

The Promise of Engagement for Promoting Lifelong Cognitive Health

Elizabeth A. L. Stine-
Morrow

University of Illinois



The Adult Learning Lab ((((((

- How do learning, memory, and attention change through the adult lifespan?
- What do we have to do to continue learning and growing through adulthood?
 - Focus on engagement in everyday activities

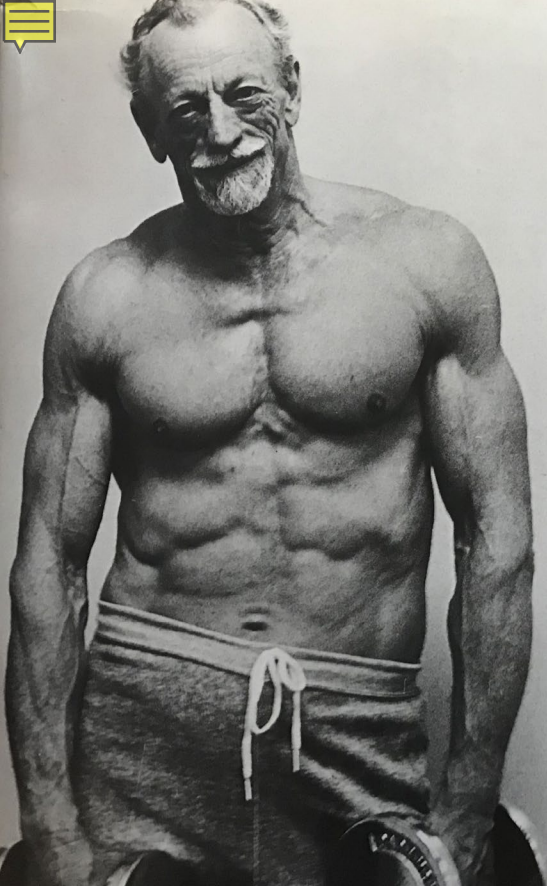


- What do you like best about growing older?
- What are the challenges?





