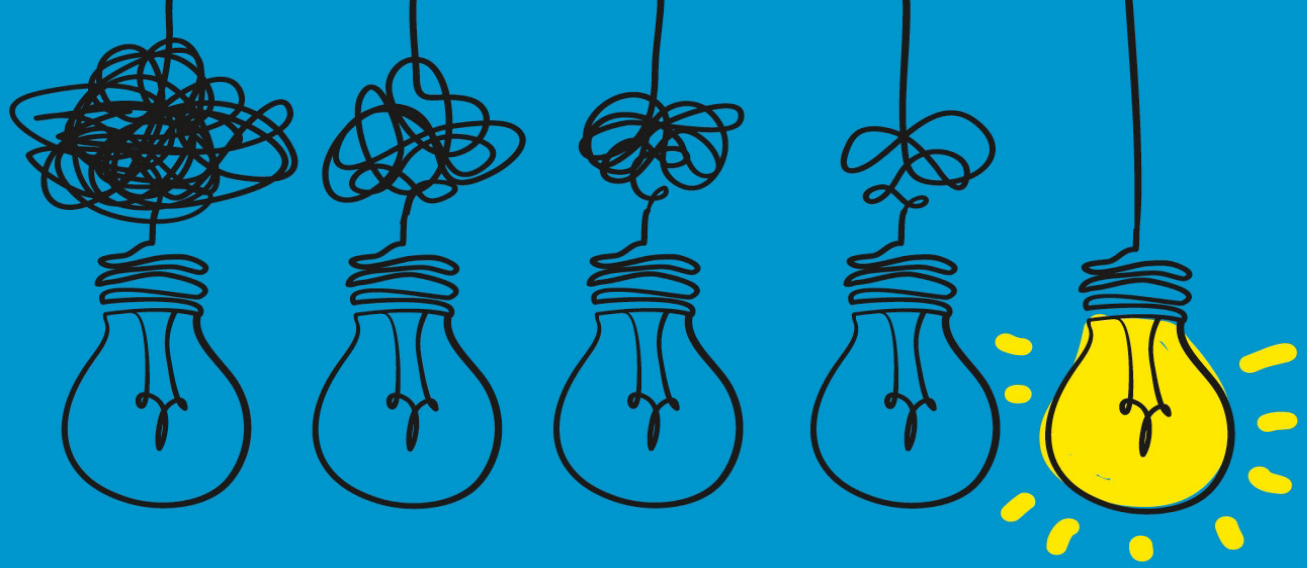




LEARN

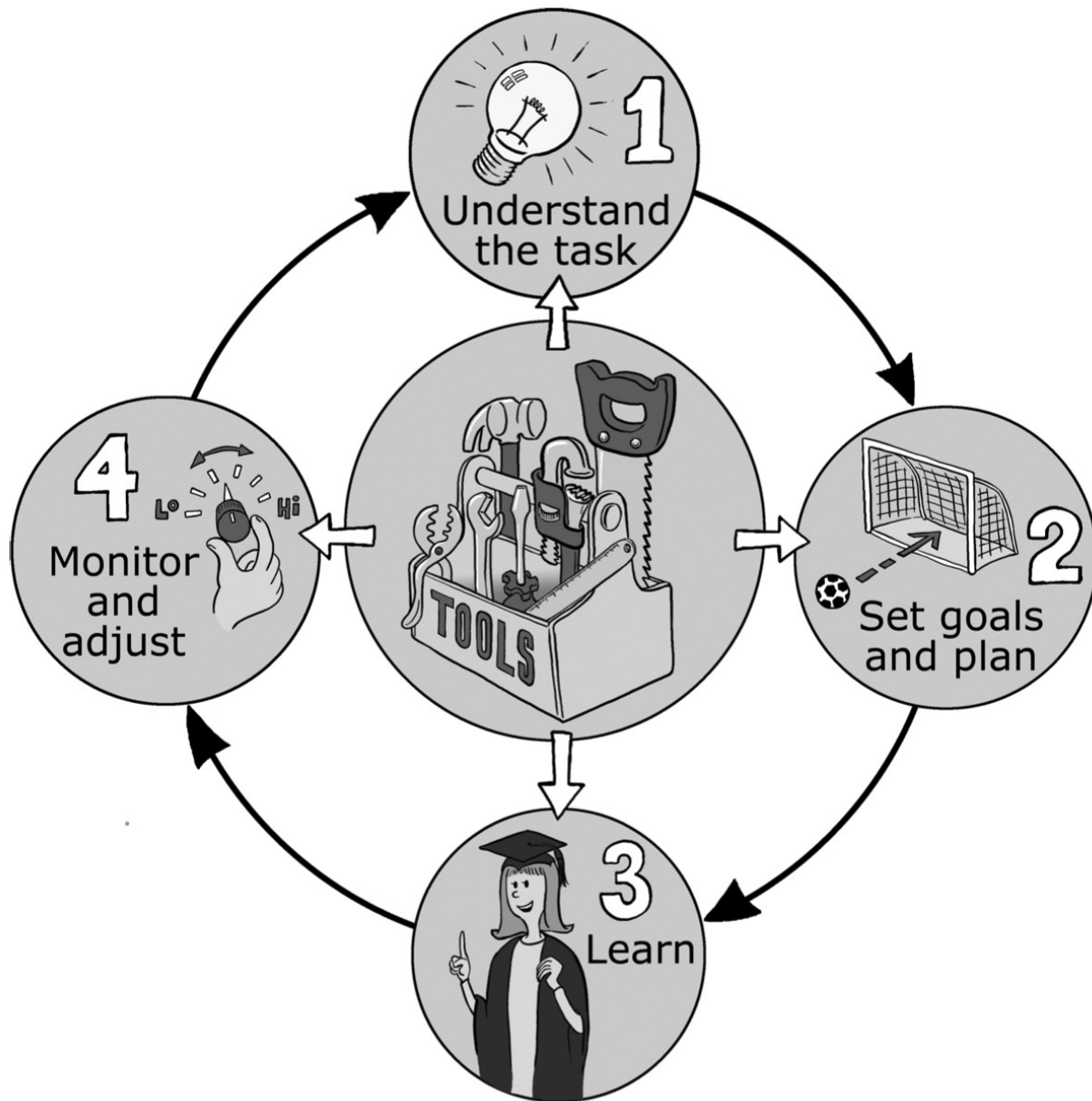
Like a Pro

Science-Based
Tools to Become Better
at Anything

BARBARA OAKLEY, PhD, PE
AND OLAV SCHEWE

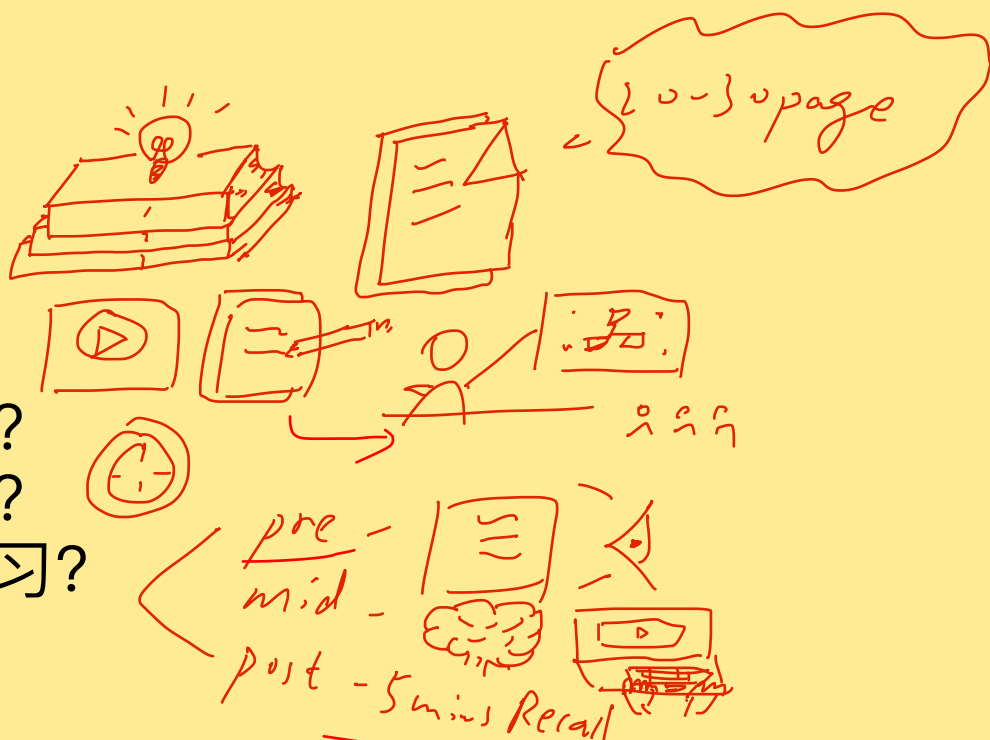
"Jam-packed with practical, evidence-based advice."

—Daniel H. Pink, #1 *New York Times* bestselling author



The four steps of being a self-regulated learner.

学什么?
 学习进度?
 怎么学? →
 需要预习吗?
 需要复习吗?
 如何高效学习?

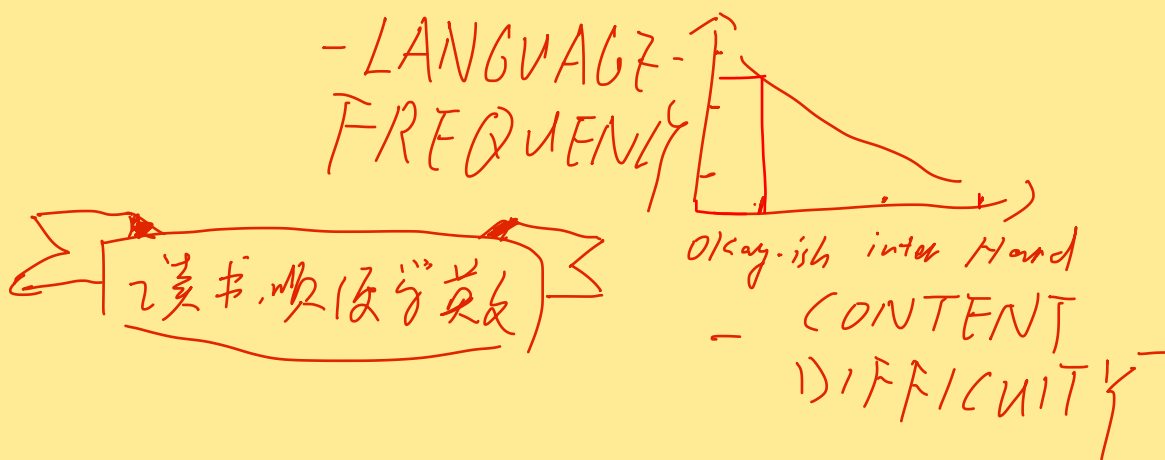


Mantra: 用最小的力气, 做好一件小事。

Motivation: 读书学以致用, 顺便提升英文审美。

Morale: _____, 无须坚持。

Mindset: Don't just set goals, build systems.



Asking Yourself Metacognitive Questions

The easiest way to become more metacognitive is simply to start asking yourself higher-level questions, such as:

- What are the resources available to help me when I struggle?
- ★ • Do I focus on the right things at the right level in my studying? Should I prioritize differently?
