

# **SMART PRACTICE: BRAIN-BASED ESOL INSTRUCTIONAL TECHNIQUES**

**SESSION 1**

**FIRST LITERACY**

**FEBRUARY 26, 2016**

# **FRAMING OUR DISCUSSION**

- **What is learning?**
- **What does memory have to do with learning?**
- **How do we know when our students have gained mastery of what they have learned?**

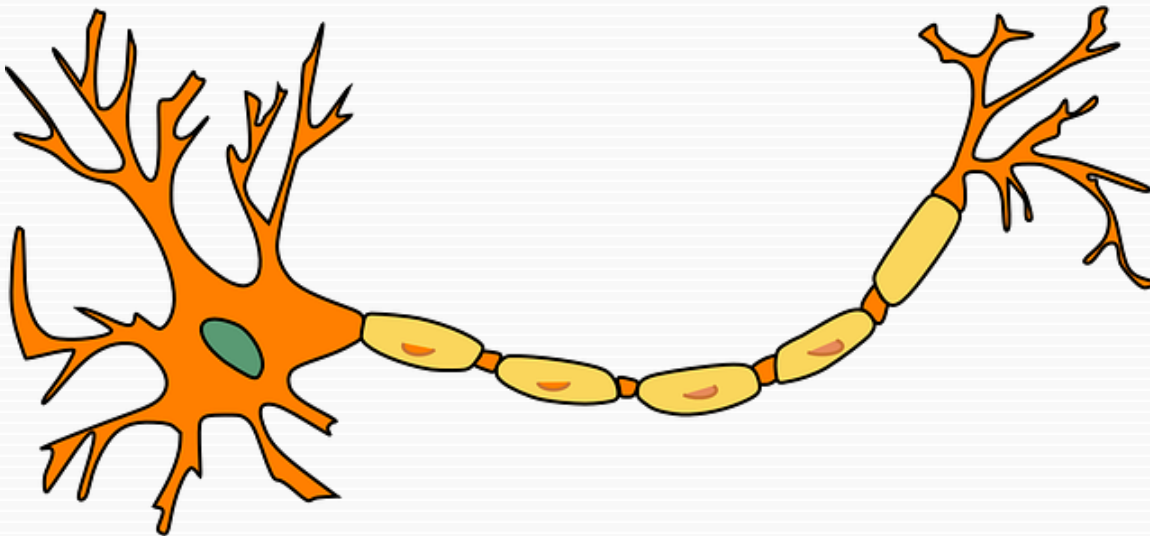
# **TODAY'S AGENDA**

- 1. Learning at the Neural Level**
- 2. Connections**
- 3. Repetition**
- 4. Desirable Difficulty**
- 5. Planning Your Implementation**

# THE HUMAN BRAIN

100, 000, 000, 000

The number of neurons we have at birth.





**One neuron can make up to  
10,000 connections through its  
dendrites.**

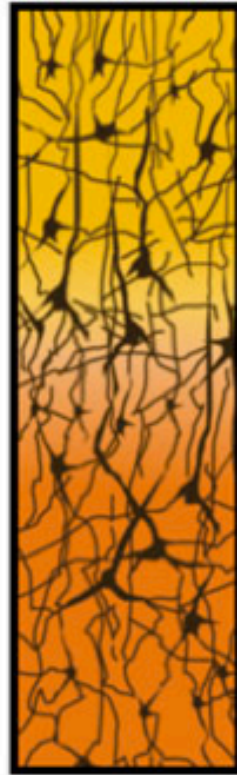
# NEURAL CONNECTIONS DEVELOP



Newborn



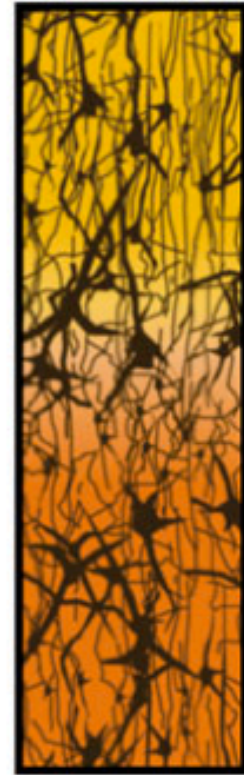
1 Month



9 Months



2 Years



Adult

CC License: Corel, J.L. *The postnatal development of the human cerebral cortex.* Harvard University Press; 1975.

