

The New Science of Learning: How Research is Revolutionizing the Way We Teach



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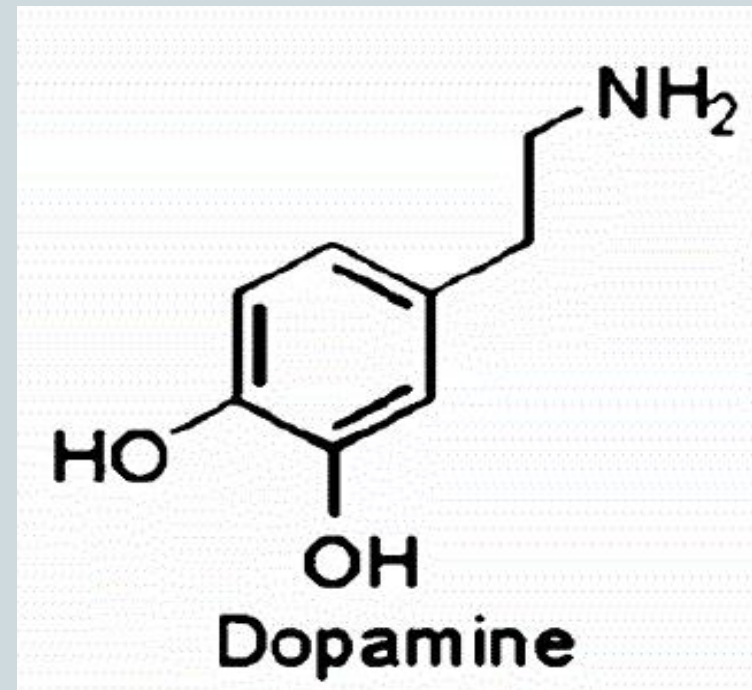
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Reward for Success

- Dopamine is there to reward your brain for learning new information, or engaging in new experiences.
- Without dopamine, you would not be interested in learning or trying new things.



Multitasking

86% of students report texting throughout entire class periods.
(McCoy, 2013)

Clifford Nass (Stanford), studies social and psychological impacts of media. His research shows that chronic multitasking were terrible at ignoring irrelevant information; they're terrible at keeping information in their head nicely and neatly organized; and they're terrible at switching from one task to another.....yet they think they are great multitaskers.

(Ophir, Nass, & Wagner, 2009. Proceedings of the National Academy of Sciences)