- Can I be a more effective student? What can I improve?
- What do I find difficult and why?

写到这，想到在读的一本中文书：李松蔚老师的《5%的改变》。

5%的改变

李松蔚 著



44个“扰动惯性”的真实案例

四川文艺出版社

1 / 350

他在引言中说「所有的答案都藏在新的行动里」，心理咨询师能做的是「扰动惯性」：

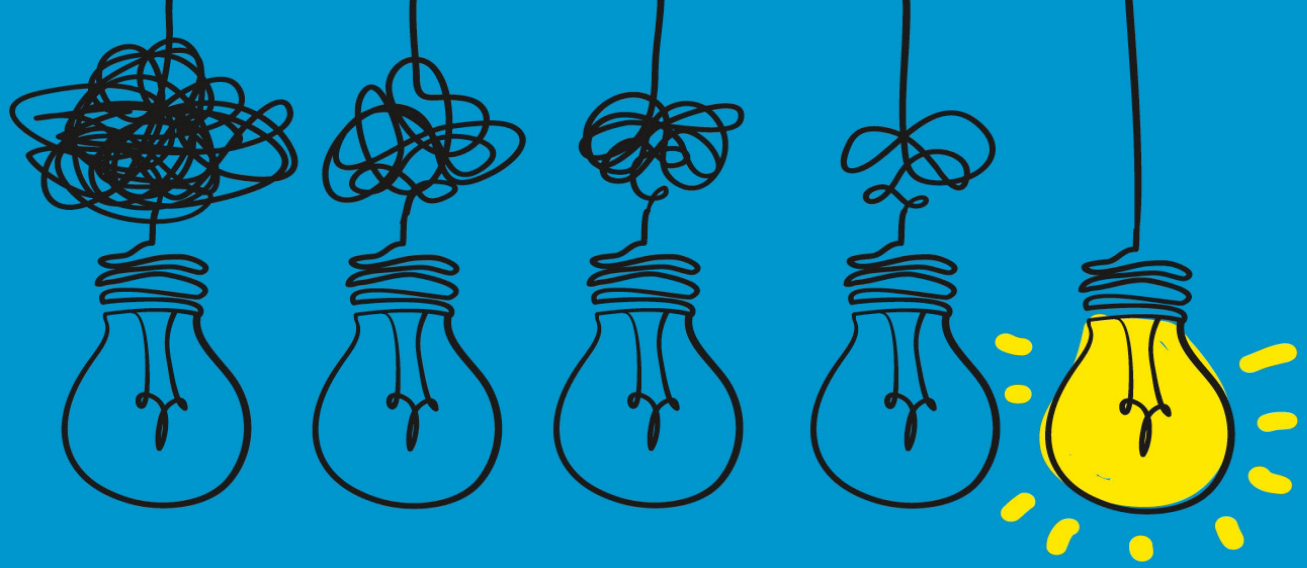
引言

身博主的视频就改善你的体形，或是阅读一份菜谱就知道食物的滋味。你想要答案，就得自己找。

很多人都喜欢通过“思考”寻找答案，更安全，更无痛，并且显得更深刻和触及灵魂。但要我来说，还

不是因为懒。很多人并不真的“懒”，他们宁肯为了维持一个不舒服的惯性，每天付出十倍、百倍的努力，但他们害怕“新奇”。这跟神经系统的加工偏好有关。我们把那些熟悉的刺激看成安全的（哪怕实际上在伤害自己），一遍遍甘之如饴，而新的经验无论好坏，都让人如临大敌。讽刺的是，被往日习惯困扰的人，反而更排斥新的尝试，因为新的尝试意味着更多不确定和风险。相比之下，他们更愿意通过书本或听课学到一个答案——听完说一句“算了，我肯定做不到”，或者“我试过类似的方法，没什么用”。有时我也会收到这种特殊的“反馈”：我给出行动的建议，对方却再也没有回音。我认为这是在用一种无声的方式告诉我：“你的建议对我太刺激了，我顶多想一想，肯定做不到！”

所以，他们要尝试的行动既要是新的，又不能太难受，这就是所谓“扰动”：恰到好处的“刺激”，让对方更容易地启动不一样的尝试。这是这本书的挑战。



LEARN

Like a Pro

Science-Based
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**BARBARA OAKLEY, PhD, PE
AND OLAV SCHEWE**

"Jam-packed with practical, evidence-based advice."

