

# Teaching Them How to Learn

---

Debra S. Herold, PhD  
Senior Lecturer, Department of Psychology

*Edward C. Moore Symposium  
March 6, 2015*



**INDIANA UNIVERSITY  
PURDUE UNIVERSITY  
INDIANAPOLIS**

# Plan for today

- Quiz
- Research
- Application

# What do you think leads to the best learning?

- A. Amount of time spent studying.
- B. Paying close attention to the materials as you study.
- C. The intention or desire to learn.
- D. Learning in a way that matches your personal learning style.
- E. What you think about while studying.

*Modified from a demonstration by Chew, S.L. (2013). National Institute of Teaching in Psychology, St. Petersburg, FL.*

- 
- Read the instructions on your sheet to yourself.
  - Raise your hand if you have any questions.
  - Then listen for the list of words.

# What do you think leads to the best learning?

- A. Amount of time spent studying.
- B. Paying close attention to the materials as you study.
- C. The intention or desire to learn.
- D. Learning in a way that matches your personal learning style.
- E. What you think about while studying.

# Penny Test

- Do you know what a penny looks like?
- Draw one for me. Include as many details as possible.



(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)



(i)



(j)



(k)



(l)



(m)



(n)



(o)

How We Remember: Cues to Improving Memory. (n.d.). Retrieved March 2, 2015, from <http://2012books.lardbucket.org/books/beginning-psychology/s12-02-how-we-remember-cues-to-improv.html>

---

**Why is this task so hard?**

Encoding failure

---

# Teach them to

1. Attend to information
2. Engage in deep processing and self-reference

# Levels of Processing ( Craik & Tulving, 1975)

## CAR

- Is the word written in capital letters?
- Does the word rhyme with train?
- Does the word fit in the sentence “He saw a \_\_\_\_\_ on the street.”

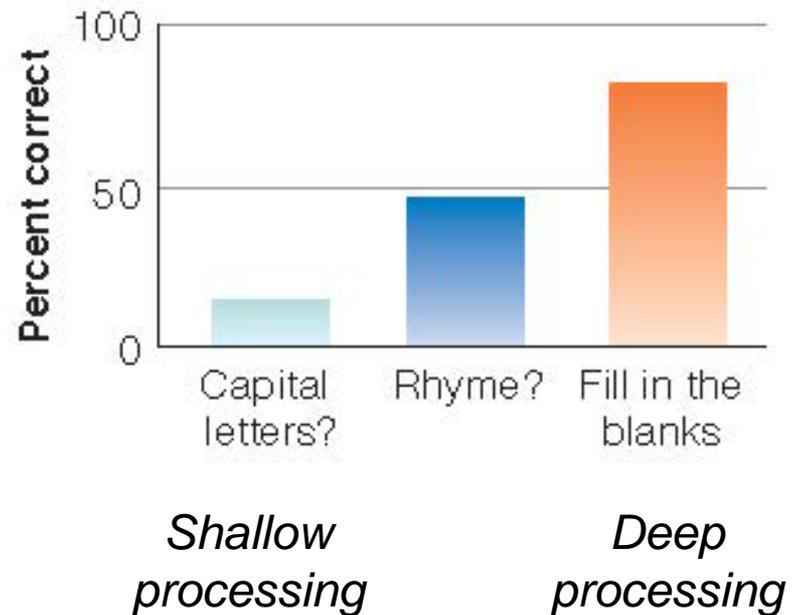


Image adapted from Goldstein, E. B. (2015). *Cognitive Psychology: Connecting Mind, Research, and Everyday Experience* (4<sup>th</sup> Edition). Cengage Learning

# Teach them to

1. Attend to information
2. Engage in deep processing and self-reference
3. Form visual images

boat - tree

# Teach them to

1. Attend to information
2. Engage in deep processing and self-reference
3. Form visual images
4. Generate cues

# Retrieval Cues

## Mäntylä (1986)

### Stimuli - 504 nouns

- Group 1: generated three retrieval cues for each word at encoding (e.g., TREE: tall, green, bark)
- Group 2: provided with three retrieval cues at encoding
- Group 3: no encoding phase; provided with three retrieval cues at test

Remembered nouns using self-generated retrieval cues.

