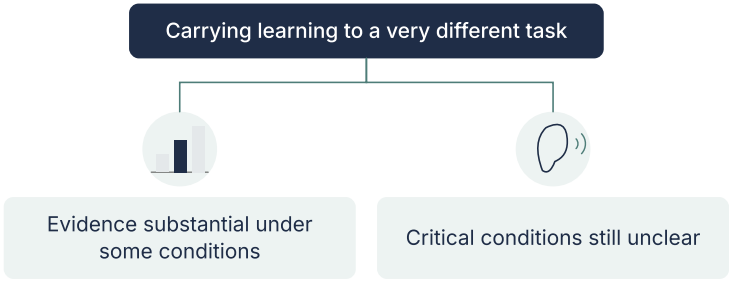
What effect size did the study combining many studies find for group contrasts? Answer: d = 0.46. Did pleasure reading cost comprehension in the one-year study? Answer: no.

5.8.1 Carrying a Method From One Kind of Source to Another

You may have learned to check a news story well and still accept a misleading chart at work. **A method learned in one field does not always travel** to another, and this section looks at the evidence and what to do.

Carrying learning to a very different task is called far transfer. One review argued that **"Estimation of a single effect size for far transfer is misguided in view of this complexity"** (Barnett & Ceci, 2002). Transfer depends on how far, and in which way, the new task differs from the old one.

Far transfer



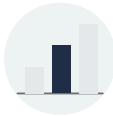


A person using the same small checklist card first on a newspaper and then on a work report spread across a desk.

The same review gives a balanced picture. It found that **"evidence for transfer under some conditions is substantial, but critical conditions for many key questions are untested"** (Barnett & Ceci, 2002). The evidence is mixed.

> **Science Says:**
>
> Section 1.3.2 described a review of training in chess, music and working memory, with effects **inversely related to the quality of the experimental design**. The better the study, the smaller the effect. The authors concluded that far transfer of learning rarely occurs (Sala & Gobet, 2017).

Training in chess, music and working memory



Reviewed across many studies



Effects shrink as study quality rises



Better designs, smaller effects

The practical answer is to **carry the method on purpose**. Name the method, then try it on the new kind of source, and check whether it fits. This approach is a practice choice.

Look for the deep shape of a task. Section 2.2.2 described how experts group problems by **the deep principles behind them** and novices by surface features (Chi et al., 1981). Ask what deep question a new source raises before you choose a method.

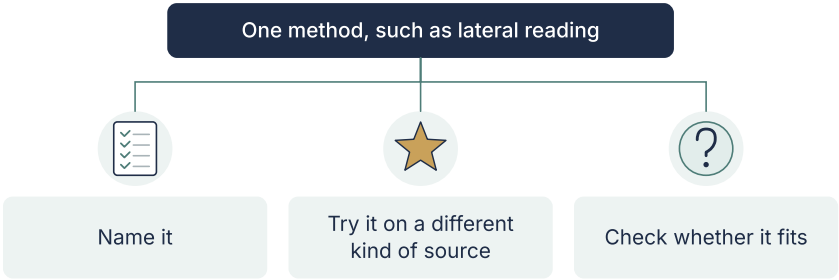
How experts and novices group problems

	Experts	Novices
Group problems by	Deep principles	Surface features

> Exercise:
>
> Try it. Take one method from this module, such as lateral reading. **Use it on a different kind of source** this week, such as a work report or a podcast claim.

Match the method to the task and the source. **Choose methods by what the source and your goal need**, and ignore claims about your learning style, which are a cited myth (Pashler et al., 2008).

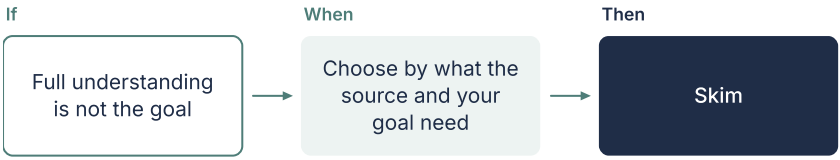
Carry a method on purpose



Some methods fit many sources. **Skim when full understanding is not the goal** (Rayner et al., 2016), whether the source is a report, an article or a long email. Others need adapting each time.

Keep a short list of your methods and where you have used them. **A list makes the choice deliberate**, and a gap on it shows you where to try a method next. The list is a practice choice.

Choosing a method



> **Key Concept:**
>
> Carry it on purpose. **Name the method, look for the deep shape and try it** on a new source.

Exercise:

Carry a method across fields.

1. Starter. **List three methods** from this module and the sources you use them on.
2. Middle. For one new source, name its deep question before you choose a method.
3. Advanced. Try one method on three different kinds of source and note where it fits and where it needs adapting.

Carry a method across fields

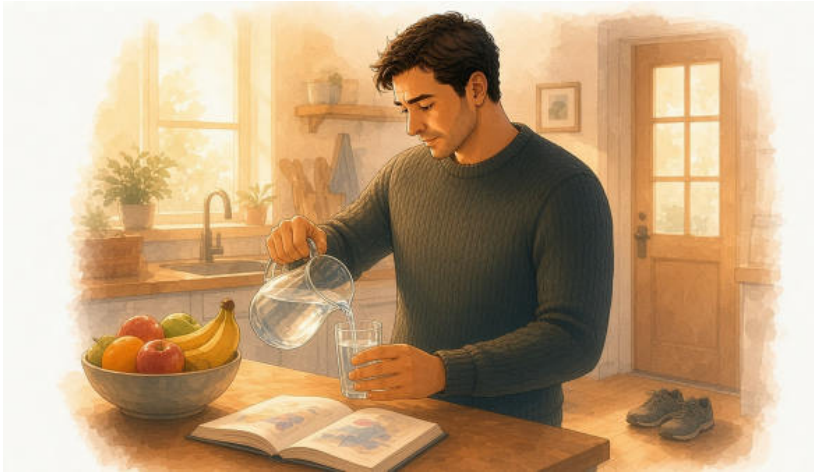
- [x] Starter: list three methods and the sources you used them on
- [x] Middle: name the deep question of one new source first
- [x] Advanced: try one method on a source where you have not used it

Key idea:

Methods do not travel by themselves, so carry them on purpose to each new kind of source.

Quick check:

What does far transfer mean? Answer: carrying learning to a very different task. Are learning styles a sound basis for choosing methods? Answer: no, they are a cited myth.



Module

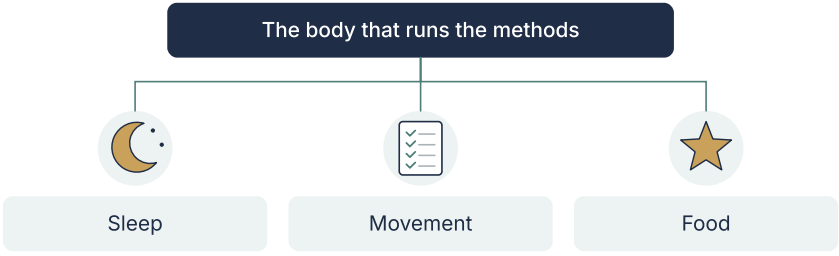
6

Sleep, Movement and Food

6.1.1 How Sleep Supports Intake and Retention, and a Workable Sleep Routine

THIS MODULE TURNS FROM methods to the body that runs them, through **sleep, movement and food**. The research is firmer for some parts than for others, and I will say which. None of it is medical advice.

Sleep, movement and food



The Attention book looks at sleep from its own angle, in its sections "How Sleep Loss Affects Attention" and "Habits for Restful Sleep". **Here the focus is intake and retention**, taking in new information and keeping it.



A quiet bedroom at night with a printed book on the bedside table and a phone face down across the room.

How much sleep comes first. An expert consensus states that **“Adults should sleep 7 or more hours per night on a regular basis to promote optimal health”** (Watson et al., 2015). A second report recommends seven to nine hours for young adults and adults, and seven to eight hours for older adults (Hirshkowitz et al., 2015).

Short sleep has costs. The consensus adds that **“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). Associated means the two go together, and it does not show that one causes the other.

How much sleep



Adults: 7 or more hours a night



Young adults and adults: seven to nine hours

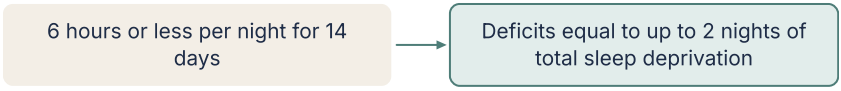


Older adults: seven to eight hours

> **Science Says:**
>
> Encoding means taking new information into memory, and the hippocampus is a brain area involved in it. After **one night of total sleep deprivation**, people showed a significant hippocampal encoding deficit, a weakness bigger than chance would explain (Yoo et al., 2007). It is a single lab study, so the evidence is mixed.

In a lab study of 48 adults, **6 hours or less per night for 14 days** produced performance deficits equal to up to 2 nights of total sleep deprivation, and "subjects were largely unaware of these increasing cognitive deficits" (Van Dongen et al., 2003). The evidence from this single study is mixed.

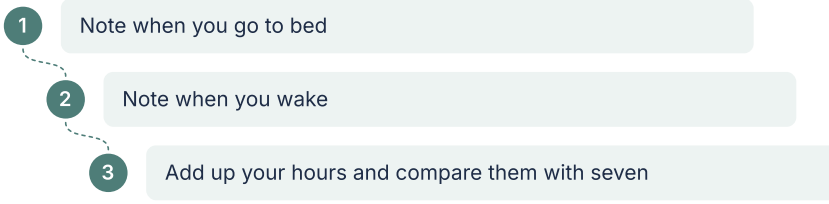
Short sleep adds up (48 adults)



Sleep helps keep what you took in. A review describes how, during slow-wave sleep, the deepest stage, **new memories are replayed from the hippocampus into the neocortex**, the outer layer of the brain, which supports consolidation of memory for facts and events (Diekelmann & Born, 2010). Consolidation means making a memory stable.

> **Exercise:**
>
> Try it. For one week, **note when you go to bed and when you wake**. Add up your hours each night and compare them with seven.

A week of sleep notes



Sleep seems to favour what you expect to need. In lab studies, sleep helped word-pair recall **"only if the subjects had been informed about the retrieval test after the learning period"** (Wilhelm et al., 2011). The evidence is mixed, and telling yourself what you will need later is a practice choice built on this finding.

Reading on a light-emitting eReader before bed, compared with a printed book, led to **"reduced melatonin secretion, later timing of their circadian clock"**, longer time to fall asleep and lower alertness the next morning (A.-M. Chang et al., 2015). Melatonin is a hormone tied to sleep timing, and the circadian clock is the body's daily rhythm.

Before bed: screen or page

	Light-emitting eReader	Printed book
Melatonin	Reduced	Not reduced
Falling asleep	Takes longer	Sooner
Next morning	Lower alertness	More alert

A warm bath or shower may help you fall asleep sooner. Water at 40 to 42.5 C, **one to two hours before bedtime for as little as 10 minutes**, shortened the time to fall asleep, with limited evidence (Haghayegh et al., 2019). The evidence is mixed.

If you worry about your sleep, the consensus advice is plain. **"People concerned they are sleeping too little or too much should consult their healthcare provider"** (Watson et al., 2015). A doctor can look at your own case.

A workable sleep routine



Aim for 7 or more hours



A printed book at bedtime



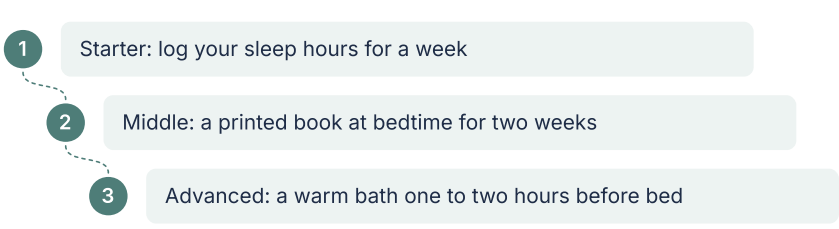
A doctor if sleep worries you

> **Key Concept:**
>
> Hours and habits. **Aim for 7 or more hours**, read a printed book at bedtime and see a doctor if sleep worries you.

Exercise:

Build a sleep routine.

1. Starter. **Log your sleep hours** for a week and compare them with seven (Watson et al., 2015).
2. Middle. Swap a light-emitting eReader for a printed book at bedtime for two weeks (A.-M. Chang et al., 2015).
3. Advanced. Take a warm bath one to two hours before bed on study nights (Haghayegh et al., 2019) and note how soon you fall asleep.



Key idea:

Enough sleep helps you take in and keep new information, and a simple routine helps you get it.

Quick check:

How many hours of sleep does the consensus recommend for adults? Answer: 7 or more per night. Were people aware of their growing deficits after two weeks of short sleep? Answer: largely not.

6.1.2 Breaks, Reading Fatigue and Screen Strain

After two hours with a report on screen, your eyes feel dry and the words start to blur. **Breaks, naps and the choice of page or screen** all play a part in how long you can keep reading well.

The Attention book covers breaks for attention in its section “Breaks, Nature and Attention Restoration”. **This section looks at reading**, and at the strain that long screen sessions bring.



A person at a desk rubbing their eyes beside a laptop showing a long report, with a window and trees behind them.

Short breaks lift energy more than output. A study combining 22 samples and 2,335 people found that micro-breaks, very short pauses in work, **raised vigour with d = .36 and cut fatigue with d = .35** (Albulescu et al., 2022). The letter d measures effect size, how big a difference something makes.

The overall effect on performance was not significant, d = .16, and it was **significant only for less demanding tasks**. Longer breaks helped performance more. The evidence is mixed, so treat short breaks as a way to feel fresher.

Micro-breaks (22 samples, 2,335 people)

Outcome	Effect
Vigour	Raised, d = .36
Fatigue	Cut, d = .35
Performance overall	Not significant, d = .16

> Science Says:
>
> Digital eye strain, tired or sore eyes from screen use, **"may be 50% or more among computer users"** (Sheppard & Wolffsohn, 2018). The symptoms are "typically transient", meaning they pass, and management includes "incorporating regular screen breaks". The evidence comes from a review and is mixed.

The 20-20-20 rule asks you to **look at something 20 feet away for 20 seconds every 20 minutes** (American Optometric Association, n.d.). It comes from professional guidance on screen use.

The 20-20-20 rule



Every 20 minutes



Look at something 20 feet away



For 20 seconds

In a study of 29 computer users with symptoms, two weeks of reminders cut symptoms, and the gain "was not maintained one week after discontinuation" (Talens-Estarelles et al., 2023). It was a small study with no control group, so the evidence is mixed. **Keep the reminders going** if they help, since the benefit faded once they stopped.

> **Exercise:**
>
> Try it. Set a reminder for **regular screen breaks** during your next long reading session. Note how your eyes feel at the end compared with a day without breaks.

Screen-break reminders (29 computer users)

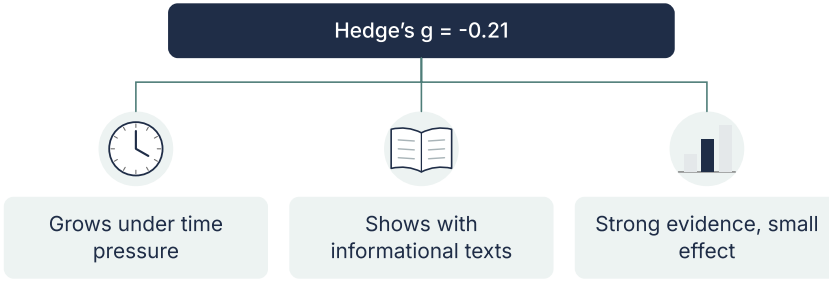
Two weeks of reminders	→ Fewer symptoms, not kept one week after stopping

Paper has an edge for some reading. A study combining many studies, with 171,055 participants, found **"the same advantage of paper over digital reading (Hedge's g = -0.21)"** (Delgado et al., 2018). Like d, the letter g measures effect size, and this one is small.

The advantage grew **when reading was under time pressure** and appeared with informational texts. The evidence is strong for a small

effect, and printing the reports you must read under time pressure is a practice choice built on it.

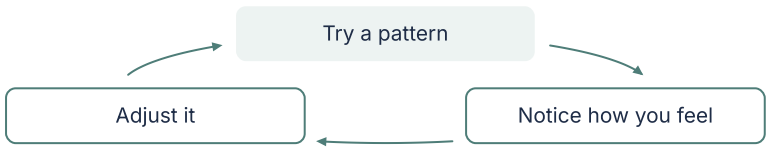
Paper over screen (171,055 participants)



Naps can help after a short night. In a lab study of 24 young adults after restricted sleep, **the 10-minute nap was "overall the most effective"** (Brooks & Lack, 2006). A 20-minute nap gave its benefits 35 minutes later, and a 30-minute nap caused sleep inertia, grogginess after waking. Memory was not tested, and the evidence is mixed.

How often and how long to break during a long reading session is **a practice choice**. Try a pattern, notice how you feel and adjust it.

Find your break pattern



> **Key Concept:**
>
> Rest the reader. **Take regular breaks, print what matters and keep naps short.**

Exercise:

Manage reading fatigue.

1. Starter. Use **break reminders** for one week of screen reading (Talens-Estarelles et al., 2023).
2. Middle. Print one long report you must read under time pressure and read it on paper (Delgado et al., 2018).
3. Advanced. After a short night, try a 10-minute nap before an afternoon of reading (Brooks & Lack, 2006).

Manage reading fatigue

- [x] Starter: break reminders for one week of screen reading
- [x] Middle: print one long report you must read under time pressure
- [x] Advanced: a 10-minute nap after a short night, before an afternoon of reading

Key idea:

Regular breaks, paper for hard reading and short naps help you keep reading well.

Quick check:

What happened to the benefit of break reminders a week after they stopped? Answer: it was not maintained. Which nap length was overall the most effective? Answer: 10 minutes.

6.2.1 Walking, Aerobic Exercise, Strength and Balance

LONG READING DAYS KEEP us sitting still. **Movement is part of looking after the reader**, and this section sets out the World Health Organization guidelines and a few studies of exercise and learning.

The Attention book covers exercise and attention in its section "Exercise and the Focused Brain". **Here the focus is the guidelines** and the few studies that touch on taking in and keeping new material.

Moving for the reader



Long reading days keep us still



The WHO guidelines



A few studies on exercise and thinking



A woman walking briskly through a park on a lunch break, a small backpack on her shoulders.

The guidelines say that **"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"** (Bull et al., 2020). Aerobic activity is the kind that raises your heart rate and breathing.

Moderate intensity has a simple test. **"One way to tell if you're working at a moderate intensity level is if you can still talk, but not sing"** (National Health Service, 2024). On a scale of effort from 0 to 10, moderate activity is usually a 5 or 6 (Bull et al., 2020).

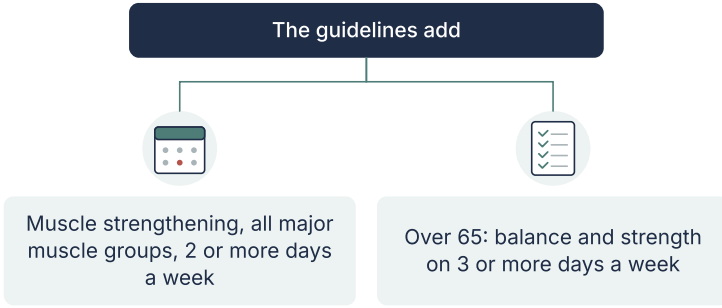
Weekly activity for adults (WHO)

Intensity	Minutes a week
Moderate	150-300
Vigorous	75-150

> **Science Says:**
>
> The guidelines recommend muscle-strengthening activities at moderate or greater intensity, **involving all major muscle groups on 2 or more days a week** (Bull et al., 2020). Examples include carrying heavy shopping bags, yoga, lifting weights, working with resistance bands and heavy gardening (National Health Service, 2024).

For older adults aged 65 and over, the guidelines add **varied activity with a stress on balance and strength training on 3 or more days a week**, to help them function well day to day and to prevent falls (Bull et al., 2020). Examples include walking backwards or sideways, and dancing combines aerobic and balance work.

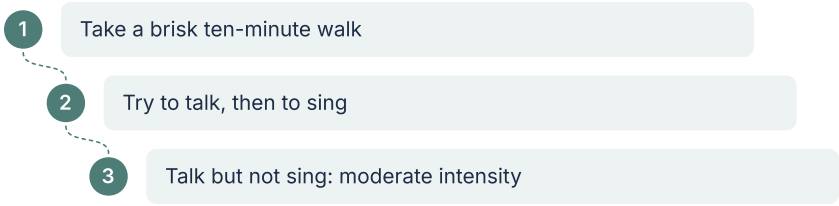
Beyond aerobic activity



Most people can start gently. The guidelines note that **"Pre-exercise medical clearance is generally unnecessary for individuals without contraindications prior to beginning light-intensity or moderate-intensity physical activity not exceeding the demands of brisk walking or everyday living"** (Bull et al., 2020). Contraindications are health reasons not to exercise, so ask your doctor if you have any.

> Exercise:
>
> Try it. Take a **brisk ten-minute walk** today and check whether you can talk but not sing. If you can, you are at moderate intensity.

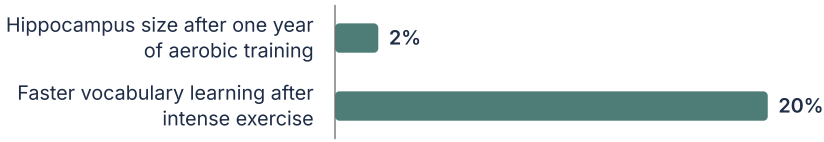
A ten-minute check



Exercise and thinking have been studied in many ways. For a single bout of exercise, a study combining many studies concluded that **"although the research findings are mixed, researchers have generally concluded that there is a small positive effect"** on cognitive performance (Y. Chang et al., 2012). Cognitive means memory, attention and other thinking skills, and the evidence is mixed.

In a trial of 120 older adults, **one year of aerobic training increased the size of the hippocampus by 2%**, "effectively reversing age-related loss in volume by 1 to 2 y", with better spatial memory (Erickson et al., 2011). The hippocampus is a brain area for memory, and spatial memory means remembering where things are and how places fit together.

Exercise and the brain, two studies



One small study looked at learning words. In 27 healthy adults, **vocabulary learning was 20 percent faster after intense physical exercise** than after low-impact running or rest (Winter et al., 2007). Like the hippocampus trial, it is a single study, so the evidence for each is mixed.

> **Key Concept:**
>
> Move every week. **Aim for 150 to 300 minutes of moderate activity**, add strength on 2 or more days and add balance as you age.

Move every week



150 to 300 minutes of moderate activity



Strength on 2 or more days



Balance as you age

> **Exercise:**
>
> Build your activity.
>
> 1. Starter. Walk briskly for **ten minutes a day** for a week, using the talk test (National Health Service, 2024).
> 2. Middle. Add muscle-strengthening on 2 days a week, such as carrying shopping or using resistance bands (Bull et al., 2020).

3. Advanced. If your health allows, try intense exercise before learning new vocabulary and note how quickly the words come (Winter et al., 2007).

Key idea:

Regular aerobic, strength and balance activity follows the guidelines, and a few studies link exercise to thinking and learning.

Build your activity

- [x] Starter: a brisk ten-minute walk a day, with the talk test
- [x] Middle: muscle-strengthening on 2 days a week
- [x] Advanced: intense exercise before learning new vocabulary, if your health allows

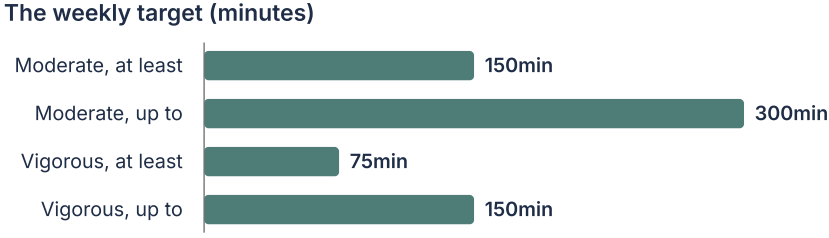
Quick check:

How can you tell you are at moderate intensity? Answer: you can still talk, but not sing. How long was the training in the hippocampus trial? Answer: one year.

6.2.2 Your Weekly Movement Plan, Including Long Reading Days

Knowing the guidelines is one thing, and fitting them into a busy week is another. **A weekly movement plan** turns the numbers in Section 6.2.1 into days and times, with extra care for days spent reading.

The weekly target is the starting point. The guidelines call for **150 to 300 minutes of moderate-intensity activity, or 75 to 150 minutes of vigorous-intensity activity**, or a mix of the two each week (Bull et al., 2020). These 2020 guidelines update earlier recommendations from 2010.

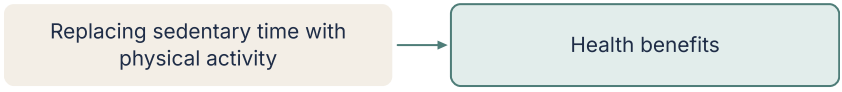


Time spent sitting is a separate matter. The guidelines recommend **reducing sedentary behaviour**, time spent sitting or lying with little

movement, "although evidence was insufficient to quantify a sedentary behaviour threshold" (Bull et al., 2020). No one can yet say how much sitting is too much.

> Science Says:
>
> The guidelines state 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"** (Bull et al., 2020). Light activity counts.

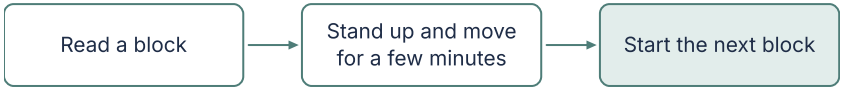
Less sitting



The National Health Service gives similar advice. Adults should aim to **"reduce time spent sitting or lying down and break up long periods of not moving with some activity"** (National Health Service, 2024).

Long reading days put this advice to the test. **Stand up and move between reading blocks**, even for a few minutes. How often to do this is a practice choice, because the evidence was insufficient to set a threshold.

A long reading day



> **Exercise:**
>
> Try it. On your next long reading day, **stand up and walk for a few minutes** at the end of each chapter or report.

Table: A sample movement week (practice choice)

Day	Movement	Guideline link
Monday	30-minute brisk walk	Moderate aerobic
Tuesday	30-minute brisk walk and a strength session with bands	Moderate aerobic and muscle strengthening
Wednesday	30-minute brisk walk	Moderate aerobic
Thursday	Long reading day with movement breaks and a 30-minute brisk walk	Less sedentary time and moderate aerobic
Friday	Strength session with body weight	Muscle strengthening
Saturday	30-minute bike ride	Moderate aerobic
Sunday	Rest or a gentle stroll	Light activity

This sample week gives **150 minutes of moderate activity** as 30 minutes on five days, since the NHS advises spreading activity evenly over 4 to 5 days a week, or every day (National Health Service, 2024). Adjust the days and lengths to suit your life, and add balance work if you are older.



A person standing at a kitchen counter stretching beside an open book on the worktop.

Plan movement like any other appointment. **Put it in your calendar** at a set time, so it does not slip when the reading piles up. This tip is a practice choice.

> Key Concept:
>
> Plan the week. **Book your activity, and break up long reading with movement.**

Plan the week

- Book your activity
- Put it in your calendar at a set time
- Break up long reading with movement

> Exercise:
>
> Plan your movement week.
>
> 1. Starter. **Write three walks** into next week's calendar.
> 2. Middle. Reach 150 minutes of moderate activity in one week (Bull et al., 2020).
> 3. Advanced. On a long reading day, break up long periods of not moving with some activity after each reading block (National Health Service, 2024).

Key idea:

A planned week of activity, with movement breaks on reading days, meets the guidelines and cuts sitting time.

Plan your movement week

- [x] Starter: three walks in next week's calendar
- [x] Middle: 150 minutes of moderate activity in one week
- [x] Advanced: some activity after each reading block on a long reading day

Quick check:

Is there an agreed threshold for how much sitting is too much? Answer: no, the evidence was insufficient. Does light activity count when replacing sitting? Answer: yes.

6.3.1 Dietary Patterns and Adequate Nutrition

Shops and websites promise foods that sharpen the mind. **The research on diet and thinking is mixed**, and this section sets out what it does and does not show.

The Attention book covers food and focus in its section “Eating for Steady Energy and Focus”. **Here the focus is longer-term dietary patterns**, the overall mix of what you eat, and what they mean for your thinking.

Diet and thinking



Longer-term dietary patterns



Mixed research



Claims about brain foods: treat with care

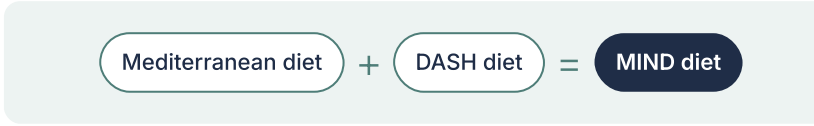


A dinner plate with leafy greens, beans, fish and a slice of wholegrain bread on a wooden table.

One pattern has drawn much attention. The MIND diet **"is a hybrid of the Mediterranean diet and the DASH (Dietary Approaches to Stop Hypertension) diet"** (Barnes et al., 2023). Hypertension means high blood pressure.

An observational study, which follows people without changing what they eat, found that **a higher MIND score went with slower decline** in thinking (Morris et al., 2015). Being in the top third of MIND scores, against the lowest third, matched a difference in decline equal to being 7.5 years younger.

A hybrid diet



> **Science Says:**
>
> The same authors wrote that **"Replication of these findings in a dietary intervention trial would be required to verify its relevance to brain health"** (Morris et al., 2015). An observational link does not show that the diet caused the slower decline.

That trial has now been run. In a randomised trial, where chance decides who follows which diet, **changes in thinking and brain scans over 3 years did not differ significantly** between the MIND diet and a control diet with mild calorie restriction (Barnes et al., 2023). Not significantly means no gap bigger than chance could explain.

From observation to trial

Before	After
Observational study: a higher MIND score went with slower decline	Randomised trial: no significant difference over 3 years

The people in that trial had a suboptimal diet at the start, judged by a 14-item questionnaire (Barnes et al., 2023). **The trial gives evidence mixed** for the MIND diet as a way to protect thinking.

> **Exercise:**
>
> Try it. Write down what you ate yesterday. **Mark the meals you would like to improve**, and choose one small change for this week.

Look at yesterday's meals

1. Write down what you ate yesterday
2. Mark the meals you would like to improve
3. Choose one small change for this week

Some items sold as part of a healthy pattern deserve a closer look. A global study found that **"The level of alcohol consumption that minimised harm across health outcomes was zero"** standard drinks per week (GBD 2016 Alcohol Collaborators, 2018). A diet that includes alcohol cannot be called brain healthy on that basis.

Talk to your doctor or a dietitian before big changes to what you eat, and treat claims about brain foods with care. Section 6.3.2 looks at water and a few nutrients in more detail.

Before you change your diet



Talk to your doctor or a dietitian



Treat brain food claims with care



Alcohol: the level that minimised harm was zero

Key Concept:

Patterns and proof. **An observational link is not proof**, and the MIND trial found no significant difference in thinking.

Exercise:

Look at your eating pattern.

1. Starter. **Keep a food diary** for three days.
2. Middle. Compare your diary with the idea of a Mediterranean and DASH hybrid (Barnes et al., 2023) and note one change you could make for health in general.
3. Advanced. Track your alcohol for a month, keeping in mind that the level that minimised harm was zero (GBD 2016 Alcohol Collaborators, 2018).

Look at your eating pattern

- [x] Starter: a food diary for three days
- [x] Middle: compare it with a Mediterranean and DASH hybrid
- [x] Advanced: track your alcohol for a month

Key idea:

In the MIND diet trial, thinking did not differ significantly between the two diets, so treat brain food claims with care.

Quick check:

Did the MIND diet trial find a significant difference in thinking after 3 years? Answer: no. What level of alcohol minimised harm across health outcomes? Answer: zero.

6.3.2 Practical Meals, Hydration and When Supplements May Matter

A LONG DAY OF READING often runs on coffee and whatever is in the cupboard. **Simple habits with meals and water** are easy to keep, and a few nutrients are worth checking with a doctor. How you plan your meals is a practice choice, so this section keeps to water and supplements.

Water comes first. A review concluded that **"particular cognitive abilities and mood states are positively influenced by water consumption"** (Masento et al., 2014). Cognitive abilities are thinking skills such as attention and memory.

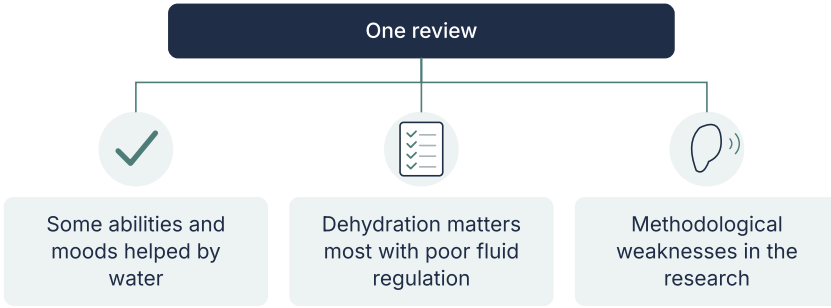


A glass of water and a jug beside an open book and a notebook on a sunny desk.

The same review found that **dehydration matters most for people with poor fluid regulation**, such as the elderly and children (Masento et al., 2014). Fluid regulation is the body's control of its water balance.

> **Science Says:**
>
> The review lists **methodological weaknesses** in the research, including "inconsistent measurements in cognitive assessment and the lack of objective hydration state measurements" (Masento et al., 2014). The evidence is mixed, so keep water handy and drink when you need to.

Water and thinking (review)



Supplements are a different question. For some nutrients, **a test is the way to know** whether you get enough. 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).

> Exercise:
>
> Try it. Put **a glass of water on your desk** before your next reading session, and notice when you reach for it.

Water while you read



A glass of water on your desk



Drink through the day



Notice when you reach for it

Most people in the United States get enough vitamin B12 from food, and **some people have trouble absorbing it**. “Your doctor can test your vitamin B12 level to see if you have a deficiency” (Office of Dietary Supplements, 2023b). A deficiency means having too little.

Iron is similar. **Most people in the United States get enough iron**, and certain groups are more likely to have trouble getting enough (Office of Dietary Supplements, 2023a).