—Daniel H. Pink, #1 New York Times bestselling author

About the Authors



Rachel Oakley

BARBARA OAKLEY, PhD, PE is a professor of engineering at Oakland University and was named Michigan's Distinguished Professor of the Year in 2018. Oakley is also a popular instructor of massive open online courses and has taught millions how to learn more effectively. You can sign up for email updates [here](#).





Ofu Yu

OLAV SCHEWE is the founder and CEO of Educas, an educational technology start-up that develops solutions to help students learn. He is also an educational consultant for one of the world's largest educational tech companies, Kahoot!. You can sign up for email updates [here](#).



go (in, into) cahoot(s)

1. 合夥

- They went cahoot in business.

他們合夥做生意。

in cahoot(s) with

1. 與...合夥

- The multinational corporation is in cahoot with local firms.

這家跨國公司和當地商號合營。

2. 與...同謀;與...串通

- be in cahoot with the enemy

通敵

- policemen in cahoots with the underworld

與黑社會分子沆瀣一氣的警察

Also by Dr. Barbara Oakley

Learning How to Learn ✓

Mindshift ✓

A Mind for Numbers

Cold-Blooded Kindness

Pathological Altruism

Evil Genes

Hair of the Dog

Practicing Sustainability

Career Development in Bioengineering and Biotechnology

Also by Olav Schewe

Super Student

The Exchange Student Guidebook



barbara oakley hair of the dog



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About 56,400,000 results (0.57 seconds)



Hair of the Dog: Tales from Aboard a Russian...

Book by Barbara Oakley



Barbara Oakley

<https://barbaraoakley.com> › books › hair-of-the-dog

Hair of the Dog

Tales from Aboard a Russian Trawler. **Barbara Oakley's** riveting portrayal of espionage, lust, comic adventure, hard work – and harder drinking – brings to life a ...



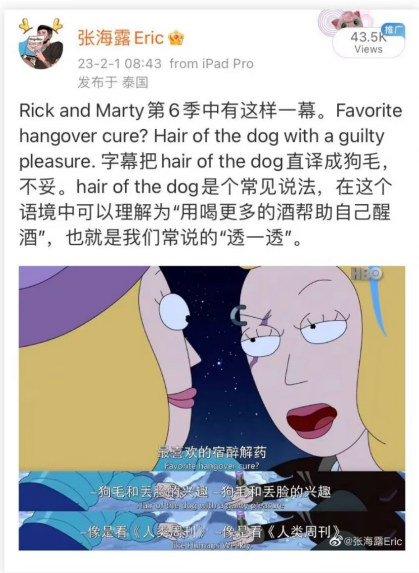
英语学习笔记 >



还记得 **hair of the dog** 吗？



上次朋友圈就发过：



To Our Readers

Do you spend too much time learning with disappointing results? Do you find it difficult to remember what you read? Do you put off studying because it's boring and you're easily distracted?

This book is for you.

We're Olav Schewe and Barb Oakley, and both of us have struggled in the past with our learning. But we have found techniques to help us master material—*any* material. Building on insights from neuroscience and cognitive psychology, we will give you a crash course to improve your ability to learn, whether you're studying math, language, coding, karate, cooking, or anything else. You'll see *why* the strategies work because you'll see what's happening in the brain when you use them. No, this isn't a little book of miracles. But you will find that reducing frustration and improving your study success may sometimes feel miraculous.

In Olav's case, he always wanted to get good grades, but he couldn't, no matter how hard he studied. He almost gave up on his dreams, thinking he wasn't smart enough. But then he discovered that the key to better grades wasn't his own innate abilities, or the number of hours he put in—instead, it was *how* he studied. After he took a step back in his teens and made some adjustments in his learning techniques, he began to excel.

In the end, Olav, the former “slow” student with average grades, became the top student in his high school class. He went on to get a master's with distinction in business administration from the University of Oxford. And his book on how to study effectively, *Super Student*, became an international best seller—translated into more than a dozen different languages.

As for Barb, she flunked math and science all the way through high school. She was convinced she didn't have “the math gene.” In her later

twenties, however, she decided to start all over again with math, beginning with remedial high school algebra. Slowly, she improved in math and science. By applying powerful study methods learned during her language study at the United States Defense Language Institute, she succeeded. She's now a professor of engineering—she also teaches millions of students around the world in online courses such as “Learn like a Pro” and “Learning How to Learn,” which is one of the world's largest massive open online courses. This goes to show that even when you believe you're genetically incapable of succeeding at a subject, that doesn't need to be true at all.

You might think, “I am terrible with numbers,” or “I can't learn languages,” or “I can't speak in front of crowds,” when the reality is that you simply haven't learned how to do those things—yet. Instead, if you change your focus to finding techniques and methods for learning, you'll find that this little book puts marvelous insights at your fingertips. You'll find new solutions, often based on recent neuroscientific findings, that will allow you to move mental mountains and do what you never thought you could do.

Through their decades of writing, teaching, and research on learning, Olav and Barb have developed deep connections with experts from a vast array of disciplines. What you'll find in this little book are the very best of practical learning tools and insights synthesized from research in neuroscience, cognitive psychology, education, and many other fields. And it's all honed with feedback from hundreds of pro learners, many of whom themselves have gone through the trenches of learning difficult concepts and skills. Pro learners gradually add tools and techniques to their mental toolbox, and discover how to think more critically about their learning. That allows these learners to make the best use of their brains, whether those brains seem “naturally” geared toward learning or not.

This book will help you join the pro learning club. Welcome aboard!

Simple can be harder than complex: you have to work hard to get your thinking clean to make it simple. But it's worth it in the end because once you get there, you can move mountains.

Steve Jobs, founder of Apple (1955–2011), quoted in *BusinessWeek*, May 1998

Checklist: How to Become an Effective Learner

Below, we have summarized the advice in this book. (Yes, you need to have read the book to fully benefit from it).

1. Focus intently and beat procrastination.

- ☐ Use the Pomodoro Technique (remove distractions, focus for 25 minutes, take a break).
- ☐ Avoid multitasking unless you find yourself needing occasional fresh perspectives.
- ☐ Create a ready-to-resume plan when an unavoidable interruption comes up.
- ☐ Set up a distraction-free environment.
- ☐ Take frequent short breaks.

2. Overcome being stuck.

- ☐ When stuck, switch your focus away from the problem at hand, or take a break to surface the diffuse mode.
- ☐ After some time completely away from the problem, return to where you got stuck.
- ☐ Use the Hard Start Technique for homework or tests.
- ☐ When starting a report or essay, do not constantly stop to edit what is flowing out. Separate time spent writing from time spent editing.

3. Learn deeply.

- ☐ Study actively: practice active recall (“retrieval practice”) and elaborating.
- ☐ Interleave and space out your learning to help build your intuition and speed.
- ☐ Don’t just focus on the easy stuff; challenge yourself.

- ☐ Get enough sleep and stay physically active.

4. Maximize working memory.

- ☐ Break learning material into small chunks and swap fancy terms for easier ones.
- ☐ Use “to-do” lists to clear your working memory.
- ☐ Take good notes and review them the same day you took them.

