

# Notes on Effective Learning

Based on  
**make it stick**

*The Science of Successful Learning*  
*Brown, Roediger & McDaniel, 2014*

January 6, 2015

# Learning: you're doing it wrong

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- We are *poor judges* of when we are learning well.
- *Rereading text* and *massed practice* are the most practiced methods, but are the *least productive*.
- These methods give rise to feelings of fluency that are mistaken for true mastery.

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



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- People do have multiple learning strategies, and all people learn best when they “go wide.”
- Limiting instruction to your preferred style reduces learning.

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- This skill is better acquired through **interleaved and varied practice** than massed practice.

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- Testing helps calibrate our judgements.
- “Shooting an azimuth.”

# Learning requires a **foundation of prior knowledge**



"Mr. Osborne, may I be excused? My brain is full."

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- All of these memory masters use mnemonic tricks that involve relating the new knowledge to something they already know, such as the “memory palace.”

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- The hippocampus actually creates new neurons throughout your life.
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- When learning is hard, you're doing important work.

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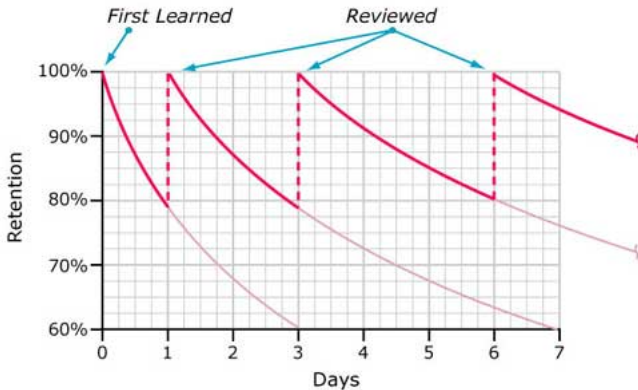
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QUIZZING IS A LEARNING TOOL!

# Spaced repetition

Typical Forgetting Curve for Newly Learned Information



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  - Invent quiz questions as you read
  - Don't listen to your intuition!

# Learning tips

- Space out retrieval practice
  - No cramming
  - Use flash cards: [www.ankisrs.net](http://www.ankisrs.net)
  - Avoid massed practice

# Learning tips

- Interleave different study problems
  - Move back and forth in the text
  - Move between subjects
  - Move between study strategies

# Learning tips

- Elaboration
  - explain it in your own words and relate it to your own experience

# Learning tips

- Generation
  - Try to answer a problem before being shown the solution

# Learning tips

- Reflection
  - Write out essays on your learning

# Learning tips

- Calibration
  - Use an objective instrument to assess yourself

# Learning tips

- Mnemonic devices
  - Mind maps
  - Memory palace
  - Think in vivid, crazy images
  - Major memory system for numbers



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