# WHAT MAKES LEARNING CONNECTIONS DURABLE?

*“Neurons that fire together wire together.”*

*~ Hebb's Rule, 1949*

- repetition
- multiple modalities
- effortful learning

# RECAP: THE HUMAN BRAIN

**True or False?**

**Each neuron carries one memory.**



**True or False**

**Our brains change over our lifetimes.**

## **True or False?**

**Learning happens when neurons make new connections.**

## **True or False?**

**Neural connections never atrophy and disappear.**

# **CONSOLIDATE YOUR LEARNING**

- 1. What happens in the brain when a person learns something new?**
- 2. How can the person make the learning durable and strong?**

**Learning is  
about making  
connections.**

# LIMITS OF LEARNING

**Fill in the blank.**

*“There is virtually no limit  
to how much learning we can remember,  
as long as we **relate it to what we already know.**”*

~Brown, Roediger, McDaniel (2014) *Make It Stick*

# SCHEMA

## Recap and Reflection

*“If a schema is triggered near the moment of learning, that learning is more permanent.”*

~ John Medina, *Brain Rules*, 2014

Think-Pair-Share:

***What is the neural reason for this?***

# **SMART PRACTICE . . .**

## **MAKE CONNECTIONS**

- 1. Show a picture to activate schema.**
- 2. Ask an opening question.**
- 3. Grammar discovery.**
- 4. Pretest.**



# ACTIVATE SCHEMA: SHOW A PICTURE

*What do  
you see?*



# **ACTIVATE SCHEMA:** **ASK A QUESTION**



*What do you know  
about [the topic]?*

# ACTIVATE SCHEMA:

## GRAMMAR DISCOVERY

First, she separates the clothes into color piles. Then, she puts a load into the washer. She sets the water temperature according to the color of the load.

Underline the verbs.

# ACTIVATE SCHEMA

## PRE-TEST

Students who are given a pre-test improve their learning by

\_\_\_\_\_.