5. Memorize more efficiently.

- ☐ Use memory tricks to speed up memorization: acronyms, images, and the Memory Palace.
- ☐ Use metaphors to quickly grasp new concepts.

6. Gain intuition and think quickly.

- ☐ Internalize (don’t just unthinkingly memorize) procedures for solving key scientific or mathematical problems.
- ☐ Make up appropriate gestures to help you remember and understand new language vocabulary.

7. Exert self-discipline even when you don’t have any.

- ☐ Find ways to overcome challenges without having to rely on self-discipline.
- ☐ Remove temptations, distractions, and obstacles from your surroundings.
- ☐ Improve your habits.
- ☐ Plan your goals and identify obstacles and the ideal way to respond to them ahead of time.

8. Motivate yourself.

- ☐ Remind yourself of all the benefits of completing tasks.
- ☐ Reward yourself for completing difficult tasks.
- ☐ Make sure that a task’s level of difficulty matches your skill set.
- ☐ Set goals—long-term goals, milestone goals, and process goals.

9. Read effectively.

- ☐ Preview the text before reading it in detail.
- ☐ Read actively: think about the text, practice active recall, and annotate.

10. Win big on tests.

- ☐ Learn as much as possible about the test itself and make a preparation plan.
- ☐ Practice with previous test questions—from old tests, if possible.
- ☐ During tests: read instructions carefully, keep track of time, and review answers.
- ☐ Use the Hard Start Technique.

11. Be a pro learner.

- ☐ Be a metacognitive learner: understand the task, set goals and plan, learn, and monitor and adjust.
- ☐ Learn from the past: evaluate what went well and where you can improve.

1



How to Focus Intently and Beat Procrastination

You're reading this book because, no matter what you're trying to learn, you want to make sure every minute of your studies counts. So let us start by giving you one of the simplest, most powerful mental tools in the world of study: the Pomodoro Technique.^{*} This clever method will definitely help boost your concentration—we know this from research. Even if you already know the Pomodoro, you'll discover modern twists that can make the Pomodoro even more powerful. And there's much more in the chapters ahead that will be new to you!

Spn

The Pomodoro Technique

Use this approach to structure your study sessions:

1. **Sit down where you'll be studying or working and remove any possible distractors.** This means ensuring there are no pop-ups or extraneous open tabs on your computer, dings from your cell phone, or anything else that could draw you off-task.
2. **Set a timer for 25 minutes.** You can use a mechanical or silent digital timer. You can also use the timer or an app on your phone. If



**DON'T COUNT
THE DAYS.
MAKE THE
DAYS COUNT.**

LOOKUPQUOTES.COM

- MUHAMMAD ALI -

you use your phone, place it out of sight and beyond arm's reach so you won't be distracted while focusing.

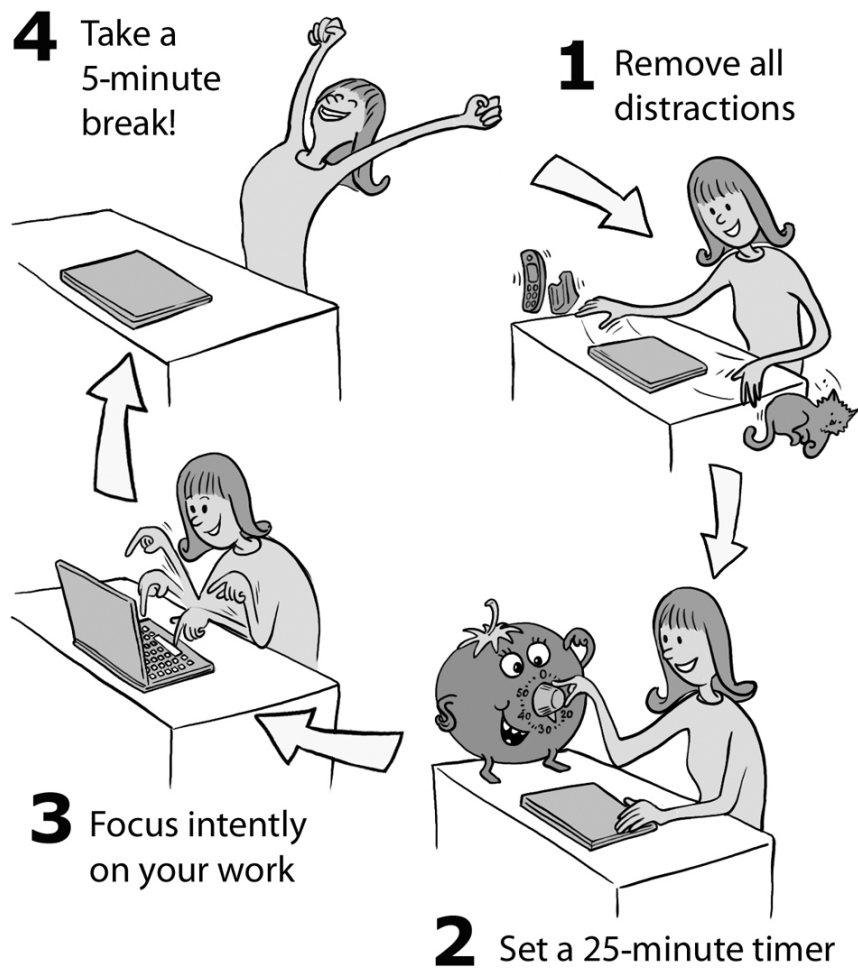
3. ^{like} ~~Dive in~~ **and study or work as intently as you can** for those 25 minutes. If your mind wanders (as it inevitably will), just bring your attention back to the task at hand. Most things can wait or be postponed for 25 minutes. If distracting thoughts come up that you feel like you should act on, write them down in a to-do list so you can tackle them after the Pomodoro session is over.
4. **Reward yourself** for about 5 minutes at the end of the Pomodoro session. Listen to your favorite song, close your eyes and relax, go for a walk, make a cup of tea, cuddle with your dog or cat—anything to let your mind comfortably flow free. It's also best to avoid checking your cell phone or email during this break time—more on why later.
5. **Repeat** as appropriate. If you want to study for 2 hours, you can do four Pomodoros with the break lasting roughly 5 minutes each time. If you have trouble getting yourself back to work when the break is done, set a timer for the break as well.

POPULAR POMODORO APPS

- focus booster (PC)
 - PomoDone
 - Forest
 - Toggl
-



Learning curve?



The Pomodoro Technique in four easy steps.

Sounds easy, doesn't it? It *is* easy. Sometimes your mind may struggle while doing a Pomodoro, but the reality is almost anyone can keep their focus for 25 minutes.



Why the Pomodoro Technique Works

You might wonder how something so simple can be so powerful. The reason is that the Pomodoro Technique captures important aspects of how your brain learns.

- Pomodoro-fueled bursts of focused attention give your brain practice in focusing without disruption, which is much needed in today's distraction-ridden mobile phone world.¹

given

- ★ • Short mental breaks where you get away from focusing are ideal to allow you to transfer what you've just learned into long-term memory, clearing your mind for new learning.² You can't feel this process taking place, which is why you might tend to skip it—but *don't skip it!*
- • Anticipation of a reward keeps you motivated throughout the Pomodoro.
- It's much easier to commit and recommit yourself to short bursts of dedicated study than to seemingly endless sessions.
- • Your studies begin a pattern of focusing on the *process*—putting in *→ autotelic* certain amounts of dedicated time—rather than the *goal* or *outcome*. In the long run, having a good process in place is much more important than any one individual session or goal.
- ✗ → • When you even just think about something you don't like or don't want to do, it activates the insular cortex, causing a "pain in the brain." This pain diminishes after about 20 minutes of focus on the activity.³ Twenty-five minutes is therefore perfect to get you into study mode.