Superman in his later years



GROWING OLD IS NOT FOR SISSIES

PORTRAITS OF
SENIOR ATHLETES

ETTA CLARK

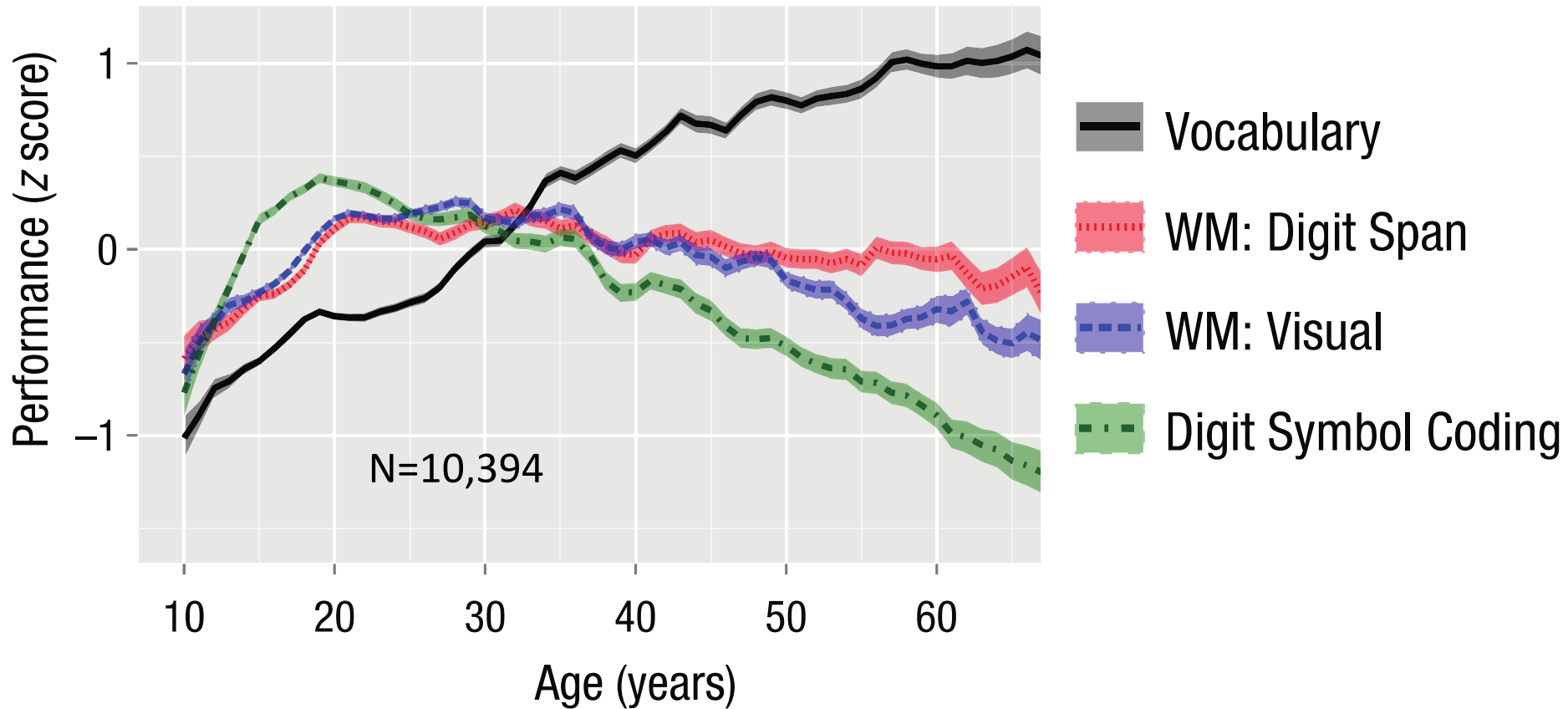
WITH AN INTRODUCTION BY RICHARD SELZER



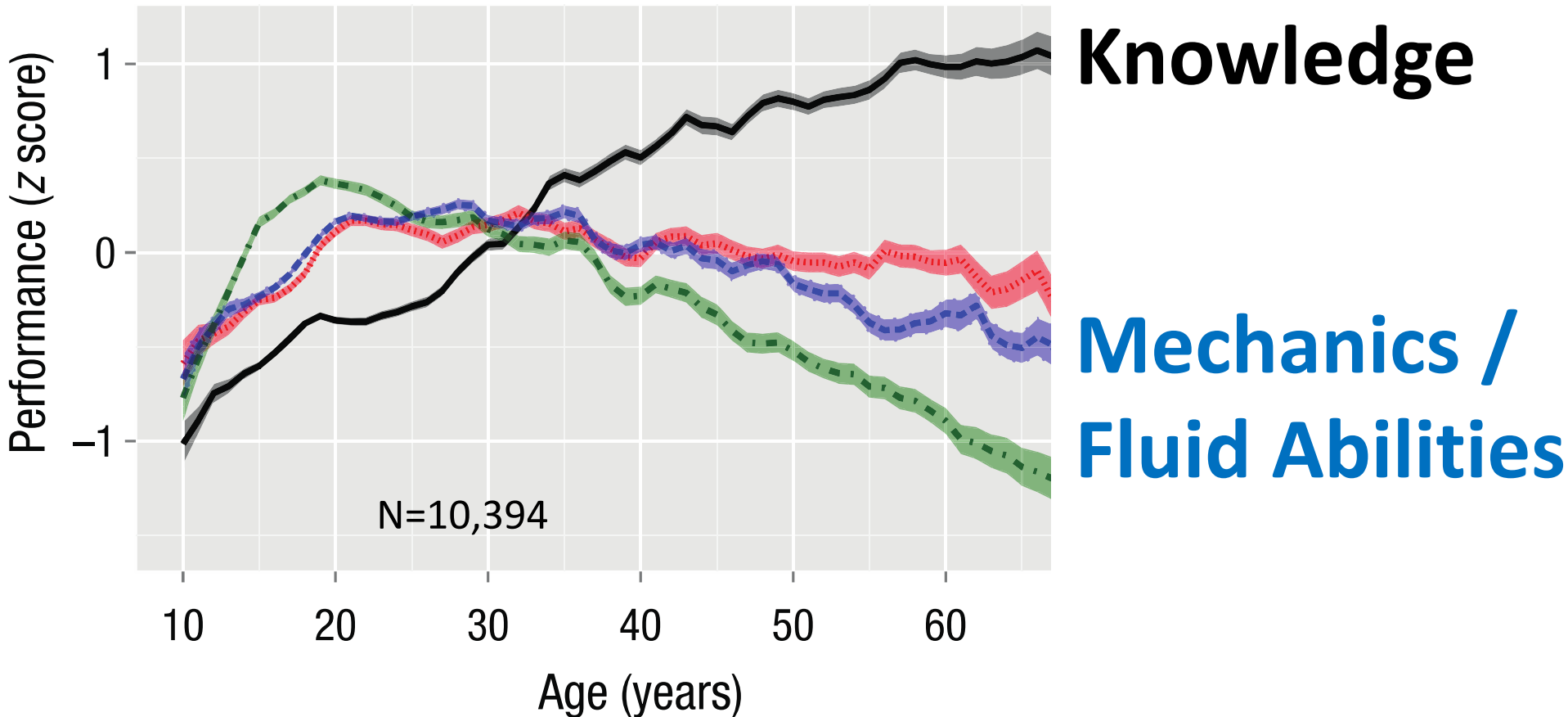
Growing Old Is Not For Sissies



Mental abilities through the adult lifespan



SO, there are two kinds of abilities





What is the pathway to continued cognitive resilience with aging?



