

**Making It Stick:  
The Science of Successful Learning  
and Memory**

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ARTS & SCIENCES

# Puzzles

- We are life-long learners, so why do we often find learning so hard?
- Why do even good students often use ineffective strategies?
- What learning strategies work well?
- Why do we sometimes think we know a topic well, only to show later that we do not?
- Why are ineffective educational strategies so resistant to change?

# Surveys Asking Students How They Study

reread material

highlight material

review (reread) notes from class

*use strategies to memorize*

*outline material*

*use flashcards*

*study groups*

Karpicke, Butler, & Roediger (*Memory*, 2009)

# Question for Students

Ask them if they learn better from restudying material or testing themselves on the material?

Restudying is the preferred strategy, testing themselves produces better results.

Describe one experiment to illustrate my point.

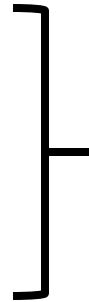
# Judgments of Learning

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*Task: Learn key ideas  
in a 250-word prose passage, over 4 trials*

**Pure Study:**

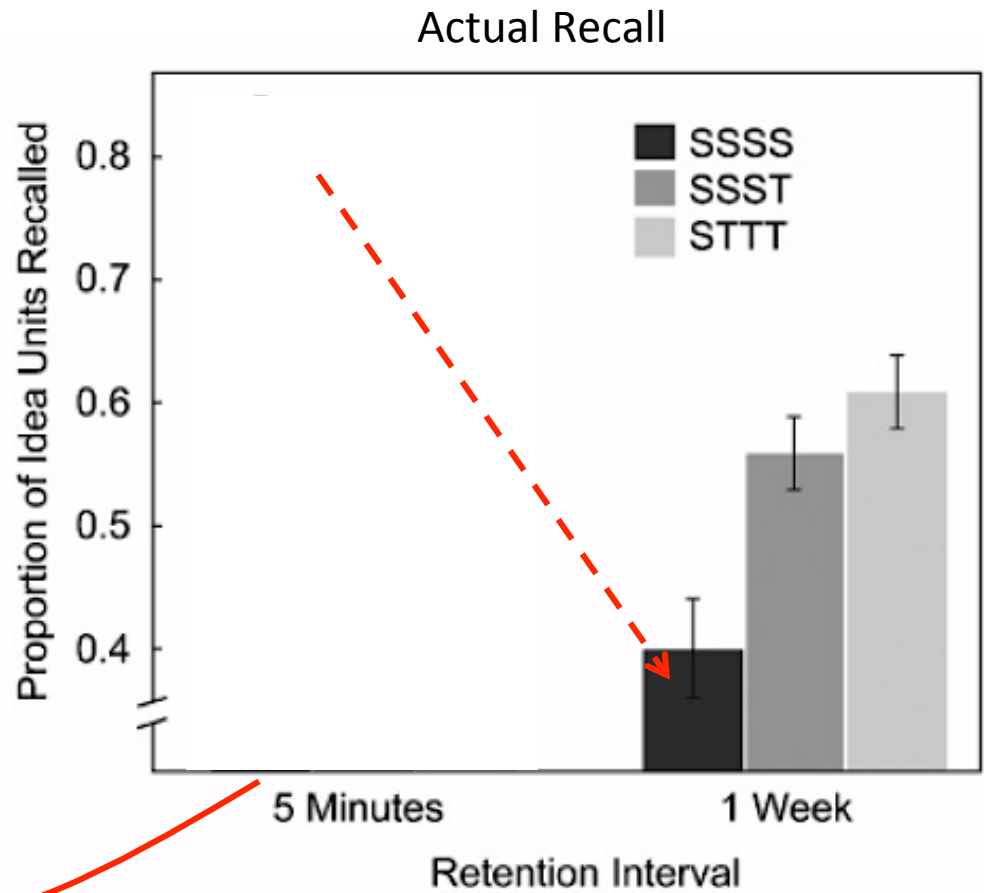
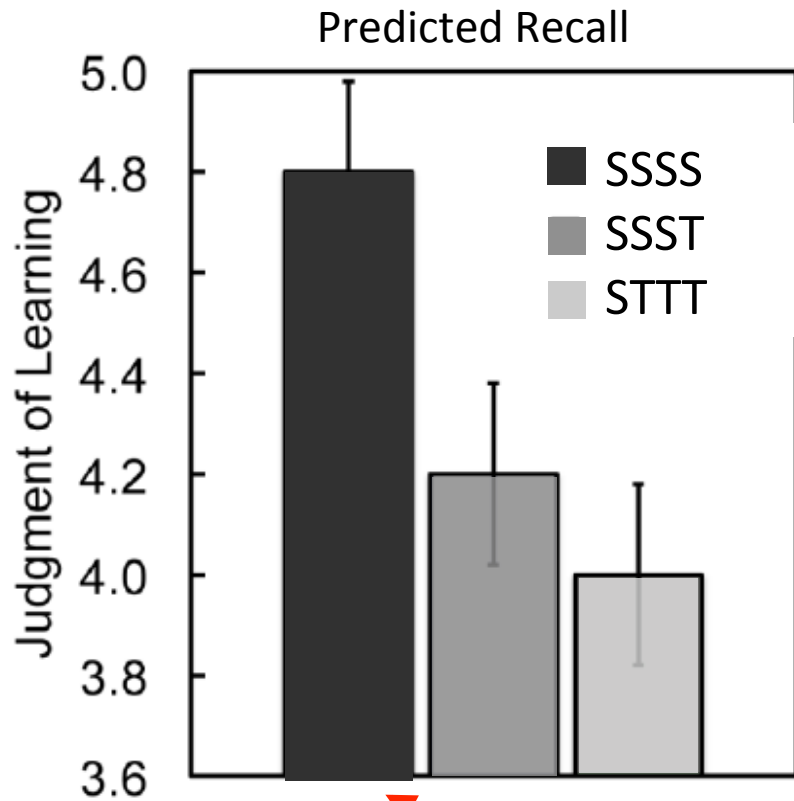
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“How well will you remember the passage in one week?”

