

Using Cognitive Science Principles to Optimize Classroom Activities and Assessments

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Workshop goals

You should be able to

- **understand what creates enduring memories**
- **recognize the role of previous knowledge in creating new knowledge**
- **understand that thinking is effortful and often avoided**

Welcome!

Please memorize these numbers:

869

the area code of your cellphone + 100

471

Worksheet 1

Note how all are reading it – “People are naturally curious...”



Worksheet 2

Poll: Did you have the correct number of rows and columns?

A. yes

B. no

Poll: What percent of the icons did you correctly place?

A. 0 to < 20%

B. 20% to < 40%

C. 40% to < 60%

D. 60% to < 80%

E. 80% to 100%



Worksheet 2

How can recalling your phone screen be so hard when you saw it recently, yet so easy to recall how you ended up in your current job, which was months if not years ago?



Principle 1

“Memory is the residue of thought.”

Dan Willingham, Ch. 3 of “Why Don’t Students Like School – A Cognitive Scientist Answers Questions About How the Mind Works and What It Means for the Classroom.”

Translation – you want your student to think deeply about the topics you teach. Just like how you thought about what job to take and why.

Principle 1: “Memory is the residue of thought.”

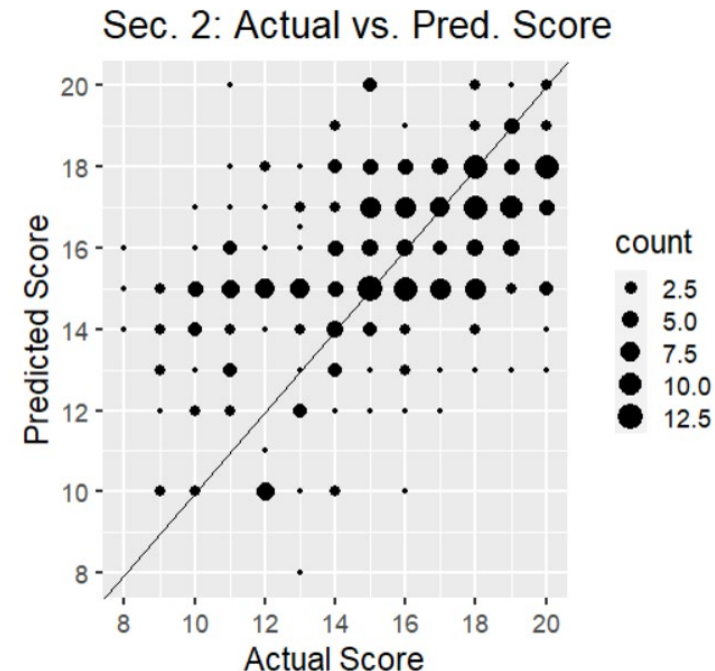
Poll: Which of the following questions is most likely to lead to a deeper understanding of elasticity?

- A. The price of widget goes from \$1.30 to \$1.50 and the quantity demanded falls from 2,500 units to 2,000 units. Calculate the own price elasticity using the midpoint formula.**
1. -2.0 2. -1.6 3. -1.4 4. -1.2 5. -1.0
- B. Which best explains the concept of own price elasticity?**
1. how a change in quantity demanded leads to a change in a price
 2. how a change in a price leads to a change in quantity demanded
 3. it is the slope of the demand curve
 4. it is the inverse of the slope of the demand curve

Principle 1: “Memory is the residue of thought.”

One of my students: “I have never been a good test taker and the quizzes are a poor reflection of my actual knowledge on economics.”

Common student practice: “reviewing” notes instead of thinking deeply about the topics. This often leads to overconfidence on exams.



Principle 1: “Memory is the residue of thought.”

Poll: Think about a concept that your students often miss every semester. What do you tend to do?

A. try to explain it better the next semester

B. design an active learning activity that leads students to think more deeply about that topic

ex: change in demand vs. change in quantity demanded

Number recall

Please write down the three numbers from earlier today.

They are

869

the area code of cellphone + 100

471

Poll: **Did you get the first one correct?**

A. yes B. no

Poll: **Did you get the second one correct?**

A. yes B. no

Poll: **Did you get the third one correct?**

A. yes B. no

Number recall – Principle 2

“We understand new things in the context of things we already know, and most of what we know is concrete.”

Ch. 4, Willingham

How often do you make connections between topics?

- 1. Measuring the Economy
- 2. Why Economies Grow in the Long-Run
- 3. The Labor Market and the Business Cycle
- 4. Explaining the Economy's Movements in the Short Run (Perusal 8)
 - A. Overview of AD and SRAS
 - B. Aggregate Demand (AD)
 - C. Aggregate Supply (SRAS)
 - D. Static Equilibrium
 - E. The Covid Recession and This Expansion
 - F. Monetary and Fiscal Policy
 - ... - comparison of the roles of the Fed & Treasury
 - fiscal policy review
 - future budget challenges
- G. Funding Your Retirement
 - why worry?
 - Social Security
 - defined benefit plans
 - stocks over decades
 - defined contribution plans
 - life cycle or target date mutual funds
 - 15% contribution each pay period

Attempts: 702 out of 702

I sometimes connect current topics to previous topics of our course. What do you think of this?

it is very helpful	435 respondents	62 %	<div></div> ✓
it is somewhat helpful	243 respondents	35 %	<div></div>
neither helpful nor unhelpful	18 respondents	3 %	<div></div>
it is somewhat unhelpful	4 respondents	1 %	<div></div>
it is very unhelpful	2 respondents	0 %	<div></div>

Or, better yet, do you have students make connections between topics so they're thinking deeply?