Everyday mental feats depend on

**Your
Current Abilities
“what you have”**

**Your Effort
and Strategies
“what you do”**

Knowledge

**Mechanics /
Fluid Abilities**

Everyday mental feats depend on

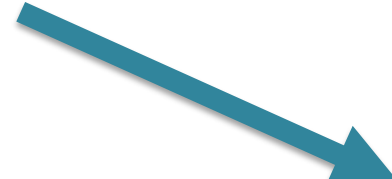
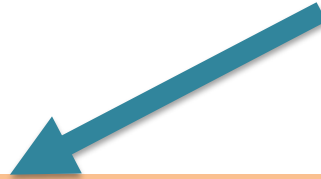
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Effort and Strategies...



**“Attentional
Engagement”**



The example of reading...

- A complex skill that we can take for granted once acquired!
- Let's look under the hood at the mental processes.



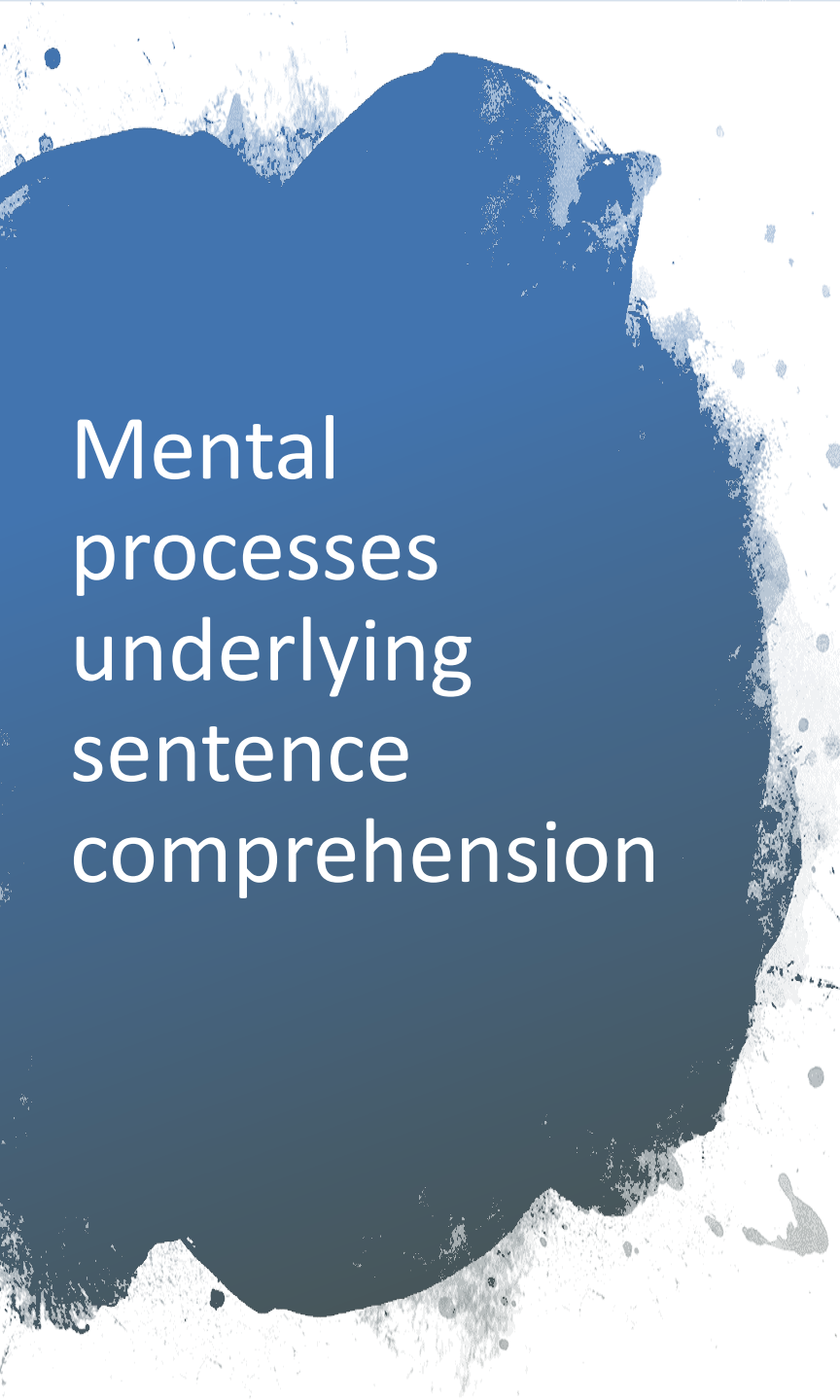
What do you have to
do to understand a
sentence?