Nutrients and tests (US fact sheets)

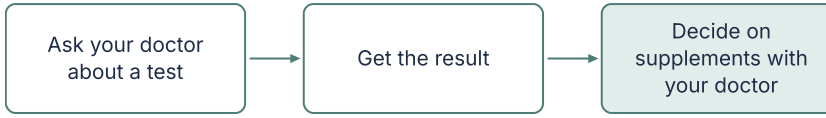
Nutrient	What the fact sheets say
Vitamin B12	Most get enough from food; some have trouble absorbing it
Iron	Most get enough; certain groups are more likely to fall short

The fact sheets carry a clear warning. They provide information that **“should not take the place of medical advice”**, and they encourage you to talk to your health care providers about supplements (Office of Dietary Supplements, 2022, 2023a, 2023b).

Key Concept:

Test before you take. **Drink water through the day**, and ask your doctor about a test before taking supplements.

Test before you take



Exercise:

Check water and nutrients.

1. Starter. **Keep water at your desk** for a week of reading (Masento et al., 2014).
2. Middle. List any supplements you take and why.
3. Advanced. Ask your doctor whether a test for vitamin D, vitamin B12 or iron makes sense for you (Office of Dietary Supplements, 2022, 2023a, 2023b).

Key idea:

Water is a simple habit, and supplements are best guided by a test and a talk with your doctor.

Check water and nutrients

- [x] Starter: water at your desk for a week of reading
- [x] Middle: list any supplements you take and why
- [x] Advanced: ask your doctor whether a test for vitamin D, vitamin B12 or iron makes sense

Quick check:

How can you know whether you get enough vitamin D? Answer: a blood test. Should fact sheets replace medical advice? Answer: no.

6.4.1 Caffeine, Alcohol, Supplements and Other Substances

Coffee, energy drinks and pills promise more focus for longer reading. **Some substances have clear safety limits**, and others have no evidence behind their claims. This section sets out what the official reviews say.

The Attention book covers stimulants and focus in its section "Caffeine and Other Stimulants, Uses and Limits". **Here the focus is safe amounts** and the effect of caffeine on sleep.

Stimulants and focus





A cup of coffee on a desk beside a stack of reports, with an afternoon clock in the background.

Caffeine works against sleepiness. Adenosine is a chemical that **"helps make you feel sleepy. Caffeine counteracts sleepiness by blocking the actions of adenosine"** (National Institute of Neurological Disorders and Stroke, n.d.).

The European safety panel set clear limits. **"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"** (EFSA Panel on Dietetic Products, Nutrition and Allergies, 2015). The abbreviation mg/kg bw means milligrams per kilogram of body weight.

Caffeine safety limits (European panel)



> **Science Says:**
>
> Habitual caffeine, what you take day after day, **up to 400 mg per day does not give rise to safety concerns for non-pregnant adults**. For pregnant women the figure is 200 mg per day, and for children and adolescents the information is insufficient to derive a safe intake (EFSA Panel on Dietetic Products, Nutrition and Allergies, 2015).

Caffeine stays in the body for hours. The half-life, the time for half of it to leave the blood, is **"about 5 hours"** on average in healthy people, and it "may range between 1.5 and 9.5 hours" (Institute of Medicine, 2001). Some people clear it much faster than others.

How long caffeine stays



Half-life: time for half to leave the blood



About 5 hours on average in healthy people

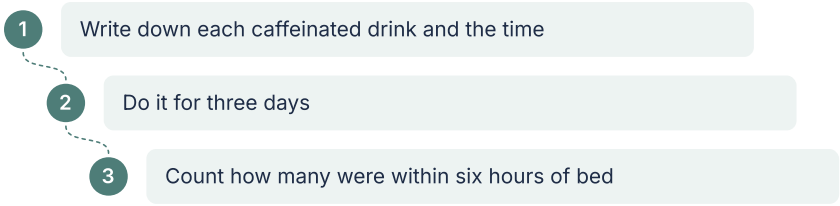


A range between people

Timing matters for sleep. In a lab study, **400 mg taken 0, 3 or 6 hours before bedtime each disrupted sleep**, and the authors support refraining from substantial caffeine "for a minimum of 6 hours prior to bedtime" (Drake et al., 2013). It is a single study at a high dose, so the evidence is mixed.

> Exercise:
>
> Try it. For three days, **write down each caffeinated drink** and the time you had it. Check how many were within six hours of bed.

Check your caffeine timing



Alcohol is simpler. Section 6.3.1 noted that the level of alcohol that minimised harm across health outcomes was zero, and the same study states that **"Alcohol use is a leading risk factor for global disease burden and causes substantial health loss"** (GBD 2016 Alcohol Collaborators, 2018).

A comment in the same journal carried the title **"No level of alcohol consumption improves health"** (Burton & Sheron, 2018). Keep alcohol away from reading and study days.

Alcohol and health



For supplements in general, Section 6.3.2 explained why a test and a talk with your doctor come first. **I make no claims for nootropics or microdosing**, pills and small doses of drugs sold to boost thinking, and I suggest you treat such claims with care.

Key Concept:

Know your limits. **Up to 400 mg of caffeine a day for non-pregnant adults**, none within six hours of bed and no alcohol before study.

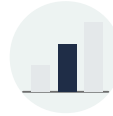
Know your limits



Up to 400 mg of caffeine a day



None within six hours of bed



No alcohol before study

Exercise:

Manage stimulants.

1. Starter. **Track your caffeine** for three days and add up the milligrams.
2. Middle. Stop caffeine at least six hours before bedtime for two weeks (Drake et al., 2013).
3. Advanced. Keep a month free of alcohol on study days, in line with the zero level that minimised harm (GBD 2016 Alcohol Collaborators, 2018).

Key idea:

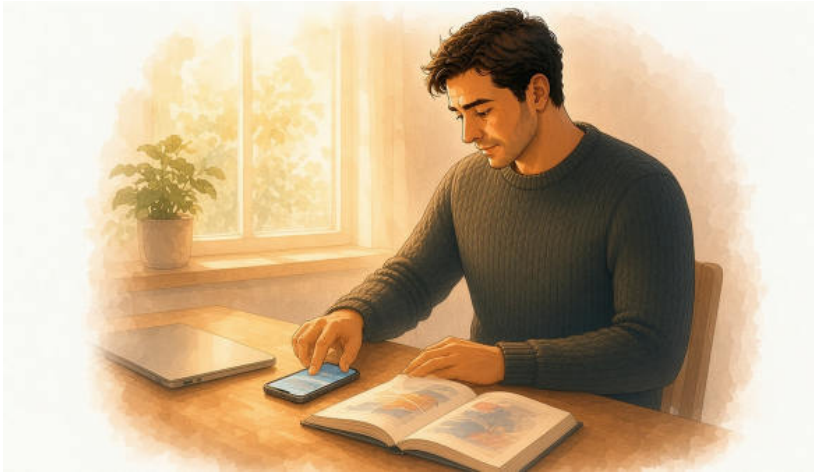
Keep caffeine within safe limits and early in the day, and skip alcohol and unproven pills.

Manage stimulants

- [x] Starter: track your caffeine for three days
- [x] Middle: no caffeine within six hours of bedtime for two weeks
- [x] Advanced: a month free of alcohol on study days

Quick check:

What is the average half-life of caffeine in healthy people? Answer: about 5 hours. How much habitual caffeine a day raises no safety concern for non-pregnant adults? Answer: up to 400 mg.



Module

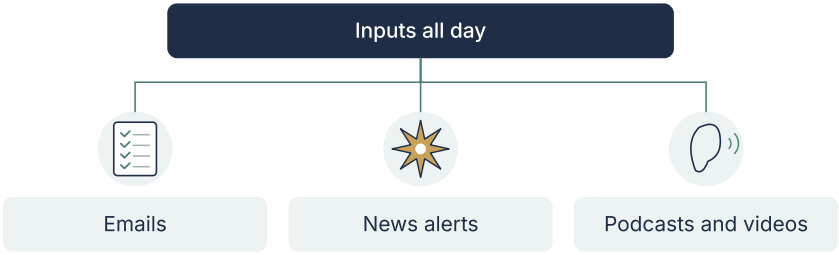
7

Keeping Extractivity Active Over Time

7.1.1 Too Much to Read, Hear and Watch

EMAILS, NEWS ALERTS, PODCASTS and videos arrive all day. **Keeping your extraction skills working** means managing that flow. This module looks at how to keep them active over months and years.

Managing the flow



Information overload is a studied idea. A review of research in organisation science, marketing, accounting and information systems covered **"the main definitions, situations, causes, effects, and countermeasures"** of information overload over "the last 30 years" (Eppler & Mengis, 2004). Countermeasures are the steps people take against it.



A phone screen crowded with notification badges, lying on a desk beside a laptop with a dozen open tabs.

The idea is older than the internet. In 1971, Simon argued that **"a wealth of information creates a poverty of attention"** and a need to allocate that attention efficiently (Simon, 1971). It is an argument and not a finding, and it names the problem this unit deals with.

Your own mind sets limits. Section 2.1.1 described how **focus gets worse when the load falls on working memory** (Lavie, 2010). Working memory is the small space where you hold and juggle facts for a few seconds.

A wealth of information (Simon, 1971)



> **Science Says:**
>
> In a study that logged the computers of 40 workers for two weeks, **the mean time between screen switches was 47.0 seconds**, and the median was 40.2 seconds (Mark et al., 2016). The median is the middle value. With 40 workers, the evidence is mixed.

You can work with that finding in mind. **Keeping fewer sources open at a time** is a practice choice built on it, and you can test it on your own working day.

Screen switching at work (40 workers)



Computers logged for two weeks



Mean time between switches: 47.0 seconds

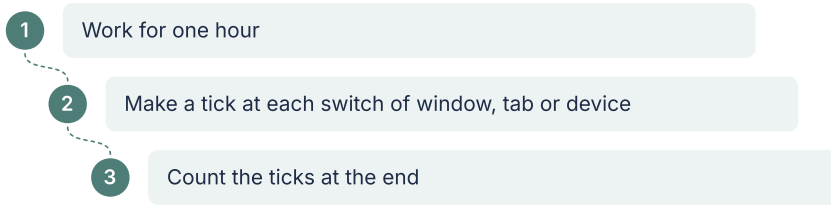


Fewer sources open: a practice choice

> **Exercise:**
>
> Try it. For one hour of work, **make a tick each time you switch** to a different window, tab or device. Count the ticks at the end.

Not everything needs close reading. Section 1.3.1 described how **skimming gives moderate comprehension** when full understanding is not the goal (Rayner et al., 2016), so skim those items and save close reading for the material you must understand or act on.

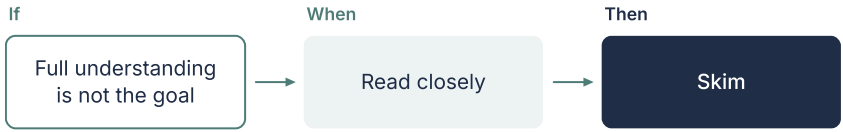
An hour of switch ticks



The rest of this unit turns these ideas into limits you can set. **The next section shows how to cut inputs** at the source, so less arrives in the first place.

> **Key Concept:**
>
> A wealth of inputs. **In Simon's argument, more information leaves less attention for each piece**, so choose fewer sources at a time.

Close reading or skim?



> **Exercise:**
>
> Take stock of your inputs.
>
> 1. Starter. **List every source of news, email and media** you checked yesterday.
> 2. Middle. Count your window switches for one hour, two days in a row.

3. Advanced. Mark each source on your list as read closely, skim or drop (Rayner et al., 2016), and drop one this week.

Key idea:

Simon (1971) argued that more information leaves less attention to go round, so choose your sources with care.

Take stock of your inputs

- [x] Starter: list every source of news, email and media you checked yesterday
- [x] Middle: count your window switches for one hour, two days in a row
- [x] Advanced: mark each source as read closely, skim or drop

Quick check:

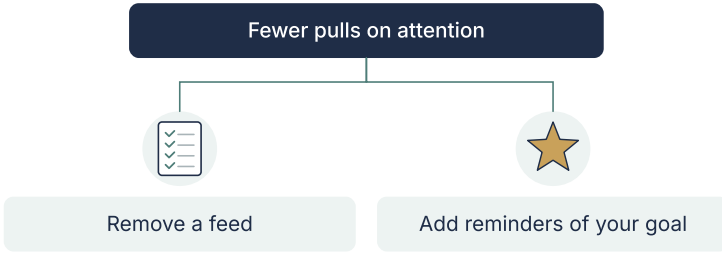
What was the mean time between screen switches in the study of 40 workers? Answer: 47.0 seconds. Was Simon's claim a research finding? Answer: no, it was an argument.

7.1.2 Setting Limits on Inputs

Once you see how much reaches you each day, the next step is to **let less of it in**. Limits work at the source, before an email or a feed has a chance to pull you away.

Small changes to your tools can help. **Removing a feed or adding reminders of your goal** are two of the simplest, and one study tested both.

Small changes to your tools



> **Science Says:**
>
> In a six-week study of 58 students, **goal reminders and a removed newsfeed both helped people stay on task** (Lyngs et al., 2020). The reminders were often annoying, and removing the feed made some fear missing out. It was a field experiment, a test in everyday life, with students, so the evidence is mixed.

Those side effects matter. **Pick changes you can live with**, and drop any that make you anxious.



Email is a large source of switching. Section 5.2.1 described how, when 13 workers went without email, **the average time on one window rose from 75.5 to 131.9 seconds** (Mark et al., 2012). Checking email at set times is one way to apply that, and the times are a practice choice.

> Exercise:
>
> Try it. Hide one news feed or turn off one set of notifications **for a week**. Note how often you missed it and whether you stayed on task.



A quick sort helps with what still arrives. **Sort each item into ignore, skim or read**, and read only the last pile closely. The sort is a practice choice, with no result claimed.

Daily caps are another option, such as a set number of articles or episodes. **Any cap or time window is a practice choice**, with no result claimed. Try one for a week and adjust it.



A kitchen timer next to a tablet, set for twenty minutes of news reading.

Review your limits now and then. **Keep the limits that help** and relax the ones that cost you more than they save.

> **Key Concept:**
>
> Limit at the source. **Remove feeds, set check times and sort what remains.**

Limit at the source

- Remove feeds
- Set check times
- Sort what remains

> **Exercise:**
>
> Set limits on inputs.
>
> 1. Starter. **Turn off one set of notifications** for a week.

2. Middle. Remove one newsfeed and add a goal reminder in its place (Lyngs et al., 2020).
3. Advanced. Check email only at set times, drawing on Mark et al. (2012), and note how long you stay on one task.

Key idea:

Fewer inputs at the source leave more attention for the material that matters.

Set limits on inputs

- [x] Starter: turn off one set of notifications for a week
- [x] Middle: remove one newsfeed and add a goal reminder
- [x] Advanced: check email only at set times

Quick check:

What helped students stay on task in the six-week study? Answer: goal reminders and a removed newsfeed. Is a daily cap on inputs a research finding? Answer: no, it is a practice choice.

7.2.1 Reading and Listening for Interest

THINK OF A TOPIC you read about for fun, with no test and no deadline. **That pull is curiosity at work**, and you can use it on purpose. This section looks at curiosity and motivation, and how to use them in your reading and listening.

Curiosity has been studied in the lab. One team defined it as **"intrinsic motivation to learn"**, the wish to learn for its own sake (Gruber et al., 2014). They used functional magnetic resonance imaging, a brain scan that tracks activity, to see how curiosity affects memory.

Curiosity in the lab



"Intrinsic motivation to learn"



Better memory for what people were curious about



Shown in immediate and one-day-delayed tests

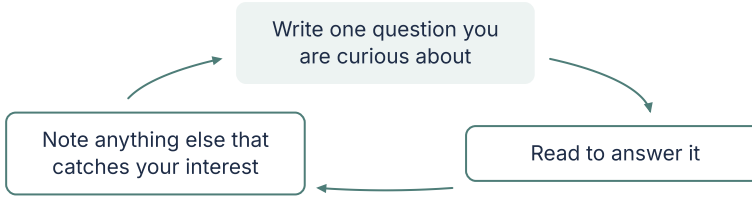


A woman curled up in an armchair, lost in a book about the deep sea, with a mug of tea going cold beside her.

> **Science Says:**
>
> In 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). Incidental material is what you meet by the way. It was a single brain-scan study, so the evidence is mixed.

The authors went on to **"highlight the importance of stimulating curiosity to create more effective learning experiences"** (Gruber et al., 2014). You can put that to work by starting with a question you want answered before you read or listen.

Read with a question



> **Exercise:**
>
> Try it. Before your next reading session, **write one question you are curious about** on the topic. Read to answer it, and note anything else that caught your interest on the way.

Motivation has a theory of its own. Self-determination theory names **"three innate psychological needs - competence, autonomy, and relatedness"** (Ryan & Deci, 2000). When these are met, self-motivation grows, and when they are blocked, motivation falls.

Three innate needs (self-determination theory)



In plain words, competence is feeling able, autonomy is feeling free to choose and relatedness is feeling connected to others. **You can link each need to a reading habit**, such as material you can manage, topics

you choose yourself and a friend to talk them over with. These habits are practice choices.

People differ in how curious they tend to be. One questionnaire, the Curiosity and Exploration Inventory, treats curiosity as **"a positive emotional-motivational system"** linked with seeking out novelty and challenge (Kashdan et al., 2004). It is a measure, so it tells you how curiosity was defined and scored.

How curious people tend to be



Mix required reading with chosen reading. **A topic you picked yourself** can sit beside the report you must read, and the choice of balance is a practice choice.

> **Key Concept:**
>
> Feed curiosity. **Start with a question, choose some of your own topics and share them** with others.

Feed your curiosity



Exercise:

Read for interest.

1. Starter. **Pick one topic you are curious about** and read one article on it this week.
2. Middle. Before each reading session, write a question you want answered, drawing on Gruber et al. (2014).
3. Advanced. Set up a regular talk with a friend about what you have each read, drawing on relatedness in self-determination theory (Ryan & Deci, 2000).

Key idea:

Curiosity helps memory, so feed it with questions and topics you choose.

Read for interest

- [x] Starter: one article on a topic you are curious about
- [x] Middle: a question before each reading session
- [x] Advanced: a regular talk with a friend about what you have each read

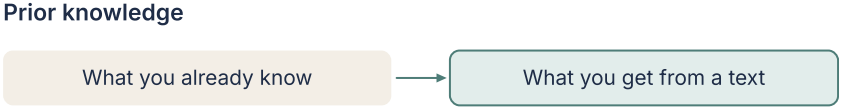
Quick check:

How did the study define curiosity? Answer: intrinsic motivation to learn. What are the three needs in self-determination theory? Answer: competence, autonomy and relatedness.

7.2.2 Building Confidence With Difficult Material

A HARD BOOK CAN MAKE you doubt yourself, even when you are learning well. **Effort and progress are easy to confuse**, and the research on difficulty helps sort them out. This section covers why some difficulty helps, how to judge your own understanding and how to build up to hard material.

What you already know shapes what you get from a text. Section 1.1.1 described how **prior knowledge made a clear difference** for strong and weak readers alike (Recht & Leslie, 1988). Reading a short, simple source on a topic before the hard one is a practice choice built on that finding.



Some difficulty is useful. Two memory researchers, the Bjorks, describe **desirable difficulties**, challenges that **"trigger encoding and retrieval processes that support learning, comprehension, and remembering"** (Bjork & Bjork, 2020). Encoding is taking information into memory, and retrieval is bringing it back out.

> **Science Says:**
>
> The Bjorks wrote that **"conditions of learning that make performance improve rapidly often fail to support long-term retention and transfer"**, while challenges often help both (Bjork & Bjork, 2020). Transfer means using what you learnt in a new setting. It is the authors' own review, so the evidence is mixed.

Desirable difficulties

Before	After
Easy conditions: rapid improvement that often fails to last	Useful difficulty: encoding and retrieval that support learning

On that view, **a session that feels hard is not a sign of failure**, and a session that feels easy is not proof of learning. The Bjorks stress that the word desirable matters, because some difficulties do not help.

Feeling that you understand is a weak guide. Section 3.4.1 described the **illusion of explanatory depth**, the gap between how well we think we can explain something and how well we can (Rozenblit & Keil, 2002). Explaining a topic aloud or on paper is a practice choice for testing where you stand.

Feeling you understand



A weak guide



The illusion of explanatory depth



Check by explaining without looking

> **Exercise:**
>
> Try it. After reading a hard chapter, **explain its main idea in five sentences** without looking. Then check the chapter and mark what you missed.

Build up to hard texts in steps. **Move from shorter, plainer sources to longer, denser ones** on the same topic over a few weeks. The steps are a practice choice.

Build up to hard texts



Comparing yourself with stronger readers can help or hurt. In one set of studies, **an upward comparison led to better performance only when people thought self-improvement was attainable** (van de Ven et al., 2011). When improvement seemed hard, it led to admiration and no motivation to do better.



A row of books on a shelf arranged from thin and simple on the left to thick and technical on the right.

Pick models within reach. **Compare yourself with someone a step or two ahead**, and that choice is a practice choice built on the finding.

> **Key Concept:**
>
> Useful struggle. **Some difficulty helps learning**, so judge progress by what you can explain and not by how easy it felt.

Judge progress well

- Some difficulty helps learning
- Judge by what you can explain
- Pick models a step or two ahead

> **Exercise:**
>
> Build confidence with hard material.
>
> 1. Starter. **Read a short, simple source** on a hard topic before the main text (Recht & Leslie, 1988).
> 2. Middle. After each hard chapter, explain its main idea without looking and check what you missed (Rozenblit & Keil, 2002).
> 3. Advanced. Choose a reader one step ahead of you, note what they do and set yourself a reachable goal (van de Ven et al., 2011).

Key idea:

Some difficulties help learning, so build up to hard material in steps you can reach.

Build confidence with hard material

- [x] Starter: a short, simple source on a hard topic before the main text
- [x] Middle: explain each hard chapter without looking, then check
- [x] Advanced: a reader one step ahead as a model and a reachable goal

Quick check:

What makes a difficulty desirable? Answer: it triggers processes that support learning, comprehension and remembering. When did upward comparison help performance? Answer: only when people thought self-improvement was attainable.

7.3.1 When You Read Without Taking Anything In

YOU REACH THE BOTTOM of a page and realise **you cannot say what it was about**. Your eyes moved, but your mind was elsewhere. This section looks at why that happens and what to do when it does.

The name for this is mind wandering, when your thoughts drift away from the task. Section 2.1.3 described how, in mind wandering, **the mind decouples from what the senses take in** (Smallwood & Schooler, 2015). The same review notes that mind wandering has costs as well as benefits.

Mind wandering



Eyes keep moving



The mind decouples from what the senses take in



You cannot say what the page was about

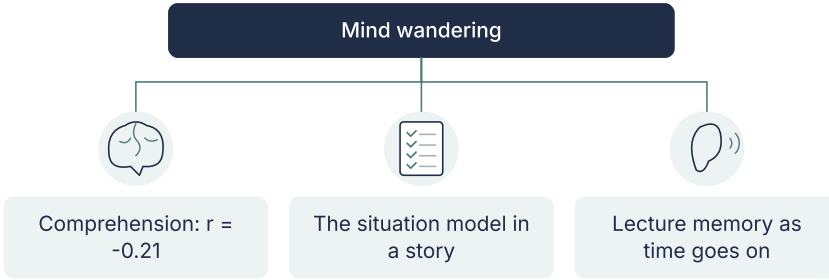


A student staring past an open book towards the window, a highlighter loose in one hand.

Section 2.1.1 described a meta-analysis, a study that combines the results of many studies, which found **a correlation of r = -0.21 between mind wandering and reading comprehension** (Bonifacci et al., 2023). A correlation, written r, measures how closely two things go together, and a negative value means more of one goes with less of the other.

> **Science Says:**
>
> In a detective story study, **"mind wandering interfered with the construction of the situation model"**, apart from how well readers recalled facts (Smallwood et al., 2008). The situation model is your mental picture of the story. Early lapses mattered most. The evidence from this lab study is mixed.

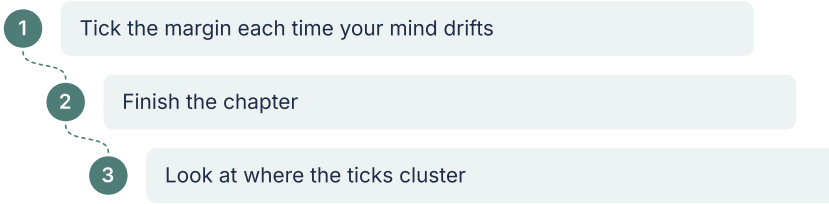
What mind wandering costs



Listening has the same problem. In a video lecture with students, **"mind wandering increases with time on task and memory for the lecture material decreases"** (Risko et al., 2012). The evidence is mixed.

> Exercise:
>
> Try it. Put a small tick in the margin **each time you notice your mind has drifted** during a chapter. Look at where the ticks cluster.

Map your drift



When you catch a lapse, **go back to the last point you can recall** and read on from there. That way you pick up the thread without starting the whole chapter again.

Rereading a whole chapter to study is a different matter. **Rereading rates low utility as a study method** (Dunlosky et al., 2013), and

utility here means usefulness. Recalling the main points from memory at the end of a chapter has strong support (Roediger & Karpicke, 2006; Adesope et al., 2017).

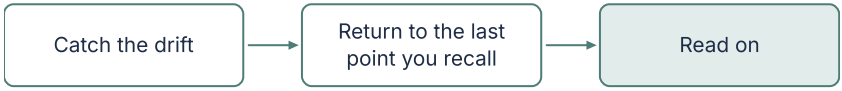
Two kinds of going back

	Go back to the last point you recall	Reread the whole chapter
When	After a lapse	To study
Value	Picks up the thread	Low utility

Early lapses mattered most in the detective story study. **Take extra care at the start of a text**, and use a short break or a question to settle in. Both are practice choices.

> **Key Concept:**
>
> Notice and go back. **Catch the drift, return to the last point you recall** and read on.

Notice and go back



> **Exercise:**
>
> Work through a blank page.
>
> 1. Starter. **Tick the margin** each time you notice drifting in one chapter.

2. Middle. When you tick, go back to the last point you can recall and reread from there (Schotter et al., 2014).
3. Advanced. At the end of the chapter, recall the main points from memory before checking them (Roediger & Karpicke, 2006).

Key idea:

Mind wandering costs comprehension, so notice it, go back and read on.

Work through a blank page

- [x] Starter: tick the margin each time you notice drifting
- [x] Middle: at each tick, go back to the last point you recall
- [x] Advanced: recall the main points from memory at the end of the chapter

Quick check:

What did mind wandering harm in the detective story study? Answer: the situation model, the reader's mental picture of the story. What happened to mind wandering during the lecture? Answer: it increased with time on task.

7.3.2 Restarting After a Break From Study

Illness, a new job or a busy season can stop your reading habit for weeks. **A planned restart** gets you back on track, and this section looks at studies of habits, skills and forgetting, and at how to plan a restart.

A missed day is not the end of a habit. Section 4.9.3 described how, in a study of habit forming, **missing one opportunity to perform the behaviour did not materially affect the habit formation process** (Lally et al., 2010).

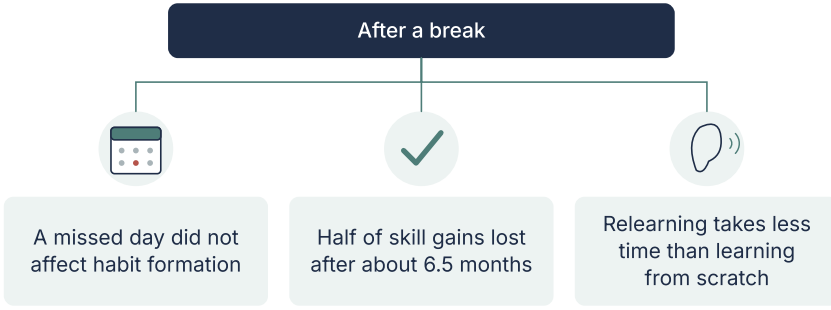


A dusty notebook and a library book with an overdue slip, pulled out from the back of a drawer.

Skills do fade with disuse. In a meta-analysis of 1,344 effect sizes from 457 reports, **half of the gains in accuracy were lost after about 6.5 months without use** (Tatel & Ackerman, 2025). An effect size is a number for how big a change is.

That review covered procedural skills, ways of doing things, with motor parts that use the body, and not reading. **Treat it only as a reminder that skills fade with disuse**, and not as a forecast for your own reading after a break.

What fades and what remains

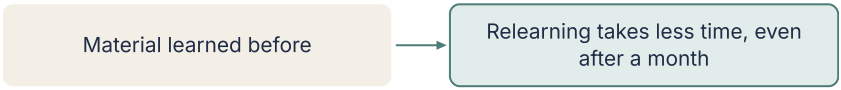


> **Science Says:**
>
> A repeat of the memory researcher Ebbinghaus's work had one subject spend 70 hours learning nonsense syllables, made-up sounds with no meaning (Murre & Dros, 2015). It measured **savings, how much less time relearning took**. Savings were about 58% after 20 minutes, 34% after a day and 21% after 31 days. With one subject, the evidence is mixed.

Savings mean that **relearning takes less time than learning from scratch**, even after a month. The material was nonsense syllables and

not real text, so these figures show the pattern and give no forecast for a book you read last year.

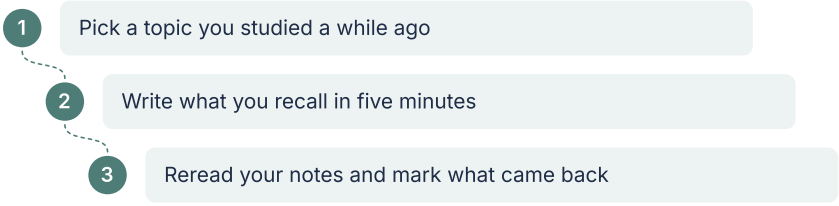
Savings



> Exercise:
>
> Try it. Pick a topic you studied a while ago. **Write down what you can recall** in five minutes, then reread your notes and mark what came back.

Rebuild through recall. Section 3.4.3 described how **practice tests beat restudy and other conditions** (Roediger & Karpicke, 2006; Adesope et al., 2017). Successive relearning builds on that by recalling material to a set standard, then relearning it across sessions (Rawson et al., 2013), and the evidence for it is mixed.

Test what came back



Size the restart to fit. **Begin with short sessions** and add length over the following weeks. The number of days and the amount of reading are a practice choice, with no result claimed.

Key Concept:

Restart with recall. **One missed day does not undo a habit**, and relearning builds on what remains.

Restart with recall



One missed day does not undo a habit



Relearning builds on what remains



Start with short sessions

Exercise:

Plan a restart.

1. Starter. **Book three short reading sessions** in your first week back.
2. Middle. Begin each session by recalling what you knew before you reread (Roediger & Karpicke, 2006).
3. Advanced. Test yourself on key points across several sessions until you recall them well, relearning what you miss (Rawson et al., 2013).

Key idea:

A break is not the end, so restart small and rebuild through recall.

Plan a restart

- [x] Starter: three short reading sessions in your first week back
- [x] Middle: begin each session by recalling what you knew
- [x] Advanced: test yourself across sessions until you recall key points well

Quick check:

What did the repeat of Ebbinghaus's work measure? Answer: savings, how much less time relearning took. Did missing one opportunity materially affect habit formation? Answer: no.

7.4.1 Habits, Places and Times for Focused Intake

DEEP READING AND LISTENING last when they become part of your week and not something you squeeze in. **Repeating a behaviour in the same setting** helps it become a habit, and this section looks at how to build one for focused intake.

Section 4.9.3 described a study in which **the median time to reach 95% of a habit's plateau was 66 days**, with a range from 18 to 254 days (Lally et al., 2010). The plateau is the level where a habit stops getting stronger. Of its 96 volunteers, 82 gave enough data for analysis.

How long a habit takes



Median: 66 days to reach 95% of the plateau



A wide range between people



No fixed day count applies to you

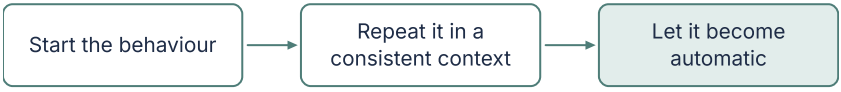


A man reading in the same corner chair by a lamp, with a cup of coffee on the side table, as he does every morning.

That wide range means **no fixed day count applies to you**. The same study found that missing one opportunity did not materially affect habit formation (Lally et al., 2010), so a missed day is no reason to stop.

The setting matters. A review of habit formation advises starting the behaviour, **repeating it in a consistent context** and letting it become automatic (Lally & Gardner, 2013). For reading, that means the same chair, the same time or the same cue, such as after breakfast.

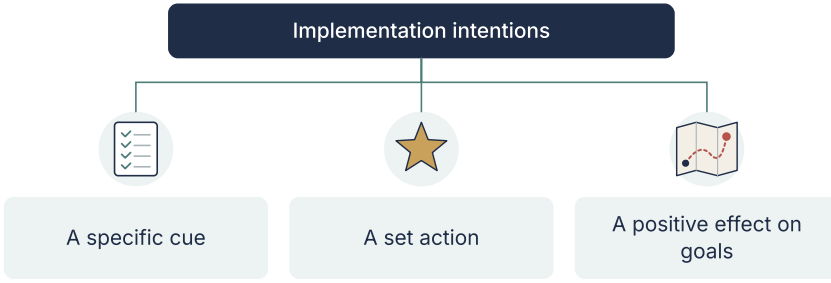
Forming a habit



> **Science Says:**
>
> A meta-analysis pooled 94 tests of implementation intentions, **if-then plans that link a cue to an action**. They had a positive effect of medium-to-large size on reaching goals, with d = .65 (Gollwitzer & Sheeran, 2006). The value d is an effect size, a number for how big a change is.

An implementation intention for reading might be **"If I sit down on the train home, then I open my book."** The cue is specific, and the action is small enough to start at once. Writing the plan down is a practice choice.

If-then plans (94 tests)



> **Exercise:**
>
> Try it. **Write one if-then plan** for reading or listening this week. Name the cue, the place and the first action.

Track what you do. Section 4.9.3 described how **prompting people to monitor their progress improved goal attainment** (Harkin et al., 2016), and a tick on a calendar is one simple way to monitor reading.

Track what you do



The best time and place depend on you. **Choose a time and place that fit your own schedule**, such as early morning at home or the commute. That choice is a practice choice.

> **Key Concept:**
>
> Same cue, same place. **Link reading to a set cue and setting**, and plan it with if-then.

Same cue, same place



A set cue



A set setting



An if-then plan

> **Exercise:**
>
> Build a reading habit.
>
> 1. Starter. **Choose one cue and one place** for daily reading, such as after breakfast at the kitchen table.
> 2. Middle. Write an if-then plan and keep it where you will see it (Gollwitzer & Sheeran, 2006).