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*Task: Recall key ideas in a 250-word prose passage*



Illusion of mastery

# The Retrieval Practice Effect (or the testing effect)

Retrieval from memory not only assesses what we know, but *changes* it:

- Strengthens retention, and
- Improves later performance

...more than additional study.

## A basic problem we confront—as teachers and as learners ourselves:

- Conditions of learning that make performance improve rapidly often fail to support long-term retention and transfer,

*...on the other hand*

- Conditions of learning that appear to create difficulties for the learner, slowing the rate of *apparent* learning, often increase long-term retention of knowledge



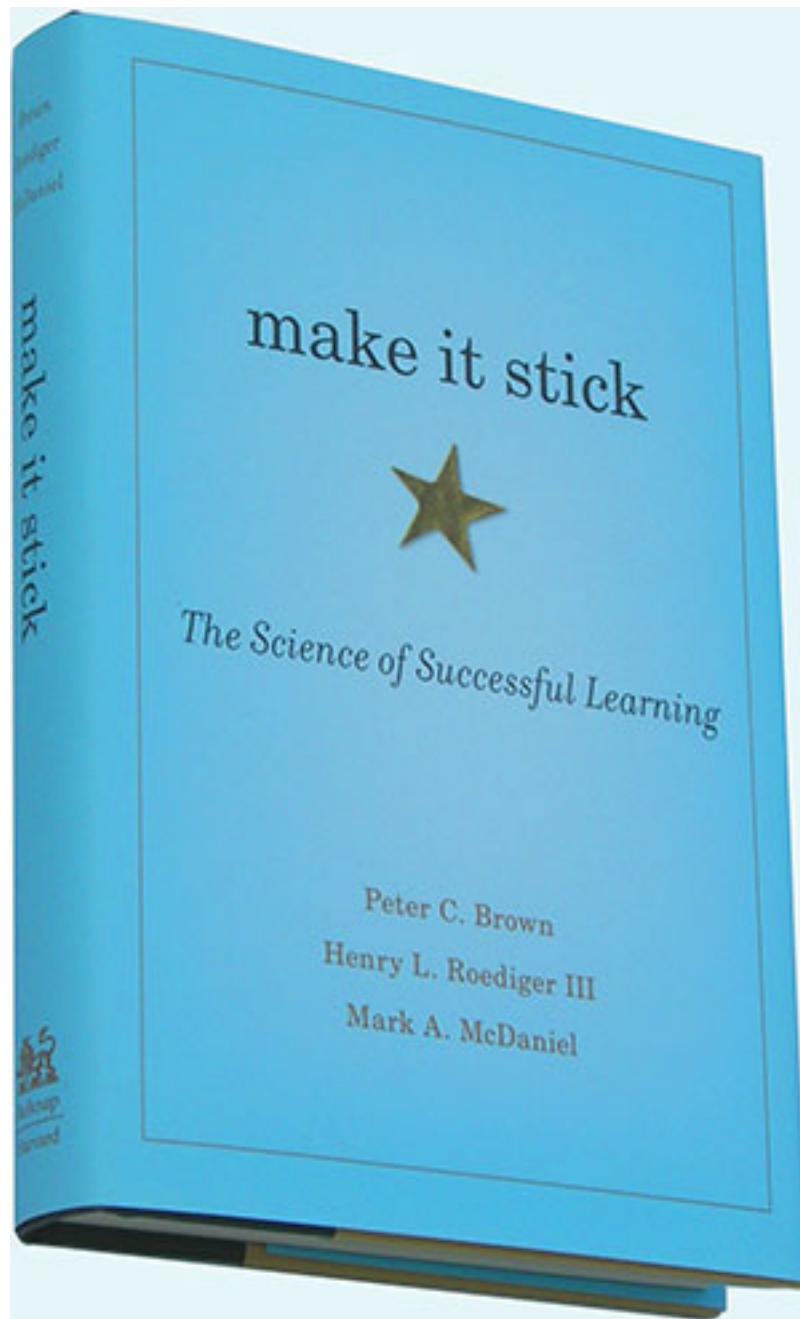
**Desirable difficulties** in learning: Some practices that slow learning and make it seem harder actually produce more durable learning

- Using tests (rather than presentations) as learning events
- Varying the conditions of learning
- Distributing or spacing study or practice sessions
- Providing “mixed up” instead of blocked practice during learning

# Daily assessments

- Permit retrieval practice of key concepts
- Increase class attendance and attention paid
- Increase reading before class
- Permit 'metacognitive awareness' on the part of the student
- Permits teachers to know what they have gotten across (formative assessment)
- Lessen test anxiety

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Thank you!

Questions?

# To Make Learning Stick

- Practice getting it *out* vs. getting it *in*
- Space and mix up practice
- Try to figure it out before being shown how
- Elaborate:
  - Connect new learning to what you already know
  - Restate it in your own words
  - Find layers of meaning and cues for retrieval
- Form mental images, create a narrative