

# MAKE IT **STICK**

## THE SCIENCE OF SUCCESSFUL LEARNING

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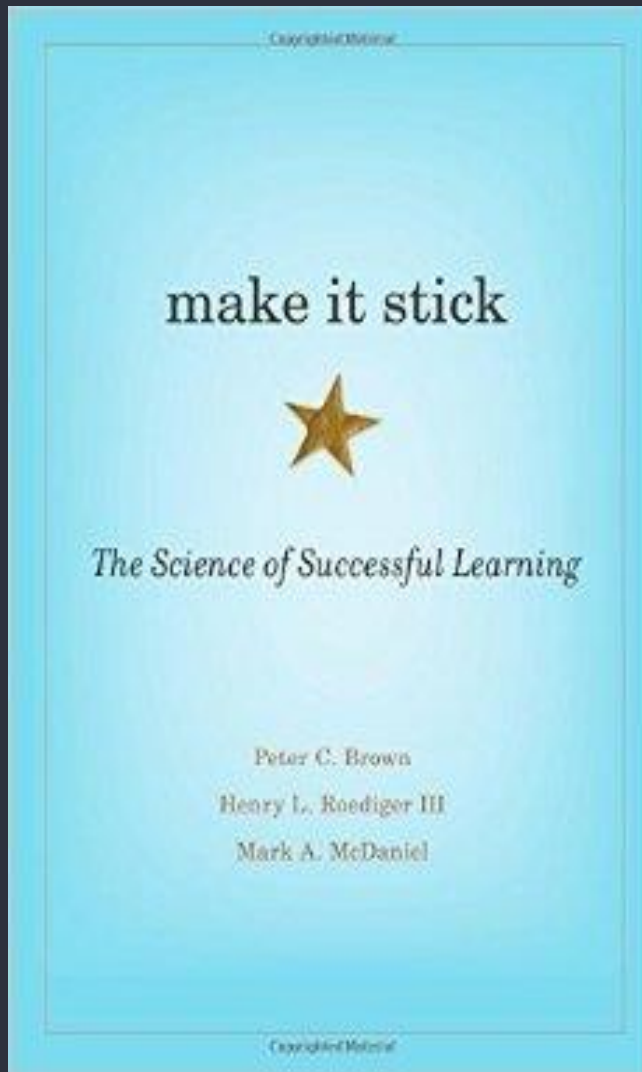


“People generally are going about learning the wrong ways.”



# What is learning?

“Acquiring knowledge and skills and having them readily available from memory so you can make sense of future problems and opportunities.”



# Claims

# CLAIM #1



Learning is deeper and more durable when it is effortful.

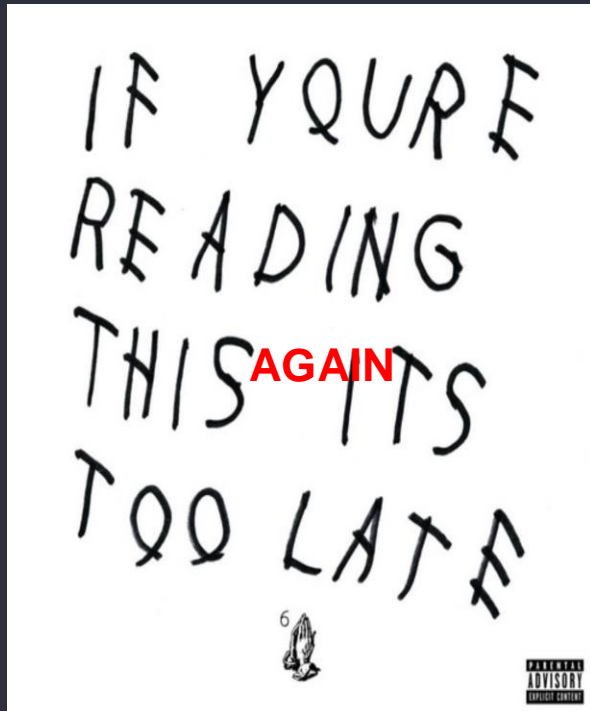


# CLAIM #2

We are **poor judges** of  
when we are learning well  
and when we're not.