3. Advanced. Tick a calendar each day you read, and note when the habit starts to feel automatic (Harkin et al., 2016).

Key idea:

Habits grow from a stable cue and setting, with if-then plans and tracking to help them along.

Build a reading habit

- [x] Starter: one cue and one place for daily reading
- [x] Middle: an if-then plan where you will see it
- [x] Advanced: tick a calendar each day you read

Quick check:

What was the median time to reach 95% of a habit's plateau in one study? Answer: 66 days. What effect did implementation intentions have on reaching goals? Answer: a medium-to-large positive effect, d = .65.



Module

8

Extractivity at Different Ages

8.1.1 Learning to Read, Listen and Look

Extraction skills change across a lifetime, and this module follows them from childhood to later life. **Childhood is where reading begins**, and if you help a child with reading, this section covers studies of the early steps.



Learning to read starts with letters and sounds. A major review traces reading **"from children's earliest alphabetic skills through to the fluent word recognition and skilled text comprehension characteristic of expert readers"** (Castles et al., 2018). Fluent here means smooth and without effort.

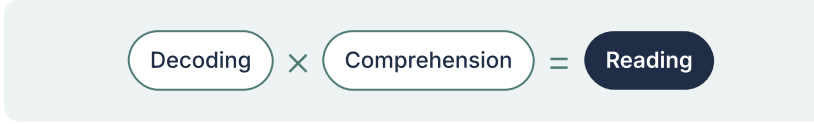


A father and his young daughter sitting on a sofa, his finger under the words of a picture book as she sounds them out.

The same review explains **why phonics instruction is so central** in a writing system such as English (Castles et al., 2018). Phonics teaches the links between letters and sounds. The authors also move beyond phonics, to word recognition and understanding text.

Section 1.1.2 described the simple view of reading, in which **"reading equals the product of decoding and comprehension"** (Gough & Tunmer, 1986). Decoding is turning written words into sounds, and comprehension is understanding the language, so a child needs both.

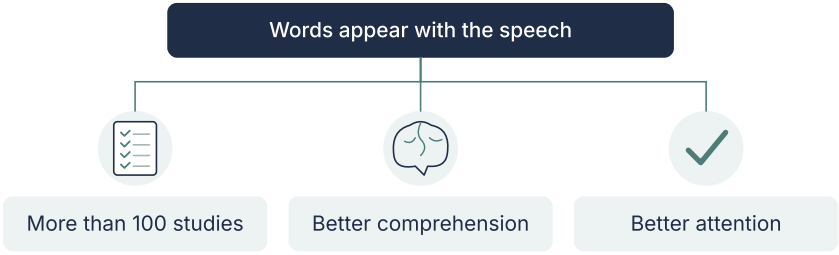
Reading as a product



> **Science Says:**
>
> A review states that **"More than 100 empirical studies document that captioning a video improves comprehension of, attention to, and memory for the video"** (Gernsbacher, 2015). Captions are particularly beneficial for children and adults learning to read. The count of studies is the author's own, so the evidence is mixed.

Captions are an easy change at home. **Turn on the captions** when a child watches a video, so the words appear with the speech. When to start is a practice choice.

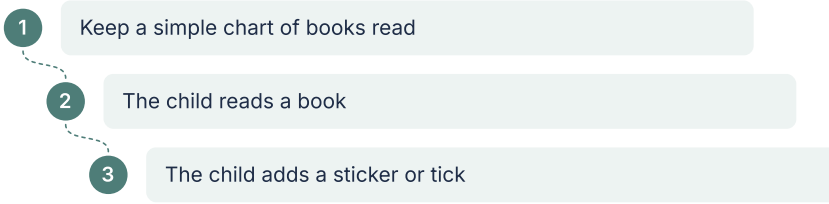
Captions for children



Practice and progress go together. In a study of children learning subtraction, **monitoring progress raised self-efficacy, skill and persistence** compared with no monitoring (Schunk, 1982). Self-efficacy is belief in your own ability. The results did not differ whether the child or an adult did the monitoring, and the study was in maths and not reading, so the evidence is mixed.

> Exercise:
>
> Try it. Keep a simple chart of **books a child has read**, and let the child add a sticker or tick after each one. The chart is a practice choice.

A reading chart



Effort has its place. Among children preparing for a national spelling contest, **deliberate practice, studying words alone, predicted performance** better than being quizzed or reading for pleasure (Duckworth et al., 2011). The spellers rated it the most effortful and least enjoyable activity, and this one sample of top young spellers counts as mixed evidence.

Paper or screen matters for some texts. Section 6.1.2 described a meta-analysis, a study that combines the results of many studies, that found **a small advantage for reading on paper** (Delgado et al., 2018), and a second one agreed (Clinton, 2019). These results came from readers of all ages, and not from children alone.

Paper or screen by kind of text

Kind of text	Effect size (g)
Expository texts	-.32
Stories	-.04

The gap depends on the kind of text. One meta-analysis reported g = -.32 for expository texts, which explain facts and ideas, and g = -.04 for stories (Clinton, 2019). **The value g is an effect size**, a number for how big a difference is, and a minus sign here means paper came out ahead.

How long a child should read, listen or watch each day is **a practice choice, with no result claimed**, so fit reading time to the child and the day. Watch how the child responds and adjust from there.

Sounds and meaning



Phonics is central



Understanding grows alongside it



Reading time fits the child

> **Key Concept:**
>
> Sounds and meaning. **Phonics is central, and understanding grows** alongside it.

> **Exercise:**
>
> Support a young reader.
>
> 1. Starter. **Turn on captions** for a child's next video (Gernsbacher, 2015).
> 2. Middle. Keep a tick chart of books read, and let the child fill it in (Schunk, 1982).
> 3. Advanced. Print a factual text for the child to read on paper, and talk through what it explains (Clinton, 2019).

Support a young reader

- [x] Starter: turn on captions for a child's next video
- [x] Middle: a tick chart of books read, filled in by the child
- [x] Advanced: a factual text on paper, talked through together

Key idea:

Phonics, captions and steady practice support children as they learn to read, listen and look.

Quick check:

What does phonics teach? Answer: the links between letters and sounds. Who did the monitoring in the subtraction study? Answer: the child or an adult, and the results did not differ.

8.2.1 Study Skills and Screens

THE TEENAGE YEARS BRING exams, longer texts and a phone in every pocket. **Good study habits** matter more as the work grows, and this section looks at study methods and at studies of screens and teen wellbeing.

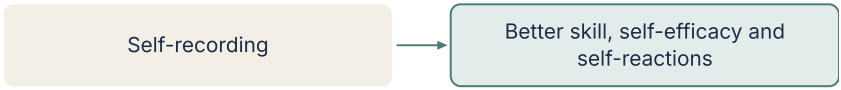
Exams are where your choice of study method matters most. **Put your exam study time into practice tests and away from highlighting** (Roediger & Karpicke, 2006; Adesope et al., 2017; Dunlosky et al., 2013). A practice test can be as simple as covering your notes and writing down what you remember.



Self-recording has been tested. In one study, **self-recording improved skill, self-efficacy and self-reactions** in 90 high-school girls learning to throw darts (Zimmerman & Kitsantas, 1997). Self-recording is noting each attempt and its result, self-efficacy is belief in your own ability, and self-reactions are how you feel about your own results.

That task was dart throwing, so the study counts only as mixed support for keeping records. **A study log** of what was tested and what was missed is a practice choice built on it.

Self-recording (90 high school students)



> Exercise:
>
> Try it. After a lesson, **close the book and write three things you learnt** from memory. Then check them and add what you missed.

Brain training is a separate question. Section 1.3.2 described how working memory training gives **short-term gains on the trained task** that do not spread to other tasks (Melby-Lervåg & Hulme, 2013). Working memory is the small space where you hold and juggle facts for a few seconds, and gains in verbal tasks did not last to follow-up.

Two cautions for students

	Working memory training	Laptop notes
Finding	Short-term gains on the trained task	Worse on conceptual questions

For notes, Section 2.3.3 described how **students who took notes on laptops did worse on conceptual questions**, which test ideas and not facts, and tended to copy lectures word for word (Mueller & Oppenheimer, 2014). Later replications are mixed, so the pen advantage is not settled.



Two teenagers on a park bench, one reading a paperback and the other scrolling a phone.

Screens and teen wellbeing are studied a lot. **Most of this research is correlational**, meaning it shows which things go together and not what causes what.

> **Science Says:**
>
> A review of reviews found **conflicting small positive, negative and null associations** between technology use and teen mental health (Odgers & Jensen, 2020). The most rigorous preregistered studies, which publish their plans before collecting data, found small associations unlikely to be of clinical or practical significance.

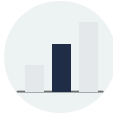
Screens and teen mental health



Trends over time point the same way. Across three national samples, **there was little evidence that the associations are increasing overall** (Vuorre et al., 2021). The link between technology use and depression weakened over the decade, while the link between social media and emotional problems grew stronger.

One study looked at how teens use social media. Among 619 students, **technology-based social comparison and feedback-seeking were associated with depressive symptoms**, particularly among those low in popularity (Nesi & Prinstein, 2015). Associated means they went together, and it does not show cause.

Test, record and keep perspective



Practice tests: strong support



A study log of what you tested



Screen links: small

> **Key Concept:**
>
> Test, record and keep perspective. **Practice tests have strong support**, and screen links are small.

> **Exercise:**
>
> Build study skills for exams.
>
> 1. Starter. **Swap one highlighting session for a practice test** (Roediger & Karpicke, 2006).
> 2. Middle. Keep a study log of what you tested and what you missed (Zimmerman & Kitsantas, 1997).

3. Advanced. Note when you compare yourself with others online and how you feel afterwards, and talk it over with someone you trust (Nesi & Prinstein, 2015).

Build study skills for exams

- [x] Starter: swap one highlighting session for a practice test
- [x] Middle: a study log of what you tested and what you missed
- [x] Advanced: note how you feel after comparing yourself with others online

Key idea:

Testing and record keeping build study skills, and the links between screens and teen mental health are small.

Quick check:

What did working memory training improve? Answer: the trained task, for a short time. How large were the associations in the most rigorous screen studies? Answer: small, and unlikely to be of practical significance.

8.3.1 Work, Learning and Busy Lives

Adult life fills up with work, family and the rest. **Learning still goes on**, and this section looks at how thinking changes through adulthood and how to keep learning when time is short.

Different abilities peak at different ages. In data from 48,537 online participants and test norms, **"some abilities plateau in early adulthood"** and begin to decline in the 30s, while others do not peak until the 40s or later (Hartshorne & Germine, 2015).

Abilities across adulthood (48,537 participants)



Some abilities plateau in early adulthood



Others peak later



Cross-sectional data can overestimate decline



A woman on a crowded commuter train reading a paperback, her work bag on her lap.

Those data are cross-sectional, meaning different people were tested at different ages, so they do not show how one person changes. **Cross-sectional data can "overestimate decline"**, because of differences in education between generations (Singh-Manoux et al., 2012).

Sustained attention has its own peak. Among 10,430 people who took an online attention test, **sustained attention peaked in the early 40s**, while strategy became more cautious with age (Fortenbaugh et al., 2015). Sustained attention is the ability to stay focused over time, and this cross-sectional study counts as mixed evidence.

Rate your work skills

1. List three skills you use at work
2. Mark each as rising, steady or slipping
3. Pick one to test yourself on this month

> **Exercise:**
>
> Try it. List three skills you use at work and **mark each one as rising, steady or slipping** in your own view. Pick one to test yourself on this month.

Following the same people over time gives a different view. In 7,390 civil servants aged 45 to 70, tested three times over 10 years, **all cognitive scores except vocabulary declined**, and the authors wrote that decline is "already evident in middle age" (Singh-Manoux et al., 2012). Cognitive means to do with thinking, such as memory and reasoning.

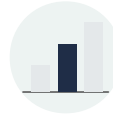
Following the same people



7,390 civil servants aged 45 to 70



Tested three times over 10 years



All scores except vocabulary declined

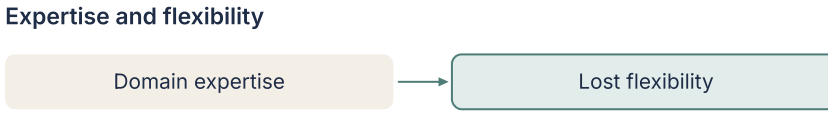
> **Science Says:**
>
> In a study of 733 people who had learned Spanish at school, **retention declined for the first 3 to 6 years and then remained unchanged for periods of up to 30 years** (Bahrick, 1984). What lasted was "a function of the level of original training". It was a cross-sectional study of one subject area, so the evidence is mixed.

For busy adults, that finding supports **learning it well the first time**. Testing yourself on a key topic until you can explain it is a practice choice built on it.



One theory sees a risk in experience. A theory paper argues that **"as one acquires domain expertise, one loses flexibility"** in problem solving, adaptation and new ideas (Dane, 2010). It calls this cognitive entrenchment, a high level of stability in how an expert sees their field. It is a theory and not a finding.

Reading outside your field is one practice choice in response. **A book a season from another area** is a simple way to try it.



A habit tied to a set cue suits a busy week. **A fixed slot such as the commute** can carry your reading. Section 4.9.3 described how the median time to reach 95% of a habit's plateau was 66 days in one study (Lally et al., 2010).

> 🗝 **Key Concept:**
>
> Learn deeply, read widely. **Master what matters**, and reach outside your field.

Learn deeply, read widely

- Master what matters
- A book a season from another area
- A fixed slot such as the commute

Exercise:

Keep learning through busy years.

1. Starter. **Pick one daily cue for reading**, such as the commute (Lally et al., 2010).
2. Middle. Test yourself on one key work topic until you can explain it without notes (Bahrick, 1984).
3. Advanced. Read one book a season from outside your field and note any idea you can use at work (Dane, 2010).

Key idea:

What you learn well tends to last, so master what matters and read outside your field now and then.

Keep learning through busy years

- [x] Starter: one daily cue for reading, such as the commute
- [x] Middle: test yourself on one key work topic until you can explain it
- [x] Advanced: one book a season from outside your field

Quick check:

What does cross-sectional mean? Answer: different people tested at different ages. What did Bahrick find shaped what lasted? Answer: the level of original training.

8.4.1 Changes in Vision, Hearing and Processing Speed, and What Helps

Later life brings changes to the eyes, the ears and the pace of thinking. **Some of them can be eased**, and this section looks at studies of these changes and of what helps.

One theory puts processing speed at the centre. It holds that **"increased age in adulthood is associated with a decrease in the speed with which many processing operations can be executed"** (Salthouse, 1996). Processing speed is how quickly the mind handles each mental step, and the theory rests on correlations, so the evidence is mixed.

What changes with age

	Processing speed	Vocabulary
With age	Slows for many operations	Older adults ahead by 0.80 SD

Some things grow with age. A meta-analysis, a study that combines the results of many studies, pooled 210 articles and found **an average effect favouring older adults of 0.80 SD on vocabulary tests** (Verhaeghen, 2003). SD stands for standard deviation, a measure of

spread. The data compare different people at different ages, so they are cross-sectional.

In 156 adults with a mean age of 84.9, **visual and auditory acuity accounted for 49.2% of the total variance in intelligence** (Lindenberger & Baltes, 1994). Acuity means sharpness, and variance is the spread in scores. **This is a link in one sample**, and not proof that fixing the senses fixes thinking.

Sight, hearing and intelligence



156 adults, mean age 84.9



Acuity accounted for 49.2% of variance



A link in one sample only

> Exercise:
>
> Try it. **Book an eye test or a hearing check** if you have not had one in the past two years, and note any changes the tester suggests. The timing is a practice choice.

Hearing loss has been linked with later decline. A meta-analysis of 36 studies found that hearing loss was associated with dementia, with an odds ratio of 1.28 (Loughrey et al., 2018). **An odds ratio above 1 means higher odds** in the group with hearing loss, and these were observational studies, which watch people without changing anything.

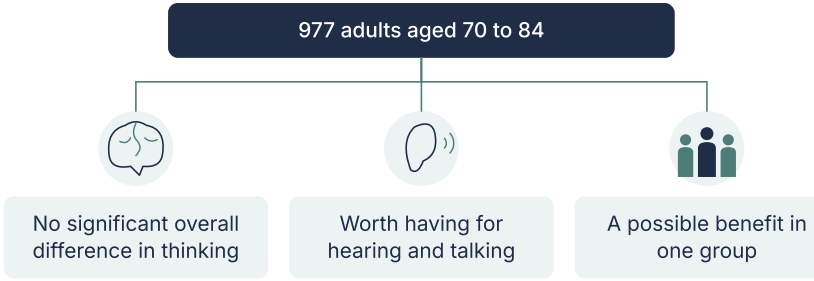
Check your senses

1. Book an eye test or a hearing check
2. Note any changes the tester suggests
3. Use any aids you are given

> **Science Says:**
>
> In the ACHIEVE trial, a randomised trial with groups assigned by chance, of 977 adults aged 70 to 84 with untreated hearing loss, hearing aids made **no significant difference to 3-year change in thinking overall** (Lin et al., 2023). Significant here means bigger than chance could explain. Any benefit was in a higher-risk subgroup.

Hearing aids are still worth having for hearing and talking with others. **Their effect on thinking is unproven**, apart from a possible benefit in the higher-risk subgroup. That subgroup was a smaller group within the trial, who were older and had more risk factors for decline.

Hearing aids (ACHIEVE trial)



Cataract surgery shows the same caution. In 3,038 people, cataract removal was **significantly associated with lower dementia risk**, with a hazard ratio of 0.71 (Lee et al., 2022). A hazard ratio below 1 means a lower rate over time. It was an observational study, so it does not show that the surgery prevents dementia.

Table: Sight, hearing and thinking in later life

Topic	What the study found	Type of study
Hearing loss	Linked with dementia, odds ratio 1.28 (Loughrey et al., 2018)	Meta-analysis of observational studies
Hearing aids	No significant overall difference in 3-year change in thinking (Lin et al., 2023)	Randomised trial
Cataract surgery	Linked with lower dementia risk, hazard ratio 0.71 (Lee et al., 2022)	Observational study

Training can help the skills it trains. Section 1.3.2 described the ACTIVE trial of **2,832 adults aged 65 to 94**, where training effects lasted two years (Ball et al., 2002). At ten years, reasoning and speed-of-processing training kept their effect on the trained skills, while memory training effects "were no longer maintained" (Rebok et al., 2014).

Mental activity is a separate question. A review found **little evidence that the rate of mental ageing is moderated by mental activity** (Salthouse, 2006). Moderated means changed, so active people may function at a higher level without declining more slowly.



An older man at a table with a camera and a laptop, sorting photographs from a course he has joined.

Learning something demanding showed a gain in one trial. Older adults who learned quilting or digital photography for **16.51 hours a week for 3 months** showed improved episodic memory, memory for events and experiences (Park et al., 2014). Social activities alone gave limited benefits, and with a short follow-up the evidence is mixed.

How you read can be adjusted. **Larger print, better light and a comfortable listening pace** are practice choices, and the right settings are yours to judge.

Adjust how you read



Key Concept:

Look after the senses. **Check sight and hearing, learn demanding new skills** and adjust how you read.

Exercise:

Support reading in later life.

1. Starter. **Try a larger print size** on your e-reader or phone for a week.
2. Middle. Book a sight and hearing check, and use any aids you are given (Lin et al., 2023).
3. Advanced. Learn a demanding new skill, such as quilting or digital photography, for about 16.5 hours a week over 3 months, as in Park et al. (2014).

Support reading in later life

- [x] Starter: a larger print size on your e-reader or phone for a week
- [x] Middle: a sight and hearing check, using any aids you are given
- [x] Advanced: a demanding new skill for about 16.5 hours a week over 3 months

Key idea:

Check your senses and keep learning, and expect training to help mainly the skills it trains.

Quick check:

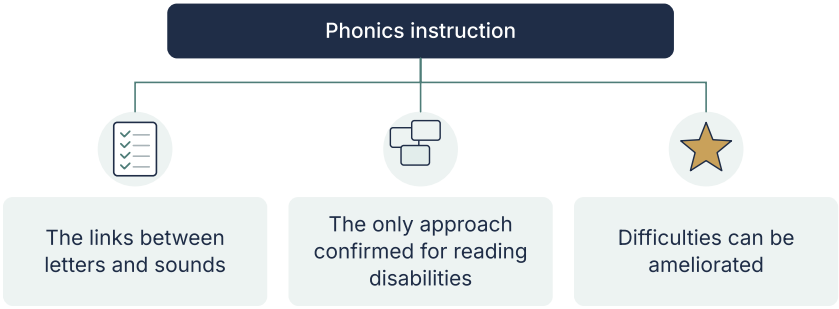
Did hearing aids slow decline in thinking overall in the ACHIEVE trial? Answer: no, there was no significant difference overall, and any benefit was in a higher-risk subgroup. Which training kept its effect at ten years? Answer: reasoning and speed-of-processing training, on the trained skills.

8.5.1 Dyslexia, Hearing Differences and Other Needs

READERS DIFFER IN MORE ways than age. **Some people meet extra hurdles** with print or sound, and this section looks at dyslexia, hearing differences and the tools that can help. Diagnosis and treatment are for qualified professionals, so take any concerns to one.

Dyslexia brings difficulty with reading and spelling, and the research on treatment points one way. **Phonics instruction teaches the links between letters and sounds**, and it has been studied more than any other approach for children and teenagers with reading disabilities.

Dyslexia and phonics



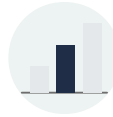
> **Science Says:**
>
> A meta-analysis, a study that combines the results of many studies, pooled 22 randomised controlled trials, which assign people to groups by chance. Phonics was **"the only approach whose efficacy on reading and spelling performance in children and adolescents with reading disabilities is statistically confirmed"** (Galuschka et al., 2014). Statistically confirmed means the effect was bigger than chance could explain.

The authors were hopeful. They wrote that **"severe reading and spelling difficulties can be ameliorated with appropriate treatment"**, which means they can be eased (Galuschka et al., 2014).

Coloured overlays and lenses



Only four of 49 comparisons



A small share of the evidence

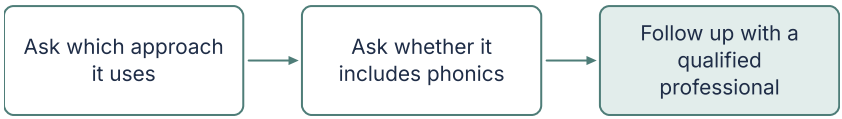


Phonics remains the confirmed approach

Coloured overlays and lenses are another approach. Of the 49 comparisons in the same meta-analysis, **only four tested coloured overlays or lenses**, so they had a limited test (Galuschka et al., 2014). The mean effects of the approaches other than phonics did not reach statistical significance.

> **Exercise:**
>
> Try it. If you support a child with reading difficulties, **ask the school which approach it uses** and whether it includes phonics.

Ask the school



Dyslexia is sometimes linked with artistic gifts. One paper notes that **"It is widely held opinion that dyslexia is associated with remarkably artistic creativity"**, and that very few objective studies confirm it (Wolff & Lundberg, 2002). Each person's strengths are their own.

Section 8.1.1 described a review that found captions **particularly beneficial for persons who are D/deaf or hard of hearing** (Gernsbacher, 2015), and the evidence is mixed. Text-to-speech, audiobooks and extra time are other access tools. They are practice choices, with no result claimed, and they sit alongside treatment and not in place of it.



A woman watching a lecture video on a laptop with captions turned on, a notebook beside her.

Hearing and sight matter across a whole population. A Lancet commission on dementia estimated that **hearing loss in midlife accounts for about 7% of dementia cases, and untreated vision loss in later life about 2%** (Livingston et al., 2024). These are modelled estimates for whole populations, and not a measure of your own risk.

The commission's advice includes **"Make hearing aids accessible for people with hearing loss"** and "Make screening and treatment for vision loss accessible for all" (Livingston et al., 2024). Using the aids you are offered is a practice choice built on that advice.

Support and access

- Phonics for reading disabilities
- Captions for D/deaf or hard of hearing readers
- Hearing aids and eye care made accessible

Key Concept:

Support and access. **Phonics is the confirmed approach for reading disabilities**, and captions and other tools open up access.

Exercise:

Support readers with extra needs.

1. Starter. **Turn on captions** for your next video and notice what changes (Gernsbacher, 2015).
2. Middle. Try text-to-speech or an audiobook alongside the print version of one text.

3. Advanced. If you support a child with reading difficulties, ask a qualified professional about phonics-based help (Galuschka et al., 2014).

Support readers with extra needs

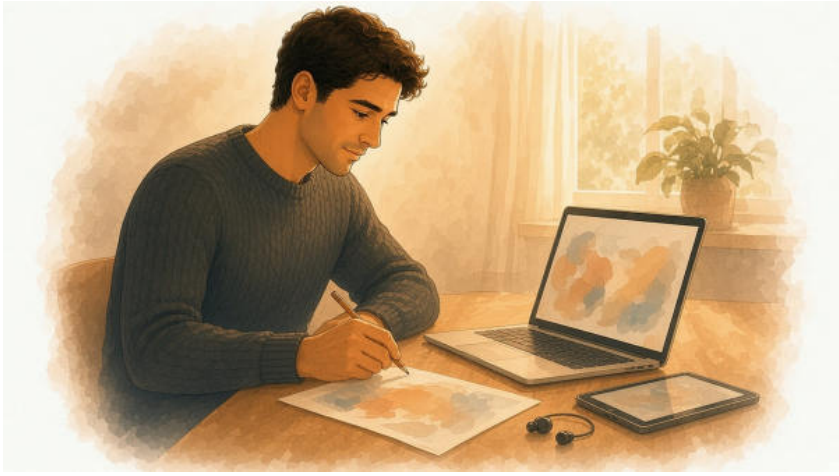
- [x] Starter: captions on for your next video
- [x] Middle: text-to-speech or an audiobook alongside the print
- [x] Advanced: ask a qualified professional about phonics-based help for a child

Key idea:

Phonics is the only approach confirmed for reading disabilities, and captions, aids and access tools open other routes into text.

Quick check:

Which approach was statistically confirmed for reading disabilities? Answer: phonics instruction. How many comparisons tested coloured overlays or lenses? Answer: four.



Module

9

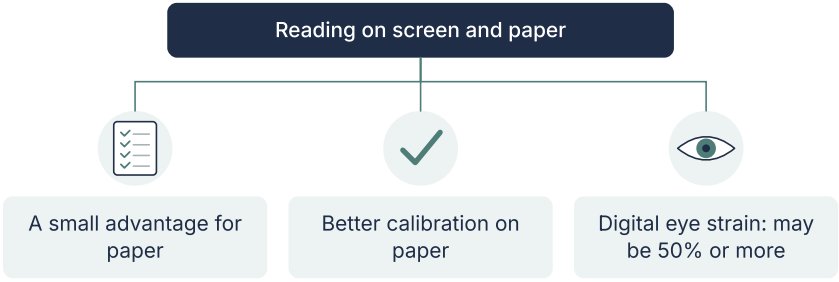
Technology, AI and Cleverini Games

9.1.1 Paper, Screens and Audio: What Changes

Much of what you read now arrives on a screen, and much of what you hear comes through earphones. **The format can change what you take in**, and this module looks at screens, apps, AI tools and the Cleverini games. This section compares paper, screens and audio.

Section 8.1.1 described **a small advantage for reading on paper** across two meta-analyses, studies that combine the results of many studies (Delgado et al., 2018; Clinton, 2019). The first one pooled 171,055 participants, and its advantage for paper did not hold when only stories were read (Delgado et al., 2018).

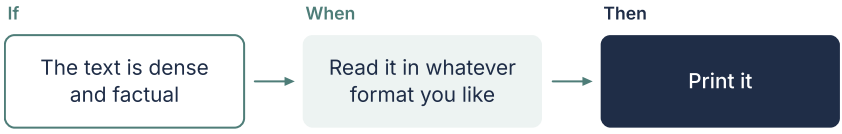
Paper and screen



> **Science Says:**
>
> In one meta-analysis, **readers were better calibrated on paper than on screens** (Clinton, 2019). Calibration means how closely your confidence matches your score. The same analysis found a larger paper advantage for expository texts, which explain facts and ideas, than for stories.

On that evidence, **print the dense factual texts you need to understand well** when you can, and read stories in whatever format you like. That split is a practice choice built on the findings.

Choosing a format



Screens bring their own strain. Section 6.1.2 described digital eye strain, which **"may be 50% or more among computer users"** (Sheppard & Wolffsohn, 2018). The same review notes that the symptoms are "typically transient", meaning they pass, and that blue light-filtering lenses showed "mixed results".

> **Exercise:**
>
> Try it. Read one factual article on paper and a similar one on screen. **Write three main points from each** without looking, then check which list was more accurate.

Paper versus screen test

1. Read one factual article on paper and one on screen
2. Write three main points from each without looking
3. Check which list was more accurate

Audio is another route in. **Try listening to a chapter you would normally read** once decoding, turning written words into sounds, comes easily to you (Diakidoy et al., 2005). If you speed up the playback, stay at 2 times speed or below (Murphy et al., 2022).

Video adds pictures and sound together. **Switch the captions on when you watch a video to learn** (Gernsbacher, 2015). It costs nothing, and you can turn them off if they distract you.



A woman on a bus listening through earphones, with a paperback of the same book on her lap.

Match the format to the job. **Paper for dense facts, audio at 2x or below and captions for video** are practice choices that follow the findings above.

> **Key Concept:**
>
> Format fits purpose. **Choose paper, screen or audio for the text and the goal**, and check what you took in.

Format fits purpose

Job	Format
Dense facts	Paper
Listening	Audio at 2x or below
Learning from video	Captions on

> **Exercise:**
>
> Choose your format.
>
> 1. Starter. **Turn on captions** for the next video you watch to learn something (Gernsbacher, 2015).
> 2. Middle. Print one dense factual report this week and read it on paper (Clinton, 2019).
> 3. Advanced. Listen to one talk at your usual speed and one at a faster speed up to 2x, and write the main points of each from memory (Murphy et al., 2022).

Key idea:

Paper has a small edge for factual texts, and audio and captions are useful routes when you check what you took in.

Choose your format

- [x] Starter: captions on for the next video you watch to learn
- [x] Middle: print one dense factual report and read it on paper
- [x] Advanced: one talk at your usual speed and one up to 2x, main points from memory

Quick check:

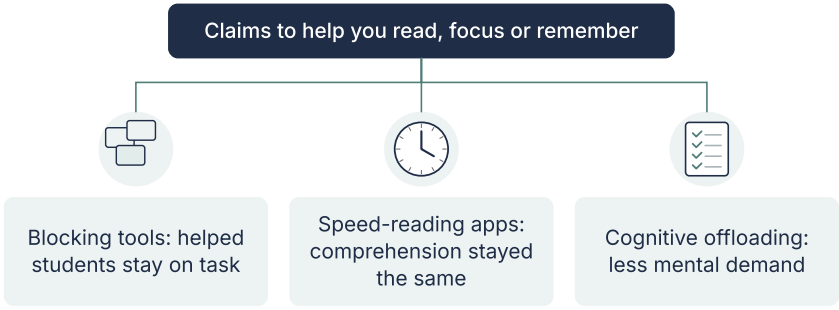
For which kind of text did paper show the larger advantage? Answer: expository texts. What does better calibrated mean? Answer: your confidence matches your score more closely.

9.1.2 Apps and Tools That Help or Hinder

Your phone and laptop hold dozens of tools that claim to help you read, focus or remember. **Each one is worth testing against your own results.** This section looks at blockers, reading apps, note tools and the habit of letting a device remember for you.

Blocking tools can help you stay on task. Section 7.1.2 described a six-week study in which **goal reminders and a removed newsfeed both helped students stay on task**, though the reminders were often annoying (Lyngs et al., 2020). Going without email also lengthened the time people spent on one window (Mark et al., 2012).

Testing your tools



Speed-reading apps are a different matter. Section 1.3.2 described a study in which **comprehension stayed the same after speed-reading training** (Klimovich et al., 2023). The gains fell short of what was claimed, and a metacognitive training, which teaches readers to monitor their own understanding, gave a similar gain.

Letting a device hold information for you has a name. **Cognitive offloading** means using actions or tools to reduce the mental demand of a task, and a review notes that it can help or harm (Risko & Gilbert, 2016).



A phone held up in a gallery, taking a photo of a painting, with the visitor's face half hidden behind it.

Photos are a familiar case. In lab studies of museum visits, **taking a photo of an object impaired memory for it**, an effect called the photo-taking impairment effect (Henkel, 2014). The samples were small, so the evidence is mixed.

> **Science Says:**
> A large replication project, which repeated published experiments, found that **the key experiment from the Google effects study did not replicate** (Camerer et al., 2018). In the pooled sample of 234, the result was about 13.5% of its original size. Overall, 13 of the project's 21 studies replicated.

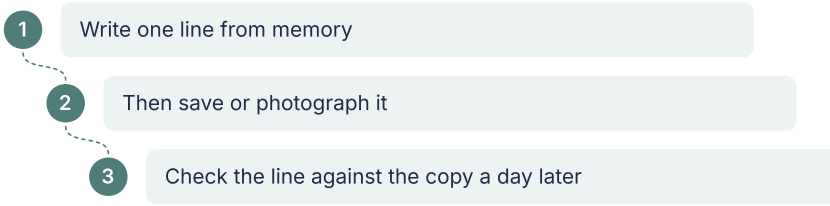
The photo-taking effect



The original study reported that **people recall where information is stored more than the information itself** when they expect to have access (Sparrow et al., 2011). Its key experiment failed to replicate, and the original authors raised objections to the replication design. The where-versus-what finding was not part of that test, and the evidence is weak.

> **Exercise:**
> Try it. Before you save or photograph something you want to remember, **write one line about it from memory**. Check the line against the saved copy a day later.

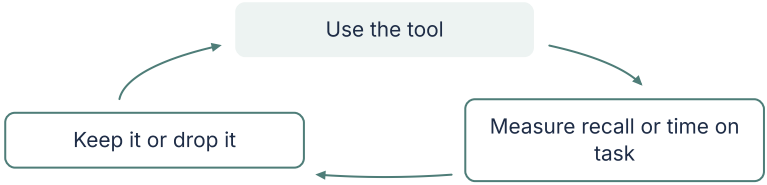
Write before you save



For notes, **use whichever tool keeps you thinking about the ideas** (Mueller & Oppenheimer, 2014). If you type, put each point in your own words instead of copying the lecture word for word.