The Pomodoro Technique is highly adaptable. If you get into the flow and find yourself wanting to continue past 25 minutes, that's okay. The length of the reward period is also flexible and can be longer than 5 minutes if your Pomodoro has gone longer than the usual 25 minutes. Just don't forget that taking a mental break is important. One analysis of data from a time-recording app found that highly productive workers work for an average of 52 minutes with a 17-minute break.⁴ The key was that when these superstar workers focused, they *focused*, and when they took a break, they really took a break.

If you have nothing else to do once you've finished your Pomodoro, good. But if you have still more work to do, take a 5-minute break (set a "break" timer if you need to), then start the next Pomodoro. If you're doing a series of Pomodoros, try taking a longer, 10- to 15-minute break after every third or fourth Pomodoro you complete.

If you use the Pomodoro method to study new material, it's also wise to **spend at least some minutes of the Pomodoro looking away from what you're studying and trying to *recall* what you have just learned.** As you

★ will see in chapter 3, *recall* (also called “retrieval practice”) is one of the most powerful ways to both remember and understand new information.



Avoid Your Mobile Phone During Learning Breaks

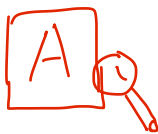
Research by professors Sanghoon Kang and Terri Kurtzberg from Rutgers Business School has revealed that **using a mobile phone for a break does not allow your brain to recharge as effectively as the other types of breaks.**⁵ They note: “As people are increasingly addicted to their cell phones, it is important to know the unintended costs associated with reaching for this device every spare minute. Although people may assume that it is not different from any other kind of interaction or break, this study shows that the phone might be more cognitively taxing than expected.”

Mobile phones are also particularly distracting if you happen to be in face-to-face training or classes. One study found that “Students who were not using their mobile phones wrote down 62% more information in their notes, were able to recall more detailed information from the lecture, and scored a full letter grade and a half higher on a multiple choice test than students who actively used their mobile phones.”⁶ Even just having your phone near you while you’re studying can be distracting—your brain is still tracking it if it knows it’s close at hand.⁷

↳ If you feel anxious without a phone, researchers have found you’ll still be better off with the phone out of reach.⁸ Leave your phone in a backpack, briefcase, or purse, or even back in the car. You’ll be shocked at how much your focus improves.

Be Wary of Multitasking When Studying

Whenever you switch your focus to a new task, you activate information stored in your brain related to the new task.⁹ When you then switch to a different task, for example, when checking your email or a text message, you activate a different set of information. This leaves what’s called an attention residue—some leftover attention from your previous task that means your attention isn’t fully on the new task. Frequent task-switching



increases susceptibility to distraction, causes more errors, slows work, makes writing worse, diminishes learning, and causes forgetting. In short, it's bad news. One study by researchers at the University of Michigan found that cognitive performance fell by 30 to 40 percent when participants switched between tasks instead of completing one task before moving to the next.* ¹⁰ This is part of the magic of the Pomodoro Technique—it allows you to focus on *one* task without the interruptions that can cause you to multitask.

However, although researchers have focused on the dark side of multitasking, there is a brighter side—creativity. When you are focused on a task, you can become cognitively fixed on it. This reduces your ability to step back and take another approach or perspective. It seems that task-switching reduces cognitive fixation.¹¹ The question then arises, how often should you task-switch? There are no easy answers, because it depends so much on the task and how often you might get cognitively “stuck.”

Earmuffs can be one of the best tools around to help you maintain focus. We recommend the 31 dB Peltor earmuffs (although large, they are virtually screaming-baby-proof) over more slender noise-canceling earmuffs.

If, on any particular day, you find yourself going off-task^{x2} so often that your work is suffering, we recommend that you use the Pomodoro Technique. This will keep you on task. But if you're making good progress in your study session despite a few occasional peeks at something different, especially when you feel a bit stuck in your problem-solving or writing, you're probably doing just fine.

Set Up a Distraction-Free Environment

Taking occasional peeks at a distraction is one thing, but to avoid being frequently drawn completely off-task^{x1}, you want to **find a place to study where distractions are eliminated or minimized**. Learning specialists recommend avoiding study in rooms where your friends or colleagues socialize—for example, a college dorm room or student or employee cafeteria. There can be too many interruptions. A quiet library or an isolated

location can be ideal. If you have to work in noisy environments, **earplugs, earmuffs, or noise-canceling headphones can be invaluable.** The nice thing about headphones is that they also send a “do not disturb” signal to others.

Some of the worst distractions are notifications from your computer and phone, especially because you can become compulsive about checking them. You can be pulled off-task even when you aren’t cognitively stuck. One study showed that people on average checked for messages every 35 seconds when messenger apps were left open.¹² On a brighter note, however, business employees who had their access to nonessential websites blocked for a week reported both deeper focused immersion and higher productivity.¹³

POPULAR WEBSITE BLOCKERS

- Freedom
 - FocalFilter (Windows)
 - SelfControl (Mac)
 - StayFocusd (Chrome)
-

Do a sweep through the notifications settings on your devices and disable audible, visible, and vibrating alerts. “Do not disturb” mode may help. Use the Pomodoro Technique to keep you away from the internet or other distractions, or install a website blocker. Don’t pity yourself that you live in a modern social media era where it’s harder to get away from distractions. Even back in the mid-1800s, legend has it that novelist Victor Hugo, author of *Les Misérables* and *The Hunchback of Notre-Dame*, had his servant lock him naked in his study with a pen and paper to keep him from the distractions that beckoned. (You’d think his books would have been shorter as a result.) Distractions are always going to be around—it’s our job to figure out our own best ways to combat them.

Create a Ready-to-Resume Plan When an Unavoidable
Interruption Comes Up

ERIC

How can I use on a brighter note in daily convos?

CHATGPT

You can use the phrase "On a brighter note" in daily conversations to introduce a positive or uplifting aspect after discussing something negative or challenging. Here are a few examples of how you can incorporate it:

1. After discussing a difficult work situation:

"I had a tough day at work today. The workload was overwhelming, but on a brighter note, I received praise for my recent project."

2. When talking about a disappointing event:

"The concert got canceled last night due to bad weather. However, on a brighter note, they rescheduled it for next month."

3. In a conversation about personal challenges:

"I've been dealing with a lot of stress lately, but on a brighter note, I started practicing mindfulness, and it's been helping me feel more centered."

4. When discussing current events or news:

"There's been a lot of negative news lately, but on a brighter note, there have been some significant breakthroughs in medical research."

Using "On a brighter note" allows you to shift the conversation's tone, inject positivity, and highlight the more encouraging aspects of a situation. It helps create a balanced perspective and can uplift the overall mood of the conversation.

Message



A

I

The

You



If you are interrupted by something or someone unavoidable, take a few seconds to mentally note where you are in your current task, and how you'll return to that task. This can be as simple as noting that you were three-quarters of the way down the page you were reading, and that's where you'll return your gaze when you finish the interruption.