Remembered nouns using other-person-generated retrieval cues.

Never saw nouns; presented with other-person-generated retrieval cues.

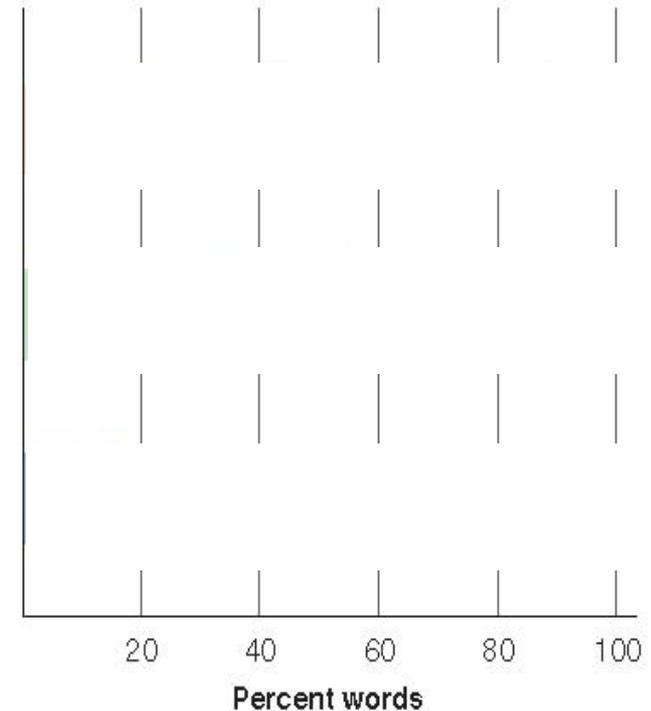


Image adapted from Goldstein, E. B. (2015). *Cognitive Psychology: Connecting Mind, Research, and Everyday Experience (4<sup>th</sup> Edition)*. Cengage Learning

# Teach them to

1. Attend to information
2. Engage in deep processing and self-reference
3. Form visual images
4. Generate cues
5. Create context and organize information

# Listen to the following passage

- Before I read it to you, if you are sitting on the left side of the room, close your eyes for a moment.



---

# Test

- Write down as much as you can recall from the passage.

# Organize Information

## Critical Thinking Table—Behavioral Neuroscience—Chapter 2 How Does My Brain Work?

Essential Questions	Fundamental and Powerful Concepts	Vocabulary
<b>2.1 Introduction</b>		
<b>2.2 Neuron</b>		
2.2.1 What does my brain consist of?	<i>neurons</i> <i>structure</i>	<i>cell body</i> <i>dendrites</i> <i>axon</i> <i>axon terminal</i> <i>myelin sheath</i> <i>glial cells</i>
2.2.2 What do neurons do and how do they do it?	<i>function</i> <i>information transfer</i> <i>conduction</i> <i>synaptic transmission</i>	<i>resting potential</i> <i>ion channels</i> <i>action potential</i> <i>refractory period</i> <i>all-or-none principle</i> <i>synapse</i> <i>vesicles</i> <i>receptors</i> <i>postsynaptic potential</i> <i>reuptake</i>
2.2.3 What are the chemicals in my brain?	<i>neurotransmitters</i>	<i>acetylcholine</i> <i>dopamine</i> <i>serotonin</i> <i>norepinephrine</i> <i>GABA</i> <i>glutamate</i> <i>endorphins</i>

# Teach them to

1. Attend to information
2. Engage in deep processing and self-reference
3. Form visual images
4. Generate cues
5. Create context and organize information
6. Test frequently

# Testing Effect

(Roediger & Karpicke, 2006)