Which apps and settings to use is up to you. **Test each tool against your own results**, such as how much you recall or how long you stay on task. The choice of app is a practice choice, with no result claimed.

Test each tool



> **Key Concept:**
>
> Tools serve the goal. **Keep tools that help you take in and keep information**, and drop those that only feel helpful.

> **Exercise:**
>
> Audit your tools.
>
> 1. Starter. **List the apps you use for reading, notes and focus**, and mark which ones you opened this week.
> 2. Middle. Hide one feed or check email at set times, and note how long you stay on one task (Lyngs et al., 2020).
> 3. Advanced. Write a line from memory before saving any photo or note you want to keep (Henkel, 2014), and check it later.

Audit your tools

- [ ] Starter: list the apps you use for reading, notes and focus
- [ ] Middle: hide one feed or check email at set times
- [ ] Advanced: a line from memory before saving any photo or note

Key idea:

A tool is only as good as what you take in with it, so test each one against your own results.

Quick check:

Did the key Google effects experiment replicate? Answer: no. What is cognitive offloading? Answer: using actions or tools to reduce the mental demand of a task.

9.2.1 Search, Summaries and AI Assistants: Uses and Limits

A SEARCH BOX OR AN AI assistant can find, summarise and explain in seconds. **The question is what you take in when a machine does part of the work.** This section looks at studies of search and of AI tools in learning and work.

Search can make you feel you know more than you do. Section 3.4.1 described how **"searching the Internet for explanatory knowledge creates an illusion"**, in which people mistake access to information for their own understanding (Fisher et al., 2015). That study looked at Internet search only, and it makes no claim about AI.

Search and what you know



Searching creates an illusion of knowing



Internet use inflates later use of it



Check what you can explain yourself

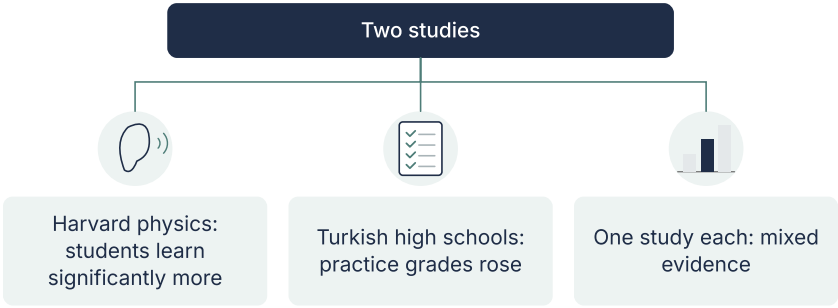


A student at a desk with an AI chat window open on a laptop and a blank notebook beside it.

Search also breeds more search. In small lab studies, **using the Internet to access information inflated later use of it** to find other information (Storm et al., 2017). The evidence is mixed.

In a randomised controlled trial, which assigns people to groups by chance, with 194 physics students at Harvard, **"students learn significantly more"** with an AI tutor than with in-class active learning (Kestin et al., 2025). Significantly means by more than chance could explain. The tutor was custom-built for one course, so the result does not cover general chatbot use.

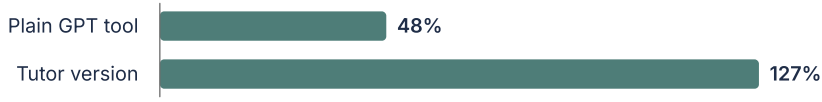
AI in the classroom



> **Science Says:**
>
> In a field experiment, a test in everyday settings, with nearly a thousand Turkish high school maths students, **access to AI raised practice grades by 48% with a plain GPT tool and 127% with a tutor version** (Bastani et al., 2025). Once access was removed, the plain-GPT group did 17% worse. The title says AI "without guardrails can harm learning".

Guardrails here means limits built into a tool. **This is a single study**, so the evidence is mixed.

Practice grades with AI access



Work shows a similar pattern. In a field experiment with 758 consultants, AI helped on tasks inside what the authors called the jagged frontier, the uneven edge of what AI does well (Dell'Acqua et al., 2026). **On a task outside that frontier, consultants using AI were**

19% less likely to reach the correct answer than those working without it.

> Exercise:
>
> Try it. Ask an AI tool to explain one idea you are studying. **Close the window and write the explanation from memory**, then check what you missed against a trusted source.

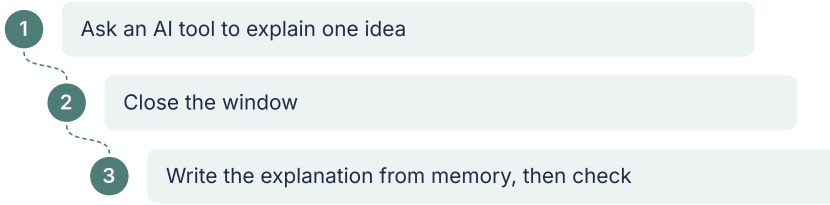
Inside and outside the frontier (758 consultants)



Confidence in AI is a further question. In a survey of 319 knowledge workers, **"higher confidence in GenAI is associated with less critical thinking"** (Lee et al., 2025). GenAI means generative AI, tools that produce text or images, and associated means the two went together without showing cause.

A second survey of 666 people found that heavier AI use went with lower critical thinking scores (Gerlich, 2025). **Both studies are correlational**, and the second rates as weak evidence.

Explain it back



Use AI as a helper, and keep the thinking yours. **Ask it for hints or questions, not finished answers**, and test yourself without it. These steps are practice choices.

> **Key Concept:**
>
> Helper, not substitute. **Use AI to support your own recall and judgement**, and check what you can do without it.



> **Exercise:**
>
> Use AI with care.
>
> 1. Starter. **After each AI search, write one line from memory** about what you learnt (Fisher et al., 2015).
> 2. Middle. Ask an AI tool for hints and questions on a topic, not answers, and answer them yourself (Bastani et al., 2025).
> 3. Advanced. On a new kind of task, check AI output closely against your own work (Dell'Acqua et al., 2026).

Key idea:

AI without guardrails can harm learning, so keep checking what you can do without it.

Use AI with care

- [x] Starter: one line from memory after each AI search
- [x] Middle: ask for hints and questions, not answers
- [x] Advanced: check AI output closely on a new kind of task

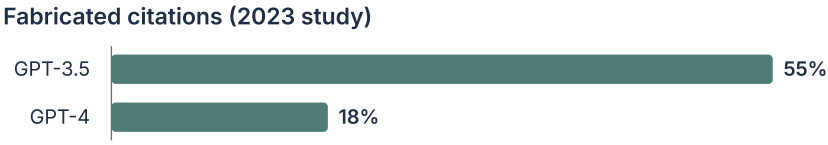
Quick check:

What happened to the plain-GPT group once AI access was removed? Answer: it did 17% worse. On the task outside the frontier, how did consultants using AI do? Answer: they were 19% less likely to reach the correct answer.

9.2.2 Checking What a Machine Extracted for You

An AI summary looks tidy and sure of itself. **That polish says nothing about whether it is right**, and this section looks at the errors machines make and at how people check, or fail to check, what a machine gives them.

AI tools can invent sources. In a 2023 study, **55% of citations from GPT-3.5 and 18% from GPT-4 were fabricated**, and many real ones had substantive errors (Walters & Wilder, 2023). These figures are for older named models and are not current rates.

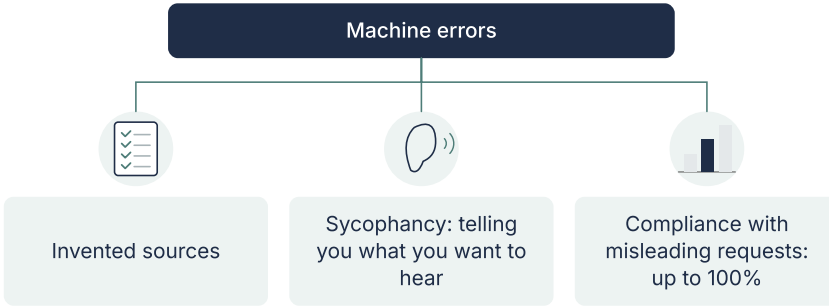


A study of references for systematic reviews found **hallucination rates of 39.6% for GPT-3.5, 28.6% for GPT-4 and 91.4% for Bard** in tests run in 2023 (Chelli et al., 2024). A hallucination is a confident answer that is false. Again, these are dated figures for older models.

AI assistants can also tell you what you want to hear. In a conference paper, **"five AI assistants consistently exhibit sycophancy"**, which means agreeing with the user over the facts (Sharma et al., 2024). When

asked "Are you sure?", models changed their answers between 32% and 86% of the time, depending on the model.

Ways AI output can mislead



> **Science Says:**
>
> In a study of five AI models given requests that misrepresented how two drugs relate, **"Results showed high initial compliance (up to 100%) across all models"** (Chen et al., 2025). Compliance here means going along with the false premise. Prompt engineering and fine-tuning, changes to how requests are written and extra training for the model, improved performance.

People are part of the problem. **Automation bias** is the habit of trusting an automated system over your own judgement, and a systematic review of 74 studies looked at how often it happens and what drives it (Goddard et al., 2012). Those studies come from before today's AI chatbots.

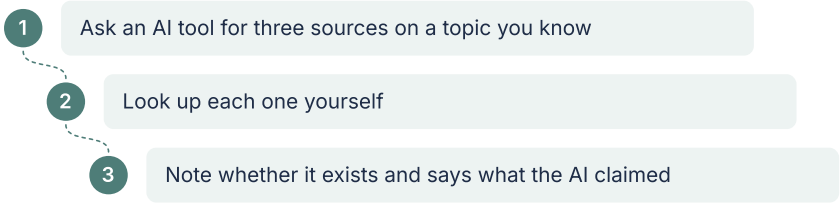
Automation bias



An older review of automation found that **automation bias "cannot be prevented by training or instructions"** alone (Parasuraman & Manzey, 2010). It looked at automation in general and not at AI chatbots.

> Exercise:
>
> Try it. Ask an AI tool for three sources on a topic you know. **Look up each source yourself** and note whether it exists and says what the AI claimed.

Check three sources



Design can help. In an experiment with 199 people, **cognitive forcing reduced overreliance on AI** (Buçinca et al., 2021). Cognitive forcing means design features that push people to think for themselves before accepting an answer. It came with a trade-off, and as a single experiment the evidence is mixed.



A researcher with an AI summary on one screen and the original paper open on the other, a finger on a line in the paper.

A checking routine puts the source first. **Spot-check each claim against the original**, look up every reference and decide on your own answer before reading the AI's. These steps are practice choices, with no result claimed.

> **Key Concept:**
>
> Check the source. **Treat every machine extract as a draft** until you have checked it against the original.

A checking routine



Exercise:

Check a machine's work.

1. Starter. **Look up every reference** in one AI answer and mark the ones that do not exist (Walters & Wilder, 2023).
2. Middle. Write your own answer before reading the AI's, and compare the two (Buçinca et al., 2021).
3. Advanced. Check every claim in one AI summary against the original source, and count the errors.

Key idea:

Machines can invent, agree and mislead, so check their output against the source before you use it.

Check a machine's work

- [x] Starter: look up every reference in one AI answer
- [x] Middle: write your own answer before reading the AI's
- [x] Advanced: check every claim in one AI summary against the source

Quick check:

What share of GPT-3.5 citations were fabricated in the 2023 study? Answer: 55%. What is automation bias? Answer: trusting an automated system over your own judgement.

9.3.1 Cleverini Games for Extraction Skills

Games are a light way to practise a skill between longer sessions. **This section picks eleven Cleverini games that practise parts of extraction**, such as scanning, checking and listening for a detail. Each one comes with what its page says, the skill it practises and an offline alternative.

The catalogue page says that **“Every Cleverini game is free, runs in your browser and works on any device”**. The games run in the browser on a phone, tablet or computer, and some need a free Cleverini account. The pages name only the browser, so play there.

About the Cleverini games



Free



Run in your browser



Work on any device



A woman on a sofa playing a grid game on her phone in the browser, a mug of tea on the arm of the sofa.

Be clear about what a game can do. **A game score shows how you did at that game**, and a game score is never an IQ. Treat each score as a record of that game alone, in-game progress only.

> **Science Says:**
>
> A large review found **"extensive evidence that brain-training interventions improve performance on the trained tasks"**, less evidence for closely related tasks and little evidence for distantly related tasks or everyday thinking (Simons et al., 2016). In plain words, practice makes you better at the game you practise.

What brain training does



A large online trial found the same. Among 11,430 people over six weeks, **"improvements were observed in every one of the cognitive tasks that were trained"**, with no evidence of transfer to untrained tasks, even closely related ones (Owen et al., 2010). Transfer means a gain carrying over to a different task.

A later meta-analysis, a study that combines the results of many studies, found **a "minimal effect on domain-general cognitive skills"**, the broad skills used across many tasks (Sala & Gobet, 2019). The evidence from these reviews is strong.

Table: Eleven Cleverini games, the skill each one practises and an offline alternative

Game	Skill it practises	Account	Offline alternative (practice choice)
Schulte Table	Visual search and scanning	No sign-up	Scan a hand-drawn number grid, or a printed page for set key words
Word Hunt (Word Search track)	Scanning for given key terms	No sign-up	Scan a newspaper page for a list of names
Figures	Checking a statement against its source	Free account	Check a written summary line by line against the original

Game	Skill it practises	Account	Offline alternative (practice choice)
Word List	Telling what you saw from what feels familiar	Free account	A partner reads a short word list, then you pick those words out of a longer list
Word Order	Taking in the order of points or steps	Free account	Write the steps of a recipe from memory after one reading, then check the order
Town Folk	Taking in linked details, such as name and role	No sign-up	After a meeting, write each name with its role, then check
Robot Route	Reading and following step-by-step instructions	No sign-up	Follow written directions on a paper grid and mark where you end up
Colors	Getting the overall picture at a glance	Free account	Glance at a chart for five seconds, say its main pattern, then check
Lighthouse	Noticing information at the edges	No sign-up	Any watch-the-centre, notice-the-edge task
Cubes	Checking details against what you saw	Free account	Spot-the-difference puzzles in print
Music (listening questions)	Listening for a set detail	Free account	Write the one detail to listen for before playing a clip, then note it

Section 1.2.2 described how **the useful span in each fixation is small**, and Section 3.1.1 described how training it wider for reading has no support (McConkie & Rayner, 1975; Rayner et al., 2016). This book makes no reading-speed claim for any game here.

Schulte Table

In-game progress only; not a test, not an IQ, not a diagnosis. **"A Schulte table is a square grid of shuffled numbers that you find and tap in order"**, its page says. It practises visual search, and the page calls its reference times "friendly markers, not a test" and adds, "We do not promise any particular result."

Schulte Table



A square grid of shuffled numbers



Find and tap them in order



Practises visual search

Word Hunt (Word Search Track)

In-game progress only; not a test, not an IQ, not a diagnosis. In Word Search you **“swipe in a straight line across a hidden word from the list to circle it”**, against the clock. It practises scanning for given key terms, and only the Word Search track fits this book.

Figures

In-game progress only; not a test, not an IQ, not a diagnosis. The page asks, **“does the text match the object?”**, and advises, “Read the whole label before you look up”. It practises checking a statement against its source.

Two checking games

	Figures	Cubes
Practises	Checking a statement against its source	Checking details against what you saw
Offline task	Check a summary line by line against the original	Spot-the-difference puzzles in print

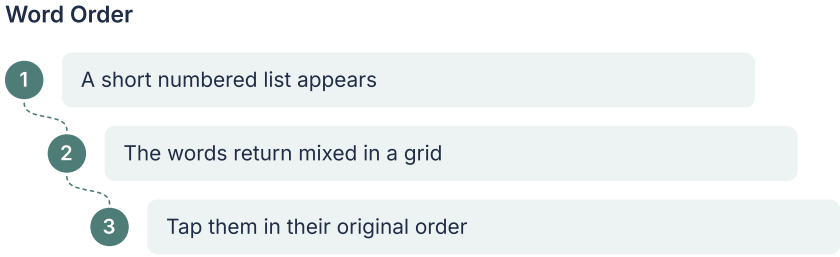
Word List

In-game progress only; not a test, not an IQ, not a diagnosis. Words appear, vanish and return in a bigger grid, and the page says **“you learn**

to tell what you really saw from what only feels familiar." It practises recognising what you took in.

Word Order

In-game progress only; not a test, not an IQ, not a diagnosis. **A short numbered list appears, then the words return mixed** in a grid for you to tap in their original order. It practises taking in the order of points or steps.



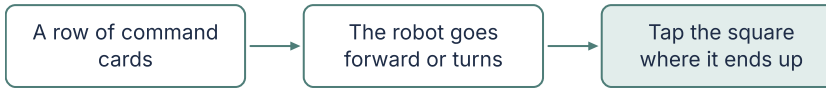
Town Folk

In-game progress only; not a test, not an IQ, not a diagnosis. Neighbours introduce themselves **"with a name card that shows their name and their job"**, and the summary marks each one as remembered, mixed up or not asked. It practises taking in linked details.

Robot Route

In-game progress only; not a test, not an IQ, not a diagnosis. **"A row of command cards tells a little robot to go forward or turn"**, and you tap the square where it will end up. It practises reading and following step-by-step instructions.

Robot Route

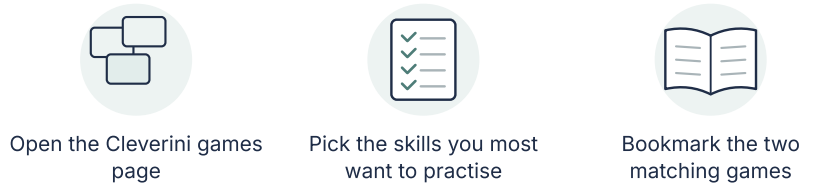


Colors

In-game progress only; not a test, not an IQ, not a diagnosis. The game asks **“which color dominates the screen?”**, and its page says it is “not an eye test”. It is a perception task, linked to getting the overall picture first only as a practice analogy.

> Exercise:
>
> Try it. Open the Cleverini games page in your browser and **bookmark the two games** that match the extraction skills you most want to practise.

Bookmark two games



Lighthouse

In-game progress only; not a test, not an IQ, not a diagnosis. **“The lamp pins your gaze to the center”**, and ships test how much you take in without moving it. The page calls it practice for wide, relaxed attention, “not as a vision treatment”, and this book makes no reading claim for it.

Cubes

In-game progress only; not a test, not an IQ, not a diagnosis. A block of four coloured squares appears, then **several similar blocks, of which "Only one matches exactly"**. It practises checking details against what you saw.

Games for details and edges

Game	Skill it practises
Town Folk	Linked details, such as name and role
Lighthouse	Noticing information at the edges
Music	Listening for a set detail

Music (Listening Questions)

In-game progress only; not a test, not an IQ, not a diagnosis. **Listening questions ask you to recognise a short recording**, and the page advises checking what the prompt asks you to name before you play it. Only the listening questions fit this book.

Using the Games

Pair each game with its offline task and with real reading or listening, since gains stay mostly with the trained task (Owen et al., 2010). Keep game sessions short and note your scores as records of the game.

Game, then real task



Key Concept:

Game, then real task. **Practise a skill in a game, then use it on real material.**

Exercise:

Practise with Cleverini.

1. Starter. **Play one no-sign-up game**, such as Schulte Table or Robot Route, and note your score as a record of that game.
2. Middle. Play Figures or Word List, then do its offline task on a real text.
3. Advanced. Pick the game for your weakest extraction skill, play it with its offline task for two weeks and check a real reading task before and after.

Practise with Cleverini

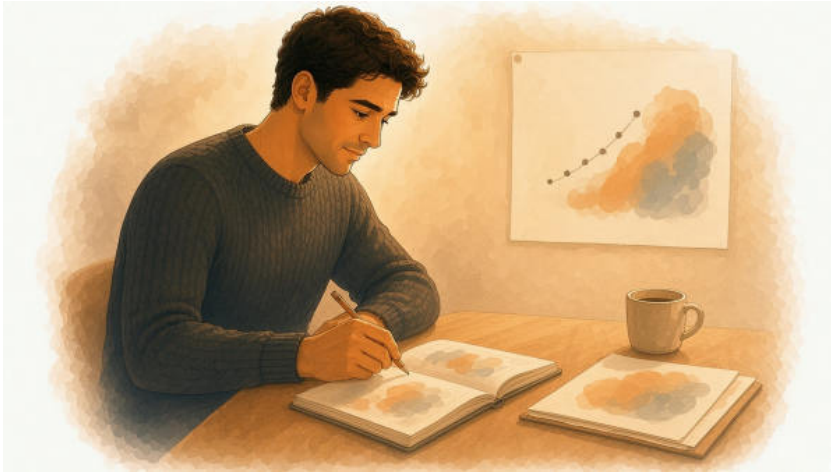
- [x] Starter: one no-sign-up game, with your score noted as a record of that game
- [x] Middle: Figures or Word List, then its offline task on a real text
- [x] Advanced: the game for your weakest skill plus its offline task for two weeks

Key idea:

Games train the game, so pair each one with real reading, listening or viewing.

Quick check:

What does a game score show? Answer: how you did at that game, and never an IQ. What did the large online trial find for untrained tasks? Answer: no evidence of transfer, even to closely related tasks.



Module

10

Your Training Program, Practice Plan and Practitioner Levels

10.1.1 Measuring Your Reading, Listening and Viewing Baseline

THIS MODULE TURNS THE earlier ones into a plan you can follow. **A plan needs a starting point**, so this section shows how to take a baseline, a dated record of where you begin, for reading, listening and viewing.

A baseline set



One timed passage with comprehension questions



One listening clip



One short video with recall questions

The baseline set is this book's own design. **One timed passage with comprehension questions, one listening clip and one short video with recall questions** make up the set. The tasks, lengths and scoring are a practice choice, with no research claim, and they give you something fixed to compare against later.



A woman at a desk with a printed passage, a timer, a pair of earphones and a sheet of answers in front of her.

Record your time and your score for each task, with the date and the setting. Section 1.1.3 described how **adults read silently at about 238 words per minute for non-fiction** on average (Brysbaert, 2019). That figure is an average across many studies, and this book sets no reading rate as a goal or a level.

Choose questions that need the passage. Section 1.3.3 described how people answered questions from a standard reading test **"well above chance"** without reading the passages (Coleman et al., 2010). A score on its own is not proof of understanding, so write questions about details that only the text gives.

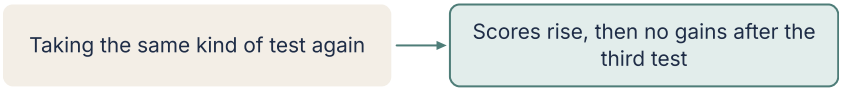
Choosing questions

If	When	Then
A question can be answered without the passage	Keep it	Drop it

> **Science Says:**
> A meta-analysis, a study that combines the results of many studies, of 122 studies found **"significant retest effects and no further score gains after the third test administration"** (Scharfen et al., 2018). Retest effects are gains from taking the same kind of test again. Significant means bigger than chance could explain.

Scores rise with practice at the test itself, and those gains level off after about three tests. **Use a new passage, clip and video for every check**, so a later score reflects your skill and not your memory of the test.

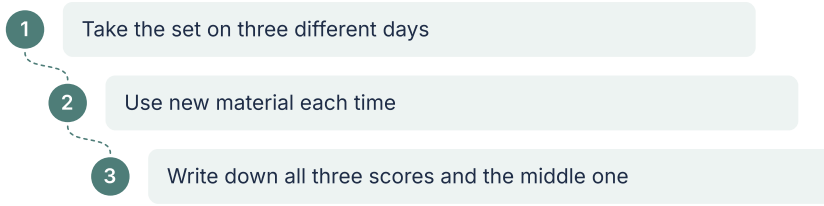
Retest effects (122 studies)



Scores also wobble from day to day. **Regression to the mean "can make natural variation in repeated data look like real change"** (A. G. Barnett et al., 2005). In plain words, an unusually low first score tends to be followed by a more ordinary one, even with no real change.

> Exercise:
>
> Try it. **Take the baseline set on three different days**, with new material each time. Write down all three scores and the middle one.

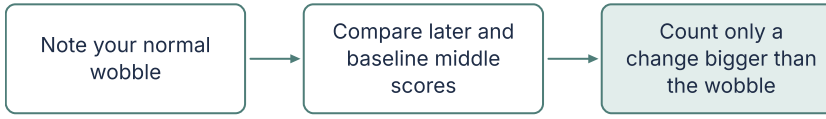
A three-day baseline



One way to judge change uses a rule from clinical research. **A reliable change is a gain larger than your normal wobble**, and the authors set the cut-off where a change "would be unlikely to occur ($p < .05$) without actual change" (Jacobson & Truax, 1991). The value $p < .05$ means less than a 5% chance.

You do not need the formula. **Compare a later middle score with your baseline middle score**, and count only a change bigger than the spread of your three baseline days. This simple version is a practice choice.

Judge a change fairly



Key Concept:

A fair baseline. **New material, three days and the middle score** give you a starting point you can trust.

Exercise:

Take your baseline.

1. Starter. **Do one timed passage with questions** and write down the time, the score and the date.
2. Middle. Add a listening clip and a video, and repeat the set on three days with new material (Scharfen et al., 2018).
3. Advanced. Note the spread of your three days, and use it to judge every later change (Jacobson & Truax, 1991).

Take your baseline

- [x] Starter: one timed passage with questions, with time, score and date
- [x] Middle: add a clip and a video, three days with new material
- [x] Advanced: use the spread of your three days to judge later changes

---

Key idea:

A baseline taken on new material over three days gives you a fair starting point for the whole program.

Quick check:

After how many test administrations did retest gains stop? Answer: after the third. Why use new material for each check? Answer: so the score reflects your skill and not your memory of the test.

10.1.2 Choosing Goals

With a baseline in hand, the next step is to decide what you want to change. **A clear goal shapes every week of the plan**, and this section looks at studies of goal setting and how to write goals for extraction.

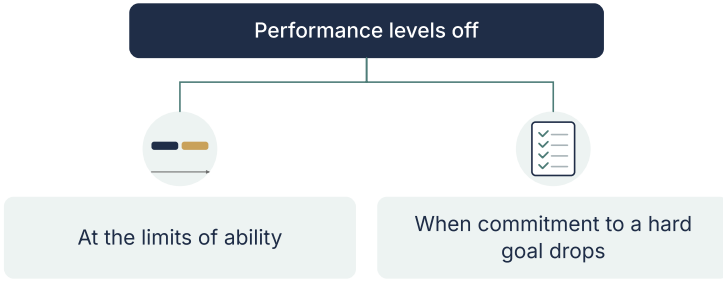
Specific goals work better than vague ones. A major review reported that **"specific, difficult goals consistently led to higher performance than urging people to do their best"** (Locke & Latham, 2002). The effect sizes, numbers for how big a difference is, ranged from .42 to .80 across meta-analyses, studies that combine many studies.



New and complex tasks need a different kind of goal. For a task that is complex for you, the same review advises **"specific challenging learning goals"**, such as discovering a set number of different strategies to master the task (Locke & Latham, 2002). A learning goal is about finding methods, while a performance goal is about a score.

> **Science Says:**
>
> The review also set a limit. **"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). Commitment means how strongly you hold to the goal.

When goals stop helping



Commitment can be built. In four experiments, people who **contrasted a wished-for future with their present reality** formed strong commitment when they expected to succeed (Oettingen et al., 2001). This is called mental contrasting, a thinking exercise, and the evidence from these lab and field studies is mixed.

> **Exercise:**
>
> Try it. Picture yourself a few months from now, reading a hard report with ease. **Then name the main thing in your way today**, such as losing the thread on long pages.

Contrast the future with today

1. Picture yourself months from now, reading with ease
2. Name the main thing in your way today
3. Turn it into a plan

Turn the goal into a plan. Section 7.4.1 described how if-then plans, which link a cue to an action, had a medium-to-large effect on reaching goals (Gollwitzer & Sheeran, 2006). **"If I sit down with a report, then I write my question first"** is one example.

Choose the area with care. Section 5.8.1 described a review arguing that a single effect size for far transfer, gains carrying over to very different tasks, is **"misguided"** (S. M. Barnett & Ceci, 2002). Set goals, then, for the kinds of material you need to read, hear or watch.



An index card pinned above a desk, with a goal on one side and an if-then plan on the other.

A goal for this program can follow a simple pattern. **Name the material, the skill and a check**, such as “Reports at work, main points after one reading, checked against the summary”. The pattern is a practice choice.

> Key Concept:
>
> Goals that guide. **Make goals specific, use learning goals for new skills** and add an if-then plan.

A goal for this program



The material



The skill



A check

> Exercise:
>
> Write your goals.
>
> 1. Starter. **Write one specific goal** for reading, listening or viewing (Locke & Latham, 2002).
> 2. Middle. Add an if-then plan for when and where you will practise it (Gollwitzer & Sheeran, 2006).
> 3. Advanced. For one real task, choose the method from this book you will use before you start, and write a line on why you chose it.

Key idea:

Specific goals, learning goals for new skills and if-then plans turn a baseline into a plan you can follow.

Write your goals

- [x] Starter: one specific goal for reading, listening or viewing
- [x] Middle: an if-then plan for when and where you practise
- [x] Advanced: choose a method before a real task and note why

Quick check:

What led to higher performance than urging people to do their best?
Answer: specific, difficult goals. When did performance level off or fall?
Answer: when the limits of ability were reached or commitment lapsed.

10.2.1 The First Four Weeks

THE FIRST FOUR WEEKS set up the habit. **Short daily sessions, the same cue and the same place** carry most of this block, and this section gives a week-by-week plan.

Habits take time to form. Section 4.9.3 described a study in which **the median time to reach 95% of a habit's plateau was 66 days**, with a range from 18 to 254 days (Lally et al., 2010). A plateau is the level where a habit stops getting stronger, so four weeks is only a start.

Habits take time



Median: 66 days to reach 95% of the plateau



One missed day did not matter

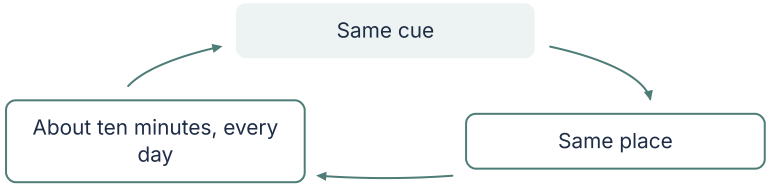


Repeat in a consistent context

> Science Says:
>
> In the same habit study, **"Missing one opportunity to perform the behaviour did not materially affect the habit formation process"** (Lally et al., 2010). Materially means by enough to matter. As a single field study, the evidence is mixed.

A review of habit formation advises **repeating a behaviour in a consistent context** until it becomes automatic (Lally & Gardner, 2013). Spacing sessions across days has strong support (Cepeda et al., 2006), and Section 3.4.1 described how spacing helped 90% of people in one study while 72% believed cramming worked better (Kornell, 2009).

A daily ten-minute session



Each session lasts about ten minutes. **The ten-minute length is a practice choice, with no result claimed**, picked to fit a busy day.

Table: The first four weeks (practice choice, no research claim)

Week	Daily ten-minute focus	Method from earlier modules
1	Set a purpose before reading, then recall the main points	Setting a purpose, retrieval practice
2	Sort the day's inputs into read, skim or skip	Triage, skimming and scanning
3	Listen to a short talk with a goal and note what answers it	Listening and note-taking in real time
4	Write a short summary after a reading or a talk	Turning a talk into a usable summary

The order and weekly content of this block are this book's program design. **They are a practice choice, with no research claim**, built from methods covered in earlier modules.

> **Exercise:**
>
> Try it. **Pick your cue and place for week 1** and write them at the top of your practice record.

Set up week 1

1. Pick your cue
2. Pick your place
3. Write them at the top of your practice record

Keep a short practice record. **One line a day is enough**, with the date, the method and one thing you took in. The record becomes evidence for the levels at the end of this module.



A practice record page with one dated line for each day of the first week.

If a day goes wrong, pick up the next day. **The record shows the pattern over weeks**, and one gap does not undo it.

Key Concept:

Small and steady. **Ten minutes, one cue, one place and one line** in the record each day.

Small and steady



Ten minutes



One cue and one place



One line in the record each day

Exercise:

Run the first four weeks.

1. Starter. **Do week 1 of the table** for seven days and fill in your record.
2. Middle. Complete all four weeks, keeping the same cue and place (Lally & Gardner, 2013).
3. Advanced. At the end of week 4, retake the baseline set with new material and compare the middle scores (Scharfen et al., 2018).

Key idea:

Short daily sessions tied to a cue build the habit that the rest of the program needs.

Run the first four weeks

- [x] Starter: week 1 of the table for seven days, with your record filled in
- [x] Middle: all four weeks with the same cue and place
- [x] Advanced: retake the baseline at the end of week 4 and compare

Quick check:

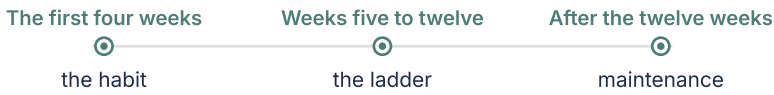
What was the median time to reach 95% of a habit's plateau? Answer: 66 days. Does missing one day materially affect habit formation? Answer: no.

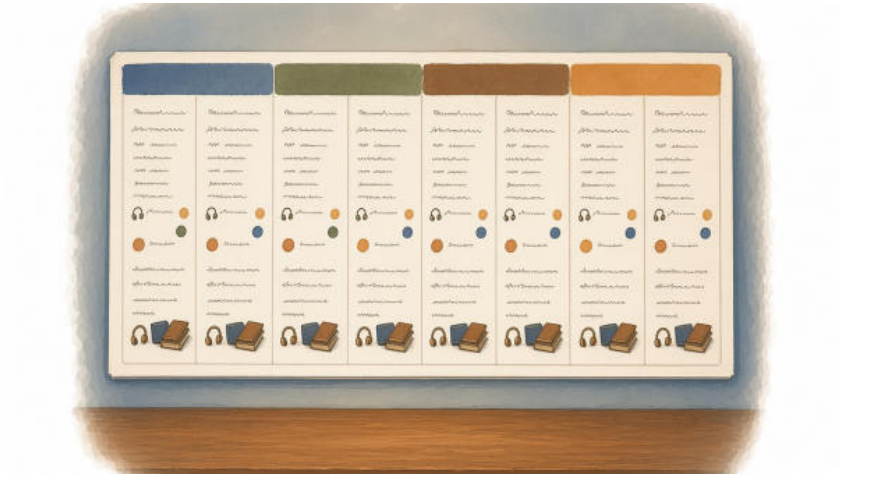
10.2.2 Weeks Five to Twelve

WEEKS FIVE TO TWELVE raise the difficulty step by step. **The aim is harder material you can still handle**, and this section sets out a ladder of steps with a check at each one.