Multitasking

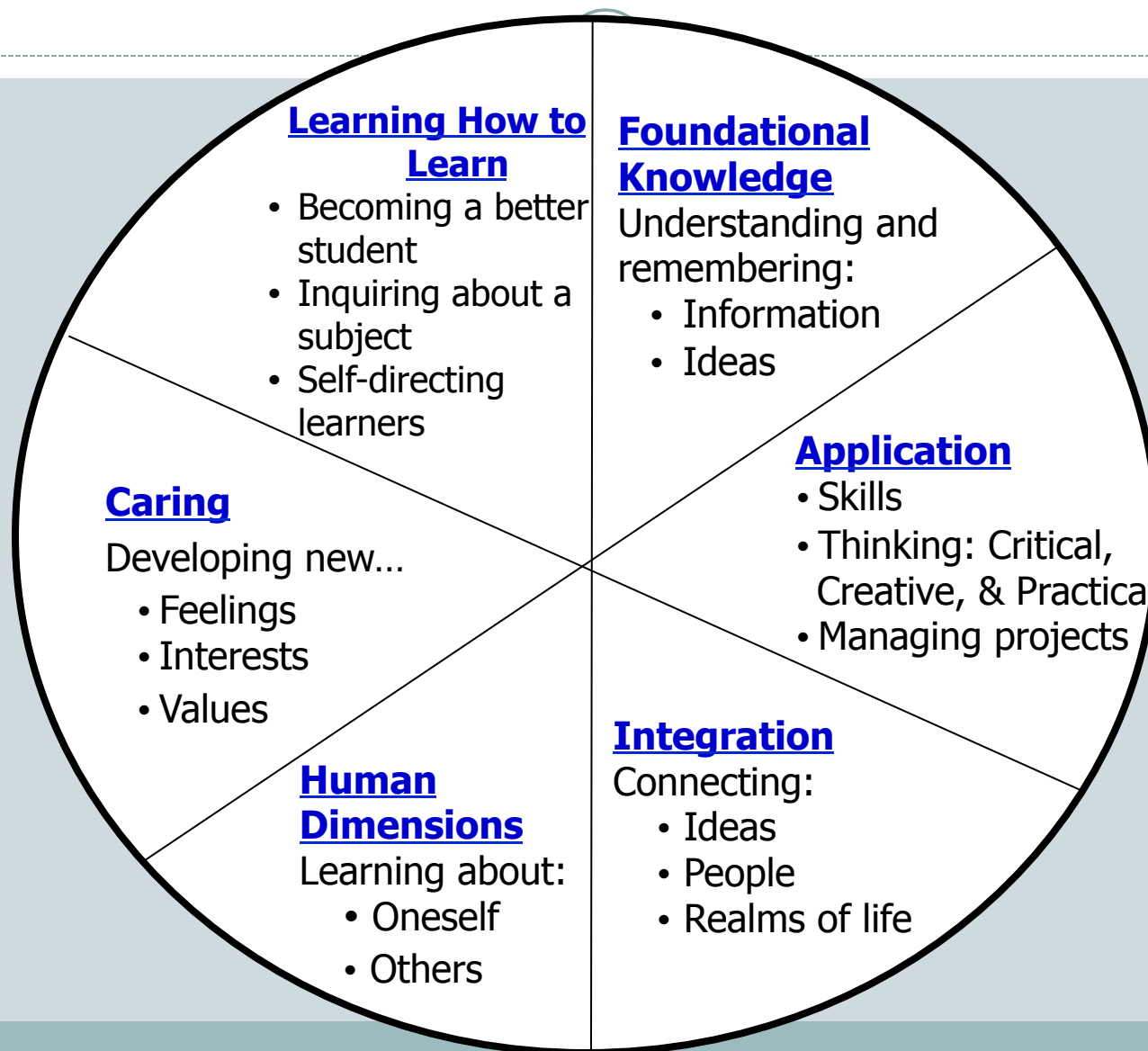
- Placed in front of a computer with internet and a television for 30 minutes. Estimate how many time switch attention from one to the other.
- Following study session participants asked how many time they had “shifted” attention.
- Estimated Average 15 times....

Actual.....120 times.
Computer average was 6 seconds and TV average was 2 seconds.
(Brasel & Gips, 2011.
Boston College)