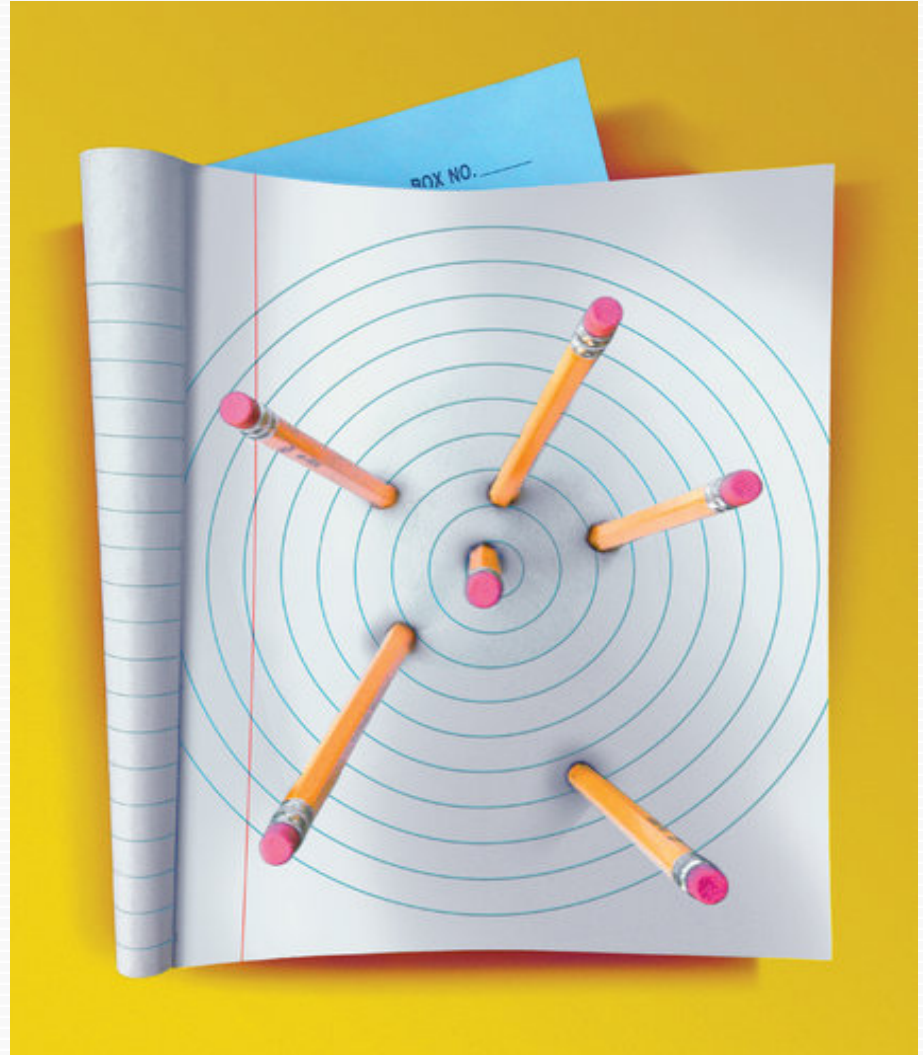
- a. 11%
- b. 22%
- c. 33%
- d. 44%

Richland, Kornell, Kao (2009)

# COUNTER-INTUITIVE RESULTS OF PRE-TESTS

*On pre-tests particularly multiple-choice, we benefit from answering incorrectly by, in effect, priming our brain for what's coming later."*

~ Benedict Carey, NYT, 2014



# **ACTIVATE SCHEMA:** **PRE-TEST**

**At the start of a lesson, give a short test.**

- True/False.
- Multiple choice.
- Open questions: who, what, where, when, why, how.

# **CONSOLIDATE YOUR LEARNING**

- 1. “Neurons that fire together, wire together.” What does this quote mean?**
- 2. Why is pretesting an effective learning tool?**
- 3. Is the purpose of pretesting to get students to memorize their learning?**

# **SMART PRACTICE . . .**

## **MAKE CONNECTIONS**

**What are ways to activate students' schema and prime their learning?**

**1. . . .**

**2. . . .**

**3. . . .**

**4. . . .**



# TODAY'S AGENDA

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# A SCHEMA BUILDING EXERCISE