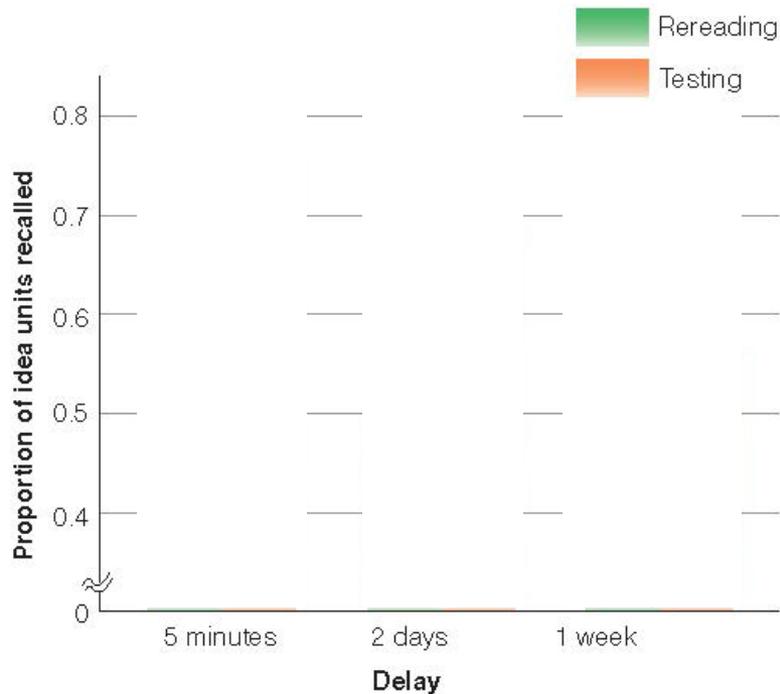
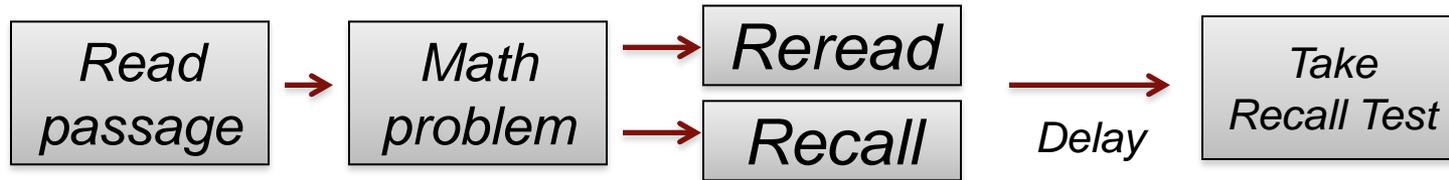


Image adapted from Goldstein, E. B. (2015). *Cognitive Psychology: Connecting Mind, Research, and Everyday Experience* (4<sup>th</sup> Edition). Cengage Learning

# Teach them to

1. Attend to information
2. Engage in deep processing and self-reference
3. Form visual images
4. Generate cues
5. Create context and organize information
6. Test frequently

# SEE-I

- S is a STATEMENT: A clear, concise, correct definition of the term.  
\_\_\_\_\_ means...
- E is an ELABORATION: Another way of saying it, using your own words.  
In other words...
- E is an EXAMPLE: A good one, one that is correct and actually works, one that is from your own experience.  
An example of \_\_\_\_\_ would be....
- I is an ILLUSTRATION: A metaphor, image, or comparison.  
\_\_\_\_\_ is like...

# SEE-I: Language

- S is a STATEMENT: Language is a system for combining a finite number of arbitrary symbols into an infinite number of meaningful statements.
- E is an ELABORATION: In other words, language allows you to communicate by taking just a few things and putting them together to communicate about a limitless number of things.
- E is an EXAMPLE: Written English is a good example of a language because we have only 26 letters, but we can put them together to make a nearly infinite number of words which are then put together to make a limitless number of meaningful statements.
- I is an ILLUSTRATION: Language is like a ball of clay. At first, it is just a meaningless lump of material. While you may only have a small amount of it, a skilled artist can shape it into just about anything.