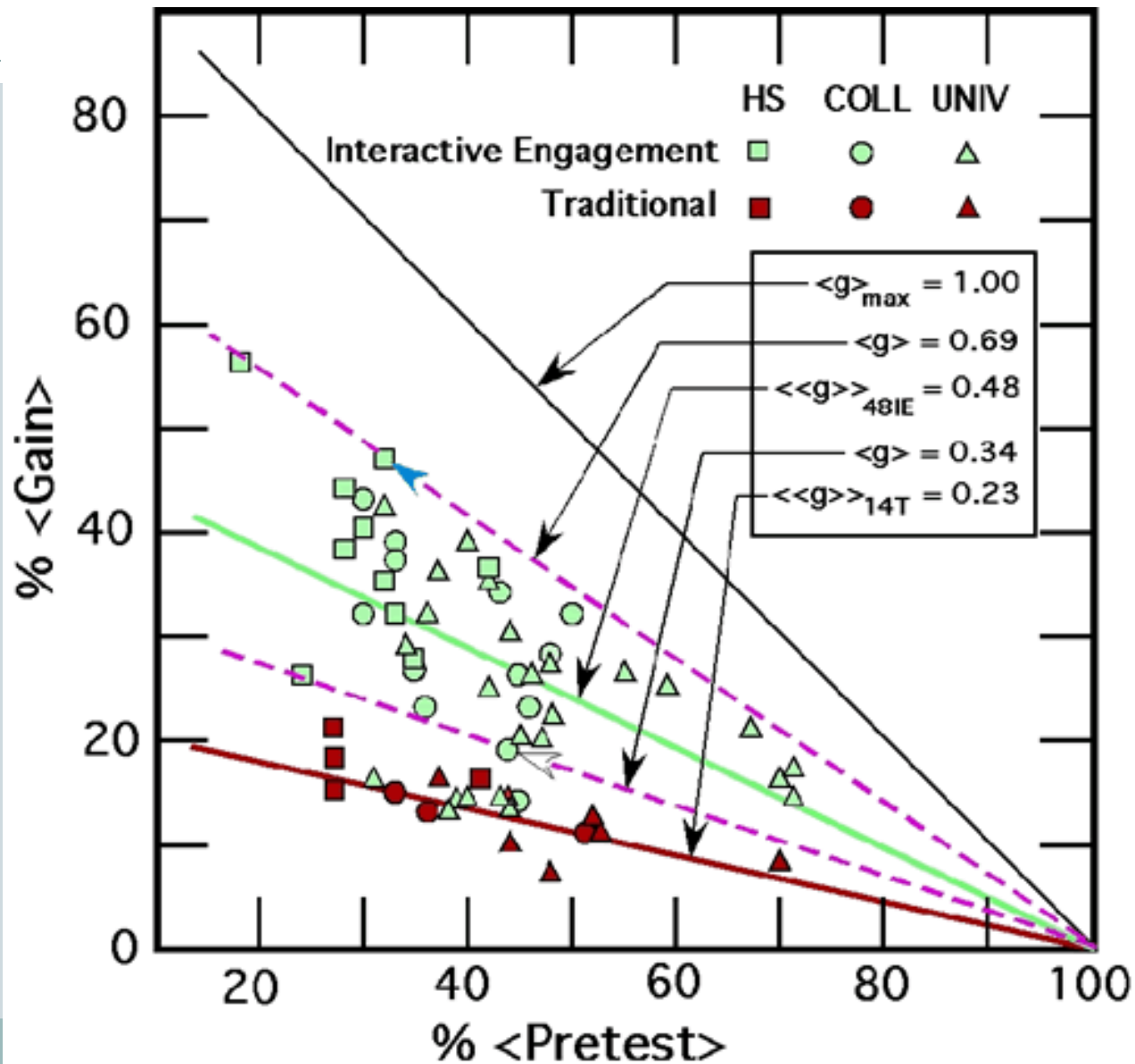


Taxonomy of Significant Learning

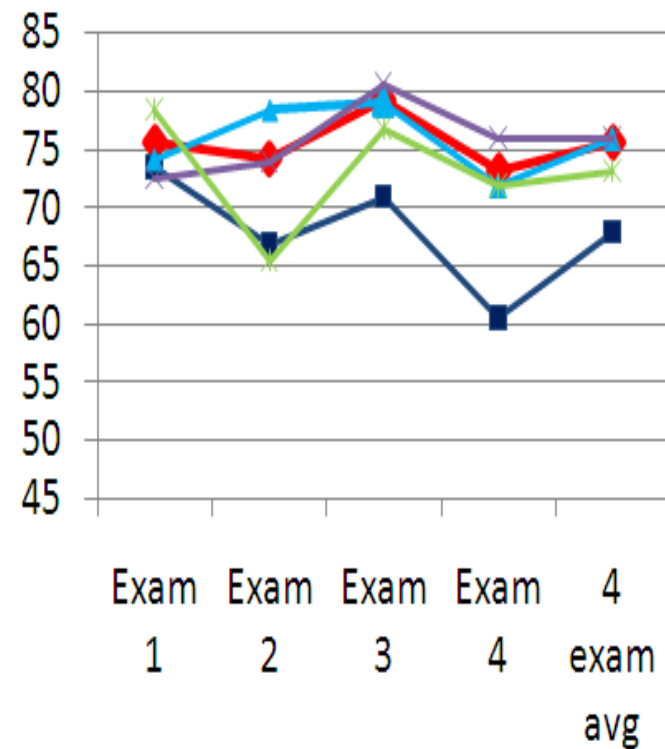
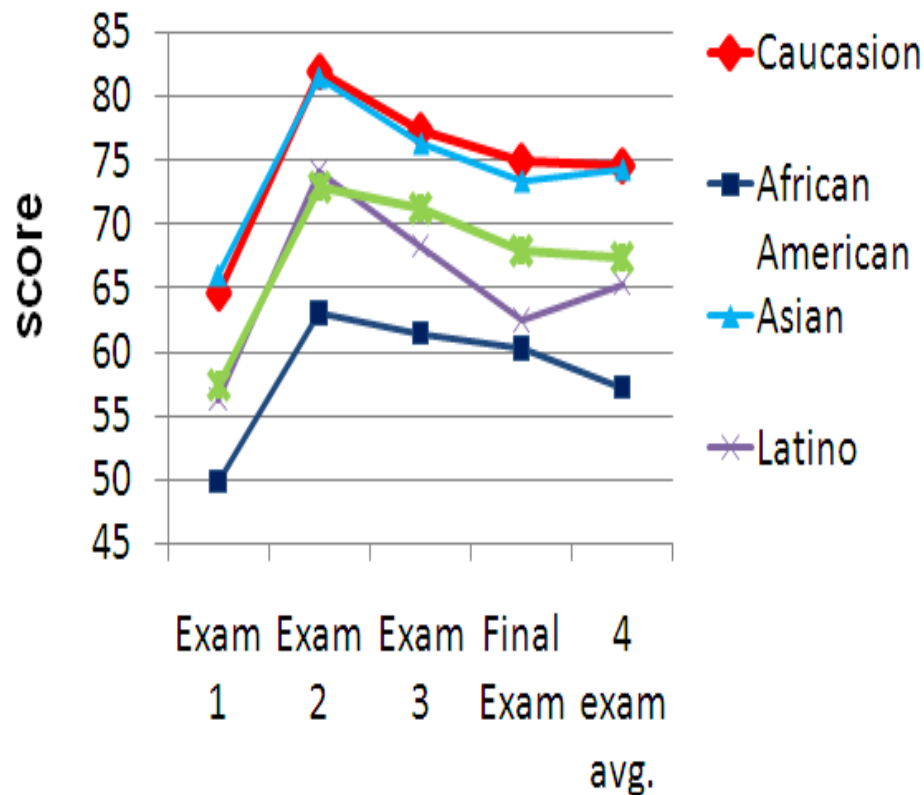
Fink 2003 www.deefinkandassociates.com



Hake (1998)



Teaching Strategies



Comparison of subgroups in Biol 101 Traditional 2010 (left) vs. Enhanced 2011 (right) Sections.

Card passing



What is one issue or concern you have with respect to your students and creating an effective learning environment?