*“Practice makes perfect.”*

# LEARNING & RETRIEVING



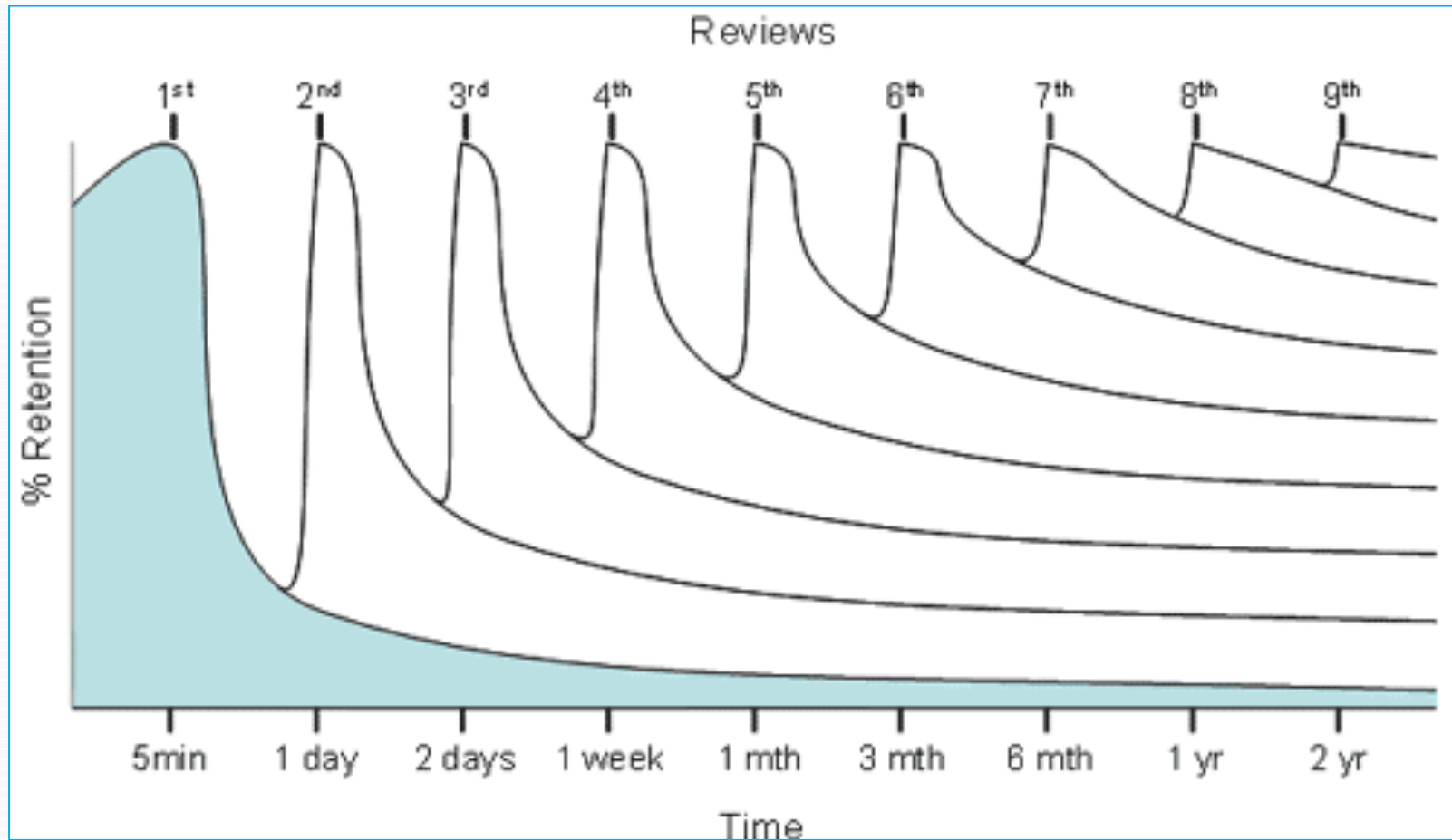
# THE FORGETTING CURVE



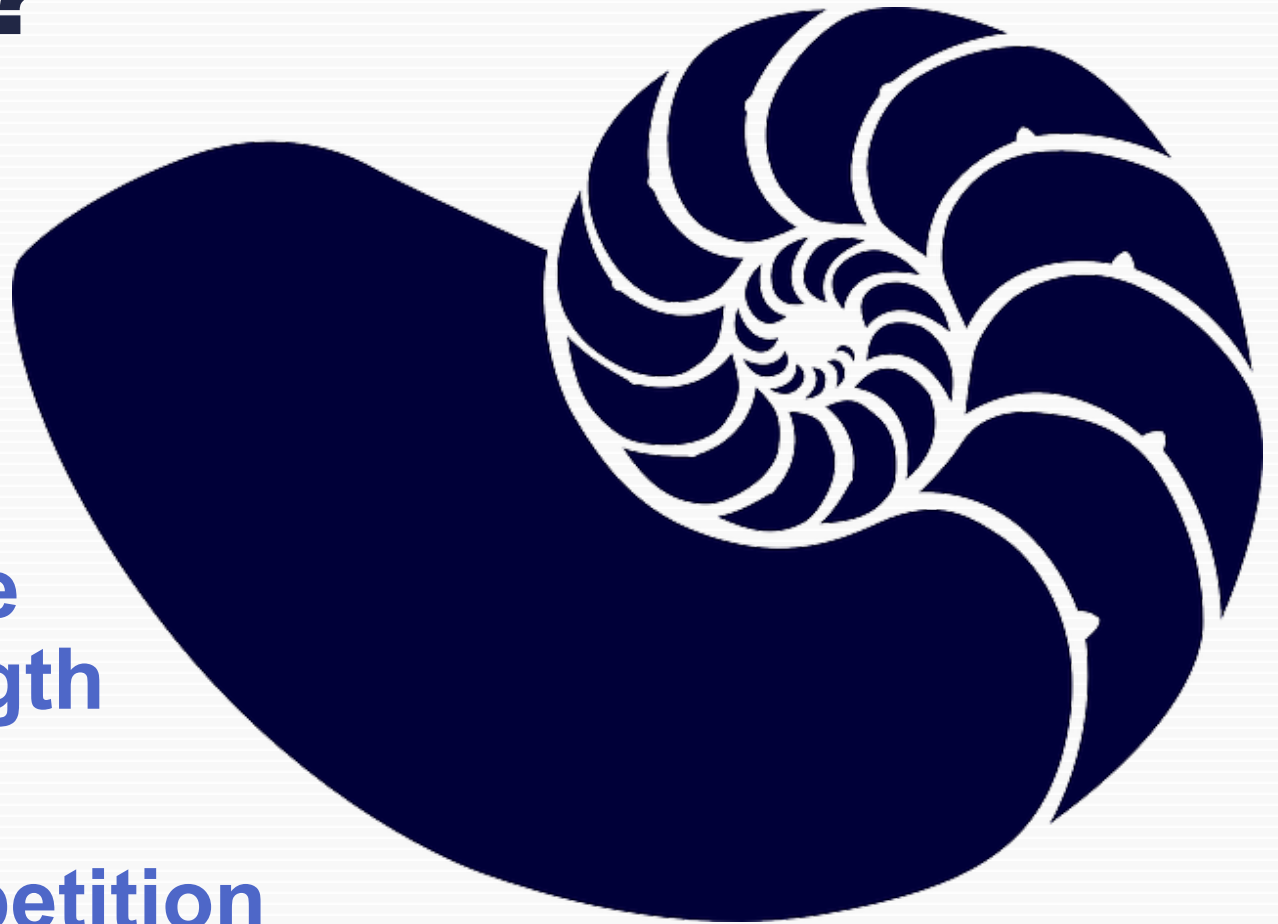
In 1885, Hermann Ebbinghaus determined:

*Information is lost very quickly after it is learned.*

# REPETITION & THE FORGETTING CURVE



# HOW OFTEN SHOULD YOU REPEAT?



Increase the interval length over time.

**Spaced Repetition**

# **CONSOLIDATE YOUR KNOWLEDGE**

- 1. Why do we forget our learning so easily?**
- 2. Why is repetition important?**

# **SMART PRACTICE . . .**

## **Repetition**

### **Brainstorm:**

**How can you build more repetition and practice into your classes?**



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# **PRE-TEST**

- 1. Is a closed book test a more effective learning tool than reviewing class notes?**
- 2. What is the difference between massed practice and interleaved practice? Which one is more effective for long term learning?**

**Learning  
requires effort.**

**IN OTHER WORDS . . .**

*. . . Fast learning  
leads to fast forgetting.*

*“When we work hard to understand information, we recall it better; the extra effort signals to the brain that this knowledge is worth keeping.”*

*~ Anne Murphy Paul, Time Magazine, 2011*

# A STUDY: REVIEW VS. RECALL

**Group A** was asked to recall their learning without notes or prompts.

**Group B** spent the same amount of time studying the material and reviewing notes.

Two days later: *Which group performed better?*

A week later:

Which group remembered **48%** of the material?

Which group remembered **90%**?

Roediger and Karpicke (2006)

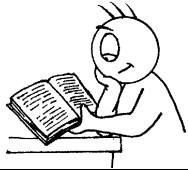
# REVIEW VS. RECALL

When you review material, you are **recognizing** material that **looks familiar**.

When you **recall** material, you are **remembering** it. Recall strengthens your memory.

# TOTAL RECALL

## Remember your Learning!



1. Read.



2. Read again.



3. Close the book.



4. Write what you remember.



5. Open the book.



6. Check your work



# TEACHING TO MASTERY?

## Group 1: Massed Practice

**Instruction on a topic and then practice the topic.**

Instruction on A. Then practice A.

Instruction on B. Then practice B. . . .etc.