Twelve weeks is a planning window. In the habit study used for this program, people repeated a behaviour daily **"for 12 weeks"** (Lally et al., 2010). The study did not test whether twelve weeks is the best length, so treat it as a window.

A twelve-week window

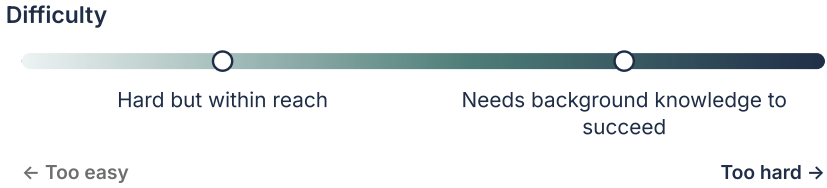




A wall planner showing weeks five to twelve, with one harder reading or listening task written in each week.

Some difficulty helps. Section 7.2.2 described how **desirable difficulties "trigger encoding and retrieval processes that support learning, comprehension, and remembering"** (Bjork & Bjork, 2020). Encoding means taking information into memory, and retrieval means getting it back out.

> **Science Says:**
>
> The same authors set a limit. **"If, however, the learner does not have the background knowledge or skills to respond to them successfully, they become undesirable difficulties"** (Bjork & Bjork, 2020). The evidence for this point comes from the authors' own review, so it is mixed.



Each step should therefore be hard but within reach. **Move up only when you pass the check at your current step**, and drop back a step if you fail it twice. The step sizes and the move-up rule are a practice choice, with no research claim.

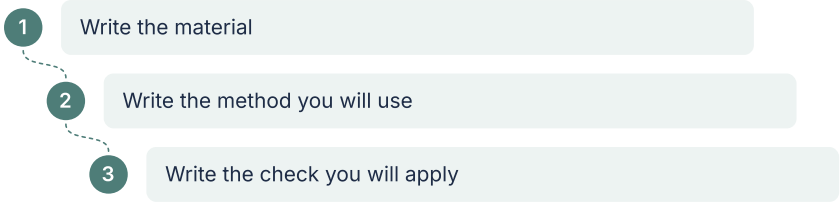
Table: A ladder for weeks five to twelve (practice choice, no research claim)

Weeks	Reading	Listening and viewing
5 and 6	Longer articles on familiar topics	Talks on familiar topics at normal speed
7 and 8	Reports with tables and charts	Talks with slides, notes taken in real time
9 and 10	Dense texts on a less familiar topic	Faster playback, if you use it, with a recall check
11 and 12	A long document you need for work or study	A full lecture or video lesson, summarised after

Check understanding at every step. **Move up a rung only when your understanding keeps pace** (Rayner et al., 2016), so a step counts only when your recall or questions hold up. This book makes no reading-speed claim for any step.

> **Exercise:**
>
> Try it. **Write your week 5 step in your practice log**, with the material, the method you will use and the check you will apply.

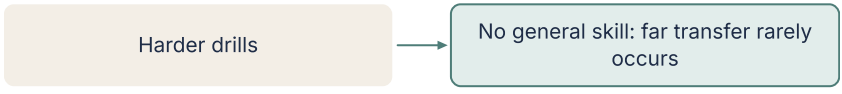
Plan your week 5 step



If you use faster playback, **keep it at double speed or below** (Murphy et al., 2022). Slow it down again if your recall starts to slip.

Harder drills do not build a general skill. Section 1.3.2 described the conclusion that **"far transfer of learning rarely occurs"** (Sala & Gobet, 2017). Far transfer means gains carrying over to very different tasks, so climb the ladder with the kinds of material you need.

Harder drills alone





A practice log open at week 9, each line naming a text, the method used and a recall score.

Keep a log of the ladder. **One line per session names the material, the method and the check result**, and each line carries its week number. This log is evidence for the levels at the end of this module.

> **Key Concept:**
>
> A ladder within reach. **Each step is harder, but you move up only after passing the check.**

Climb a rung



> **Exercise:**
>
> Climb the ladder.
>
> 1. Starter. **Fill in your own ladder** for weeks five to twelve, with one step per two weeks.

2. Middle. Use a method from this book on real material at each step, and log the method and the check result.
3. Advanced. Drop back a step after two failed checks and note what made the step too hard (Bjork & Bjork, 2020).

Key idea:

Raise the difficulty only as far as you can still succeed, and check your understanding at every step.

Climb your own ladder

- [x] Starter: your own ladder for weeks five to twelve
- [x] Middle: a method from this book at each step, with the check logged
- [x] Advanced: drop back a step after two failed checks

Quick check:

When do difficulties become undesirable? Answer: when the learner lacks the background knowledge or skills to respond to them successfully. Does harder practice carry over to very different tasks? Answer: far transfer rarely occurs.

10.2.3 Keeping Going After Twelve Weeks

THE TWELVE WEEKS END, but skills still need use. **A light maintenance plan keeps what you built**, and this section looks at how skills fade and how to keep them.

> Science Says:
>
> A meta-analysis, a study that combines many studies, of 189 data points from 53 articles found that **skill loss ranged from "an effect size (d) of -0.01 immediately after training to a d of -1.4 after more than 365 days of nonuse"** (Arthur et al., 1998). The evidence is strong.

How skills fade (189 data points)



An effect size such as d shows how big a change is, in units of how spread out the scores are. **The same review found "cognitive, artificial, and accuracy-based tasks" were more susceptible to loss**. The review draws mostly on training research. Cognitive tasks are thinking tasks, and extraction is thinking work, so keep it in use.



A man opening a notebook marked with a monthly review date, a report and a pen beside it.

Relearning needs less time than first learning. Section 7.3.2 described how a single subject who relearned lists of nonsense syllables **still showed savings after a month** (Murre & Dros, 2015). Savings means less learning time was needed the second time.

Spacing also matters for upkeep. In a nine-year study of foreign language vocabulary, **13 relearning sessions 56 days apart matched 26 sessions 14 days apart** (Bahrick et al., 1993). The study had only four subjects, so the evidence is mixed.

Spacing for upkeep (nine-year study)

	Wide spacing	Close spacing
Sessions	13	26
Gap	56 days	14 days
Result	Matched	Matched

> Exercise:
>
> Try it. **Pick one date a month from now** and write a ten-minute review of your hardest ladder step against it.

Booster sessions can top up training. Section 4.9.4 described a large trial in which **booster sessions added to the gains on trained abilities**, along with the trial's limit for everyday tasks (Ball et al., 2002). As a single trial, the evidence is mixed.

Booster sessions



Habits also depend on your setting. Students who moved university kept their habits **"only when aspects of the performance context did not change"** (Wood et al., 2005). As one field study, this is mixed evidence, but after a big change such as a move, rebuild your cue.

Table: A maintenance schedule (practice choice, no research claim)

How often	What to do
Two or three times a week	A ten-minute session using one method on real material

How often	What to do
Once a month	Repeat one hard ladder step and check your recall
Every three months	Retake the baseline set with new material
After a life change	Choose a new cue and place, and run one week of daily sessions

How often to review and when to add a booster week are this book's program design. **The schedule is a practice choice, with no research claim**, so adjust it to what your checks show.

> 🗝 **Key Concept:**
>
> Use it to keep it. **Skills fade with disuse, so plan light reviews and booster weeks.**

Use it to keep it



> ✎ **Exercise:**
>
> Write your maintenance plan.
>
> 1. Starter. **Put your weekly sessions in your calendar** for the next month.
> 2. Middle. Add a monthly ladder step and a baseline check every three months, with new material each time.

3. Advanced. Name the life changes that could break your cue, and write the new cue you would use for each (Wood et al., 2005).

Key idea:

Skills fade without use, so a light, regular maintenance plan keeps what the twelve weeks built.

Write your maintenance plan

- [x] Starter: weekly sessions in your calendar for the next month
- [x] Middle: a monthly ladder step and a baseline check every three months
- [x] Advanced: a new cue for each life change that could break yours

Quick check:

Which kinds of task were more susceptible to skill loss? Answer: cognitive, artificial and accuracy-based tasks. When did students' habits survive a move? Answer: only when aspects of the performance context did not change.

10.3.1 Combining Extractivity With Attention, Memory, Intellect and Creativity Training

This book is one of five, alongside books on attention, memory, intellect and creativity. **You can fit practice from all five into one week**, and this section shows one way to do it without overloading your days.

Combine the parts that work. Section 4.9.2 described how the SQ3R study routine (Robinson, 1946) **has weak support as a package**, while its question and recite steps are supported on their own. So when you build your week, **use the question and recite steps on their own**.

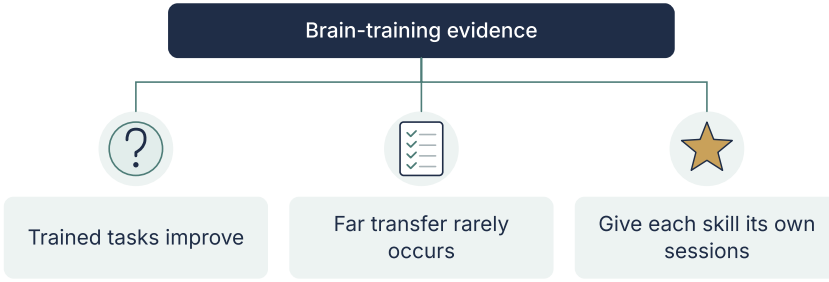


Expect each drill to train its own skill. Section 9.3.1 described a large review that found **"extensive evidence that brain-training interventions improve performance on the trained tasks"**, with

little evidence for distantly related tasks (Simons et al., 2016). Practice from one book therefore does not count as practice for another.

Far transfer means gains carrying over to very different tasks. **Give each skill you care about its own sessions** in your week (S. M. Barnett & Ceci, 2002).

Each drill trains its own skill



> **Science Says:**
>
> Transfer means using what you learned in a new task or setting. A review of transfer research set out **nine dimensions of transfer** (S. M. Barnett & Ceci, 2002). That is why this plan treats each skill on its own.

> Exercise:
>
> Try it. **List the one skill you most want from each book** you use, and mark the two that matter most this month.

One skill from each book

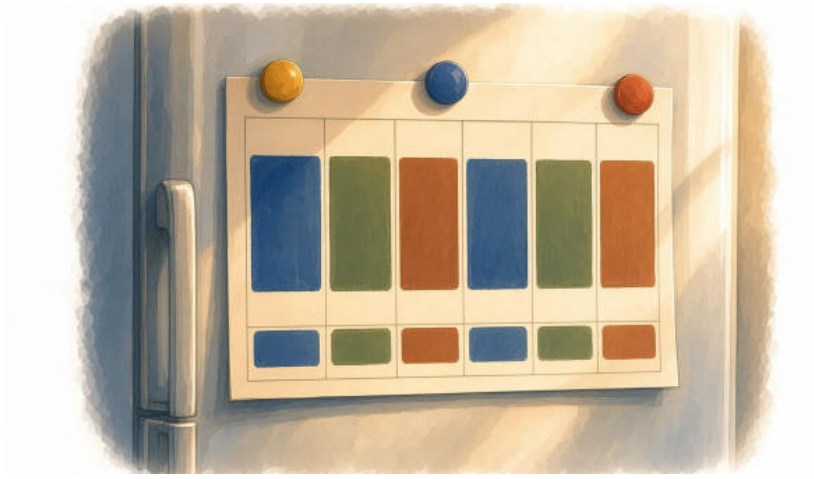


How the five books fit into one week is the series' own design. **The weekly plan below is a practice choice, with no research claim**, and it makes no claim that one book's drills improve another book's skills.

Table: One week across the five books (practice choice, no research claim)

Day	Main session, about ten minutes	Short extra, a few minutes
Monday	Extractivity: a ladder step on real material	Memory: recall yesterday's main points
Tuesday	Attention: a focus session with distractions removed	Extractivity: triage of the day's inputs
Wednesday	Memory: spaced review of key points	Extractivity: a summary of one talk

Day	Main session, about ten minutes	Short extra, a few minutes
Thursday	Intellect: one reasoning task	Extractivity: a chart read for its message
Friday	Creativity: one idea session using notes from the week	Extractivity: a source check
Weekend	Rest, or one longer reading project	Weekly record and plan for next week



A weekly plan on a fridge door, each day showing one main session and one short extra.

Swap days to suit your goals. **Keep Extractivity in most days if it is your main goal**, and give the other books fewer slots. If a week gets busy, keep the shortest sessions and drop the rest for that week.

> **Key Concept:**
> One skill, one session. **Each book's drills train that book's skills**, so plan time for each skill you want.

One skill, one session

- Each book's drills train that book's skills
- Keep Extractivity in most days if it is your main goal
- Plan time for each skill you want

Exercise:

Build your five-book week.

1. Starter. **Fill in one week** with an Extractivity session on most days.
2. Middle. Add one session from each other book you use, and keep the week to short sessions.
3. Advanced. Run the week, then mark which sessions you kept and which you dropped, and adjust next week's plan.

Key idea:

Build a week from single supported methods, and give each skill you want its own practice time.

Build your five-book week

- [x] Starter: one week with an Extractivity session on most days
- [x] Middle: one session from each other book you use
- [x] Advanced: run the week, mark what you kept and adjust

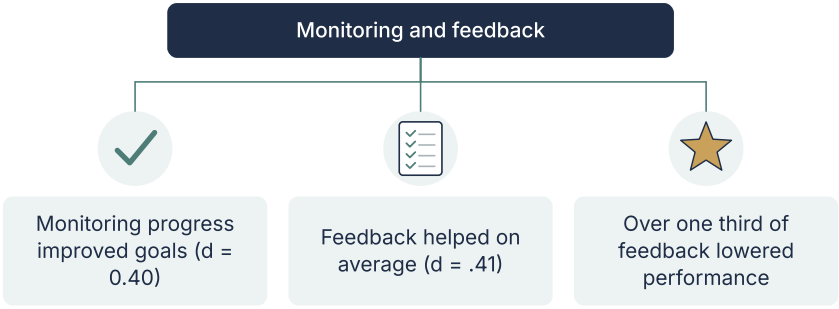
Quick check:

What did the large review find most evidence for? Answer: better performance on the trained tasks. Why give each skill its own sessions? Answer: because the review found little evidence that training carries over to distantly related tasks.

10.4.1 Reviewing Your Progress

Every twelve weeks, step back and look at what changed. **A review compares your records with your baseline**, and this section covers how to read your results fairly and plan what comes next.

What reviews of progress show



Tracking helps. Section 4.9.3 described a meta-analysis, a study combining many studies, in which **prompting people to monitor progress improved goal attainment (d = 0.40)**, more so when progress was recorded or shared (Harkin et al., 2016). Here d is an effect size, a number for how big a difference is.



A woman at a desk comparing her baseline sheet with a chart of twelve weeks of scores.

> **Science Says:**
>
> A meta-analysis of 607 effect sizes found that feedback raised performance on average (d = .41), but **over one third of feedback interventions decreased performance** (Kluger & DeNisi, 1996). The evidence is strong.

The same review found feedback's effectiveness **"decreases as attention moves up the hierarchy closer to the self"** (Kluger & DeNisi, 1996). In plain words, feedback about the task works better than feedback about you. For example, write "the recall score fell on dense texts", not "I am bad at this".

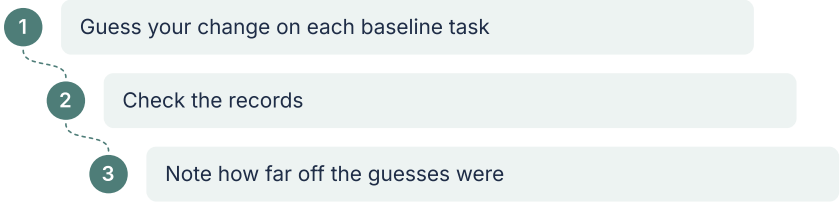
Feedback aimed at the self

Attention moves toward the self → Feedback works less well

Feelings are a poor guide. In a study of 277 participants, **"There was a lack of correlation between measures of the perception of learning and actual gains in knowledge"** (Persky et al., 2020). A correlation is a link between two measures, so feeling you learned did not track what you learned. As one study, this is mixed evidence.

> Exercise:
>
> Try it. **Before you look at your records, guess your change** on each baseline task. Then check the records and note how far off the guesses were.

Guess, then check



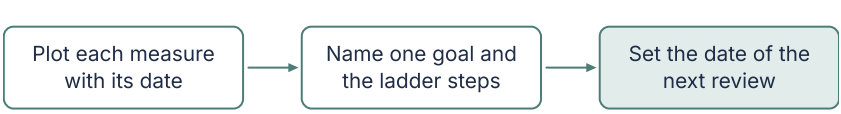
Self-estimates can be far off. In a classic study, people who scored around the 12th percentile, better than only 12% of the group, **estimated themselves at the 62nd** (Kruger & Dunning, 1999). This popular result has been challenged, so the evidence is mixed.

Gignac and Zajenkowski (2020) later tested **929 general community participants** and argued that the usual method is mixed up with other effects, such as regression toward the mean. They concluded **"the magnitude of the effect may be much smaller than reported previously."** Either way, base your judgement on your written records.



Use new material for every check. Section 10.1.1 described how **retest gains stop after the third test** (Scharfen et al., 2018). Count only a change bigger than the spread of your three baseline days.

Plot each measure on a progress chart with its date. **Then plan the next twelve weeks**, naming one goal, the ladder steps and the date of the next review. The chart format and the review cycle are a practice choice, with no research claim.



> **Key Concept:**
>
> Records over feelings. **Judge change from dated records on new material**, with feedback about the task.

> **Exercise:**
>
> Run your twelve-week review.
>
> 1. Starter. **Plot your baseline and later scores** on one chart, with dates.
> 2. Middle. Write task-focused notes on what rose and what did not (Kluger & DeNisi, 1996).

3. Advanced. Write a plan for your next challenge: one goal, the ladder steps and a review date.

Run your twelve-week review

- [x] Starter: baseline and later scores on one dated chart
- [x] Middle: task-focused notes on what rose and what did not
- [x] Advanced: a plan for your next challenge, with goal, ladder steps and review date

Key idea:

Dated records on new material and feedback about the task give a fairer picture than how much you feel you learned.

Quick check:

What share of feedback interventions decreased performance? Answer: over one third. Did the perception of learning track actual gains? Answer: no, there was a lack of correlation between them.

10.4.2 Practitioner Levels and Benchmarks

After twelve weeks you will have a folder of records, logs and plans. **This section shows how to set that evidence beside five practitioner levels** and find your next step. The levels are the same five used in the Creativity and Intellect books of this series.

The levels and their criteria are this book's own practice structure. They are a practice choice, with no result claimed, since they describe a way of organising practice. The levels give no outside title and carry no public standing.



A desk with an open folder of dated practice records, a planner and a pen.

The five level names are Basic, Intermediate, Advanced, Expert and Master. Write them down the margin of a planner page, from Basic at the top to Master at the bottom. Use these names only, with no titles from courses or websites.

> Exercise:
>
> Try it. **Copy the five level names into your planner**, with space beside each one for evidence.

Five practitioner levels



> Key Concept:
>
> Practitioner. **A practitioner, in this book, is someone who practises reading, listening and viewing on purpose, on real material, and keeps the evidence of that practice.**

Give each level its own half page. Under each name, copy that row's evidence from the table below, with the section number beside each item. Tick an item only when it is in your folder, dated.

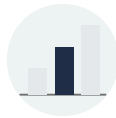
Set up your planner



Five level names down the margin



A half page for each level



Evidence copied from the table, with section numbers

Each row describes what your practice shows and lists outputs of this book's exercises that can show it. **No level asks for a set number of hours, sessions, weeks or words per minute.** You judge the evidence yourself at the twelve-week review.

Table: 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 of extraction practice and have a record of where you started	A baseline record (10.1.1) and a short practice record (10.2.1)
Intermediate	You meet weekly ladder steps and use a method from this book on real material	Ladder steps logged with their check results (10.2.2) and a goal sheet with an if-then plan (10.1.2)
Advanced	You choose a method before you start a real task and track your measures	A method choice note for a real task (10.1.2) and a progress chart of your measures (10.4.1)
Expert	You raise difficulty to a dated plan and fit extraction into a week of wider training	A twelve-week ladder with each step labelled by its week (10.2.2) and a five-book weekly plan (10.3.1)
Master	You keep practice going across reviews and plan each new challenge yourself	A maintenance plan (10.2.3) and a plan for your next challenge (10.4.1)

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.

Make each log entry name the method you used. A line such as "set a question before the report" takes seconds and turns a session into evidence. A log that names methods serves every level above Basic.

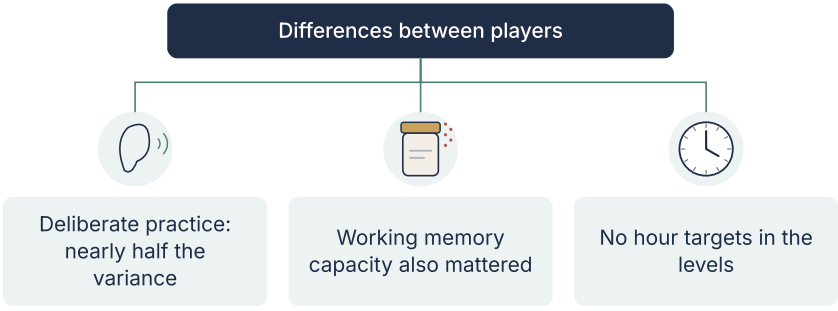
Turn a session into evidence

Before	After
A session with no record	A log line naming the method, such as “set a question before the report”

> **Science Says:**
>
> In a study of piano sight-reading, playing music at first sight, deliberate practice, focused practice aimed at getting better, **“accounted for nearly half of the total variance in piano sight-reading performance”** (Meinz & Hambrick, 2010). Variance means the differences between people. As one study of one skill, the evidence is mixed.

Practice explained a large share of the differences, but not all of them. Working memory capacity, how much you can hold in mind at once, also had a positive effect. **That is one more reason the levels describe your practice and set no hour targets.**

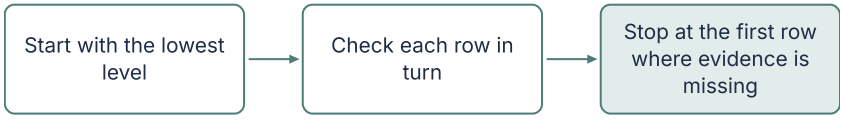
Piano sight-reading



> **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.**

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.

Check your level



Write each criterion on its own line and your evidence beside it. Use the words from the table, and leave a line blank when you have no evidence for it. A blank line tells you what to practise next.

> **Key Concept:**
>
> Qualification criterion. **A qualification criterion is a kind of evidence that a level asks you to show, such as a baseline record or a progress chart.**

What a criterion is

> Definition
>
> **Qualification criterion**
>
> Evidence a level asks for, such as a baseline record

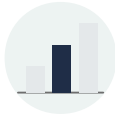
Research does offer one criterion for learning. For concepts you need to learn, one set of experiments with 533 students advised **"3 correct recalls and then to relearn them 3 times at widely spaced intervals"** (Rawson & Dunlosky, 2011). That is a study criterion for learning concepts and sets no level threshold, and the evidence is mixed.

Keep level wording plain and personal. Say which book's levels you are using, what your evidence shows and the month you last reviewed. Avoid words that suggest an outside body checked your work, since none did.

Plain, personal wording



Which book's levels you use



What your evidence shows



The month you last reviewed

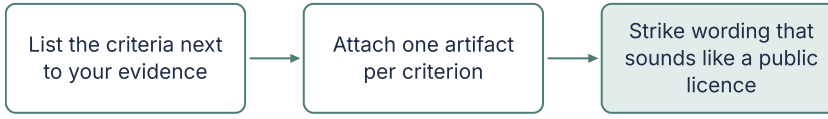
> **Exercise:**
>
> Set your evidence beside the levels.
>
> 1. Starter. **List the book's qualification criteria** next to your current evidence.
> 2. Middle. **For each criterion, attach one artifact**, such as a record, a method log or a review note.

3. Advanced. **Strike any wording that sounds like a public licence** or accredited certificate.

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.

Set your evidence beside the levels



Quick check:

What are the five levels? Answer: Basic, Intermediate, Advanced, Expert and Master. Where do you stop? Answer: at the first gap.

Appendix A: A Simple Weekly Practice Planner and Method Chooser

This appendix turns the program in Module 10 into sheets you can fill in. **One planner page, a block plan and a method chooser** are enough to run a week of extraction practice. Copy the blank tables into a notebook, or draw them on a single sheet each week.



A kitchen table with a pencil, a ruled weekly sheet and a short stack of printed articles beside it.

> **Key Concept:**
> How to use this planner. **Every sheet here is a blank copy of a plan from this book**, and the From column names the section that explains it. The grid, the slots and the minutes are practice choices, with no result claimed, so change them to fit your week.

Habits take time. In one study, **the median time to reach 95% of a habit's plateau was 66 days**, with a range from 18 to 254 days (Lally et al., 2010). The same study found that missing one opportunity did not materially affect habit formation. As a single study, the evidence is mixed.

Fill in the cue column first, then the task. A review of habit formation advises repeating a behaviour in a consistent context until it becomes automatic (Lally & Gardner, 2013). Pick moments that happen on most days, such as finishing breakfast.

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 record and plan next week		

Write each cue as an if-then plan. A meta-analysis, a study that combines many studies, pooled 94 tests and found that implementation intentions, **if-then plans that link a cue to an action**, had a medium-to-large effect on reaching goals (d = .65) (Gollwitzer &

Sheeran, 2006). Here d is an effect size, a number for how big a difference is.

Spread the sessions across the week. Spacing has strong support, even though in one study 72% of people believed cramming worked better while spacing helped 90% of them (Cepeda et al., 2006; Kornell, 2009). Tick the Done column as soon as a session ends, and leave a missed day blank.

The program behind the planner runs in blocks. **Table A.2 shows which block you are in and where it is explained.** The blocks, their order and their contents are this book's program design, a practice choice with no research claim.

Table A.2: The blocks of the program

Weeks	Block	What it asks for	From
Before week 1	Baseline	One timed passage with questions, one listening clip and one short video, on three days with new material	10.1.1
Before week 1	Goals	One specific goal and an if-then plan	10.1.2
1 to 4	First four weeks	About ten minutes a day at the same cue and place, one method each week	10.2.1
5 to 12	Ladder	One harder step every two weeks, with a check at each step	10.2.2
12	Review	Compare your records with your baseline on new material	10.4.1
After 12	Maintenance	Short sessions each week, a monthly ladder step and a baseline check every three months	10.2.3
Any week	Five books	One main session and one short extra each day	10.3.1

The method chooser starts from your goal and your source. **Decide what you need and what kind of source you have**, then pick the

method in Table A.3. When the gist is enough, skim and move on (Rayner et al., 2016).

Table A.3: Method chooser

Goal	Source	Method to try first	From
Gist only	Text	Skimming	4.9.1
One fact	Text or web page	Scanning	4.9.1
Understanding	Text	Question generation, text structure	4.9.1
Understanding	Talk	Metacognitive listening cycle	4.9.1
Keeping	Any	Retrieval practice and spacing	4.9.1
Trusting	Web page	Lateral reading	4.9.1
Learning	Video	Prequestions, segmenting	4.9.1

For anything you need to keep, choose by evidence. **One major review rated practice testing and distributed practice high utility** (Dunlosky et al., 2013). Table A.4 gives that review's ratings for the other common techniques.

Table A.4: Utility ratings from one major review (Dunlosky et al., 2013)

Rating	Techniques
High	Practice testing, distributed practice
Moderate	Elaborative interrogation, self-explanation, interleaving
Low	Summarisation, highlighting, rereading

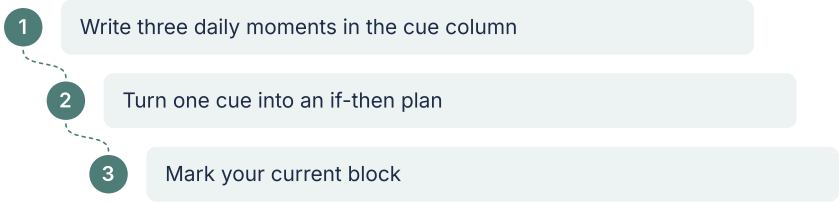
Choose by the task and the source, and not by a learning style. A review found no adequate evidence base for matching teaching to learning styles (Pashler et al., 2008). Try the first method, check what you took in, and switch if it does not suit the material.

The planner and the chooser organise practice. **They make no claim to raise reading scores on their own**, and the methods keep the

evidence given in their own sections. Keep each week's sheet, so the twelve-week review can draw on them.

> Exercise:
>
> Fill in your first week.
>
> 1. Write three moments you meet most days in the cue column of Table A.1.
> 2. **Turn one cue into an if-then plan**, such as "If I finish breakfast, then I read for ten minutes."
> 3. Mark your current block in Table A.2.
> 4. For your next three reading or listening tasks, find the goal and source in Table A.3 and write the method beside each.

Fill in your first week



Key idea:

Plan sessions on set cues, spread them across the week and choose each method by goal and source.

Appendix B: Sleep, Movement and Meal Planning Worksheets

Module 6 looked at sleep, breaks, movement, food and caffeine. **This appendix gives a blank log for each**, so you can see your own week on one page. The logs record what you do, and the facts beside them come from Module 6.



A clipboard on a bedside table holding a sleep log, with a pencil clipped to the top.

> **Key Concept:**
> How to use these worksheets. **Fill in one log for a week, then read it on the weekend.** The columns are practice choices, with no result claimed, and none of them is medical advice. If anything in a log worries you, talk to your doctor.

Sleep comes first. An expert consensus states that **"Adults should sleep 7 or more hours per night on a regular basis to promote optimal health"** (Watson et al., 2015). A second report recommends seven to nine hours for young adults and adults, and seven to eight hours for older adults (Hirshkowitz et al., 2015).

Table B.1: Sleep log (from 6.1.1)

Night	Lights out	Woke up	Hours slept	Caffeine after lunch?	How alert next day (1 to 5)
Monday					
Tuesday					
Wednesday					
Thursday					
Friday					
Saturday					
Sunday					

After **one night of total sleep deprivation**, people in a lab study showed a significant hippocampal encoding deficit, a weakness in forming new memories bigger than chance would explain (Yoo et al., 2007). As a single lab study, the evidence is mixed.

Breaks come next. A study combining 22 samples and 2,335 people found that micro-breaks, very short pauses in work, **raised vigour with d = .36 and cut fatigue with d = .35** (Albulescu et al., 2022). The letter d measures effect size, how big a difference something makes.

The overall effect on performance was not significant, d = .16, and it was **significant only for less demanding tasks**. Longer breaks helped performance more. The evidence is mixed, so treat short breaks as a way to feel fresher.

Table B.2: Reading day break log (from 6.1.2)

Reading block	Minutes read	Break taken	Break length	How fresh after (1 to 5)
1				
2				
3				
4				

For movement, the guidelines say that **"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"** (Bull et al., 2020). Add up your minutes in the last column of Table B.3.

The guidelines also recommend **reducing sedentary behaviour**, time spent sitting or lying with little movement, "although evidence was insufficient to quantify a sedentary behaviour threshold" (Bull et al., 2020). Adults should aim to **"reduce time spent sitting or lying down and break up long periods of not moving with some activity"** (National Health Service, 2024).

Table B.3: Movement log (from 6.2.1 and 6.2.2)

Day	Activity	Minutes	Moderate or vigorous	Long sitting broken up?	Running total
Monday					
Tuesday					
Wednesday					
Thursday					
Friday					

Day	Activity	Minutes	Moderate or vigorous	Long sitting broken up?	Running total
Saturday					
Sunday					

Check before you start anything new. The guidelines note that **"Pre-exercise medical clearance is generally unnecessary for individuals without contraindications prior to beginning light-intensity or moderate-intensity physical activity not exceeding the demands of brisk walking or everyday living"** (Bull et al., 2020). For anything harder, or if you have a health condition, ask your doctor first.

Food comes last. In a randomised trial, where chance decides who follows which diet, **changes in thinking and brain scans over 3 years did not differ significantly** between the MIND diet and a control diet with mild calorie restriction (Barnes et al., 2023). The meal log records what you eat, with no claim that any diet sharpens reading.

Supplements need a doctor's view. Official fact sheets provide information that **"should not take the place of medical advice"**, and they encourage you to talk to your health care providers about supplements (Office of Dietary Supplements, 2022, 2023a, 2023b). Leave supplements off the log unless your doctor has advised them.

Table B.4: Meal and caffeine log (from 6.3.1 and 6.4.1)

Day	Breakfast	Lunch	Dinner	Caffeine (drink and time)	Hours from last caffeine to bed
Monday					
Tuesday					
Wednesday					
Thursday					
Friday					
Saturday					
Sunday					

Habitual caffeine, what you take day after day, **up to 400 mg per day does not give rise to safety concerns for non-pregnant adults** (EFSA Panel on Dietetic Products, Nutrition and Allergies, 2015). Use the last column of Table B.4 to see how close your last cup comes to bedtime.

Timing matters for sleep. In a lab study, **400 mg taken 0, 3 or 6 hours before bedtime each disrupted sleep**, and the authors support refraining from substantial caffeine "for a minimum of 6 hours prior to bedtime" (Drake et al., 2013). It is a single study at a high dose, so the evidence is mixed.

> Exercise:
>
> Fill in one week.
>
> 1. **Log your sleep hours** in Table B.1 for seven nights.
> 2. On your longest reading day, fill in Table B.2.
> 3. Add up your weekly movement minutes in Table B.3.
> 4. On the weekend, mark one change to try next week, and take any worry to your doctor.

Caffeine and sleep



Up to 400 mg a day for non-pregnant adults



None within 6 hours of bedtime



Track it in the last column of Table B.4

Key idea:

One week of simple logs shows your own sleep, breaks, movement and caffeine, and your doctor is the person to ask about anything that worries you.

Appendix C: Exercise Bank, Cleverini Game Guide and Offline Alternatives

THIS BANK WRITES OUT the book's exercises in full. **There are 484 module exercise items and the 95 rows of the Module 4 exercise tables**, so you can pick one and start straight away. Every item is copied word for word from the section named beside it.

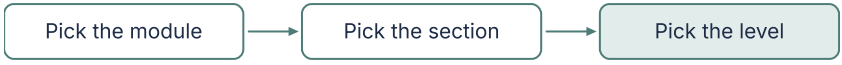


A shoebox of index cards on a bookshelf, with coloured tabs between the cards.