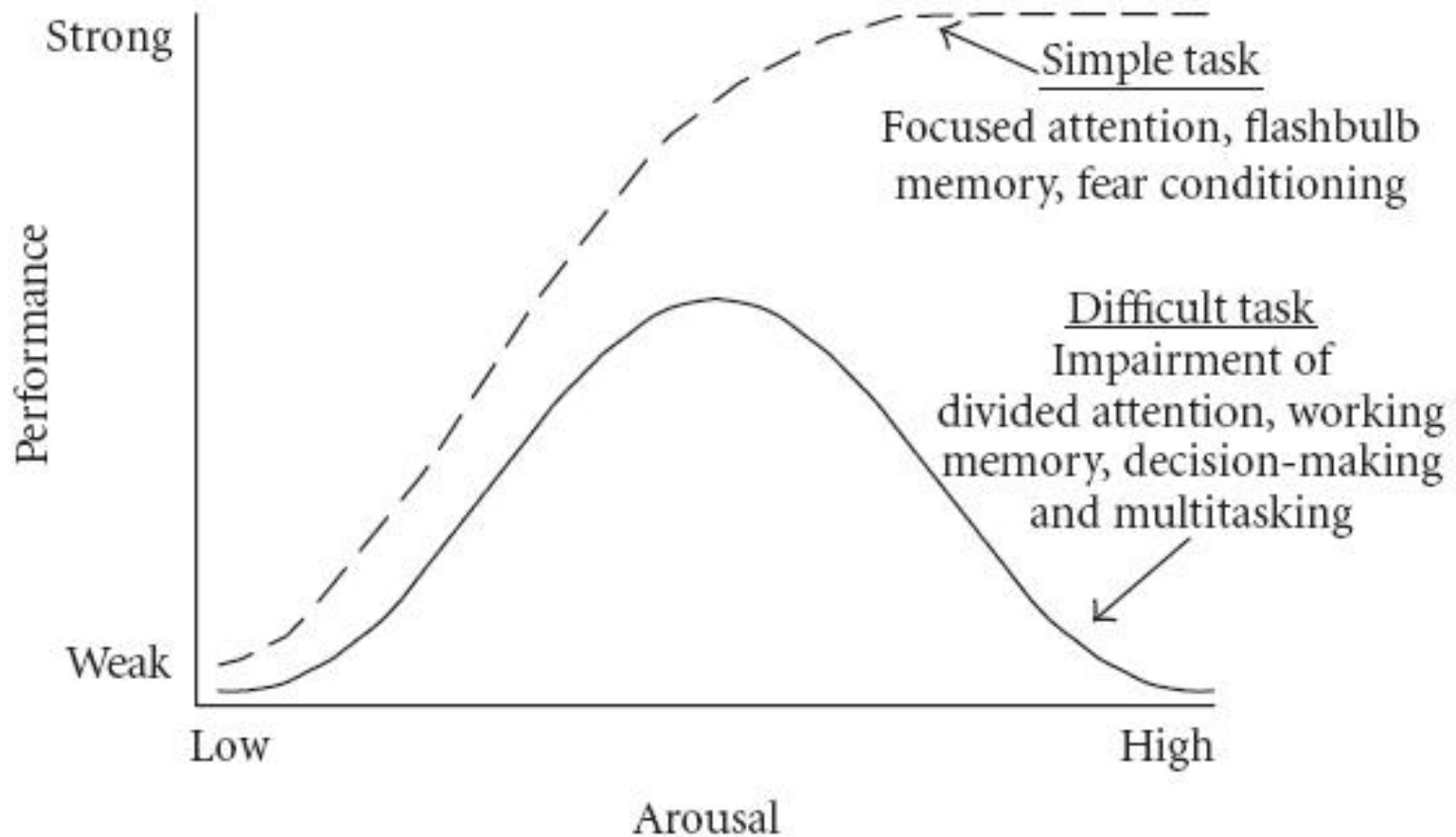
Thinking vs Recall



It takes more time and energy to think than to recall.

When it is better to not think?

Levels of Concern vs. Degree of Learning



Yerkes–Dodson Law



(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)



(i)



(j)



(k)



(l)



(m)