This ready-to-resume plan reduces attention residue that can disrupt the new task. How? It provides the closure the brain is looking for—even if the closure is only temporary. A sense of temporary completeness allows you to fully engage in the interrupting task, even while it allows you to return to the original task more easily later.¹⁴

Take Frequent Brief Breaks

We already mentioned that the mental break part of the Pomodoro Technique is critically important. Too prolonged a focus doesn't give your brain time to offload the new material you're learning into long-term memory.¹⁵ Your studying becomes less effective. In addition, specific areas of the brain can tire when you use them for a long time. Although researchers still don't know why, it's thought that just as muscles will tire from exercise, so can the brain tire from use, so-called "cognitive exhaustion."¹⁶

Short (5- to 10-minute) breaks involving complete mental relaxation—no internet, no texting, no reading, nothing at all—are the best for enhancing what you've just learned, because the new information can settle without interference.¹⁷ This means you're not being lazy if you want to take a short nap or just do nothing—instead, you're being efficient.²⁰ 

HOW MANY HOURS SHOULD YOU STUDY PER DAY IN COLLEGE?

If you're a college student, we recommend that you study between 2 and 8 hours per weekday (in addition to classes), depending on your ambition and the rigor of your study program. The gold standard of study time is set by medical students with A grades. Above and beyond the hours they spend in classes, medical students generally study an average of 6 to 8 hours a day—studying more than 8 didn't improve grades. B and C medical students are more likely to study 3 to 5 hours a day.¹⁸ The average engineering student studies about 3 hours a day, while social science and business students average 2 hours daily.¹⁹ (Barb found herself studying engineering

6 to 8 hours a day, even though she generally took a slightly lighter than average course load. But this allowed her to earn A grades.)

Breaks that involve something physical, like going for a walk or jog, or even just getting up for a cup of tea, are always a good idea. Part of the reason that breaks where you move around may be so valuable may simply be that you aren't thinking so much. Another reason is that movement and exercise themselves are helpful for the learning process—more on that later.

Music and Binaural Beats

Music seems to slow down learning for most students, especially in math.²¹ You may feel better studying to music, and feel you can study longer. But that's because when you're listening to music, part of your attention is following the tune so you aren't working as hard as you could be. Music can also lead to multitasking as you switch between work and fiddling with your playlist. If you are getting good grades or evaluations for what you're learning, you're probably fine to listen to music. But if your feedback isn't what you'd like, or you're struggling to make headway with the material, we'd suggest backing away from music. There are hints, however, that those with attentional disorders may benefit from studying to music.²²

Incidentally, there is a music-related phenomenon called “binaural beats.” By wearing stereo headphones, the right and left ears can be supplied with two slightly different frequency tones—for example, 300 Hz and 320 Hz. Surprisingly, a person hears not only the original two tones, but also a third frequency—the difference between those two frequencies. In this case, the difference would be 20 Hz—called the “beat” frequency.

Researchers first became aware of binaural beats when they were investigating how the brain locates sounds.²³ Beginning in the 1970s, people began to explore possible changes in consciousness produced when the beats might shift, or entrain, brain activity toward the beat frequency. Most uses of binaural beats today are by regular people who download audio materials from various online sources to help them focus, remember, relax, or meditate. Since the beats can have a bland, monotonous sound, they are often embedded in music or pink noise.



binaural music



Videos

For sleep

For anxiety

Relaxing

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binaural beat



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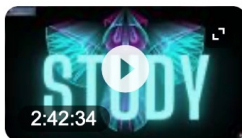
meditation

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for anxiety

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frequencies



Focus Music, Binaural Beats Concentration Music for Studying ...

YouTube · Greenred Productions - Relaxing Music
May 9, 2562 BE



Increase Brain Power, Focus Music, Reduce Anxiety, Binaural ...

YouTube · Music for Body and Spirit - Meditation Music
Nov 19, 2562 BE



Super Intelligence: Memory Music, Improve Focus and ...

YouTube · Greenred Productions - Relaxing Music
Dec 21, 2560 BE

You can explore studying to binaural beats, but be aware that the observed positive effects, at least in the baseline studies, are modest.*²⁴ And despite their claims, online sources for binaural beats can be of questionable legitimacy. Finally, research suggests that the effect of binaural beats on focus might be canceled by the effects of the music they might be embedded in.

Meditation and Yoga

Meditation has been suggested as a method for building focus. Overall, there are two general types of meditation—focused types, such as mantra meditation, and open monitoring types, such as mindfulness. Mantra-type meditation may provide more direct practice in building focus, although effects generally become apparent after weeks or months. Open monitoring-type meditation may help cognition indirectly, by improving mood. A challenge is that many past studies on meditation didn't follow proper scientific procedures, so more research is needed.²⁵

There are some preliminary indications that yoga may have positive effects on cognition and may improve the connections of the diffuse mode.²⁶ (More on the diffuse mode in the next chapter.) But research on the effects of yoga is at an even more preliminary stage than meditation, so it's hard to draw firm conclusions.

★ ★ ★

In this chapter, we've covered how to focus on what you're learning. But sometimes focusing just isn't enough. What do you do when you get stuck? Read on!

KEY TAKEAWAYS ?

FROM THE CHAPTER

- **The Pomodoro Technique is one of the most powerful methods for tackling procrastination.** To do it:
 - Remove distractions.

- Set a timer for 25 minutes.
 - Focus as intently as you can for those 25 minutes.
 - Reward yourself. Take a 5-minute or so mental break. (Use a timer for the break if necessary.)
 - Do another Pomodoro until the work—or you!—is done.
- **A pain in the brain can trigger procrastination.** Be aware of minor feelings of discomfort when you think about something you don't like to do—these feelings can trigger procrastination. That pain in the brain dissipates once you get started.
 - **In general, it's best to avoid multitasking.** But multitasking is not all bad—it can sometimes help you avoid becoming fixed on a cognitive approach that's going nowhere.
 - **Set up a distraction-free environment.** Do a sweep through the notifications settings on your devices and disable audible, visible, and vibrating alerts. Keep your phone out of reach.
 - **If you are called off-task by someone or something, try to take mental note of where you were so you can more easily return to it.**
 - **Take frequent brief breaks.** If you go too long on any one task, you will inevitably tire.
 - **If you like to listen to music when you're working, make sure it isn't distracting your attention.** Think twice about listening to music while studying unless you're already learning the material well.

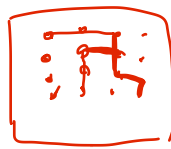
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How to Overcome Being Stuck

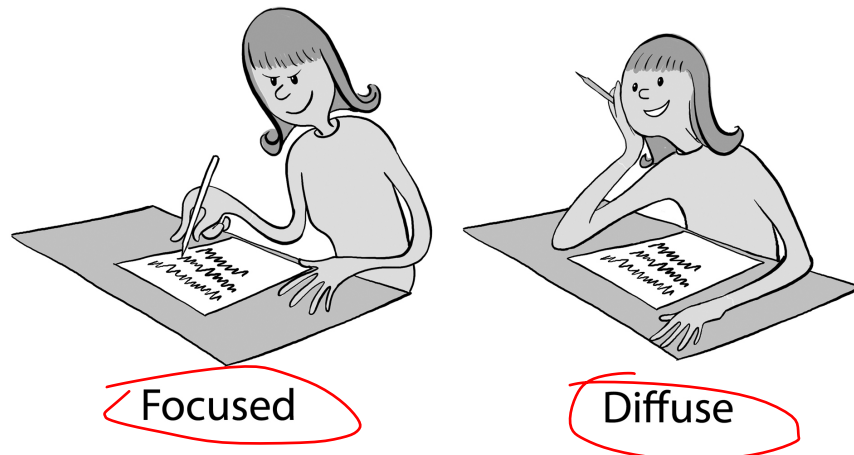
Olav once crashed a drone into the top of a tall tree, where it got stuck—too intertwined in the leafy branches to come free, far too high to reach by ladder, or even by throwing a rock. Climbing the tree wouldn't work either: the drone was caught in the thinnest branches. Olav felt as stuck as the drone itself. What should he do? Olav decided to do *nothing*. And that helped him get the drone down. How? We'll get to that in a moment.