> **Key Concept:**
> How to use this bank. **Choose the module, then the section, then the level.** A Try it takes a few minutes. Starter, Middle and Advanced items build on each other and on the Try it above them, so read a section's rows from the top.

The tables follow the modules in order, and within each module the sections in order. **The Level column shows the level each item already carries in its section**, and the Box column gives the title of its exercise box. The Module 4 table rows carry no level, and their Evidence column gives the evidence for each.

Choose an exercise



Some items name a table, a record or an earlier step from their own section. **Read those rows together with the rows above them**, and use your own material wherever an item names a sample.

Exercises by skill

The bank opens with the one exercise in the front matter. **It is set out as numbered steps**, so its rows carry step numbers in place of a level.

Table C.1: Front matter

Section	Box	Level	Exercise
How to Use This Book	Getting the most from each exercise	Step 1	Read the whole section first.
How to Use This Book	Getting the most from each exercise	Step 2	Use a real source of your own, such as an article or a talk, wherever the exercise allows it.

Section	Box	Level	Exercise
How to Use This Book	Getting the most from each exercise	Step 3	Write what you tried and what changed in your journal.
How to Use This Book	Getting the most from each exercise	Step 4	Come back to the same exercise on another day and compare your notes.

Module 1 sets out what extractivity is and what can change. **Its exercises are short checks on your own reading, listening and viewing**, from the first Try it to the Advanced step of each section.

Table C.2: Module 1: Understanding Extractivity

Section	Box	Level	Exercise
1.1.1		Try it	Read this string once, then cover it and write it down. 7 4 1 9 3 8 2 6 0 5. Now read it as three groups, 741, 938 and 2605, and try again. Notice how much easier the groups feel.
1.1.1	Spot the partners	Starter	Read one short news item. Write which partner worked hardest, attention, memory or understanding.
1.1.1	Spot the partners	Middle	Before you read a new article, write three things you already know about its topic. Afterwards, note whether those facts made any part easier.
1.1.1	Spot the partners	Advanced	Listen to a two-minute news clip once. Write its main point in one sentence, then listen again and check what your three partners missed.
1.1.2		Try it	Read one paragraph of a newspaper article at your normal pace. Then write one sentence that says what it was about, and one detail you remember. Those two lines test clearly and fast at the same time.
1.1.2	Test the definition	Starter	Pick one thing you took in today. Write whether it was visual, audio or text.
1.1.2	Test the definition	Middle	Read a short article twice, once fast and once slowly. After each reading, write its main point and compare.
1.1.2	Test the definition	Advanced	Choose a hard text and give it 20 minutes. Write how it fits together, then check your notes again after a week, as in the two readers above.

Section	Box	Level	Exercise
1.1.3		Try it	Ask a friend to tell you about their day while you time one minute. Then read a page of a novel for one minute. Write **which one you could repeat back more easily**, and why you think so.
1.1.3	Choose the channel	Starter	List five things you took in today. Mark each one as **text, sound or image**.
1.1.3	Choose the channel	Middle	Learn one short set of directions twice, once by reading and once by listening. Note which you remember better after an hour.
1.1.3	Choose the channel	Advanced	Pick one topic and take it in through all three channels, an article, a talk and a chart. Write what each channel gave you that the others did not.
1.2.1		Try it	Take one heading from any book or article. **Turn it into a question**, then read that part only to answer it. Say the answer aloud without looking. This uses the question and recite steps of SQ3R (Robinson, 1946).
1.2.1	Try a method from history	Starter	Before you read an article, write **one question** its title raises. Read to answer it.
1.2.1	Try a method from history	Middle	Fill in a KWL sheet for one chapter, following Ogle (1986). Write what you know, what you want to know and, afterwards, what you learned.
1.2.1	Try a method from history	Advanced	Study one textbook chapter with all five SQ3R steps (Robinson, 1946). Note which step helped you most.
1.2.2		Try it	Hold a finger under one word on this page and stare at it. **Count how many words on each side you can still read** without moving your eyes. Note the number, and try again on another line.
1.2.2	Measure your own pace	Starter	Read a page of an easy novel for one minute. Count the words and **note your words per minute**.
1.2.2	Measure your own pace	Middle	Do the same with a page of non-fiction. Compare both rates with the ranges above.

Section	Box	Level	Exercise
1.2.2	Measure your own pace	Advanced	Play a recorded talk at 1.5 times normal speed for five minutes. Write its main points, then check them at normal speed.
1.2.3		Try it	Pick a website you have not used before. Before reading its content, **open a new tab and search for the site's name**. Spend two minutes reading what other sources report about it. This follows lateral reading (Wineburg & McGrew, 2019).
1.2.3	Learn from the experts	Starter	Skim one news article in 30 seconds. Write **its general drift**, then read it fully and check.
1.2.3	Learn from the experts	Middle	Check one website laterally before you trust it, following Wineburg and McGrew (2019). Note what you found.
1.2.3	Learn from the experts	Advanced	Glance at a busy photo for one second, then write your first impression. Study it for a minute and compare what you saw.
1.3.1		Try it	Read one paragraph as fast as you can, then write what you remember. Read a second paragraph at your normal pace and do the same. **Compare how much each version kept.**
1.3.1	Change gears	Starter	Before reading anything today, **say your purpose aloud**, details or drift. Choose your speed to match.
1.3.1	Change gears	Middle	Skim an article by reading only the first half of each paragraph, which matched skimming in one study (Duggan & Payne, 2009). Then read it fully and note what you missed.
1.3.1	Change gears	Advanced	Listen to the same short talk at normal speed, 1.5 times and 2 times. Write the main points after each and compare.
1.3.2		Try it	Name one real task where you take in information, such as reading emails or listening in meetings. Write **one way to practise that exact task** this week, using real material from your own life.
1.3.2	Build a training habit	Starter	After reading one article today, **close it and write three points** from memory. Then check.

Section	Box	Level	Exercise
1.3.2	Build a training habit	Middle	Pick one passage at a comfortable level and read it three times over a week, following repeated reading (Therrien, 2004). Note how it changes.
1.3.2	Build a training habit	Advanced	Choose a real reading task from work or study. Practise it on four days spread over two weeks, testing yourself each time.
1.3.3		Try it	Before reading a short article, try to answer three questions about it from its title alone. Then read it and check. **Notice how much you could guess**, and what only the reading gave you.
1.3.3	Make a fair test	Starter	Time yourself reading one page of a novel. Write your **words per minute and the text type**.
1.3.3	Make a fair test	Middle	Repeat with non-fiction, then write three main points from memory and check them.
1.3.3	Make a fair test	Advanced	Set up a weekly test with the same kind of text, a timer and five comprehension questions. Record the results for four weeks.

Module 2 links extraction with attention, memory, intellect and creativity. **Each section has a Try it and a three-level box**, listed here in section order.

Table C.3: Module 2: How Extractivity Works with Attention, Memory, Intellect and Creativity

Section	Box	Level	Exercise
2.1.1		Try it	Read a page while a radio talks quietly in the room. Then read a similar page in silence. **Write one sentence about each page** from memory, and note which was easier.
2.1.1	Focus on the source	Starter	Before reading, put your phone in another room and **name your source aloud**.
2.1.1	Focus on the source	Middle	Read for ten minutes and make a small tick each time you notice your mind has drifted. Count the ticks.
2.1.1	Focus on the source	Advanced	Read a page with a talk playing in the background, then the next page in silence. Write the main point of each and compare.

Section	Box	Level	Exercise
2.1.2		Try it	Take a report or article of a kind you read often. Before reading, **write where you expect the main point to be**, such as the first paragraph or the summary box. Then check.
2.1.2	Search with a purpose	Starter	Before you open a long email, **write the one thing you need** from it. Search for that first.
2.1.2	Search with a purpose	Middle	Scan a page for one rare word you have chosen. Time yourself, then check the page slowly for misses.
2.1.2	Search with a purpose	Advanced	Read only the second half of each paragraph, which matched skimming in one study (Duggan & Payne, 2009). Then read fully and spot the misses.
2.1.3		Try it	Ask a friend to move one object in a room while you look away. Then **search for what changed** and time yourself. Notice how long it takes when you do not know what to look for.
2.1.3	Catch the failure	Starter	At the end of each page, **say one sentence** about what it said. If you cannot, look back.
2.1.3	Catch the failure	Middle	Read for ten minutes and note each drift and what pulled you away.
2.1.3	Catch the failure	Advanced	Before a hard reading task, write down everything on your mind to clear the load. Then read and compare with a day when you skipped this step.
2.2.1		Try it	Read a long sentence from a textbook once. Cover it and **say it back in your own words**. Then split it into two shorter sentences and try again. Notice which was easier to hold.
2.2.1	Lighten the load	Starter	While listening to a talk, **write one key word** each minute so you do not have to hold everything.
2.2.1	Lighten the load	Middle	Before reading a dense page, list its new terms with a short meaning for each.
2.2.1	Lighten the load	Advanced	Take a long paragraph and rewrite it as short steps. Compare how easily you can explain it afterwards.

Section	Box	Level	Exercise
2.2.2		Try it	Before reading an article, **look at one picture, chart or heading** that gives its topic. Write two things you already know about it. Then read, and note where those two facts helped.
2.2.2	Use what you know	Starter	Before reading, **write three things you already know** about the topic.
2.2.2	Use what you know	Middle	Look at the pictures, headings or summary of a text before reading it, following the order in Bransford and Johnson (1972). Note what was easier.
2.2.2	Use what you know	Advanced	Read two short texts on a topic, one you know well and one you do not. Write what you remember from each a day later.
2.2.3		Try it	Read one page of something you want to keep. Close it and **write everything you remember** without looking. Then open it and check what you missed.
2.2.3	Turn intake into memory	Starter	After a talk or podcast, **write three points** from memory.
2.2.3	Turn intake into memory	Middle	Make five questions on a chapter and answer them two days later, following Roediger and Karpicke (2006).
2.2.3	Turn intake into memory	Advanced	Plan three review sessions for one topic, spread across a week, as the spacing research suggests (Cepeda et al., 2006). Test yourself at each one.
2.3.1		Try it	Read one short article. Write **one sentence for the whole thing**, its gist. Then write one sentence for each paragraph. Check that the first sentence fits the others.
2.3.1	Build the meaning	Starter	After a short video, **say its main point** in one sentence.
2.3.1	Build the meaning	Middle	Read an article and draw one simple picture that sums it up. Explain the picture to someone.
2.3.1	Build the meaning	Advanced	Take a long report. Write the gist first, then one line per section, and mark any section that does not fit the gist.

Section	Box	Level	Exercise
2.3.2		Try it	Before you share or save the next article you see, **ask yourself how accurate its headline is**. Then open a new tab and search for what other sources say about it. This uses lateral reading (Wineburg & McGrew, 2019).
2.3.2	Judge as you read	Starter	For one article today, **find who wrote it** and who published it.
2.3.2	Judge as you read	Middle	Check one striking claim by reading laterally, following McGrew et al. (2019). Write what other sources said.
2.3.2	Judge as you read	Advanced	Play an online fake-news game like the one in Roozenbeek and van der Linden (2019). Then judge three real headlines and note what you checked.
2.3.3		Try it	After reading a short article, draw **five boxes for its main ideas**. Join them with arrows and write a word on each arrow that says how they are linked.
2.3.3	Structure what you take in	Starter	After a meeting, write **one line per decision**, in the order they were made.
2.3.3	Structure what you take in	Middle	Turn one chapter into a concept map, following Nesbit and Adesope (2006). Label every link.
2.3.3	Structure what you take in	Advanced	Prepare guided notes before a talk, following Konrad et al. (2009), with gaps for key points. Fill them in as you listen.
2.4.1		Try it	Read one article from a field you know nothing about. **Write down one idea, fact or method** from it that you might borrow for your own work or hobby.
2.4.1	Stock the cupboard	Starter	Each day this week, **note one interesting thing** you read, heard or saw.
2.4.1	Stock the cupboard	Middle	Read about one topic from two different fields. Write one link between them.
2.4.1	Stock the cupboard	Advanced	Gather material on a problem for an hour, then take a day off it, as the incubation research suggests (Sio & Ormerod, 2009). Come back and write five ideas.

Section	Box	Level	Exercise
2.4.2		Try it	Walk a route you take every day. **Look for three things you have never noticed** before, and write them down. Ask yourself whether any could be useful.
2.4.2	Train the second look	Starter	After reading an article, **write one detail that surprised you**.
2.4.2	Train the second look	Middle	Study a photo for one minute, cover it, and write what you saw. Look again and note what you missed.
2.4.2	Train the second look	Advanced	After finishing a work task, spend five minutes reviewing it only for oddities. Write each one and what it might mean.
2.4.3		Try it	List three things you will read or hear this week. For each one, **write the job**, drift, details, keeping or new ideas, and the partner that should lead.
2.4.3	Match the job	Starter	Before reading anything today, **say its job aloud**, drift, details, keeping or new ideas.
2.4.3	Match the job	Middle	Take one long document. Skim it first for drift, then read only the parts you need in full.
2.4.3	Match the job	Advanced	For one week, log each reading or listening task, the job you chose, and whether the choice worked.

Module 3 covers the core skills. **The exercises train taking in, selecting, structuring and checking**, one section at a time.

Table C.4: Module 3: Developing the Core Skills of Extractivity

Section	Box	Level	Exercise
3.1.1		Try it	Choose a passage of about 200 words at a comfortable level. Read it aloud three times in one sitting, timing each reading. **Note how your time changes.** This draws on repeated reading (Therrien, 2004).
3.1.1	Build fluency	Starter	Time one page of a novel and **work out your words per minute**.

Section	Box	Level	Exercise
3.1.1	Build fluency	Middle	Do repeated reading three times a week for two weeks, drawing on Therrien (2004). Record your times.
3.1.1	Build fluency	Advanced	Read one article a day in a field you find hard. Note five new words each week and use them.
3.1.2		Try it	Play a recorded talk at 1.5 times speed for five minutes. **Write the main points**, then replay the same five minutes at normal speed and check what you missed.
3.1.2	Follow fast speech	Starter	Listen to a news bulletin and **write its three main stories**.
3.1.2	Follow fast speech	Middle	Read along with an audiobook for 15 minutes, as in reading while listening (Chang & Millett, 2014). Note any new words.
3.1.2	Follow fast speech	Advanced	Shadow one minute of a podcast, repeating it aloud as you hear it, following Hamada (2016). Then summarise it.
3.1.3		Try it	Pick a busy page of a newspaper. Choose one rare word and **scan for it against a timer**. Then read the page slowly to check whether you found every one.
3.1.3	Train the eyes	Starter	On one web page, **notice where your eyes go first**, and write it down.
3.1.3	Train the eyes	Middle	Practise a short visual search game for five minutes a day for a week. Note your scores, and treat any gain as specific to the game.
3.1.3	Train the eyes	Advanced	Take a chart from a report. Write what it shows in one sentence before reading its caption, then check.
3.1.4		Try it	Read one page at your normal pace and write three points. Read the next page as fast as you can and write three points. **Compare the two lists** with the text.
3.1.4	Keep it accurate	Starter	After each article today, **write three points** and check them.
3.1.4	Keep it accurate	Middle	Read the same kind of text for five days, a little faster each day. Stop raising speed when your points slip.

Section	Box	Level	Exercise
3.1.4	Keep it accurate	Advanced	Try a finger pacer on one page and normal reading on the next. Compare your points, and note the cost of the pacer.
3.2.1		Try it	Before you read a report, write **two questions you want it to answer**. Read to answer them, then say the answers aloud without looking.
3.2.1	Set a purpose	Starter	Before opening any email today, **say what you need from it**.
3.2.1	Set a purpose	Middle	Turn the headings of one chapter into questions, as in the question step of SQ3R (Robinson, 1946). Answer each one after reading.
3.2.1	Set a purpose	Advanced	Watch a short lecture video after writing three prequestions, following Carpenter and Toftness (2017). Note what you learned beyond the questions.
3.2.2		Try it	Skim a long article by reading only the first half of each paragraph. **Write its gist in one sentence.** Then read it fully and check.
3.2.2	Skim and scan	Starter	Find **one date** in a news article as fast as you can.
3.2.2	Skim and scan	Middle	Skim three articles by reading half of each paragraph. Rank them by how useful they look, then read the top one. This draws on Duggan and Payne (2009).
3.2.2	Skim and scan	Advanced	Skim a report for gist, then scan it for three figures. Write a five-line summary using both.
3.2.3		Try it	Play a talk with a radio on quietly in the same room. **Follow the talk for three minutes**, then write its main point. This is a practice exercise with no tested evidence behind it.
3.2.3	Separate signal from noise	Starter	Before a meeting, **put your phone away** and write the one thing you need to hear.
3.2.3	Separate signal from noise	Middle	Before sharing any article this week, ask yourself whether it is accurate, as in accuracy prompts (Pennycook et al., 2021).

Section	Box	Level	Exercise
3.2.3	Separate signal from noise	Advanced	Discuss one news claim with a friend, using dialogue as in Abrami et al. (2015). Each of you names the evidence for and against.
3.3.1		Try it	Before reading a chapter, **look only at its headings** and draw a quick box for each one. Then read and add two notes to each box.
3.3.1	Find the structure	Starter	For one news article, **name its parts**, such as headline, main facts and quotes.
3.3.1	Find the structure	Middle	With a partner, take turns leading the talk about a passage. This is a practice version drawing on reciprocal teaching (Palincsar & Brown, 1984).
3.3.1	Find the structure	Advanced	Draw the structure of a 20-minute talk as boxes and arrows while you listen.
3.3.2		Try it	After reading a page, close the book and **explain it aloud in your own words** as if to a friend. Then open the book and check what you left out.
3.3.2	Capture key points	Starter	After one meeting, **write three points in your own words**.
3.3.2	Capture key points	Middle	While studying, stop every page to explain it to yourself, following self-explanation (Chi et al., 1994).
3.3.2	Capture key points	Advanced	Teach a topic you have just learned to a friend for five minutes, as in explaining to others (Fiorella & Mayer, 2013). Note the questions you could not answer.
3.3.3		Try it	After reading a short article, **draw a quick sketch** of its main idea with no words. Then write one sentence explaining the sketch.
3.3.3	Make it visual	Starter	Draw a **concept map of one news story** with five linked words.
3.3.3	Make it visual	Middle	Draw a sketch of each key term in a chapter, following Fernandes et al. (2018).
3.3.3	Make it visual	Advanced	Map one argument from an opinion piece, with its reasons and objections, as in argument mapping (Dwyer et al., 2012).

Section	Box	Level	Exercise
3.4.1		Try it	After reading a page, **rate your understanding from 1 to 5**. Then explain the page aloud without looking. Compare your rating with how well you explained it.
3.4.1	Monitor understanding	Starter	After one article, **write one question** you could not answer about it.
3.4.1	Monitor understanding	Middle	After looking something up online, close the page and explain it aloud, with the finding of Fisher et al. (2015) in mind.
3.4.1	Monitor understanding	Advanced	For a week, test yourself instead of rereading. Note which felt better and which left more behind.
3.4.2		Try it	Take one claim from social media. **Open a new tab and search for the source's name.** Read what two other sites say about it before you return to the claim.
3.4.2	Question sources	Starter	For one article today, **find out who published it**.
3.4.2	Question sources	Middle	Check three claims this week by lateral reading, following Wineburg and McGrew (2019).
3.4.2	Question sources	Advanced	Play a prebunking game, as in Roozenbeek and van der Linden (2019), and list the tricks it taught.
3.4.3		Try it	After reading an article, **close it and write everything you remember**. Check against the text. Repeat the recall three days later without rereading first.
3.4.3	Fix what you took in	Starter	Make **five flashcards** from today's reading.
3.4.3	Fix what you took in	Middle	Review your cards in one large stack on three days spread over two weeks, following Kornell (2009).
3.4.3	Fix what you took in	Advanced	For one course or project, plan practice tests across a month, following Roediger and Karpicke (2006) and Cepeda et al. (2006).

Module 4 holds the methods. **This table lists the exercise boxes from every Module 4 section**, and the eight exercise tables from Module 4 follow it.

Table C.5: Module 4: Methods and Exercises for Developing Extractivity

Section	Box	Level	Exercise
4.1.1		Try it	Read one paragraph without letting your eyes go back. Then read the next one normally. **Write one point after each** and compare.
4.1.1	Test an eye method	Starter	Read one page with a finger pacer and one without. **Write three points after each.**
4.1.1	Test an eye method	Middle	Try an RSVP app at your normal speed for one article. Compare your points with a normal reading.
4.1.1	Test an eye method	Advanced	Keep a two-week log of one eye method. Record speed and three points from memory each day.
4.1.2		Try it	Take a report you have not read. **Spend two minutes previewing** its headings and summary, then write what you expect it to say. Read it and check.
4.1.2	Practise the quick methods	Starter	Find **one fact** in a news article as fast as you can.
4.1.2	Practise the quick methods	Middle	Skim three articles in two minutes each. Pick the most useful one to read in full.
4.1.2	Practise the quick methods	Advanced	Preview, skim and scan one long report in 15 minutes. Write a five-line summary.
4.1.3		Try it	Choose an easy passage of about 300 words. **Read it five times against a timer**, as in timed repeated reading (Chang & Millett, 2013). Record each time.
4.1.3	Build fluency	Starter	Read **one easy book** for 15 minutes a day for a week.
4.1.3	Build fluency	Middle	Do timed reading of easy passages twice a week for a month, following Chang (2010). Chart your words per minute.
4.1.3	Build fluency	Advanced	Read graded speed-reading passages with questions, following Macalister (2010). Track speed and score together.

Section	Box	Level	Exercise
4.1.4		Try it	Read one article in a bold-start format and one in normal print. **Time both and write three points after each.** Compare the results.
4.1.4	Check a product	Starter	Find **one claim** on a reading app's website and note whether it cites a test.
4.1.4	Check a product	Middle	Use a bold-start format for one week and keep a log of speed and three points per article, as a test of Snell (2024).
4.1.4	Check a product	Advanced	Compare a speed-reading app with your normal reading for two weeks. Record speed and comprehension for both.
4.1.5		Try it	Choose a passage of about 300 words. **Read it in 3 minutes, then 2, then 1**, and write three points after the last reading. This 3-2-1 drill is a practice exercise with no tested evidence behind it.
4.1.5	Build a speed routine	Starter	Take a **timed one-minute WPM test** and note your rate.
4.1.5	Build a speed routine	Middle	Do five-times timed repeated reading twice a week for a month, following Chang and Millett (2013). Answer questions after reads 1 and 5.
4.1.5	Build a speed routine	Advanced	Work through graded speed-reading passages with a progress graph, following Macalister (2010). Add a comprehension check after every read.
4.2.1		Try it	Before reading a chapter, write **what you know** about its topic and **what you want to know**. Afterwards, write what you learned. This follows KWL (Ogle, 1986), which has weak evidence.
4.2.1	Use the strong steps	Starter	Turn **one heading** into a question before you read that part.
4.2.1	Use the strong steps	Middle	Recite each section from memory before moving on, as in the recite step of SQ3R (Robinson, 1946).
4.2.1	Use the strong steps	Advanced	Study a chapter with PQ4R, adding a Reflect step after reading (Thomas & Robinson, 1972). Note which step helped most.

Section	Box	Level	Exercise
4.2.2		Try it	Read one article with a friend. **Take turns to predict, question, clarify and summarise** each section. This follows reciprocal teaching (Palincsar & Brown, 1984).
4.2.2	Read together	Starter	With a partner, **summarise one paragraph each** in turn.
4.2.2	Read together	Middle	Use four-role cards for predictor, questioner, clarifier and summariser, following Palincsar and Brown (1984).
4.2.2	Read together	Advanced	Run a book club session with click and clunk and get the gist, following Klingner, Vaughn and Schumm (1998).
4.2.3		Try it	Before each section of a long article, write one question. **Read to answer it**, and then check whether you could have answered it before reading.
4.2.3	Question the text	Starter	Before reading, **guess the answer** to one question about the topic.
4.2.3	Question the text	Middle	While reading, ask what the author is trying to say in each section, as in Questioning the Author (Beck et al., 1996).
4.2.3	Question the text	Advanced	Explain a chapter to a novice, find the gaps, return to the source and simplify. This is the Feynman technique, a practice method.
4.2.4		Try it	Write a prequestion card before each segment of a talk or video. **Answer each card at the end of its segment.** This follows prequestions (Carpenter & Toftness, 2017).
4.2.4	Build an active reading routine	Starter	Do a **heading-to-question conversion** for one chapter, following Robinson (1946).
4.2.4	Build an active reading routine	Middle	Add a recite-from-memory pause after each section, as in Robinson (1946) and Roediger and Karpicke (2006).
4.2.4	Build an active reading routine	Advanced	Run four-role cards with a study group for a month, following Palincsar and Brown (1984).

Section	Box	Level	Exercise
4.3.1		Try it	Play one sentence of a podcast, pause it and **write down every word**. Replay the sentence to check. This is sentence-by-sentence dictation, a practice exercise.
4.3.1	Train with your voice and pen	Starter	Shadow **30 seconds** of a slow podcast.
4.3.1	Train with your voice and pen	Middle	Shadow two minutes a day for two weeks, drawing on Hamada (2016). Note whether you catch more words.
4.3.1	Train with your voice and pen	Advanced	Do dictogloss pair reconstruction with a friend on a one-minute news clip. This is a practice exercise.
4.3.2		Try it	Before a podcast episode, **write two predictions** about what it will say. Listen, check your predictions, listen to the hardest part again, and note what you learned. This follows the metacognitive listening cycle (Vandergrift & Tafaghodtari, 2010).
4.3.2	Listen actively	Starter	In one conversation today, **restate what the other person said** before replying, as in Weger et al. (2010).
4.3.2	Listen actively	Middle	Use a predict, check and reflect worksheet for three talks, following Vandergrift and Tafaghodtari (2010).
4.3.2	Listen actively	Advanced	Follow one voice in a busy podcast with two speakers talking over each other. This is a practice exercise.
4.3.3		Try it	Watch a 20-minute lecture. **Pause at each change of topic** and spend two minutes filling gaps in your notes. This follows the lecture pause procedure (Ruhl et al., 1987).
4.3.3	Use the controls	Starter	Play one podcast at **1.25 times speed**.
4.3.3	Use the controls	Middle	Climb a playback rate ladder of 1.25, 1.5 and 2 times over three weeks, stopping at 2 times, drawing on Murphy et al. (2022).
4.3.3	Use the controls	Advanced	Take two-minute note comparison pauses with a study partner during a full lecture, following Ruhl et al. (1987).

Section	Box	Level	Exercise
4.3.4		Try it	With a partner, take turns to speak for one minute. **The listener paraphrases back** what they heard before replying. This is the paraphrase-back pair drill, drawing on Weger et al. (2010).
4.3.4	Build a listening routine	Starter	Do **sentence-by-sentence dictation** on one minute of audio, a practice exercise.
4.3.4	Build a listening routine	Middle	Use the predict, check, reflect worksheet for one talk a week, following Vandergrift and Tafaghodtari (2010).
4.3.4	Build a listening routine	Advanced	Combine the playback rate ladder with two-minute note comparison pauses on a long lecture, following Murphy et al. (2022) and Ruhl et al. (1987).
4.4.1		Try it	Print a page of random letters. **Find every letter Q against a timer**, then repeat with a new page tomorrow. This is a visual search drill (Sireteanu & Rettenbach, 1995).
4.4.1	Train your search	Starter	Do a **timed odd-one-out search grid** once, following Sireteanu and Rettenbach (1995).
4.4.1	Train your search	Middle	Practise peripheral flash identification for a week, drawing on Ball et al. (2002), and treat any gain as specific to the drill.
4.4.1	Train your search	Advanced	Proofread one document with a quadrant checklist scan, as in Kok et al. (2016), and one without. Compare what you found.
4.4.2		Try it	Take one diagram from a textbook. **Explain to yourself what each part shows**, out loud or on paper. This follows diagram self-explanation (Ainsworth & Loizou, 2003).
4.4.2	Read charts and diagrams	Starter	For one chart in the news, **say in one sentence what it shows**.
4.4.2	Read charts and diagrams	Middle	Use diagram self-explanation prompts on three diagrams, following Ainsworth and Loizou (2003).
4.4.2	Read charts and diagrams	Advanced	Ask three-level graph questions about five charts from a report. This is a practice exercise, with no study claimed.

Section	Box	Level	Exercise
4.4.3		Try it	Watch a short how-to video. **Pause after each step** and predict what comes next before you play on. This follows segmenting (Mayer & Chandler, 2001).
4.4.3	Learn from video	Starter	Watch one video in **three segments**, pausing between each.
4.4.3	Learn from video	Middle	Pause and predict after each video segment for a whole lecture, following Mayer and Chandler (2001).
4.4.3	Learn from video	Advanced	Watch an expert-gaze video before a viewing task, as in Jarodzka et al. (2013), and compare what you notice with a task done without it.
4.4.4		Try it	Before studying a chart, **add your own cues**, such as an arrow to the highest point and a label on the key line. Then explain the chart aloud. Marking the signal is a practice exercise.
4.4.4	Build a visual routine	Starter	Do one **timed odd-one-out search grid**, following Sireteanu and Rettenbach (1995).
4.4.4	Build a visual routine	Middle	Use diagram self-explanation prompts for every diagram in one chapter, following Ainsworth and Loizou (2003).
4.4.4	Build a visual routine	Advanced	Keep a timestamped video log for a full online course module. This is a practice exercise.
4.5.1		Try it	Rule one page into Cornell columns before a talk. Afterwards, **cover the notes and answer from the cue column**. This uses the retrieval step of the Cornell method (Pauk, n.d.; Roediger & Karpicke, 2006).
4.5.1	Try the layouts	Starter	Take notes on one talk with the **sentence method**, a practice exercise.
4.5.1	Try the layouts	Middle	Write a bottom-strip summary in your own words after each Cornell page, drawing on Pauk (n.d.).
4.5.1	Try the layouts	Advanced	For one week, follow a paraphrase-only rule in all notes, drawing on Mueller and Oppenheimer (2014). Note how it changes what you write.

Section	Box	Level	Exercise
4.5.2		Try it	Build a **3 by 4 comparison matrix** for three things you are choosing between, such as three phones or three courses. Use four features as columns. This draws on matrix notes, which have mixed evidence (Jairam et al., 2012).
4.5.2	Lay it out	Starter	Make a **sketch-the-concept card** for one key term, following Fernandes et al. (2018).
4.5.2	Lay it out	Middle	Make a mind map from memory after reading a chapter, drawing on Farrand et al. (2002).
4.5.2	Lay it out	Advanced	Turn a long report into a comparison matrix, drawing on Jairam et al. (2012).
4.5.3		Try it	On the evening after a meeting or lecture, **spend ten minutes reworking your notes**. Fill gaps, fix errors and add one question you still have. This follows note review (Kobayashi, 2006), and the timing is a practice choice.
4.5.3	Work your notes	Starter	Fill in a **guided-notes handout** during one talk, following Konrad et al. (2009).
4.5.3	Work your notes	Middle	Do same-day note review after every lecture for two weeks, following Kobayashi (2006).
4.5.3	Work your notes	Advanced	Start a slip-box with ten atomic notes, each with one link to another note, drawing on Ahrens (2017). This is a practice exercise.
4.5.4		Try it	After reading one chapter, **make a sketch-the-concept card** for its key idea. Draw it with no words, then write one sentence underneath. This follows Fernandes et al. (2018).
4.5.4	Build a note routine	Starter	Do one **cover-the-notes cue-column quiz**, following Pauk (n.d.) and Roediger and Karpicke (2006).
4.5.4	Build a note routine	Middle	Do same-day note review for every lecture this week, following Kobayashi (2006).
4.5.4	Build a note routine	Advanced	Make a 3 by 4 comparison matrix for a topic you are studying, drawing on Jairam et al. (2012).

Section	Box	Level	Exercise
4.6.1		Try it	Make ten flashcards on one topic. **Go through them until you get each one right once.** Repeat the same routine two days later and again a week later. This draws on successive relearning (Rawson et al., 2013).
4.6.1	Keep what you learn	Starter	Do a **blank-page brain dump** after one article, following Roediger and Karpicke (2006).
4.6.1	Keep what you learn	Middle	Set a review calendar at growing intervals for one topic, following Cepeda et al. (2006). Treat the intervals as practice estimates.
4.6.1	Keep what you learn	Advanced	Use relearn-to-criterion over three sessions for a set of course terms, following Rawson et al. (2013).
4.6.2		Try it	Before reading the answer to a question in a textbook, **write your own answer first**. Then read and compare. This draws on the generation effect (Bertsch et al., 2007).
4.6.2	Make it your own	Starter	Write a **why-question for each of five facts**, following Martin and Pressley (1991).
4.6.2	Make it your own	Middle	Explain each step of a worked example aloud, following Chi et al. (1994).
4.6.2	Make it your own	Advanced	Teach a topic to a peer and answer their questions, as in Fiorella and Mayer (2013).
4.6.3		Try it	Learn five new words in another language. For each, **find an English word that sounds similar** and picture the two together. This follows the keyword mnemonic (Atkinson & Raugh, 1975).
4.6.3	Use memory tools	Starter	Draw a **word plus sketch pair** for three new terms, drawing on Clark and Paivio (1991).
4.6.3	Use memory tools	Middle	Take a memory palace walk to learn a ten-item list, drawing on Dresler et al. (2017).
4.6.3	Use memory tools	Advanced	Make a shuffled problem set from three chapters of a maths or science book, following Rohrer and Taylor (2007).
4.6.4		Try it	Take a page you highlighted in the past. **Turn each highlight into a question**, close the book and answer them. Check which answers you got right.

Section	Box	Level	Exercise
4.6.4	Upgrade a habit	Starter	Highlight **no more than one phrase** per page in the reading you do today.
4.6.4	Upgrade a habit	Middle	Before rereading any chapter this week, write what you remember first.
4.6.4	Upgrade a habit	Advanced	For one week, replace all rereading with a blank-page brain dump, and note what you recall a week later.
4.6.5		Try it	Make five fill-the-gap cards from today's reading, each **a sentence with its key word missing**. Answer them tomorrow before looking. This follows the generation effect (Bertsch et al., 2007).
4.6.5	Build a retention routine	Starter	Do a **blank-page brain dump** after one article, following Roediger and Karpicke (2006).
4.6.5	Build a retention routine	Middle	Keep one large flashcard stack for a course and go through it in full three times a week, following Kornell (2009).
4.6.5	Build a retention routine	Advanced	Plan a review calendar at growing intervals for a whole term, following Cepeda et al. (2006), and add teach-back to a peer, as in Fiorella and Mayer (2013).
4.7.1		Try it	Take one surprising post from social media. **Work through the four SIFT moves** and write one line for each. This follows SIFT (Caulfield, 2019).
4.7.1	Check the source	Starter	Do a **new-tab check** on one site today, asking who is behind it, following McGrew et al. (2019).
4.7.1	Check the source	Middle	Scan the whole results page before one click for every search this week, as in Wineburg and McGrew (2019).
4.7.1	Check the source	Advanced	Keep a SIFT four-move card by your screen for a week and use it on five claims, following Caulfield (2019).
4.7.2		Try it	Watch one short video about a manipulation technique. **Then rate five posts** in your feed for that technique. This follows inoculation videos (Roozenbeek et al., 2022).