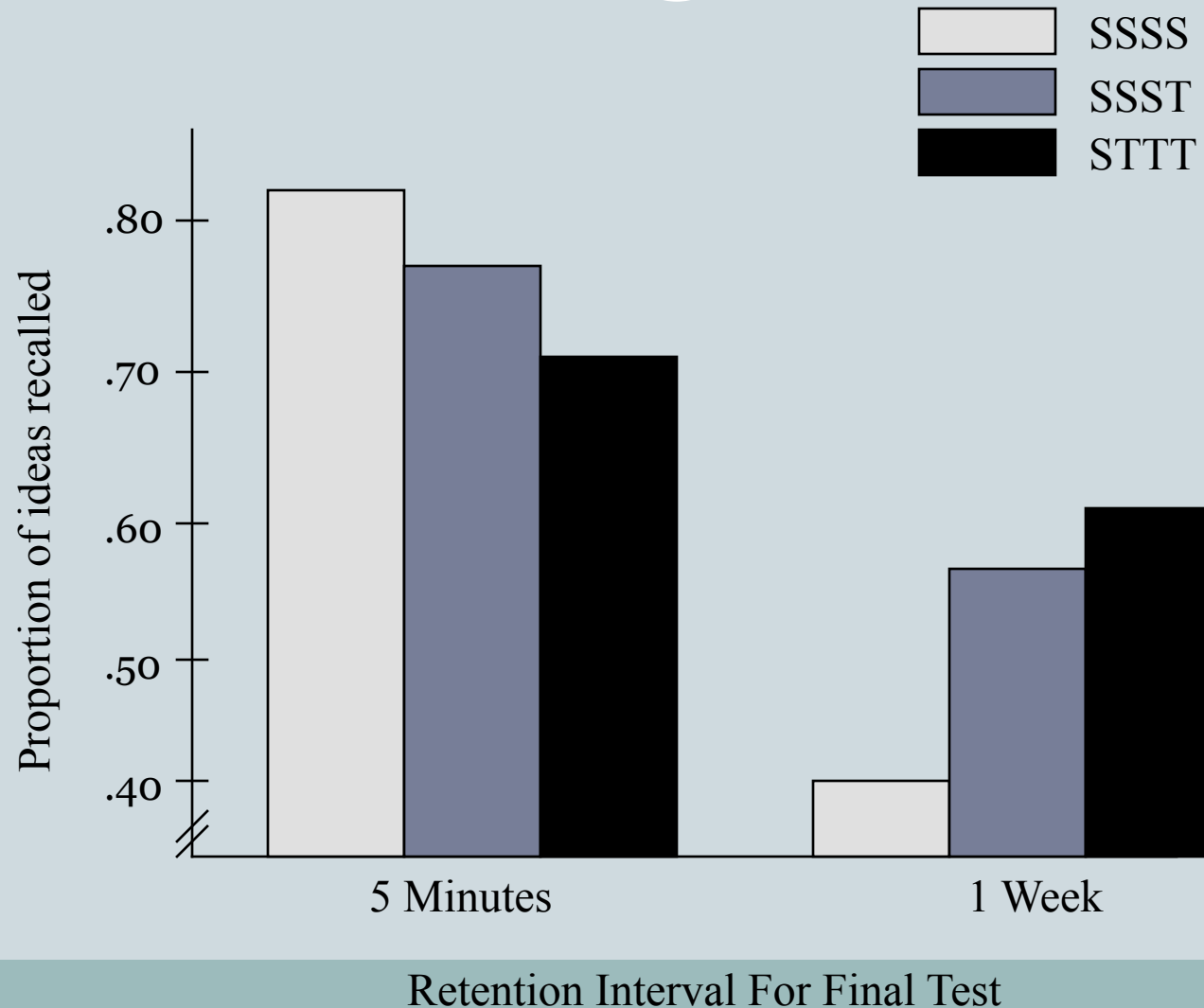


(n)



(o)

Karpicke & Roediger, 2007



Types of CATs



- Minute Paper (check understanding at end of class session)
- Muddiest Point (check understanding at end of class session)
- One-Sentence Summary (check understanding at end of class session)
- Directed Paraphrasing (check understanding of a concept)
- Lecture Checks (Mazur's Technique)
- Card Passing (very good for sensitive topics)

Exercise



- Ratey (2008) has shown that exercise increases the production of vital neurotransmitters important for:
 - Focusing and Attention
 - Motivation
 - Patience
 - Mood



Awake, but NOT Learning



Corelli, 2011 notes that when a person's brain is sleep deprived the person may actually feel fully awake and yet the neurons needed for learning and memory shut down. Essentially, basic functions operate, but complex tasks are not encoded.

Memories are made during Sleep

Most sleep researchers now agree that sleep plays an important role in the formation of long term memories . (Stickgold, 2005).