# CLAIM #3



Rereading text and massed practice are among the **least productive** study strategies.



# CLAIM #4

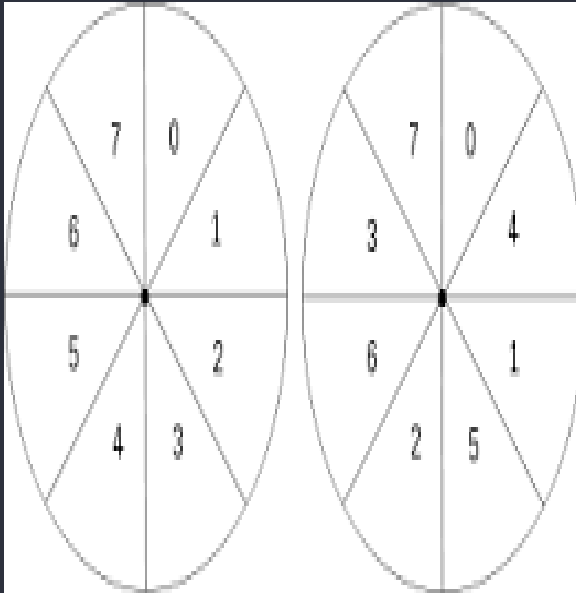


Retrieval practice is a more effective learning strategy than review by rereading.





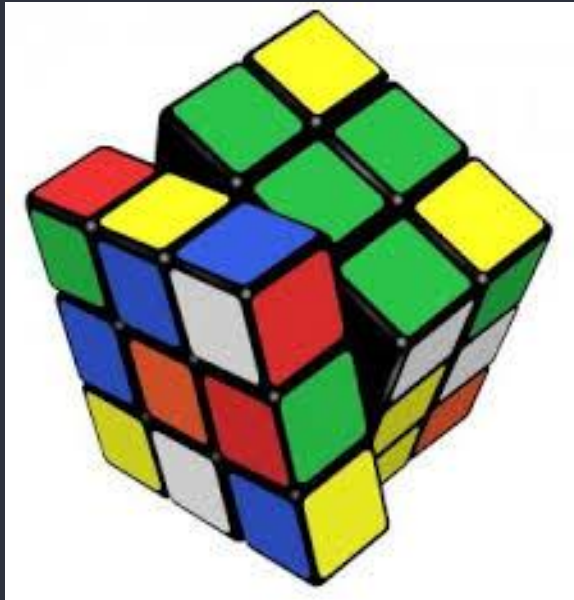
# CLAIM #5



Interleaving produces longer lasting learning and enables more versatile application.



# CLAIM #6



Trying to solve a problem before being taught the solution leads to **better learning**, even when errors are made in the attempt.



# CLAIM #7

The popular notion that you learn better when you receive instruction in a form consistent with your preferred learning style...is not supported by empirical research.



WHAT'S  
YOUR  
LEARNING  
STYLE?



# CLAIM #8



When you're adept at extracting the underlying principles or "rules" that differentiate types of problems, you're more successful at picking **the right solutions in unfamiliar situations.**



# CLAIM #9



We're all susceptible to illusions that can hijack our judgment of what we know and can do. Testing helps calibrate our judgments of what we've learned. In virtually all areas of learning, you build better mastery when you use testing as a tool to identify and bring up your areas of weakness.



# CLAIM #10



If you're just engaging in mechanical repetition, it's true, you quickly hit the limit of what you can keep in mind. However, if you **practice elaboration**, there's no known limit to how much you can learn.



# CLAIM #11

BELIEVE  
ATTRACT  
SLOVENLY  
LABORATORY  
IMPORTANT  
INTEND  
COURAGE  
ABANDONED  
ELECTRICITY  
PYRAMID

Putting new knowledge into a larger context helps learning. The more ways you can give a story meaning, the better the story stays with you.



# CLAIM #12



People who learn to **extract the key ideas** from new material and organize them into a mental model and connect that model to prior knowledge show an advantage in learning complex mastery.





# CLAIM #13



Every time you learn something new, you change the brain—the residue of your experiences is stored. In other words, the elements that shape your intellectual abilities lie to a surprising extent **within your own control**.