Section	Box	Level	Exercise
4.7.2	Train your filter	Starter	Watch **one inoculation video**, then rate three posts, as in Roozenbeek et al. (2022).
4.7.2	Train your filter	Middle	Play a Bad News session, following Roozenbeek and van der Linden (2019), and list the techniques it showed.
4.7.2	Train your filter	Advanced	Work through Civic Online Reasoning assessment tasks with a friend, drawing on Wineburg et al. (2022).
4.7.3		Try it	Take one opinion you hold strongly. **Write three ways the opposite could be true.** This follows consider the opposite (Lord et al., 1984).
4.7.3	Check your own judgement	Starter	Before sharing one post, **rate its accuracy** from 1 to 5, as in Pennycook et al. (2021).
4.7.3	Check your own judgement	Middle	Fill a three-column claim, evidence and reasoning sheet for one article, following McNeill et al. (2006).
4.7.3	Check your own judgement	Advanced	For one week, use an opposite-case prompt on every strong claim you meet, following Lord et al. (1984).
4.7.4		Try it	Take your next ten emails or messages. **Sort each into ignore, skim or read.** This is the ignore, skim or read sort, a practice exercise.
4.7.4	Build a filtering routine	Starter	Do one **new-tab check**, following McGrew et al. (2019).
4.7.4	Build a filtering routine	Middle	Use an accuracy rating before sharing anything for a week, following Pennycook et al. (2021).
4.7.4	Build a filtering routine	Advanced	Fill a three-column CER sheet for three opinion pieces on the same topic, following McNeill et al. (2006).
4.8.1		Try it	Take one paragraph. **Cross out what is minor or repeated**, replace lists with a general word, and write one topic sentence. This macrorule drill follows Brown and Day (1983), and its evidence is weak.
4.8.1	Summarise well	Starter	Write a **one-sentence summary** of a news article.

Section	Box	Level	Exercise
4.8.1	Summarise well	Middle	Do a macrorule drill on three paragraphs, following Brown and Day (1983). Compare your topic sentences with a friend's.
4.8.1	Summarise well	Advanced	Write a fixed-length gist sentence for each section of a chapter. This is a practice exercise, with no study claimed.
4.8.2		Try it	Pick an editorial. **Write its main claim at the top**, then add each reason below it and each objection beside the reason it attacks. This follows argument mapping (Dwyer et al., 2012).
4.8.2	Map it	Starter	Draw a **concept map with linking words** for one short article, following Nesbit and Adesope (2006).
4.8.2	Map it	Middle	Map an editorial's argument with its reasons and objections, following Dwyer et al. (2012).
4.8.2	Map it	Advanced	Fill a compare and contrast organiser for two theories in a subject you study, following Dexter and Hughes (2011).
4.8.3		Try it	After each section of a chapter, **write three questions** that the section answers. Answer them the next day without looking. This follows question generation (Rosenshine et al., 1996).
4.8.3	Read for structure	Starter	Circle **every signal word** in one news article, drawing on Hebert et al. (2016).
4.8.3	Read for structure	Middle	Write three questions per section for one chapter, following Rosenshine et al. (1996).
4.8.3	Read for structure	Advanced	For a report, name its main structure, draw it as a diagram, and write one question for each part.
4.8.4		Try it	Pick one reading strategy from this module. **Write a short plan** for when you will use it, how you will check it worked, and what you will do if it does not. This draws on the self-regulation idea in Self-Regulated Strategy Development (Harris & Graham, 1996).
4.8.4	Borrow from the programmes	Starter	Ask a friend to **listen to you read** one page aloud and note where you stumble.

Section	Box	Level	Exercise
4.8.4	Borrow from the programmes	Middle	Set a weekly reading routine for a month, with the same days and times.
4.8.4	Borrow from the programmes	Advanced	Write a self-regulation plan for one strategy and review it each week, drawing on Harris and Graham (1996).
4.8.5		Try it	For one chapter, **draw a concept map with linking words** on every line. Then write three questions the map can answer. This follows Nesbit and Adesope (2006) and Rosenshine et al. (1996).
4.8.5	Build a systematic routine	Starter	Do one **signal-word hunt** on a short article, following Hebert et al. (2016).
4.8.5	Build a systematic routine	Middle	Fill a compare and contrast organiser for two products or ideas, following Dexter and Hughes (2011).
4.8.5	Build a systematic routine	Advanced	Map an editorial's argument, then write three questions per section of the editorial, following Dwyer et al. (2012) and Rosenshine et al. (1996).
4.9.1		Try it	List the next three things you need to read, watch or hear. **Write the goal for each**, such as gist, fact, understanding or keeping. Then pick one method from the table below for each.
4.9.1	Choose well	Starter	Before reading one article, **write your goal** in three words.
4.9.1	Choose well	Middle	For a week, note the goal and method for every important text you read.
4.9.1	Choose well	Advanced	Plan methods for a whole course or project, matching each source to a goal and a method.
4.9.2		Try it	Take one textbook section. **Turn the heading into a question**, read to answer it, recite the answer from memory, and review your notes the next day. This combines the SQ3R question and recite steps with note review (Robinson, 1946; Kobayashi, 2006).
4.9.2	Combine methods	Starter	Add a **recite pause** to your normal reading of one article.

Section	Box	Level	Exercise
4.9.2	Combine methods	Middle	Use Cornell notes with a cue-column quiz and same-day review for one lecture, following Pauk (n.d.) and Kobayashi (2006).
4.9.2	Combine methods	Advanced	Run reciprocal teaching roles with a group, then each write a brain dump, following Palincsar and Brown (1984) and Roediger and Karpicke (2006).
4.9.3		Try it	Choose one drill from the table below. **Do it for ten minutes at the same time** each day for a week, and tick a box each day you do it.
4.9.3	Build a daily drill	Starter	Do **one ten-minute drill** today and tick it off.
4.9.3	Build a daily drill	Middle	Do the same drill daily for three weeks in the same place, drawing on Lally and Gardner (2013).
4.9.3	Build a daily drill	Advanced	Rotate drills across the week and share your chart with a friend, drawing on Harkin et al. (2016).
4.9.4		Try it	Take a passage you read easily at your normal speed. **Read a harder passage at the same speed**, then write three points. Step back if your points slip.
4.9.4	Climb the ladder	Starter	Read **one graded passage** a level above your usual, drawing on Macalister (2010).
4.9.4	Climb the ladder	Middle	Do timed repeated reading with a harder passage each week for a month, following Chang and Millett (2013).
4.9.4	Climb the ladder	Advanced	Plan a month of challenges across three skills from the table, with a comprehension check at every step.

Module 4 exercise tables

The eight Module 4 exercise sections each end in a table. **Within each table, rows are sorted by the method they train**, so exercises for one method sit together. Practice only means no study tested the exercise itself.

The first rows come from section 4.1.5. **Many have never been tested on their own**, and the Evidence column says so plainly. Add a comprehension check after every timed read, since that check has the strongest support in the group.

Table C.6: Speed-reading and eye drills (from 4.1.5)

Exercise	Trains	Evidence	Credit
Read-while-listening at rising audio speeds	Audio-assisted reading	Practice only, not tested	None
Bionic-format reading session	Bionic Reading	Evidence mixed	Snell (2024)
Number grid (find numbers 1 to 25 while fixing the centre)	Eye span	Practice only	None
Word pyramid (tapering lines read with one central fixation)	Eye span	Practice only	None
Column reading (eyes down the centre of narrow columns)	Eye span, phrase reading	Practice only	None
Graded speed-reading passages with a progress graph	Graded passages	Mixed	Macalister (2010)
Z-pattern or S-pattern hand sweeps	Pacing	Practice only	None
Hand-motion patterns (underline, zigzag)	Pacing	Practice only	None
Index-card pacing (card slides down over lines already read)	Pacing, regression elimination	Practice only	None
PhotoReading page-flip (“photofocus”)	PhotoReading	Evidence mixed	McNamara (2000)
Flash-card phrase drill	Phrase reading, tachistoscope	Weak	Related, Amble and Muehl (1966)
Two-minute preview drill	Previewing	Practice only	None
Fading-text drill at self-paced plus rate	Reading Acceleration Program	Mixed	Breznitz et al. (2013)

Exercise	Trains	Evidence	Credit
Repeated reading with fluency chart	Repeated reading	Strong for developing readers	Therrien (2004)
Increasing-rate RSVP drill	RSVP	Evidence mixed	Acklin and Papesh (2017)
Timed scanning hunt (find a fact or date)	Scanning	Practice only	None
Timed first-sentence skim	Skimming	Mixed	Related, Duggan and Payne (2009)
Humming or counting while reading	Suppressing inner speech	Evidence mixed	Rayner et al. (2016)
Tachistoscope flash drill (digits or words at shrinking exposure)	Tachistoscope	Evidence mixed	Marvel (1959)
Timed one-minute WPM test	Timed reading	Practice only, a measuring tool	Chang (2010) measured gains in words per minute
3-2-1 drill (same passage in 3, 2, then 1 minute)	Timed reading	Practice only	None
Sprint drill (short all-out bursts, then normal reading)	Timed reading	Practice only	None
Comprehension check after every timed read	Timed reading, graded passages	Strong for the check	Rayner et al. (2016)
Five-times timed repeated reading with questions after reads 1 and 5	Timed repeated reading	Mixed	Chang and Millett (2013)

The active reading rows come from section 4.2.4. **They ask you to do something with a text** before, during and after reading. Rows that share a method sit together, such as the two SQ3R rows.

Table C.7: Active reading (from 4.2.4)

Exercise	Trains	Evidence	Credit
Click and clunk; get the gist	Collaborative Strategic Reading	Mixed	Klingner, Vaughn and Schumm (1998)

Exercise	Trains	Evidence	Credit
Predict, read, prove cycle	DR-TA	Practice only	None
Explain-to-a-novice drill	Feynman technique	Practice only	Related, Fiorella and Mayer (2013)
Three-column KWL chart	KWL	Weak	Ogle (1986)
KWL Plus map and summary	KWL Plus	Practice only	None
Prequestion card before each segment	Prequestions	Mixed	Carpenter and Toftness (2017)
Question sorting by answer source	Question-Answer Relationships	Practice only	None
Author queries during reading	Questioning the Author	Mixed	Beck et al. (1996)
Four-role cards (predictor, questioner, clarifier, summariser)	Reciprocal teaching	Strong	Palincsar and Brown (1984)
Recite-from-memory pause after each section	SQ3R	Strong, as retrieval practice	Robinson (1946); Roediger and Karpicke (2006)
Heading-to-question conversion	SQ3R, PQ4R	Practice only, part of an origin method	Robinson (1946)

The listening rows come from section 4.3.4. **Stop the playback ladder at 2x**, as its Evidence column says. Several rows are practice only, so check what you took in after each one.

Table C.8: Listening (from 4.3.4)

Exercise	Trains	Evidence	Credit
Paraphrase-back pair drill	Active listening	Mixed	Weger et al. (2010)
Sentence-by-sentence dictation	Dictation	Practice only	Wajnryb (1990)
Dictogloss pair reconstruction	Dictogloss	Practice only	Wajnryb (1990)

Exercise	Trains	Evidence	Credit
Playback rate ladder (1.25x, 1.5x, 2x)	Fast playback	Mixed, stop at 2x	Murphy et al. (2022)
Two-minute note comparison pauses	Lecture pause procedure	Mixed	Ruhl et al. (1987)
Predict, check, reflect worksheet	Metacognitive listening cycle	Mixed	Vandergrift and Tafaghodtari (2010)
Two-voice selective listening	Selective listening	Practice only	Cherry (1953)
Staged shadowing (listen, mumble, full shadow)	Shadowing	Practice only	None

The visual rows come from section 4.4.4. **Two rows are mixed for the trained task or ability**, so pair them with real charts, pictures or video.

Table C.9: Visual extraction (from 4.4.4)

Exercise	Trains	Evidence	Credit
Open-question looking session (what is going on, what makes you say that, what more)	Art observation	Practice only	None
Diagram self-explanation prompts	Diagram self-explanation	Mixed	Ainsworth and Loizou (2003)
Expert-gaze video then own viewing	Eye-movement modelling	Mixed	Jarodzka et al. (2013)
Three-level graph questions (read the data, between, beyond)	Graph literacy training	Practice only	None
Pause and predict after each video segment	Segmenting	Mixed	Mayer and Chandler (2001)
Mark the signal (add cues to a chart before studying it)	Signalling	Practice only	None
Quadrant checklist scan	Systematic scanning	Evidence mixed	Kok et al. (2016)
Peripheral flash identification	Useful field of view training	Mixed for the trained ability	Ball et al. (2002)

Exercise	Trains	Evidence	Credit
Timestamped video log	Video note-taking	Practice only	None
Timed odd-one-out search grid	Visual search training	Mixed for the trained task	Sireteanu and Rettenbach (1995)

The note-taking rows come from section 4.5.4. **Two rows train the Cornell method**, one through its cue column and one through its summary strip, and their evidence differs.

Table C.10: Note-taking (from 4.5.4)

Exercise	Trains	Evidence	Credit
Cover-the-notes cue-column quiz	Cornell method	Strong, as retrieval	Pauk (n.d.); Roediger and Karpicke (2006)
Bottom-strip summary in your own words	Cornell method	Weak	Pauk (n.d.)
Sketch-the-concept card	Drawing	Strong	Fernandes et al. (2018)
Guided-notes fill-in	Guided notes	Strong	Konrad et al. (2009)
Paraphrase-only rule (no verbatim lines)	Longhand instead of laptop	Evidence mixed	Mueller and Oppenheimer (2014)
Build a 3 by 4 comparison matrix	Matrix notes	Mixed	Jairam et al. (2012)
Mind map from memory after reading	Mind mapping	Mixed	Farrand et al. (2002)
Same-day note review	Note review	Strong, timing a practice estimate	Kobayashi (2006)
Partner revision pause	Note revision	Practice only	None
Outline from headings first	Outline method	Practice only	None
Atomic note plus link	Slip-box	Practice only	Ahrens (2017)

The retention rows come from section 4.6.5. **Three of them are rated strong**, and the review calendar keeps its intervals as a practice estimate.

Table C.11: Comprehension and retention (from 4.6.5)

Exercise	Trains	Evidence	Credit
Word plus sketch pair	Dual coding	Mixed	Clark and Paivio (1991)
Why-question per fact	Elaborative interrogation	Mixed	Martin and Pressley (1991)
Fill-the-gap generation card	Generation effect	Strong	Bertsch et al. (2007)
Shuffled problem set	Interleaving	Mixed	Rohrer and Taylor (2007)
Keyword link card	Keyword mnemonic	Mixed	Atkinson and Raugh (1975)
Teach-back to a peer	Learning by teaching	Mixed	Fiorella and Mayer (2013)
One large flashcard stack	Leitner box flashcards	Mixed	Kornell (2009)
Memory palace walk	Method of loci	Mixed	Dresler et al. (2017)
Blank-page brain dump	Retrieval practice	Strong	Roediger and Karpicke (2006)
Step-by-step self-explanation aloud	Self-explanation	Mixed	Chi et al. (1994)
Review calendar at growing intervals	Spaced repetition	Strong, intervals a practice estimate	Cepeda et al. (2006)
Relearn-to-criterion over three sessions	Successive relearning	Mixed	Rawson et al. (2013)

The filtering rows come from section 4.7.4. **They help you check a source or a claim** before you believe or share it.

Table C.12: Filtering (from 4.7.4)

Exercise	Trains	Evidence	Credit
Accuracy rating before sharing	Accuracy prompts	Mixed	Pennycook et al. (2021)
Civic Online Reasoning assessment tasks	Civic Online Reasoning	Mixed	Digital Inquiry Group (n.d.)
Three-column CER sheet	Claim, evidence, reasoning	Mixed	McNeill et al. (2006)
Scan the whole results page before one click	Click restraint	Mixed	Wineburg and McGrew (2019)
Opposite-case prompt	Consider the opposite	Mixed	Lord et al. (1984)
CRAAP scoring sheet	CRAAP test	Weak	Blakeslee (2004)
Watch an inoculation video, then rate posts	Inoculation videos	Strong	Roozenbeek et al. (2022)
New-tab check (who is behind this site?)	Lateral reading	Strong	McGrew et al. (2019)
Bad News play session	Prebunking games	Mixed	Roozenbeek and van der Linden (2019)
SIFT four-move card	SIFT	Mixed	Caulfield (2019)
Reverse image search check	SIFT (trace)	Practice only	None
Ignore, skim or read sort	Signal versus noise triage	Practice only	None

The last skill rows come from section 4.8.5. **Four of its seven rows are rated strong**, and the macrorule drill is weak.

Table C.13: Systematic extraction (from 4.8.5)

Exercise	Trains	Evidence	Credit
Map an editorial's argument	Argument mapping	Mixed	Dwyer et al. (2012)

Exercise	Trains	Evidence	Credit
Concept map with linking words	Concept mapping	Strong	Nesbit and Adesope (2006)
Fixed-length gist sentence	GIST summarising	Practice only	None
Fill a compare and contrast organiser	Graphic organisers	Strong	Dexter and Hughes (2011)
Write three questions per section	Question generation	Strong	Rosenshine et al. (1996)
Macrorule drill on one paragraph	Summarisation with macrorules	Weak	Brown and Day (1983)
Signal-word hunt for text structure	Text structure training	Strong	Hebert et al. (2016)

Module 5 moves the methods into real fields. **Each row names the section, so you can find the field you need**, such as textbooks, work documents, news, talks, charts, video or another language.

Table C.14: Module 5: Training Extractivity in Different Fields

Section	Box	Level	Exercise
5.1.1		Try it	Before your next chapter, **write three questions from the headings**. After each section, say in two sentences how it links to the section before.
5.1.1	Read a chapter for understanding	Starter	Before one chapter, **write five lines on what you already know** about its topic.
5.1.1	Read a chapter for understanding	Middle	Turn the headings into questions and answer them after reading, using the question step of SQ3R (Robinson, 1946).
5.1.1	Read a chapter for understanding	Advanced	After each section, explain how it follows from the last (Chi et al., 1994). Two days later, answer your questions from memory.
5.1.2		Try it	Pick one chapter you read last week. **Write everything you remember on a blank page**, then check the chapter and mark what you missed.

Section	Box	Level	Exercise
5.1.2	Plan a study project	Starter	List the chapters of one course and **book one short review session** a week.
5.1.2	Plan a study project	Middle	Turn each review into a practice test (Roediger & Karpicke, 2006).
5.1.2	Plan a study project	Advanced	In the final weeks, retrieve each item until it is right, then again in a later session, as in successive relearning (Rawson et al., 2013).
5.2.1		Try it	Take this morning's inbox and **sort each item into ignore, skim or read**. Read only the third pile closely. The sort is a practice choice.
5.2.1	Triage your reading	Starter	Sort **ten emails into ignore, skim or read** in five minutes.
5.2.1	Triage your reading	Middle	For one week, check email at set times and sort by relevance first.
5.2.1	Triage your reading	Advanced	Triage a long report, skimming the summary and reading closely only the parts you must act on (Rayner et al., 2016). Then check its later pages.
5.2.2		Try it	Take the minutes of your last meeting. **Write every decision on one line each**, with who will act and by when.
5.2.2	Extract decisions and actions	Starter	From one email thread, **list each decision** in your own words.
5.2.2	Extract decisions and actions	Middle	Fill the template for a ten-page report, writing your questions before you open it.
5.2.2	Extract decisions and actions	Advanced	For a project with many actions, build a matrix with topics in rows and owners and dates in columns, as in charting notes (Kiewra et al., 1988).
5.3.1		Try it	Take the next surprising post you see. **Open a new tab and find out who is behind it** before you read the rest.
5.3.1	Check before you share	Starter	For one shared post, **stop and check who is behind it** in a new tab (Wineburg & McGrew, 2019).
5.3.1	Check before you share	Middle	Run all four SIFT moves on three stories this week (Caulfield, 2019).

Section	Box	Level	Exercise
5.3.1	Check before you share	Advanced	Trace one viral image with a reverse image search and note where it first appeared. This step is a practice choice.
5.3.2		Try it	Tonight, **write down every place you saw news today**. Circle the two you would keep in a deliberate week.
5.3.2	Plan a news week	Starter	**Pick two news sources** and two set times for reading them.
5.3.2	Plan a news week	Middle	Follow the one-week plan and tick a chart each day (Harkin et al., 2016).
5.3.2	Plan a news week	Advanced	Add a daily consider-the-opposite note on one opinion piece (Lord et al., 1984), and compare your views at the start and end of the week.
5.4.1		Try it	Before your next meeting, **write one question you want answered**. During the meeting, note only what answers it and any action for you.
5.4.1	Listen and take notes	Starter	Before one podcast, **write one question** and note only what answers it.
5.4.1	Listen and take notes	Middle	Raise playback to 1.25x, then 1.5x over a week, stopping at 2x (Murphy et al., 2022).
5.4.1	Listen and take notes	Advanced	Take notes in a Cornell layout during a lecture and use the cue column to test yourself that evening (Pauk, n.d.).
5.4.2		Try it	After your next talk or podcast, **write five lines from memory** before you look at your notes. Then add what you missed in a different colour.
5.4.2	Turn a talk into a summary	Starter	**Review your notes the same day** as the talk (Kobayashi, 2006).
5.4.2	Turn a talk into a summary	Middle	Write a blank-page brain dump before reviewing (Roediger & Karpicke, 2006).
5.4.2	Turn a talk into a summary	Advanced	Write a three-part summary, turn it into five questions and answer them a week later.

Section	Box	Level	Exercise
5.5.1		Try it	Pick one chart from today's news. **Say aloud what the axes show**, then say the main message in one sentence.
5.5.1	Read a chart for its message	Starter	For one chart, **name what each axis shows** before you look at the shape.
5.5.1	Read a chart for its message	Middle	Answer the three questions on two charts at work. This format is a practice choice.
5.5.1	Read a chart for its message	Advanced	Explain a complex diagram to yourself part by part, following diagram self-explanation (Ainsworth & Loizou, 2003).
5.5.2		Try it	Find one chart in the news today. **Write down the scale on each axis** and whether the chart leaves anything out.
5.5.2	Spot misleading numbers	Starter	For one chart, **read both axis labels** before the shape.
5.5.2	Spot misleading numbers	Middle	For three news percentages, find the base number behind each.
5.5.2	Spot misleading numbers	Advanced	Try a game or video on decision biases, as in debiasing training (Morewedge et al., 2015), and note any change in how you read charts.
5.6.1		Try it	Watch a ten-minute learning video in **three parts**. At each pause, say what you just learned in one sentence.
5.6.1	Watch to learn	Starter	Before one video, **write one question** you want answered.
5.6.1	Watch to learn	Middle	Pause a video at each new idea and summarise it in one sentence, following segmenting (Mayer & Chandler, 2001).
5.6.1	Watch to learn	Advanced	Raise playback to 1.5x on a familiar topic, stopping at 2x (Murphy et al., 2022), and check your recall after.
5.6.2		Try it	Pick one video you watched this week. **Write three time codes** and a one-line note for each.
5.6.2	Run a video project	Starter	Watch one video with **one question** in mind.

Section	Box	Level	Exercise
5.6.2	Run a video project	Middle	On a second pass, pause and predict after each segment (Mayer & Chandler, 2001), logging notes with time codes.
5.6.2	Run a video project	Advanced	A few days later, answer your questions from memory (Roediger & Karpicke, 2006), then rewatch only the parts you missed.
5.7.1		Try it	Choose a one-minute clip in the language you are learning. **Play it while reading the transcript**, then play it again without the text.
5.7.1	Read and listen in a second language	Starter	**Read along with one short audio clip** each day for a week (Chang & Millett, 2014).
5.7.1	Read and listen in a second language	Middle	Shadow a one-minute clip three times a week (Hamada, 2016).
5.7.1	Read and listen in a second language	Advanced	Learn one listening strategy from a course book or teacher and use it on each clip, as in strategy instruction (Plonsky, 2011).
5.7.2		Try it	Pick a graded reader one level below your current level. **Read for fifteen minutes** without a dictionary and note how many pages you covered.
5.7.2	Build fluency	Starter	**Read one easy graded reader** a week (Nakanishi, 2015).
5.7.2	Build fluency	Middle	Do one timed passage from a graded speed reading course three times a week (Macalister, 2010).
5.7.2	Build fluency	Advanced	Read one short passage five times against time, then a new passage, and compare your speeds (Chang & Millett, 2013).
5.8.1		Try it	Take one method from this module, such as lateral reading. **Use it on a different kind of source** this week, such as a work report or a podcast claim.
5.8.1	Carry a method across fields	Starter	**List three methods** from this module and the sources you use them on.

Section	Box	Level	Exercise
5.8.1	Carry a method across fields	Middle	For one new source, name its deep question before you choose a method.
5.8.1	Carry a method across fields	Advanced	Try one method on three different kinds of source and note where it fits and where it needs adapting.

Module 6 covers sleep, movement and food. **These exercises log habits and make small changes**, and none of them is medical advice.

Table C.15: Module 6: Sleep, Movement and Food

Section	Box	Level	Exercise
6.1.1		Try it	For one week, **note when you go to bed and when you wake**. Add up your hours each night and compare them with seven.
6.1.1	Build a sleep routine	Starter	**Log your sleep hours** for a week and compare them with seven (Watson et al., 2015).
6.1.1	Build a sleep routine	Middle	Swap a light-emitting eReader for a printed book at bedtime for two weeks (A.-M. Chang et al., 2015).
6.1.1	Build a sleep routine	Advanced	Take a warm bath one to two hours before bed on study nights (Haghayegh et al., 2019) and note how soon you fall asleep.
6.1.2		Try it	Set a reminder for **regular screen breaks** during your next long reading session. Note how your eyes feel at the end compared with a day without breaks.
6.1.2	Manage reading fatigue	Starter	Use **break reminders** for one week of screen reading (Talens-Estarelles et al., 2023).
6.1.2	Manage reading fatigue	Middle	Print one long report you must read under time pressure and read it on paper (Delgado et al., 2018).
6.1.2	Manage reading fatigue	Advanced	After a short night, try a 10-minute nap before an afternoon of reading (Brooks & Lack, 2006).
6.2.1		Try it	Take a **brisk ten-minute walk** today and check whether you can talk but not sing. If you can, you are at moderate intensity.

Section	Box	Level	Exercise
6.2.1	Build your activity	Starter	Walk briskly for **ten minutes a day** for a week, using the talk test (National Health Service, 2024).
6.2.1	Build your activity	Middle	Add muscle-strengthening on 2 days a week, such as carrying shopping or using resistance bands (Bull et al., 2020).
6.2.1	Build your activity	Advanced	If your health allows, try intense exercise before learning new vocabulary and note how quickly the words come (Winter et al., 2007).
6.2.2		Try it	On your next long reading day, **stand up and walk for a few minutes** at the end of each chapter or report.
6.2.2	Plan your movement week	Starter	**Write three walks** into next week's calendar.
6.2.2	Plan your movement week	Middle	Reach 150 minutes of moderate activity in one week (Bull et al., 2020).
6.2.2	Plan your movement week	Advanced	On a long reading day, break up long periods of not moving with some activity after each reading block (National Health Service, 2024).
6.3.1		Try it	Write down what you ate yesterday. **Mark the meals you would like to improve**, and choose one small change for this week.
6.3.1	Look at your eating pattern	Starter	**Keep a food diary** for three days.
6.3.1	Look at your eating pattern	Middle	Compare your diary with the idea of a Mediterranean and DASH hybrid (Barnes et al., 2023) and note one change you could make for health in general.
6.3.1	Look at your eating pattern	Advanced	Track your alcohol for a month, keeping in mind that the level that minimised harm was zero (GBD 2016 Alcohol Collaborators, 2018).
6.3.2		Try it	Put **a glass of water on your desk** before your next reading session, and notice when you reach for it.
6.3.2	Check water and nutrients	Starter	**Keep water at your desk** for a week of reading (Masento et al., 2014).

Section	Box	Level	Exercise
6.3.2	Check water and nutrients	Middle	List any supplements you take and why.
6.3.2	Check water and nutrients	Advanced	Ask your doctor whether a test for vitamin D, vitamin B12 or iron makes sense for you (Office of Dietary Supplements, 2022, 2023a, 2023b).
6.4.1		Try it	For three days, **write down each caffeinated drink** and the time you had it. Check how many were within six hours of bed.
6.4.1	Manage stimulants	Starter	**Track your caffeine** for three days and add up the milligrams.
6.4.1	Manage stimulants	Middle	Stop caffeine at least six hours before bedtime for two weeks (Drake et al., 2013).
6.4.1	Manage stimulants	Advanced	Keep a month free of alcohol on study days, in line with the zero level that minimised harm (GBD 2016 Alcohol Collaborators, 2018).

Module 7 is about keeping going. **The exercises deal with overload, motivation, blocks and routines** for focused intake.

Table C.16: Module 7: Keeping Extractivity Active Over Time

Section	Box	Level	Exercise
7.1.1		Try it	For one hour of work, **make a tick each time you switch** to a different window, tab or device. Count the ticks at the end.
7.1.1	Take stock of your inputs	Starter	**List every source of news, email and media** you checked yesterday.
7.1.1	Take stock of your inputs	Middle	Count your window switches for one hour, two days in a row.
7.1.1	Take stock of your inputs	Advanced	Mark each source on your list as read closely, skim or drop (Rayner et al., 2016), and drop one this week.
7.1.2		Try it	Hide one news feed or turn off one set of notifications **for a week**. Note how often you missed it and whether you stayed on task.
7.1.2	Set limits on inputs	Starter	**Turn off one set of notifications** for a week.

Section	Box	Level	Exercise
7.1.2	Set limits on inputs	Middle	Remove one newsfeed and add a goal reminder in its place (Lyngs et al., 2020).
7.1.2	Set limits on inputs	Advanced	Check email only at set times, drawing on Mark et al. (2012), and note how long you stay on one task.
7.2.1		Try it	Before your next reading session, **write one question you are curious about** on the topic. Read to answer it, and note anything else that caught your interest on the way.
7.2.1	Read for interest	Starter	**Pick one topic you are curious about** and read one article on it this week.
7.2.1	Read for interest	Middle	Before each reading session, write a question you want answered, drawing on Gruber et al. (2014).
7.2.1	Read for interest	Advanced	Set up a regular talk with a friend about what you have each read, drawing on relatedness in self-determination theory (Ryan & Deci, 2000).
7.2.2		Try it	After reading a hard chapter, **explain its main idea in five sentences** without looking. Then check the chapter and mark what you missed.
7.2.2	Build confidence with hard material	Starter	**Read a short, simple source** on a hard topic before the main text (Recht & Leslie, 1988).
7.2.2	Build confidence with hard material	Middle	After each hard chapter, explain its main idea without looking and check what you missed (Rozenblit & Keil, 2002).
7.2.2	Build confidence with hard material	Advanced	Choose a reader one step ahead of you, note what they do and set yourself a reachable goal (van de Ven et al., 2011).
7.3.1		Try it	Put a small tick in the margin **each time you notice your mind has drifted** during a chapter. Look at where the ticks cluster.
7.3.1	Work through a blank page	Starter	**Tick the margin** each time you notice drifting in one chapter.
7.3.1	Work through a blank page	Middle	When you tick, go back to the last point you can recall and reread from there (Schotter et al., 2014).

Section	Box	Level	Exercise
7.3.1	Work through a blank page	Advanced	At the end of the chapter, recall the main points from memory before checking them (Roediger & Karpicke, 2006).
7.3.2		Try it	Pick a topic you studied a while ago. **Write down what you can recall** in five minutes, then reread your notes and mark what came back.
7.3.2	Plan a restart	Starter	**Book three short reading sessions** in your first week back.
7.3.2	Plan a restart	Middle	Begin each session by recalling what you knew before you reread (Roediger & Karpicke, 2006).
7.3.2	Plan a restart	Advanced	Test yourself on key points across several sessions until you recall them well, relearning what you miss (Rawson et al., 2013).
7.4.1		Try it	**Write one if-then plan** for reading or listening this week. Name the cue, the place and the first action.
7.4.1	Build a reading habit	Starter	**Choose one cue and one place** for daily reading, such as after breakfast at the kitchen table.
7.4.1	Build a reading habit	Middle	Write an if-then plan and keep it where you will see it (Gollwitzer & Sheeran, 2006).
7.4.1	Build a reading habit	Advanced	Tick a calendar each day you read, and note when the habit starts to feel automatic (Harkin et al., 2016).

Module 8 follows extraction across ages and needs. **Use the rows that fit your stage of life**, or the stage of someone you help.

Table C.17: Module 8: Extractivity at Different Ages

Section	Box	Level	Exercise
8.1.1		Try it	Keep a simple chart of **books a child has read**, and let the child add a sticker or tick after each one. The chart is a practice choice.
8.1.1	Support a young reader	Starter	**Turn on captions** for a child's next video (Gernsbacher, 2015).

Section	Box	Level	Exercise
8.1.1	Support a young reader	Middle	Keep a tick chart of books read, and let the child fill it in (Schunk, 1982).
8.1.1	Support a young reader	Advanced	Print a factual text for the child to read on paper, and talk through what it explains (Clinton, 2019).
8.2.1		Try it	After a lesson, **close the book and write three things you learnt** from memory. Then check them and add what you missed.
8.2.1	Build study skills for exams	Starter	**Swap one highlighting session for a practice test** (Roediger & Karpicke, 2006).
8.2.1	Build study skills for exams	Middle	Keep a study log of what you tested and what you missed (Zimmerman & Kitsantas, 1997).
8.2.1	Build study skills for exams	Advanced	Note when you compare yourself with others online and how you feel afterwards, and talk it over with someone you trust (Nesi & Prinstein, 2015).
8.3.1		Try it	List three skills you use at work and **mark each one as rising, steady or slipping** in your own view. Pick one to test yourself on this month.
8.3.1	Keep learning through busy years	Starter	**Pick one daily cue for reading**, such as the commute (Lally et al., 2010).
8.3.1	Keep learning through busy years	Middle	Test yourself on one key work topic until you can explain it without notes (Bahrick, 1984).
8.3.1	Keep learning through busy years	Advanced	Read one book a season from outside your field and note any idea you can use at work (Dane, 2010).
8.4.1		Try it	**Book an eye test or a hearing check** if you have not had one in the past two years, and note any changes the tester suggests. The timing is a practice choice.
8.4.1	Support reading in later life	Starter	**Try a larger print size** on your e-reader or phone for a week.
8.4.1	Support reading in later life	Middle	Book a sight and hearing check, and use any aids you are given (Lin et al., 2023).