# Teach them to

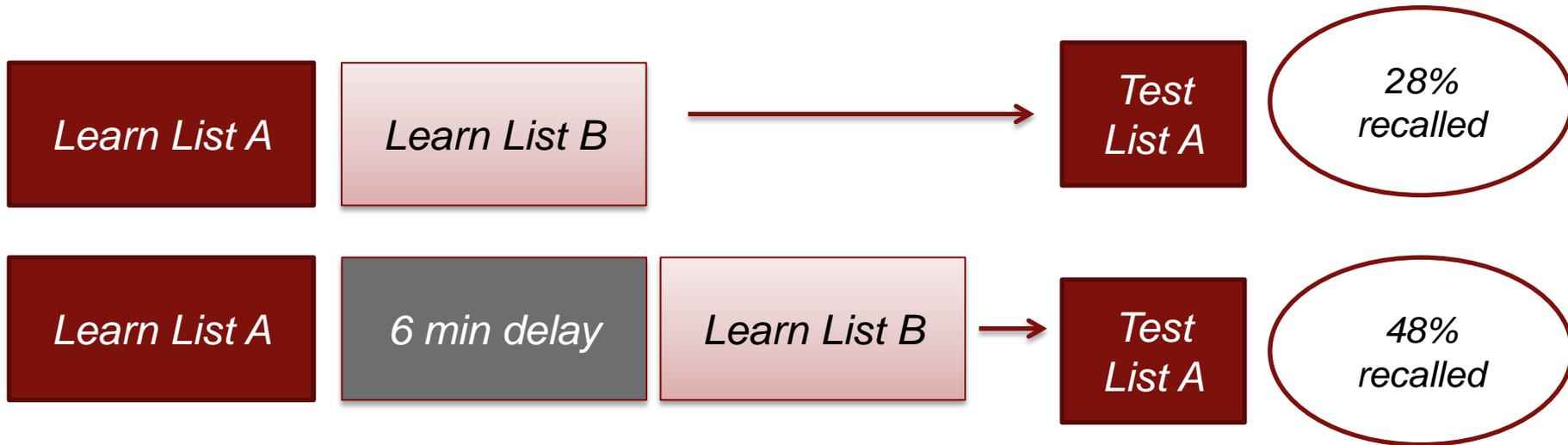
1. Attend to information
2. Engage in deep processing and self-reference
3. Form visual images
4. Generate cues
5. Create context and organize information
6. Test frequently

# Teach them to

1. Attend to information
2. Engage in deep processing and self-reference
3. Form visual images
4. Generate cues
5. Create context and organize information
6. Test frequently
7. Engage in spaced practice

# Spaced Practice

(Müller & Pilzecker, 1900)



# Teach them to

1. Attend to information
2. Engage in deep processing and self-reference
3. Form visual images
4. Generate cues
5. Create context and organize information
6. Test frequently
7. Engage in spaced practice

# References

- Bransford, J.D. & Johnson, M.K. (1972). Contextual prerequisites for understanding: Some investigations of comprehension and recall. *Journal of Verbal Learning and Verbal Behavior*, 11, 717-726.
- Bower et al. (1969). Hierarchical retrieval schemes in recall of categorized word lists. *Journal of Verbal Learning and Verbal Behavior*, 8, 323-343.
- Bower, G.H. & Winzenz, D. (1970). Comparison of associative learning strategies. *Psychonomic Science*, 20, 119-120.
- Chew, S.L. (2013). *Perceptual judgment task demonstration*. Presented at the National Institute of Teaching in Psychology, St. Petersburg, FL.
- Craik, F.I.M. & Tulving, E. (1975). Depth of processing and retention of words in episodic memory. *Journal of Experimental Psychology: General*, 104, 268-294.
- Goldstein, E. B. (2015). *Cognitive Psychology: Connecting Mind, Research, and Everyday Experience* (4<sup>th</sup> Edition). Cengage Learning.
- Neal-Beliveau, B. (2014). *Introduction to Psychology*. Department of Psychology, IUPUI. Worth Publishers/Hayden-McNeil.

# References, cont.

- Nickerson, R. & Adams, M. (1979). Long-term memory for a common object. *Cognitive Psychology*, 11, 287-307.
- Nosich, G. (2012). *Learning to Think Things Through* (4<sup>th</sup> ed.) Boston: Pearson Education.
- Paul, R. & Elder, L. (2010). *The Thinker's Guide to Analytic Thinking*. Dillon Beach, California: Foundation for Critical Thinking.
- Roediger, H.L. & Karpicke, J.D. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science*, 17, 249-255.
- Rogers, T.B., Kuiper, N.A., & Kirker, W.S. (1977). Self-reference and the encoding of personal information. *Journal of Personality and Social Psychology*, 35, 677-688.
- Slameka, N. & Graf, P. (1978). The generation effect: Delineation of a phenomenon. *Journal of Experimental Psychology: Human Learning and Memory*, 4, 592-604.