## Group 2: Interleaved Practice

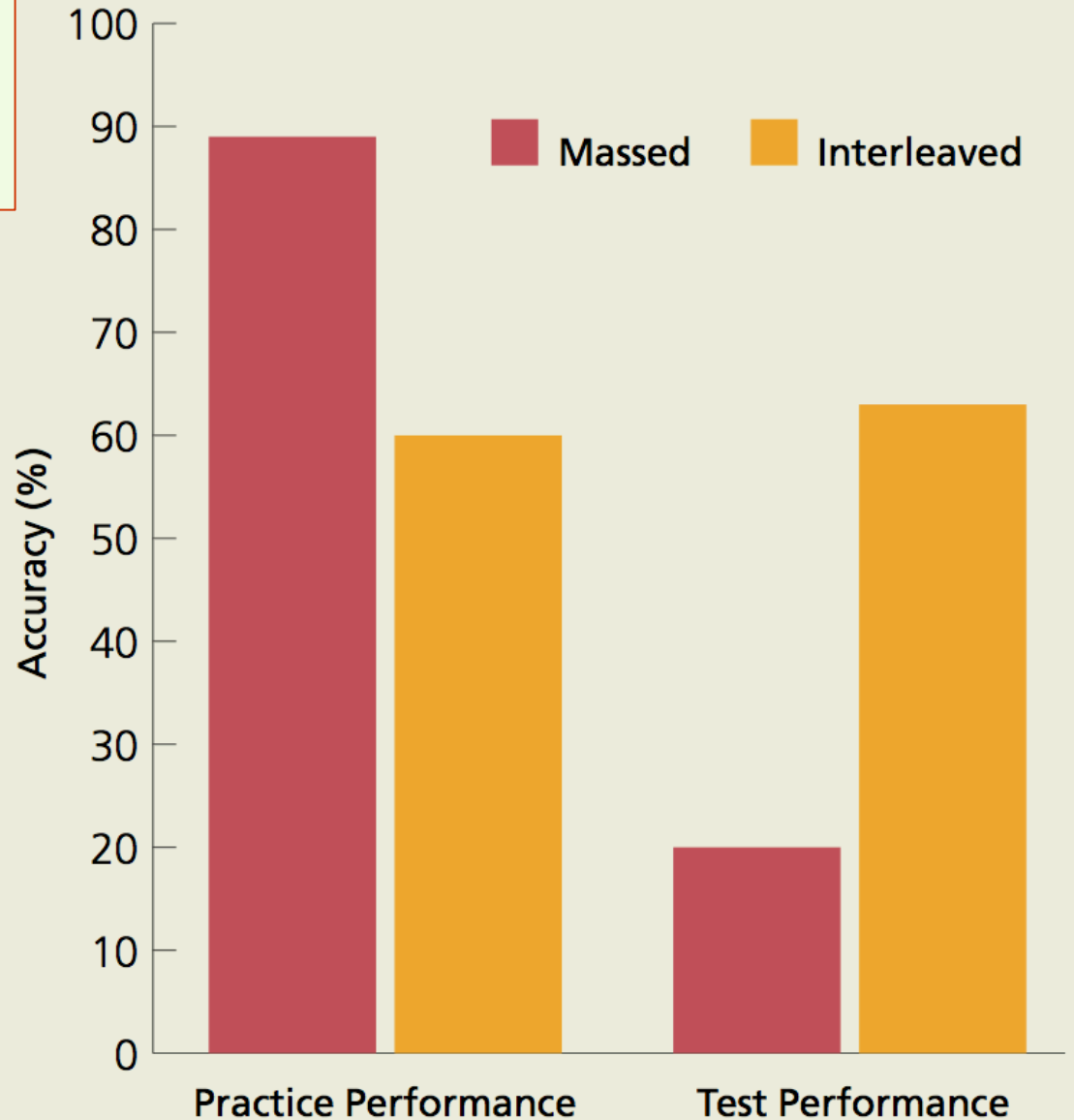
**Rotating instruction and practice.**

Instruction on A, B, C, D. Then practice A, C, D, B.

Dunloskey (2013)

**Strengthening the Student  
Toolbox: Study Strategies to  
Boost Learning**

John Dunlosky, *American Educator*,  
2013.



Accuracy at solving problems during practice session and on the delayed criterion test.

# **JUST MEMORY OR REAL LEARNING?**

**As a LEARNING strategy, retrieval practice improves:**

- **complex thinking and application skills**
- **organization of knowledge**
- **transfer of knowledge to new concepts**

# **INTERLEAVE MATERIAL**

- **Mix in previous flashcards.**
- **Mix in other verb tenses.**
- **Mix in previous vocabulary.**
- **Mix in new settings for conversational speech.**
- **Mix in previous audio-scripts or readings.**

# **CONSOLIDATE YOUR KNOWLEDGE**

- 1. As a study technique, why is self-testing a more effective learning tool than reviewing your notes?**
- 2. What is the difference between massed practice and interleaved practice? Which one is more effective for long term learning?**

# **RECAP:**

## **True or False?**

**If you practice one concept single mindedly you will burn it into your memory.**

## **True or False?**

**Varying the way you practice material confuses your memory.**

## True or False?

**The bigger the effort you make to understand something the better you remember it.**

*“Memory is the residue of thought.”*

*~ Daniel Willingham*



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# PLANNING YOUR IMPLEMENTATION

## Pre-tests:

### 1. What is a useful pretest?

- Timely feedback.
- Matches your objectives for student learning.
- Use the technique multiple times.

### 2. How can you do one in class?

# **PLANNING YOUR IMPLEMENTATION**

## **Total Recall:**

- 1. When will you use it?**
- 2. How do you have students do it?**

# **NEXT SESSION: MARCH 18**

- 1. Share your learning.**
- 2. Multimodal learning at the neural level and in the classroom.**
- 3. Student speak at the neural level and in the classroom.**