Sleep and Rest

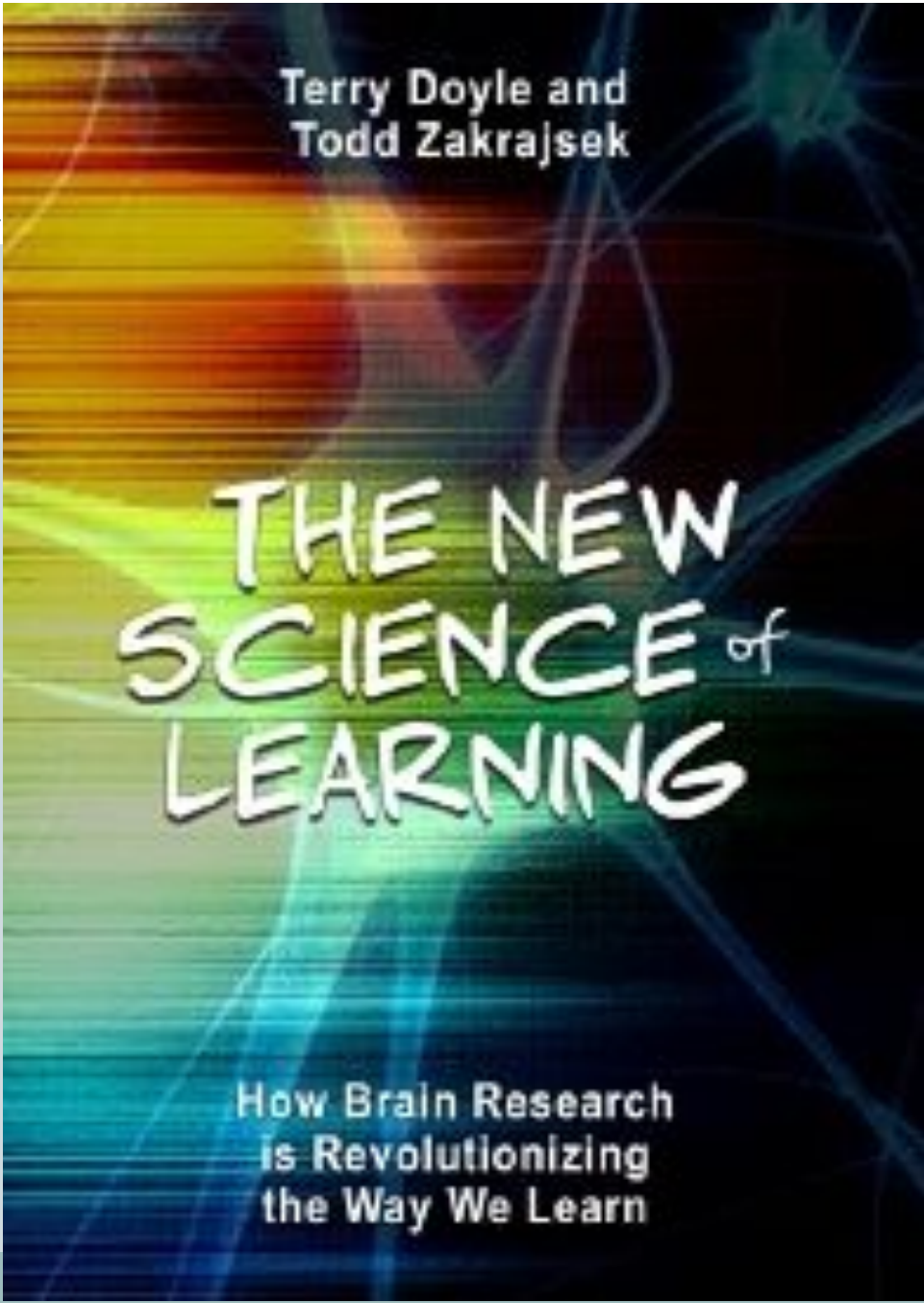
- Sleep and Rest – Researchers at the NYU's Department of Psychology and Center for Neural Science have found that rest directly after learning increases retention
- A NASA study found astronauts who napped for 27 minutes in the afternoon improved their cognitive functioning on later day tasks by 34% over nonnapping astronauts (Medina, 2008).



Food/Hydration

- Food (glucose) --- Complex carbohydrates (vegetables and whole grains) MUCH better than simple sugars





Terry Doyle and
Todd Zakrajsek

THE NEW SCIENCE^{of} LEARNING

How Brain Research
is Revolutionizing
the Way We Learn

The Scholarly Teacher



Applying Evidence-Based Strategies to Enrich Student Learning

<http://scholarlyteacher.com/>