Principle 2: “We understand new things in the context of...”

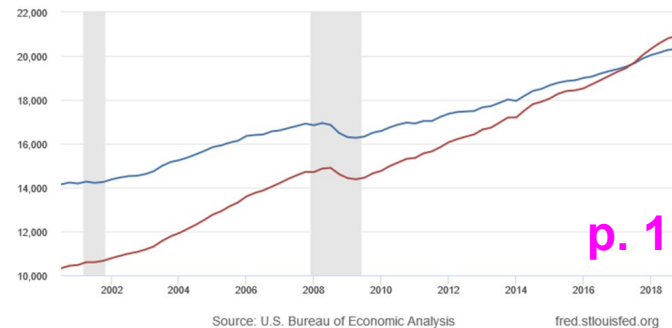
GDP Deflator

Question: What is going on from year 1 to 2?

	<u>year 1</u>	<u>year 2</u>
nominal GDP	\$10 trillion	\$11 trillion
real GDP	\$10 trillion	\$10 trillion
GDP deflator	100	110

- A. a recession B. an expansion
C. rising prices D. falling prices

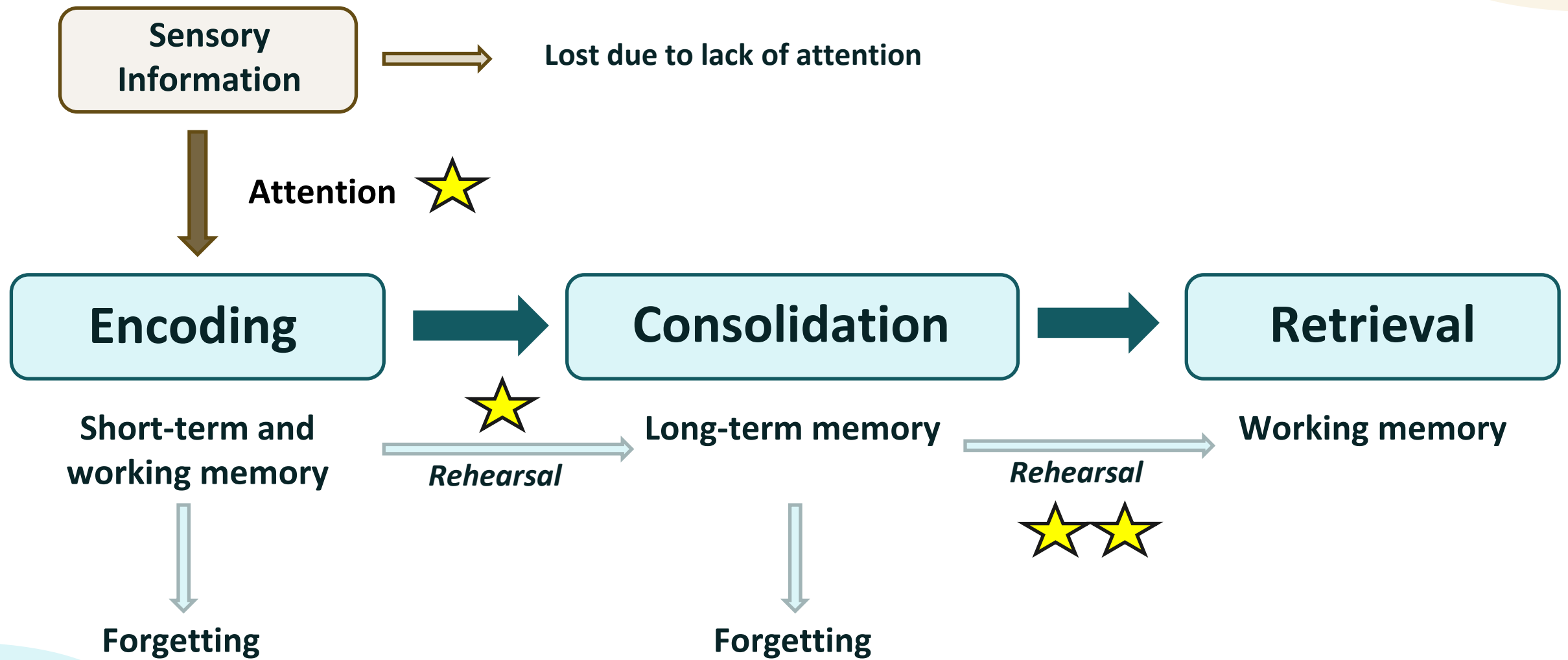
Had this before:



def: **GDP deflator =**
(nominal GDP/real GDP) • 100

Principle 3

“People are naturally curious, but we are not naturally good thinkers; unless the cognitive conditions are right, we will avoid thinking.”



Summary – the Principles

- 1. Memory is the residue of thought.**
- 2. We understand new things in the context of things we already know, and most of what we know is concrete.**
- 3. People are naturally curious, but we are not naturally good thinkers; unless the cognitive conditions are right, we will avoid thinking.**

Peer Work

Form groups of 3 or 4 and introduce yourselves. Please spread-out laptops across the groups.

Access some of your in-class activities, homework questions, or exam activities.

Or think of a topic your students have difficulty with.

With the help of your peers, rewrite previous questions, or develop new ones, with the principles from today in mind.