# SO...NOW WHAT?

# How are we to put these claims to work?



# THE RESEARCH SUGGESTS

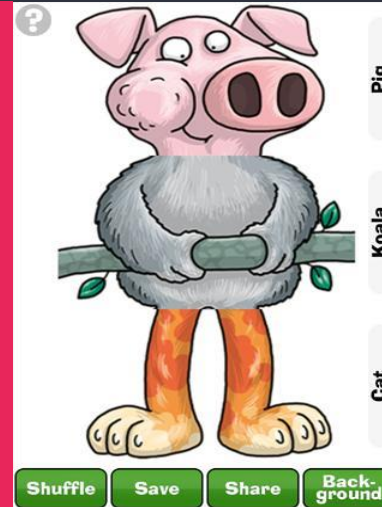
## PRACTICE RETRIEVAL

- Make an effort to recall concepts from memory.
- Reflect on what you've learned from time to time.
- Test immediately after a lecture.
- Test at spaced intervals.
- Delay feedback.



## MIX UP PRACTICE

- Space out practice.
- Interleave learning with other learning.
- Vary practice.
- Beware the familiarity trap.
- "Learn from experience" by spacing, interleaving, and varying practice.

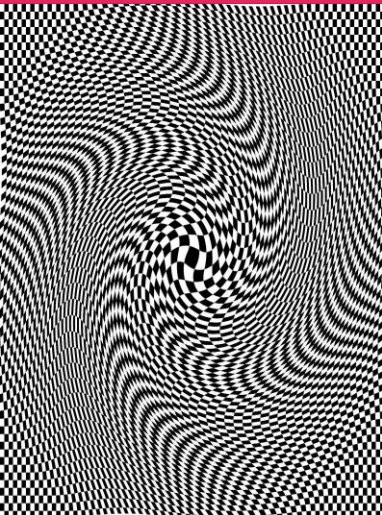


## EMBRACE DIFFICULTIES

- Know that learning is a three step process.
- Call on prior knowledge.
- Use information to keep retrieval routes strong.
- Establish retrieval cues.
- Let concepts get rusty.

## AVOID ILLUSIONS OF KNOWING

- Cultivate analysis.
- Know that memory is distorted.
- Beware imagination inflation.
- Calibrate your judgment.



## GET BEYOND YOUR LEARNING STYLES

- Be the one in charge.
- Embrace the notion of successful intelligence.
- Adopt active learning strategies.
- Distill the underlying principles.

## INCREASE YOUR ABILITIES

- Trust the brain's mutability.
- Maintain a growth mindset.
- Practice deliberately.
- Use memory cues.
- Self-discipline and persist.

*Bad times have scientific value. These are occasions a good learner would not miss.*

*Ralph Waldo Emerson*



# SOME PRACTICAL TIPS FOR THE STUDENT



- Take charge of learning.
- Accept and even embrace that learning is difficult and rise to the challenge.
- Make a habit of these three keystone study strategies:
  - Practice retrieving new learning from memory.
  - Space out your retrieval practice.
  - Interleave the study of different problem types.

Supplement these strategies with:  
elaboration, reflection, calibration,  
and mnemonic devices.



# SOME PRACTICAL TIPS FOR THE PARENT



- Ask students to talk about what they've learned in class without the textbook or notes on hand. Discuss what they've said.
- Have them use their notes to give themselves several low stakes self-quizzes for each class across a semester.
- Help them set up notes for practicing retrieval rather than rereading.
- Ask students to attempt the problems associated with a particular chapter before they even step in the classroom door. (As long as any misconceptions are corrected, they will benefit from the effort.)



# SOME PRACTICAL TIPS FOR THE PARENT



- Encourage students to identify and then not depend on their preferred learning style.
- Have them practice several types of examples rather than hone in on a particular one for a sustained period of time. Tell them to get comfortable with the discomfort!
- Facilitate experiences of elaboration.
- Have them apply what they've learn to new situations.
- Teach them to summarize.
- When you can, demonstrate your metacognition and connection to prior knowledge aloud.



# WHAT IT LOOKS LIKE IN MOTION



# PRACTICE RETRIEVAL

An excerpt of my child's notes looks like this:

The Americans with Disabilities Act of 1990 (ADA) strengthened protections for people with disabilities by requiring employers to make accommodations and prohibiting discrimination.