Getting stuck and frustrated when you're learning is common—blank pages can leave you unable to think of a single sentence as you try to begin writing, or a new approach to coding can leave you stumped. We've mentioned a few tips previously to help you avoid becoming cognitively stuck, such as briefly switching tasks or taking brief mental breaks. But if you know a little about how your brain works, you can do even more to avoid this frustration and simultaneously speed up your learning.

The Focused *and* Diffuse Modes to Solve Problems Big and Small



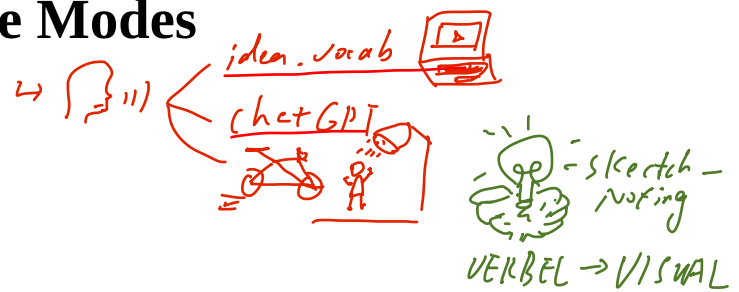
The brain has two completely different modes of thinking and learning. The first is called **focused mode**. This was what the first chapter of the book was about. It's exactly what it sounds like—you're in the focused mode when you're focusing on something. For example, you may be concentrating on an explanation of a physics problem. Or intently memorizing new vocabulary words.



Learning involves going back and forth between focused mode (left) and diffuse mode (right).

The second mode is called the **diffuse mode**. This mode is also important for thinking and learning.¹ While you're in the diffuse mode, thoughts are still flowing through your mind, but you're not focusing on anything in particular. For example, you're in the diffuse mode when random thoughts pop up while you're standing in the shower, riding a bus, going for a walk, or falling asleep. When you're in this mode, your brain can connect different thoughts and ideas in a way that it can't while in the focused mode, which is busy suppressing everything except what you are focusing on. That's the reason that people get ideas and fresh insights when they go for a walk or take a shower. →

Learning Something New and Difficult Means Alternating Between Focused and Diffuse Modes



Focused mode is all you need if what you're learning is relatively straightforward, perhaps related to ideas you've already mastered. For example, you're in focused mode when you're solving an uncomplicated addition problem, such as $14 + 32$.

But what if you're trying to learn something new and more difficult? Let's say you're trying to understand the multi-pump system of the heart or the mathematical concept of a derivative, or master a physical skill such as how to do a double kickflip on a skateboard.* You might focus hard, then harder, and then even harder, and you still can't get it.

→ / Strangely enough, allowing yourself to take a break, whether for several hours or overnight, often works magic. It's the magic of the diffuse mode. When you return your focus to the issue at hand, you'll have that "aha" insight that allows you to make progress on the issue you've been struggling with. *clicked!*

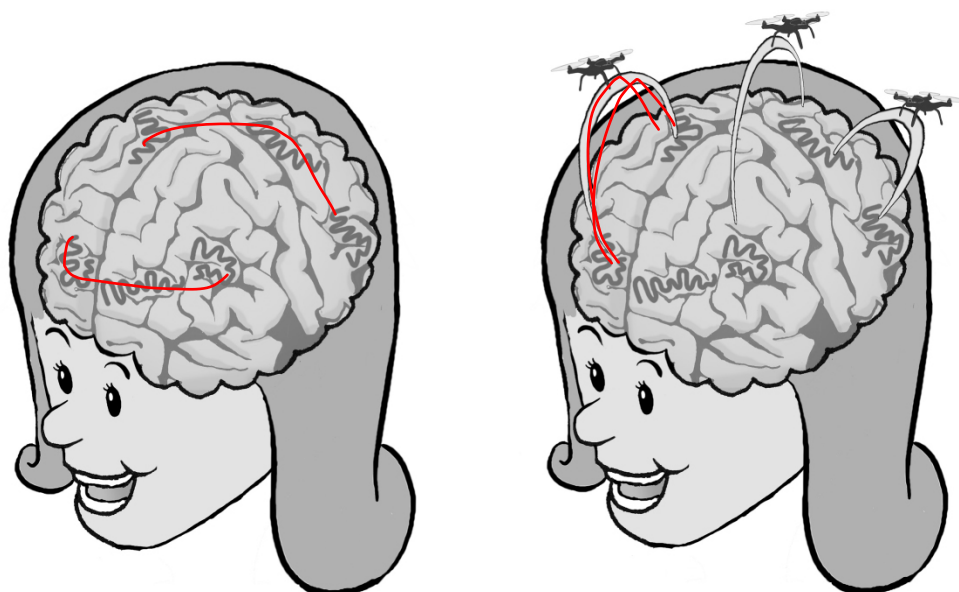
Let's use a metaphor for the focused and the diffuse mode to better understand the difference between them.

Think of your brain as a maze with learned concepts and procedures stored as pathways in different parts of the maze. When you're in the focused mode, your thoughts move along these pre-laid pathways.² You can see some of the pathways drawn into the maze on the next page.

When you concentrate on a familiar subject, like working a multiplication problem, you're using pathways you've already laid in one part of the maze. When you concentrate on another task, like conjugating a verb in another language you've learned, you use a pathway you've laid in a different part of the maze.

But if you're trying to solve a completely new problem—no preexisting pathways—it can be tough for your focused mode, since there aren't any pathways for it to use. → *blaze the trail*

So what, then, is diffuse mode? It's best to imagine the diffuse mode as a set of tiny drones that can zip quickly over parts of the maze. Because the drones can fly over the maze, they can easily make connections between parts of the brain that may not normally be connected. You use the diffuse mode whenever you're learning something new and difficult. The diffuse mode allows you to create the beginnings of a new neural pathway of ability and understanding.



This picture of the brain as a maze gives you a metaphorical feel for how your brain works in focused and diffuse modes. The focused mode is when you focus on a preexisting pathway involving topics you already know. The flight paths of the little drones flying above the maze are your diffuse mode.

You're sometimes not aware of the diffuse mode when it is at work—but you become aware of that “aha” moment when you can suddenly understand something you've been struggling with. Like when you suddenly see how to solve a tough problem in data analysis, play a difficult passage on the guitar, or intuit a new marketing approach. The feeling of “aha” is when your tiny mental drone has suddenly made a new set of connections. What seemed confusing and incomprehensible before suddenly clicks. /

★ **KEY POINT**

As long as you're focusing on a particular topic, you're *blocking* the activities of your diffuse mode on that topic. It's only when you get your focus *off* that topic that your diffuse mode can go to work on it.

But you must first focus hard on your learning challenge for the diffuse mode to then be able to work its magic.

Once the diffuse mode helps you make a new insight, the focused mode can build and strengthen the new ideas. This is why **learning often involves going back and forth between focused and diffuse modes**. You

focus—meaning that you work intensely on the material—until you begin to struggle. Then you take a break, and the diffuse mode works on the ideas in the background. Then you return to focus again, and it makes better sense. Back and forth it goes as your learning grows.

How to Get into Diffuse Mode

To get into diffuse mode regarding a topic, you must focus hard on the topic for a little bit or until you get stuck, but then *stop* focusing on it.