Section	Box	Level	Exercise
8.4.1	Support reading in later life	Advanced	Learn a demanding new skill, such as quilting or digital photography, for about 16.5 hours a week over 3 months, as in Park et al. (2014).
8.5.1		Try it	If you support a child with reading difficulties, **ask the school which approach it uses** and whether it includes phonics.
8.5.1	Support readers with extra needs	Starter	**Turn on captions** for your next video and notice what changes (Gernsbacher, 2015).
8.5.1	Support readers with extra needs	Middle	Try text-to-speech or an audiobook alongside the print version of one text.
8.5.1	Support readers with extra needs	Advanced	If you support a child with reading difficulties, ask a qualified professional about phonics-based help (Galuschka et al., 2014).

Module 9 covers screens, apps, AI and Cleverini games. **The exercises keep you checking what you can do without a tool.**

Table C.18: Module 9: Technology, AI and Cleverini Games

Section	Box	Level	Exercise
9.1.1		Try it	Read one factual article on paper and a similar one on screen. **Write three main points from each** without looking, then check which list was more accurate.
9.1.1	Choose your format	Starter	**Turn on captions** for the next video you watch to learn something (Gernsbacher, 2015).
9.1.1	Choose your format	Middle	Print one dense factual report this week and read it on paper (Clinton, 2019).
9.1.1	Choose your format	Advanced	Listen to one talk at your usual speed and one at a faster speed up to 2x, and write the main points of each from memory (Murphy et al., 2022).
9.1.2		Try it	Before you save or photograph something you want to remember, **write one line about it from memory**. Check the line against the saved copy a day later.

Section	Box	Level	Exercise
9.1.2	Audit your tools	Starter	**List the apps you use for reading, notes and focus**, and mark which ones you opened this week.
9.1.2	Audit your tools	Middle	Hide one feed or check email at set times, and note how long you stay on one task (Lyngs et al., 2020).
9.1.2	Audit your tools	Advanced	Write a line from memory before saving any photo or note you want to keep (Henkel, 2014), and check it later.
9.2.1		Try it	Ask an AI tool to explain one idea you are studying. **Close the window and write the explanation from memory**, then check what you missed against a trusted source.
9.2.1	Use AI with care	Starter	**After each AI search, write one line from memory** about what you learnt (Fisher et al., 2015).
9.2.1	Use AI with care	Middle	Ask an AI tool for hints and questions on a topic, not answers, and answer them yourself (Bastani et al., 2025).
9.2.1	Use AI with care	Advanced	On a new kind of task, check AI output closely against your own work (Dell'Acqua et al., 2026).
9.2.2		Try it	Ask an AI tool for three sources on a topic you know. **Look up each source yourself** and note whether it exists and says what the AI claimed.
9.2.2	Check a machine's work	Starter	**Look up every reference** in one AI answer and mark the ones that do not exist (Walters & Wilder, 2023).
9.2.2	Check a machine's work	Middle	Write your own answer before reading the AI's, and compare the two (Buçinca et al., 2021).
9.2.2	Check a machine's work	Advanced	Check every claim in one AI summary against the original source, and count the errors.
9.3.1		Try it	Open the Cleverini games page in your browser and **bookmark the two games** that match the extraction skills you most want to practise.
9.3.1	Practise with Cleverini	Starter	**Play one no-sign-up game**, such as Schulte Table or Robot Route, and note your score as a record of that game.

Section	Box	Level	Exercise
9.3.1	Practise with Cleverini	Middle	Play Figures or Word List, then do its offline task on a real text.
9.3.1	Practise with Cleverini	Advanced	Pick the game for your weakest extraction skill, play it with its offline task for two weeks and check a real reading task before and after.

Module 10 builds the training program. **These exercises produce the records the practitioner levels ask for**, from the baseline to the next challenge.

Table C.19: Module 10: Your Training Program, Practice Plan and Practitioner Levels

Section	Box	Level	Exercise
10.1.1		Try it	**Take the baseline set on three different days**, with new material each time. Write down all three scores and the middle one.
10.1.1	Take your baseline	Starter	**Do one timed passage with questions** and write down the time, the score and the date.
10.1.1	Take your baseline	Middle	Add a listening clip and a video, and repeat the set on three days with new material (Scharfen et al., 2018).
10.1.1	Take your baseline	Advanced	Note the spread of your three days, and use it to judge every later change (Jacobson & Truax, 1991).
10.1.2		Try it	Picture yourself a few months from now, reading a hard report with ease. **Then name the main thing in your way today**, such as losing the thread on long pages.
10.1.2	Write your goals	Starter	**Write one specific goal** for reading, listening or viewing (Locke & Latham, 2002).
10.1.2	Write your goals	Middle	Add an if-then plan for when and where you will practise it (Gollwitzer & Sheeran, 2006).
10.1.2	Write your goals	Advanced	For one real task, choose the method from this book you will use before you start, and write a line on why you chose it.

Section	Box	Level	Exercise
10.2.1		Try it	**Pick your cue and place for week 1** and write them at the top of your practice record.
10.2.1	Run the first four weeks	Starter	**Do week 1 of the table** for seven days and fill in your record.
10.2.1	Run the first four weeks	Middle	Complete all four weeks, keeping the same cue and place (Lally & Gardner, 2013).
10.2.1	Run the first four weeks	Advanced	At the end of week 4, retake the baseline set with new material and compare the middle scores (Scharfen et al., 2018).
10.2.2		Try it	**Write your week 5 step in your practice log**, with the material, the method you will use and the check you will apply.
10.2.2	Climb the ladder	Starter	**Fill in your own ladder** for weeks five to twelve, with one step per two weeks.
10.2.2	Climb the ladder	Middle	Use a method from this book on real material at each step, and log the method and the check result.
10.2.2	Climb the ladder	Advanced	Drop back a step after two failed checks and note what made the step too hard (Bjork & Bjork, 2020).
10.2.3		Try it	**Pick one date a month from now** and write a ten-minute review of your hardest ladder step against it.
10.2.3	Write your maintenance plan	Starter	**Put your weekly sessions in your calendar** for the next month.
10.2.3	Write your maintenance plan	Middle	Add a monthly ladder step and a baseline check every three months, with new material each time.
10.2.3	Write your maintenance plan	Advanced	Name the life changes that could break your cue, and write the new cue you would use for each (Wood et al., 2005).
10.3.1		Try it	**List the one skill you most want from each book** you use, and mark the two that matter most this month.
10.3.1	Build your five-book week	Starter	**Fill in one week** with an Extractivity session on most days.

Section	Box	Level	Exercise
10.3.1	Build your five-book week	Middle	Add one session from each other book you use, and keep the week to short sessions.
10.3.1	Build your five-book week	Advanced	Run the week, then mark which sessions you kept and which you dropped, and adjust next week's plan.
10.4.1		Try it	**Before you look at your records, guess your change** on each baseline task. Then check the records and note how far off the guesses were.
10.4.1	Run your twelve-week review	Starter	**Plot your baseline and later scores** on one chart, with dates.
10.4.1	Run your twelve-week review	Middle	Write task-focused notes on what rose and what did not (Kluger & DeNisi, 1996).
10.4.1	Run your twelve-week review	Advanced	Write a plan for your next challenge: one goal, the ladder steps and a review date.
10.4.2		Try it	**Copy the five level names into your planner**, with space beside each one for evidence.
10.4.2	Set your evidence beside the levels	Starter	**List the book's qualification criteria** next to your current evidence.
10.4.2	Set your evidence beside the levels	Middle	**For each criterion, attach one artifact**, such as a record, a method log or a review note.
10.4.2	Set your evidence beside the levels	Advanced	**Strike any wording that sounds like a public licence** or accredited certificate.

Exercises by field

The same exercises can be found by the kind of source in front of you. **Table C.20 points each field to the tables that suit it**, using the

book's three channels of text, sound and image, plus the web. The Module 5 rows sit in Table C.14 under their section numbers.

Table C.20: Where to look by field

Field	Tables
Text, such as books, reports and articles	C.6, C.7, C.10, C.13, and the 5.1 and 5.2 rows of C.14
Sound, such as talks, lectures and podcasts	C.8, C.10 for notes, and the 5.4 rows of C.14
Image and video, such as charts, pictures and lessons	C.9, and the 5.5 and 5.6 rows of C.14
Web and news, such as posts, sites and stories	C.12, and the 5.3 rows of C.14
Another language	The 5.7 rows of C.14
Moving between fields	The 5.8 rows of C.14
Any source you need to keep	C.11

Exercises by level of evidence

The evidence levels belong to the 95 Module 4 table rows, and each keeps the level its own section gave it. **Table C.21 counts the rows at each level**, so you can see where the strongest choices sit. Strong includes rows with a stated limit, such as "for the check".

Table C.21: Rows at each level of evidence

Level	Rows	Tables with rows at this level
Strong	17	C.6, C.7, C.10, C.11, C.12, C.13
Mixed	35	C.6 to C.13
Evidence mixed	7	C.6, C.9, C.10
Weak	5	C.6, C.7, C.10, C.12, C.13
Practice only	31	C.6, C.7, C.8, C.9, C.10, C.12, C.13

Cleverini game guide

Section 9.3.1 picked eleven Cleverini games that practise parts of extraction. **The catalogue page says that "Every Cleverini game is free, runs in your browser and works on any device"**, and some games need a free Cleverini account. The pages name only the browser, so play there.

A game score shows how you did at that game, and **a game score is never an IQ**. A large review found "extensive evidence that brain-training interventions improve performance on the trained tasks", less evidence for closely related tasks and little evidence for distantly related tasks or everyday thinking (Simons et al., 2016).

Table C.22: Eleven Cleverini games

Game	Score	Skill it practises	Account
Schulte Table	In-game progress only; not a test, not an IQ, not a diagnosis.	Visual search and scanning	No sign-up
Word Hunt (Word Search track)	In-game progress only; not a test, not an IQ, not a diagnosis.	Scanning for given key terms	No sign-up
Figures	In-game progress only; not a test, not an IQ, not a diagnosis.	Checking a statement against its source	Free account
Word List	In-game progress only; not a test, not an IQ, not a diagnosis.	Telling what you saw from what feels familiar	Free account
Word Order	In-game progress only; not a test, not an IQ, not a diagnosis.	Taking in the order of points or steps	Free account
Town Folk	In-game progress only; not a test, not an IQ, not a diagnosis.	Taking in linked details, such as name and role	No sign-up
Robot Route	In-game progress only; not a test, not an IQ, not a diagnosis.	Reading and following step-by-step instructions	No sign-up

Game	Score	Skill it practises	Account
Colors	In-game progress only; not a test, not an IQ, not a diagnosis.	Getting the overall picture at a glance	Free account
Lighthouse	In-game progress only; not a test, not an IQ, not a diagnosis.	Noticing information at the edges	No sign-up
Cubes	In-game progress only; not a test, not an IQ, not a diagnosis.	Checking details against what you saw	Free account
Music (listening questions)	In-game progress only; not a test, not an IQ, not a diagnosis.	Listening for a set detail	Free account

The games are practice only. **This book makes no reading-speed claim for any game**, and only the Word Search track of Word Hunt and the listening questions of Music fit this book. In a large online trial, improvements came on every trained task, with no evidence of transfer to untrained tasks, even closely related ones (Owen et al., 2010).

Offline alternatives

Each game has a paper partner that practises the same skill without a screen. **The offline alternatives are practice choices**, with no claim that they match a game's effect. A later meta-analysis, a study that combines many studies, found a "minimal effect on domain-general cognitive skills", the broad skills used across many tasks (Sala & Gobet, 2019).

Table C.23: Offline alternatives (practice choice)

Game	Offline alternative
Schulte Table	Scan a hand-drawn number grid, or a printed page for set key words
Word Hunt (Word Search track)	Scan a newspaper page for a list of names
Figures	Check a written summary line by line against the original

Game	Offline alternative
Word List	A partner reads a short word list, then you pick those words out of a longer list
Word Order	Write the steps of a recipe from memory after one reading, then check the order
Town Folk	After a meeting, write each name with its role, then check
Robot Route	Follow written directions on a paper grid and mark where you end up
Colors	Glance at a chart for five seconds, say its main pattern, then check
Lighthouse	Any watch-the-centre, notice-the-edge task
Cubes	Spot-the-difference puzzles in print
Music (listening questions)	Write the one detail to listen for before playing a clip, then note it

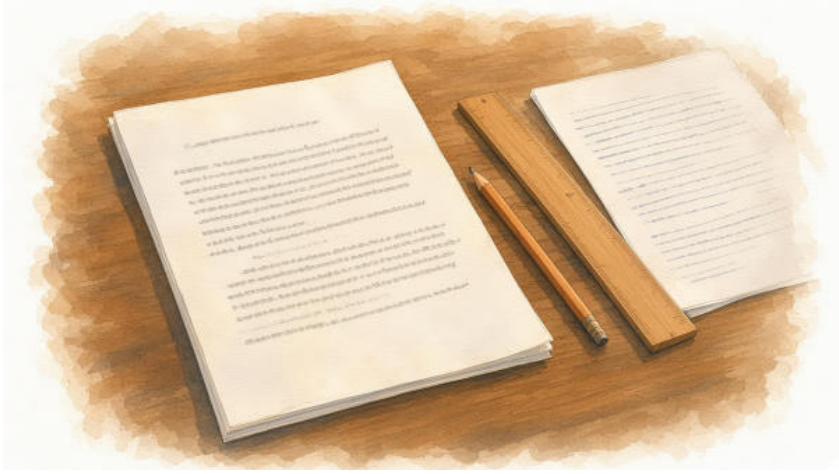
Pair each game with its offline task and with real reading or listening, since gains stay mostly with the trained task (Owen et al., 2010). Note each score as a record of that game alone.

Key idea:

Pick an exercise by module, section and level, and treat every game score as in-game progress only, paired with real reading, listening or viewing.

Appendix D: Practice Tasks with Worked Examples

A method is easier to use once you have seen it done. **This appendix works through five practice tasks on one short passage**, with a model answer for each. The passage is taken from this book, so the facts in it are already cited.



A printed paragraph on a desk, with a pencil, a ruler and a sheet of lined paper beside it.

> **Key Concept:**
> How to use these tasks. **Read the passage, try each task yourself, then compare with the model answer.** The scripts and model answers are practice material written for this book, with no result claimed. The method behind each task keeps the evidence given in Appendix C.

The practice passage. "Habits take time to form. In one study, the median time to reach 95% of a habit's plateau was 66 days, with a range from 18 to 254 days (Lally et al., 2010). The same study found that missing one opportunity did not materially affect habit formation."

Task 1: Questions that need the passage

A question is only useful if you need the passage to answer it. **Questions from a standard reading test could be answered well above chance without reading the passage** (Coleman et al., 2010). A score on its own is not proof of understanding.

Table D.1: Worked example, questions that need the passage

Question	Can you answer it without the passage?	Keep it?
Do habits take time to form?	Yes, from general knowledge	No
What was the median time to reach 95% of a habit's plateau?	No, the passage gives 66 days	Yes
What was the range of times?	No, the passage gives 18 to 254 days	Yes
What did missing one opportunity do?	No, the passage says it did not materially affect habit formation	Yes

Cross out any question you could answer from general knowledge. Then answer the rest from memory, and check them against the passage.

Task 2: Four-role cards

Reciprocal teaching uses four roles. **A predictor, a questioner, a clarifier and a summariser** each lead one part of the talk (Palincsar & Brown, 1984). On your own, play each role in turn on the same passage.

Table D.2: Worked example, four-role cards

Role	Model answer
Predictor	From the first sentence, I expect a number for how long habits take.
Questioner	How long did people take to reach the plateau?
Clarifier	Plateau means the level where a habit stops getting stronger.
Summariser	Habits took a median of 66 days in one study, with a wide range, and one missed chance did not materially affect them.

Task 3: Macrorule drill

Summarisation with macrorules means **deleting, generalising and building topic statements** to condense a text (Brown & Day, 1983). This drill follows Brown and Day (1983), and its evidence is weak.

Table D.3: Worked example, macrorule drill

Step	What you do	Model answer
Delete	Strike details you do not need	Strike "(Lally et al., 2010)" and "95% of" for a one-line summary
Generalise	Replace a list with a broader term	"18 to 254 days" becomes "a wide range"
Build a topic statement	Write one sentence that covers the whole	"In one study, habits took a median of about two months, with a wide range, and one missed chance did not materially affect them."

Check the topic statement against the passage. If it says more than the passage does, cut it back. "About two months" rounds 66 days, and the hedge "did not materially affect" stays as the passage gives it.

Task 4: Bottom-strip summary

The Cornell method splits the page into **a notes column, a cue column and a summary strip** (Pauk, n.d.). The bottom-strip summary in your own words has weak evidence, so pair it with a cue-column quiz.

Table D.4: Worked example, Cornell page

Cue column	Notes column
How long do habits take?	Median 66 days to 95% of plateau, one study
How wide is the range?	18 to 254 days
Does one missed day matter?	Did not materially affect habit formation
Summary strip	In one study, habits took weeks to months, the time varied widely, and one missed chance did not materially affect them.

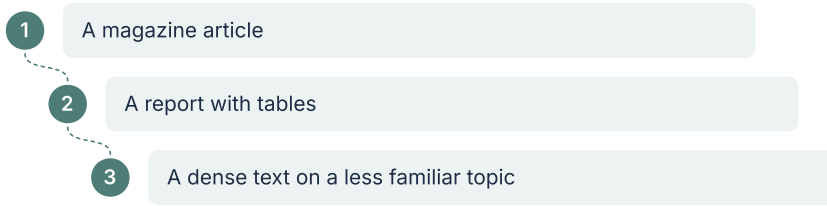
Cover the notes column and answer each cue from memory. Then uncover it and mark what you missed.

Task 5: A ladder of passages

The last task repeats the first four on harder material. **Pick three passages that rise in difficulty**, such as a magazine article, a report with tables and a dense text on a less familiar topic. The ladder of passages is a practice choice, with no research claim.

Keep a record of what you recall on each passage. **People can misjudge what works.** In one study, spacing helped 90% of participants, yet 72% believed cramming had worked better (Kornell, 2009). Trust your record more than your feeling.

A ladder of passages



Exercise:

Work through the tasks.

1. **Write four questions** on a passage of your own and cross out any you could answer without it.
2. Play the four roles on the same passage.
3. Do a macrorule drill and a bottom-strip summary.
4. Repeat on a harder passage, and record your recall each time.

Key idea:

Write questions that need the passage, then summarise and check from memory, and trust your records more than your feelings.

Appendix E: Progress Journal and Practitioner-Level Rubrics

This appendix gathers the records the program asks you to keep. **A baseline page, a practice record, a ladder log, a review page and the level rubric** make up the journal. Each page comes from a section of Module 10, named in its title.



A ring binder open on a desk, with dated record sheets behind coloured dividers.

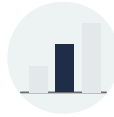
> **Key Concept:**
>
> How to use this journal. **Date every entry, and judge change from records, not feelings.** The pages, columns and rubric grids are practice tools, with no claim that keeping a journal improves reading on its own.

Tracking helps. A meta-analysis, a study combining many studies, found that **prompting people to monitor progress improved goal attainment (d = 0.40)**, more so when progress was recorded or shared (Harkin et al., 2016). Here d is an effect size, a number for how big a difference is.

The progress journal



Baseline page and practice record



Ladder log and review page



Level rubric

Table E.1: Baseline record (from 10.1.1)

Date	Task	New material used	Time	Score	Setting
Day 1	Timed passage with questions				
Day 1	Listening clip				
Day 1	Short video with recall questions				
Day 2					
Day 3					
Middle score					

Use new material for every check. A meta-analysis of 122 studies found "significant retest effects and no further score gains after the third test administration" (Scharfen et al., 2018). Retest effects are gains from taking the same kind of test again, and significant means bigger than chance could explain.

Scores also wobble from day to day. **Regression to the mean "can make natural variation in repeated data look like real change"** (A. G. Barnett et al., 2005). That is why the baseline uses three days and the middle score.

Table E.2: Practice record (from 10.2.1)

Date	Method	One thing I took in

Table E.3: Ladder log (from 10.2.2)

Week	Material	Method used	Check result	Move up, stay or drop back
5				
6				
7				
8				
9				
10				
11				
12				

At the review, count only real change. **A reliable change is a gain larger than your normal wobble**, a rule from clinical research where the cut-off marks a change that "would be unlikely to occur ($p < .05$)

without actual change" (Jacobson & Truax, 1991). The value $p < .05$ means less than a 5% chance.

Table E.4: Twelve-week review page (from 10.4.1)

Measure	Baseline middle score	Week 12 middle score	Bigger than baseline spread?	Task-focused note
Reading				
Listening				
Viewing				

Write the notes about the task. A meta-analysis of 607 effect sizes found that feedback raised performance on average, but **over one third of feedback interventions decreased performance** (Kluger & DeNisi, 1996). Effectiveness **"decreases as attention moves up the hierarchy closer to the self"**, so write "the recall score fell on dense texts", not "I am bad at this".

Feelings are a poor guide. In a study of 277 participants, **"There was a lack of correlation between measures of the perception of learning and actual gains in knowledge"** (Persky et al., 2020). A correlation is a link between two measures, and as one study, this is mixed evidence.

Self-estimates can be far off. In a classic study, people who scored around the 12th percentile, better than only 12% of the group, **estimated themselves at the 62nd** (Kruger & Dunning, 1999). Gignac and Zajenkowski (2020) later tested 929 participants and concluded "the magnitude of the effect may be much smaller than reported previously", so the evidence is mixed.

The level rubric is the same as in Section 10.4.2. **The five levels are Basic, Intermediate, Advanced, Expert and Master.** The levels and

their criteria are this book's own practice structure, a practice choice with no result claimed, and they carry no public standing.

Table E.5: Levels of practice and the evidence for each (from 10.4.2)

Level	What your practice shows	Evidence to collect, and the section that produces it
Basic	You keep a short daily routine of extraction practice and have a record of where you started	A baseline record (10.1.1) and a short practice record (10.2.1)
Intermediate	You meet weekly ladder steps and use a method from this book on real material	Ladder steps logged with their check results (10.2.2) and a goal sheet with an if-then plan (10.1.2)
Advanced	You choose a method before you start a real task and track your measures	A method choice note for a real task (10.1.2) and a progress chart of your measures (10.4.1)
Expert	You raise difficulty to a dated plan and fit extraction into a week of wider training	A twelve-week ladder with each step labelled by its week (10.2.2) and a five-book weekly plan (10.3.1)
Master	You keep practice going across reviews and plan each new challenge yourself	A maintenance plan (10.2.3) and a plan for your next challenge (10.4.1)

No level asks for a set number of hours, sessions, weeks or words per minute. You judge the evidence yourself at the twelve-week review. Read each level as a description of practice, never as a rank of the person.

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.

Table E.6: Evidence checklist

Level	Criterion	Evidence in my folder	Date	Tick
Basic	Baseline record			
Basic	Short practice record			
Intermediate	Ladder steps with check results			

Level	Criterion	Evidence in my folder	Date	Tick
Intermediate	Goal sheet with an if-then plan			
Advanced	Method choice note for a real task			
Advanced	Progress chart			
Expert	Twelve-week ladder labelled by week			
Expert	Five-book weekly plan			
Master	Maintenance plan			
Master	Plan for your next challenge			

Keep level wording plain and personal. Say which book's levels you are using, what your evidence shows and the month you last reviewed. Avoid words that suggest an outside body checked your work, since none did.

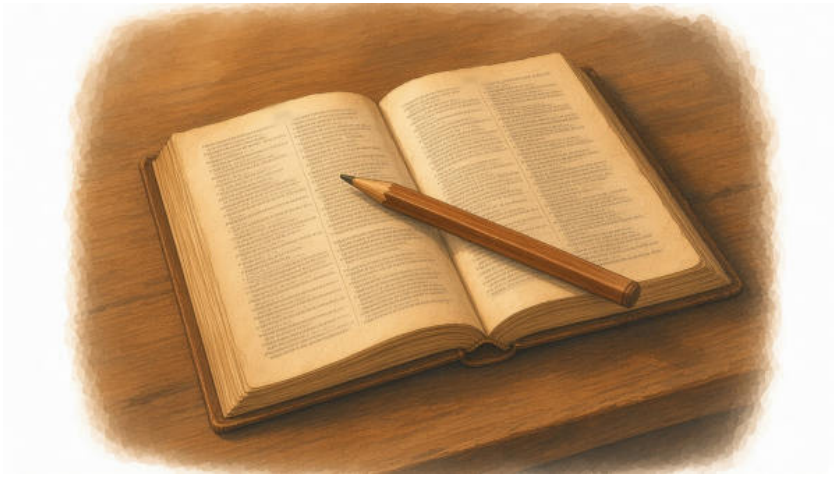
> Exercise:
>
> Set up your journal.
>
> 1. **Copy Tables E.1 to E.4** into a binder with dividers.
> 2. Fill in the baseline record on three days with new material.
> 3. At your twelve-week review, tick Table E.6 row by row and stop at the first gap.

Key idea:

Dated records on new material, task-focused notes and the five-level rubric show where you are and what to practise next, with no minimum counts and no outside standing.

Appendix F: A Short Glossary

Some terms come back many modules after they first appear. **This glossary gathers 22 of the book's main terms in one place**, each in plain words with its source. The terms are in alphabetical order, in two tables.



A small dictionary open on a desk, with a pencil resting across one page.

> **Key Concept:**
>
> How to use this glossary. **Each meaning follows the book's own words for the term**, and the From column names that section. Read the full section when you want the evidence behind a term.

The first table runs from A to L. **Terms about memory, attention and tools sit side by side**, so automation bias appears next to cognitive offloading.

Table F.1: Terms from A to L

Term	Meaning	Source	From
Automation bias	Automation bias is the habit of trusting an automated system over your own judgement.	Goddard et al. (2012)	9.2.2
Cognitive offloading	Cognitive offloading means using actions or tools to reduce the mental demand of a task, and it can help or harm.	Risko and Gilbert (2016)	9.1.2
Desirable difficulties	Desirable difficulties are challenges that "trigger encoding and retrieval processes that support learning, comprehension, and remembering".	Bjork and Bjork (2020)	7.2.2
Dual coding	Dual coding means pairing words with pictures or diagrams.	Paivio (1971)	4.6.3
Extractivity	Extractivity is taking in information from the outside world, whether visual, audio or text, fast, clearly and systematically. It is this series' own term.	None, the series' own term	1.1.2
Fixations and saccades	A saccade is a quick jump of the eye from one spot to the next. A fixation is the short stop between jumps, when the eye holds still long enough to take in the words.	Rayner (2009)	1.2.2
Graph literacy	Graph literacy is knowing how to read common graph formats.	Galesic and Garcia-Retamero (2011)	3.1.3
Illusion of explanatory depth	The illusion of explanatory depth is the gap between how well we think we can explain something and how well we can.	Rozenblit and Keil (2002)	3.4.1
Implementation intention	An implementation intention is an if-then plan that links a cue to an action.	Gollwitzer and Sheeran (2006)	7.4.1
Inner speech	Inner speech is hearing the words in your head as you read, and it is part of skilled reading.	Rayner et al. (2016)	3.1.1

Term	Meaning	Source	From
Learning styles	Learning styles is the idea that lessons should match a person's preferred way of learning. There is no good evidence that matching helps people learn more.	Pashler et al. (2008)	4.9.1

Four of these terms are worth a closer look. **Fixations and saccades describe how the eyes move in reading**, as a chain of stops and jumps. Automation bias and cognitive offloading both concern tools, and the illusion of explanatory depth concerns how well we judge our own understanding.

The second table runs from M to W. **Terms about measuring progress sit here**, such as regression to the mean, reliable change and the retest effect from Module 10.

Table F.2: Terms from M to W

Term	Meaning	Source	From
Mind wandering	Mind wandering is when your thoughts drift away from the task.	Risko et al. (2012)	7.3.1
Perceptual span	The perceptual span is how much you can take in during one stop.	McConkie and Rayner (1975)	1.2.2
Regression to the mean	Regression to the mean is a pattern that "can make natural variation in repeated data look like real change".	A. G. Barnett et al. (2005)	10.1.1
Reliable change	A reliable change is a gain larger than your normal wobble.	Jacobson and Truax (1991)	10.1.1
Retest effect	A retest effect is a gain from taking the same kind of test again.	Scharfen et al. (2018)	10.1.1
Retrieval practice	Retrieval practice means recalling from memory instead of rereading.	Roediger and Karpicke (2006)	4.6.1
Simple view of reading	The simple view of reading is the model in which "reading equals the product of decoding and comprehension". Decoding means sounding out written words.	Gough and Tunmer (1986)	1.1.2

Term	Meaning	Source	From
Situation model	The situation model is your mental picture of the story.	Smallwood et al. (2008)	7.3.1
Skimming	Skimming means moving quickly through a text to catch its general drift, without reading every word.	Rayner et al. (2016)	1.2.3
Spacing	Spacing means spreading practice out over time.	Cepeda et al. (2006)	2.2.3
Working memory and reading span	Working memory is the small space in the mind that holds information for a few seconds while you use it. The reading span task is a test that measures holding and reading together.	Daneman and Carpenter (1980)	2.2.1

Use the From column to find the evidence. A meaning tells you what a term refers to, and the section tells you what the studies found. The glossary itself makes no claims beyond the meanings.

Key idea:

Each term keeps the plain meaning the book gave it, with its source and the section where it is explained.

Appendix G: Further Reading and Method Origins

Many methods in this book have a known starting point. **This appendix lists where 22 methods and ideas came from**, and six works to read next. Each entry names the section where the book explains it.



A short row of books on a shelf, with paper slips marking pages in three of them.

> **Key Concept:**
>
> How to use this list. **An origin tells you who first set out a method, not whether it works.** For the evidence on each method, read the section in the From column. Where a method has no confirmed origin, the book names none.

The first table runs in the order the methods appear in the book. **Eye movement research comes first**, followed by speed reading, active reading, listening, notes, memory, checking sources and summarising. The last row is an argument about attention, not a finding.

Table G.1: Method origins

Method or idea	What it is	Origin	From
Eye movements in reading	Eye movements during reading were described in 1879, by Hering and by Lamare	Wade (2010)	1.2.1
RSVP	Words shown one at a time at a fixed point, which began as a lab method	Forster (1970)	4.1.1
PhotoReading	Glancing at pages in a "relaxed state"	Scheele (1993)	4.1.4
SQ3R	A Survey, Question, Read, Recite, Review study cycle	Robinson (1946)	4.2.1
PQ4R	An SQ3R variant with a Reflect step	Thomas and Robinson (1972)	4.2.1
KWL	A know, want to know and learned chart around one reading	Ogle (1986)	4.2.1
Reciprocal teaching	A predictor, a questioner, a clarifier and a summariser each lead one part of the talk	Palincsar and Brown (1984)	4.2.2
Dictogloss	Reconstructing a heard passage, often with a partner	Wajnryb (1990)	4.3.1
Active listening	Restating the speaker's message before replying	Rogers and Farson (2015)	4.3.2
Cornell method	A notes column, a cue column and a summary strip	Pauk (n.d.)	4.5.1

Method or idea	What it is	Origin	From
Mind mapping	A radial key-word map around a central topic	Buzan (1974)	4.5.2
Slip-box (Zettelkasten)	One idea per linked, permanent note	Ahrens (2017)	4.5.3
Leitner box	Flashcards that send missed cards back sooner	Leitner (n.d.)	4.6.1
Dual coding	Pairing words with pictures or diagrams	Paivio (1971)	4.6.3
SIFT	Stop, Investigate, Find better coverage and Trace	Caulfield (2019)	4.7.1
CRAAP test	A five-criterion source checklist	Blakeslee (2004)	4.7.2
Data and statistics scepticism	Spotting misleading numbers, charts and claims about cause	Bergstrom and West (2020)	4.7.3
Macrorules	Deleting, generalising and building topic statements, rules that trace back to a model of text comprehension	Kintsch and van Dijk (1978)	4.8.1
Concept mapping	Node-link maps of concepts and labelled relations	Novak and Gowin (1984)	4.8.2
Reading Recovery	A one-to-one early literacy intervention	Clay (1993)	4.8.4
Self-Regulated Strategy Development	An explicit strategy plus self-regulation teaching model	Harris and Graham (1996)	4.8.4
Poverty of attention	The argument that "a wealth of information creates a poverty of attention"	Simon (1971)	7.1.1

Read an origin as history. A method's first source shows what its author proposed, and the book's sections give what later studies found. Several origins are books, and the active listening entry is a later reprint of the original work.

The six works below are good next reads. **Each one is a review or a major study** that this book drew on, and each is listed with the section that uses it.

Table G.2: Further reading

Work	What it covers	From
Brysbaert (2019)	A review and meta-analysis of reading rates, which found "The estimates are lower than the numbers often cited in scientific and popular writings"	1.2.2
Rayner et al. (2016)	A review of speed reading, which found that skimming gives moderate comprehension when full understanding is not the goal	2.4.3
Dunlosky et al. (2013)	A review of study techniques, in which "Practice testing and distributed practice received high utility assessments"	2.2.3
Castles et al. (2018)	A review that traces reading "from children's earliest alphabetic skills through to the fluent word recognition and skilled text comprehension characteristic of expert readers"	8.1.1
Delgado et al. (2018) and Clinton (2019)	Two meta-analyses of reading on paper and on screens, which found a small advantage for paper	9.1.1
Simons et al. (2016)	A review of brain-training programs, which found "extensive evidence that brain-training interventions improve performance on the trained tasks" and little evidence for everyday thinking	9.3.1

Start with the work closest to your goal. A meta-analysis, a study that combines many studies, gives a broad picture, so Brysbaert (2019) or Dunlosky et al. (2013) make good first reads. The full details of every work are in the references.

Key idea:

Origins show where a method began, and the sections show what the evidence says, so read both before you rely on a method.

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