Rather than have her read this fact over and over again, I'm going to...

...have her formulate a question and answer it.

What's one way the ADA strengthen protections for people with disabilities?

*The ADA strengthened protections for disabled people by requiring employers to make accommodations.*





# ELABORATE

Create Experiences of Elaboration



# relinquish

**re – lin- quish**

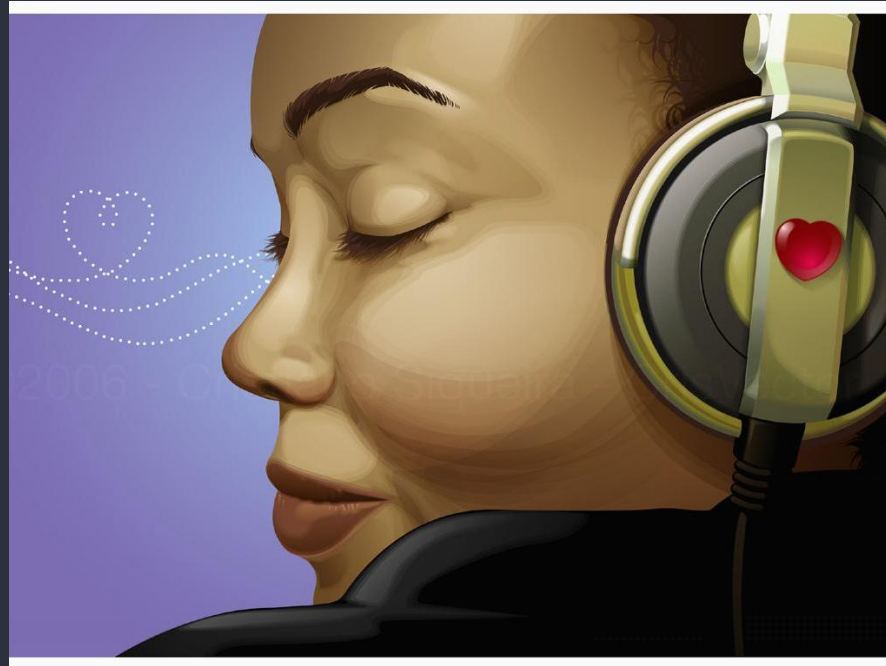
What part of speech? (action word)

**to give up;**

**to give over to;**

**to surrender**





# relinquish

If you want to reach a state of bliss, make a decision to **relinquish** the need to control, the need to be approved,

and the need to judge.

--Deepak Chopra





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## relinquish

Never **relinquish** your clothing or shoes without saying exactly when you want them back.



# Would you **relinquish** your cell phone for a used car?



# REAL-LIFE CONTROVERSY

Do you think adoptive parents should be allowed to **relinquish** custody of an out-of-control child? Why or why not?



# MIX UP PRACTICE

My child's test schedule looks like this:

**Next Wednesday:**  
Social studies quiz  
**Next Thursday:** End of  
the unit math test  
**Next Friday:** English  
exam

**Rather than  
have him study  
the night before  
each  
assessment...**

...have him study a subject,  
leave it be, study something  
else and another something  
else and then circle back  
around.

**Sunday night:** Self-  
quiz social studies  
**Monday night:** Self-  
quiz math  
**Tuesday night:** Self-  
quiz social studies  
and English  
**Wednesday night:**  
Self-quiz math



# EMBRACE DIFFICULTY

Remind your child that learning is a three-step process.



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on

Retrieval





# AVOID ILLUSIONS OF KNOWING

Your child may not know everything she thinks she knows!



For this reason, it's important that she calibrate her judgment.

Peer instruction can help tremendously!

Encourage her to start and keep a diverse study group.



# GO BEYOND LEARNING STYLE

Encourage your child to embrace the notion of successful intelligence!



**“Go wide: don’t roost in a pigeonhole of your preferred learning style but take command of your resources and tap all of your “intelligences” to master the knowledge or skill you want to possess. Describe what you want to know, do, or accomplish. Then list the competencies required, what you need to learn, and where you can find the knowledge or skill. Then go get it.”**



# CONTACT ME

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