→ To then fall into the diffuse mode, it's best to do relatively mindless activities such as brushing your teeth, washing the dishes, ironing clothes, or as we'd mentioned earlier, walking, riding a bus, taking a shower, or lying down with your eyes closed. These are activities that may require a minor bit of focus (you don't want to walk into a wall), but not much. Your brain should be left free to wander. *Your go-to activity?*

When your focus tires^{x3}, you naturally fall into the diffuse mode. How long you stay in diffuse mode varies. When you blink, for example, you're momentarily in the diffuse mode—unfortunately, this is too short a time^{x2} to allow much mental processing to occur. When you daydream for a few minutes, you're in diffuse mode. You can walk for hours in the diffuse mode. You naturally switch back and forth between focused and diffuse modes as the day goes by.



EXAMPLES OF HOW TO EXPLOIT YOUR DIFFUSE MODE

- ★ Start a difficult essay before dinner, so that diffuse mode can work in the background while you're eating.
- Begin a difficult problem set right before you take a break.
- Read difficult passages before going to bed—continue the next day.
- Rework an especially tricky or important problem before taking a shower.
- Review vocabulary lists right before going shopping.

It should be clear now that falling out of focus into the diffuse mode
→ doesn't necessarily mean you're wasting time. When it comes to learning, diffuse mode is your strategic weapon. Used wisely, your diffuse mode can

give you valuable solutions and insights—this mode is strongly linked to creativity.³ *strangely*

Oddly enough, you can be in focused mode on *one* topic, and diffuse mode on *another*, which leads us to another powerful learning tool—the **Hard Start Technique**.



“Hard Start” for Homework and Tests

The Hard Start Technique takes advantage of your diffuse mode when solving difficult homework tasks or test questions. This technique is simple:

1. Scan over the test or homework problems and make a tiny check mark over any problem that seems especially hard.
2. Begin working on the *hardest* problem. You will probably get stuck after a few minutes.
3. As soon as you find yourself getting stuck, move to an easier problem.
4. Return to the hard problem later after you’ve done one or several easier ones.

You will often be surprised that, when you return after working on another easier problem (or problems), you can make more progress on the hard problem. This occurs because, while your attention was focused on the easier problems, your diffuse mode was able to work behind the scenes on the harder problem.⁴ Also, when you first started work on the problem, your tendency might have been to fixate on your approach, even if it was wrong. Temporarily switching what you’re working on can allow you to reboot mentally, so when you return to the problem, you’ve got a fresher perspective.⁵

KEY POINT

Learning when to disconnect from a problem, whether on a test or working on homework, can sometimes be as important as persistence. ~~Students~~ often lose points on tests because they get stuck and keep working fruitlessly on harder problems when there were easier problems they could have solved.

Hard-start



stand & pick



brain racking



no-brainer

low hanging fruit

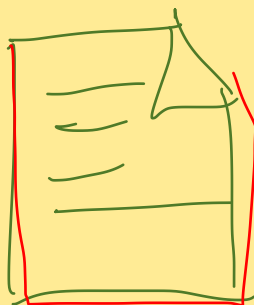


① 擒贼先擒王, 心理战优先

② 又红又专, 打通人脉

③ 先苦后甜, 适度放水

— 别较劲, 用巧力 —



If you instead wait to do the hardest problems toward the end of the test or study session, you may be more mentally fatigued and unable to do your best. Worse yet, if you're trying to work the toughest problems at the end of a timed test, there won't be time for your diffuse mode to do any background processing.

The one caveat is that this technique only works if you've studied for the assignment or test—your diffuse drone needs preexisting chunks of knowledge or information so it can connect them together.

→ Hard Start also works well for essay questions. Start by drafting a structure or layout but without doing any actual writing. Then move on to some other questions. Return to the essay question after you've had time to do some diffuse mode background processing.

Use the Diffuse Mode When Writing First Drafts

One of the biggest challenges in writing a report or essay is to get the first rough draft done. This is because, when you're writing essays and reports, your tendency is to edit every sentence as soon as it comes out. Sometimes *Feynman* you'll reject a sentence while it's still in your head, before you even see what it looks like on the page. [Nitpicking your work like this is like stopping to retie your shoe every time you take a step. You're not going to get anywhere fast.]

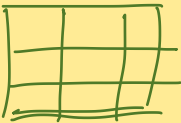
The problem is that you're mixing up focused mode work (the editing) with more diffuse mode work (the writing). To stop yourself from doing this, cover up or turn off your screen and begin writing *without* seeing the words appearing on the screen. Or write by hand without looking back at what you've written. Although this technique can feel odd at first, you'll soon get into the rhythm of getting words on the page *without* editing them. This allows you to make much faster progress in getting your first draft out. The whole point of a first draft, after all, is just getting it out on the page, no matter how bad you may think it is at the time. Later, you can edit.

WRITE OR DIE

1. Speak of your mind, edit & perfect
Later on.

2. 12:12 (PRE: Practice → pathway
MID: Diffuse mode → idea!
POST: Focus mode → language!

3. 13:12 (PRE: Topic - 11:11 = 11:11
MID: jot down key words
POST: flesh out



Write or Die, an app by Dr. Wicked, allows you to set the number of words you want to write per minute and has various irritating options, including sounds and visuals, that kick in if you start falling behind your goal. There's even a "kamikaze mode," where your writing will unwrite itself if you're too slow. Oddly enough, the app can make writing fun.

木村三孝樹

Dividing your writing into diffuse (no editing allowed) and focused (editing) modes will do much to allow your writing to move forward more quickly.

Visit a Coffee Shop to Activate Your Diffuse Mode →

When your study involves intense memorization, as with vocabulary or anatomy terms, it can be helpful to study in a quiet environment. But when your studies involve more conceptually difficult material—for example, trends in history, bridge construction, or grasping a difficult analytical concept—it can be better to study in an environment that occasionally disrupts your focus and allows your diffuse mode to pop up. This can allow you to gain new perspectives on these difficult-to-grasp ideas.⁶ A coffee shop, with the hum of background conversations and occasional clanking of cups, provides many such triggers for the diffuse mode. There are even coffee shop apps that play the sounds of a coffee shop so you can enjoy the ambiance no matter where you are.

POPULAR “BACKGROUND” NOISE APPS AND SITES

- Coffitivity
 - SimplyNoise
 - Noisli
 - myNoise
-

How Olav Got the Drone Down

So, how did Olav dislodge the drone in the tree? He stopped focusing on how to get the drone down from the tree. This let his diffuse mode go to work. Suddenly, he was inspired to attach a fishing line to an arrow. He then

shot over the branch where the drone was stuck. When he pulled on the line to shake the branch where the drone was stuck, it eventually fell.

★ ★ ★ ↳ The Road Less Traveled

In this chapter, we explored how you can couple mental focus with mental relaxation to solve difficult problems more easily. In our next chapter, we'll go deeper into the brain, to discover the best techniques for transferring information to long-term memory.

KEY TAKEAWAYS

FROM THE CHAPTER

- **Focused mode** helps you work through familiar problems, or to load difficult material into your brain so the diffuse mode can begin processing it.
- **Diffuse mode** helps you make sense of new challenges in whatever you're learning, whether it's understanding a new accounting concept, handling a challenging search engine optimization problem, or figuring out how to putt in windy conditions in golf.
- **Learning often involves moving back and forth between focused and diffuse modes.** It's typical to get stuck when learning something difficult—that just means it's time to move from focused to diffuse mode. Take a break, or work on something different, to let neural processing continue in the background.
- **Use the Hard Start Technique.** This means to begin with the *hardest* problems on tests or homework. Pause the hard problem when you get stuck so that you can work on another problem. Return to the hard problem after a while.
- **Do not edit when you're writing the first draft of a report or essay.** A good way to avoid editing is to cover or turn off your computer screen so you can't see what you're writing.