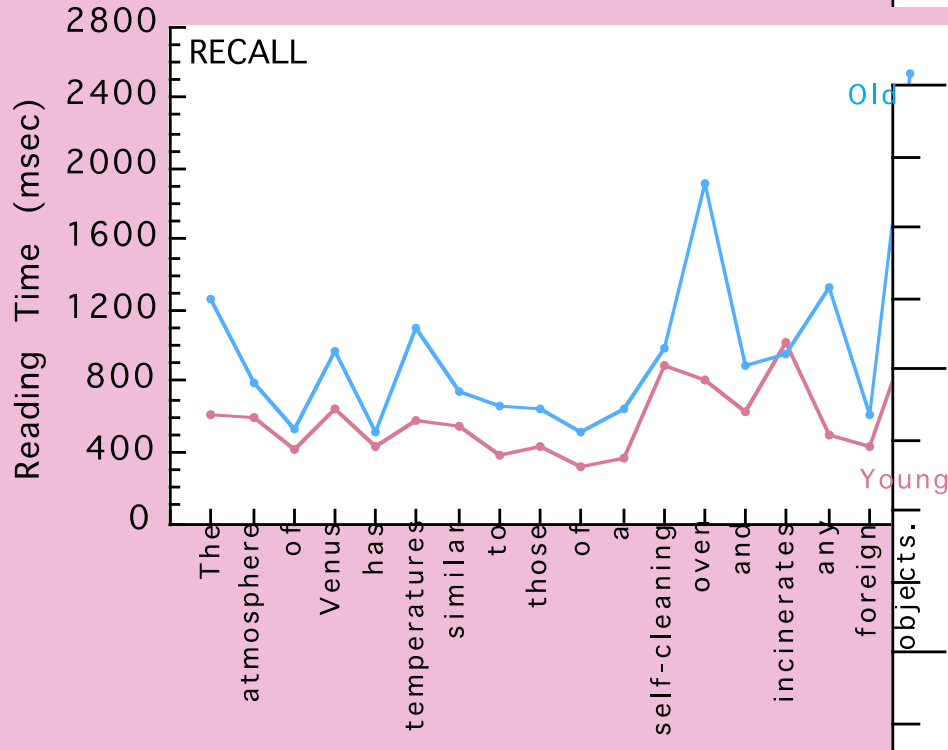
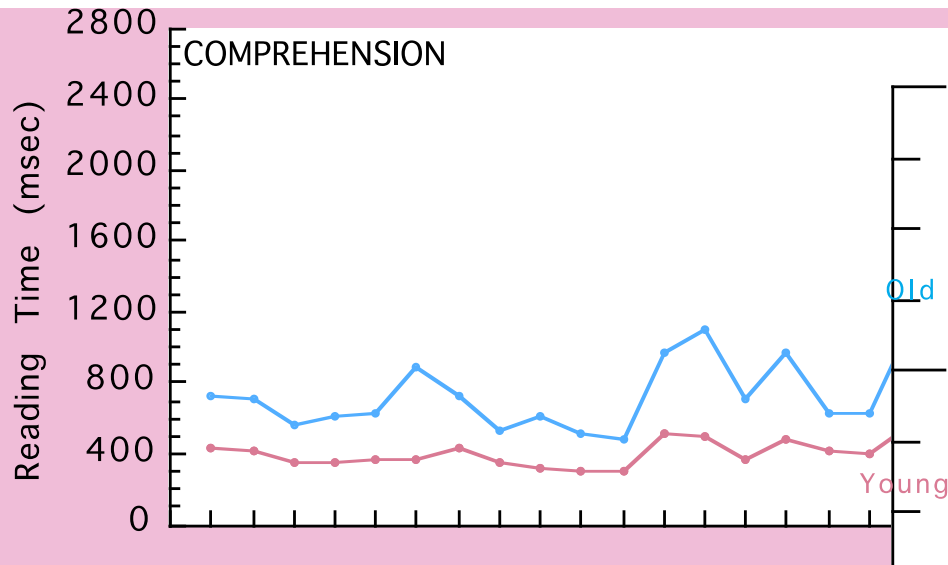
The temperatures of Venus are similar to those of a self-cleaning oven and incinerates any foreign objects.



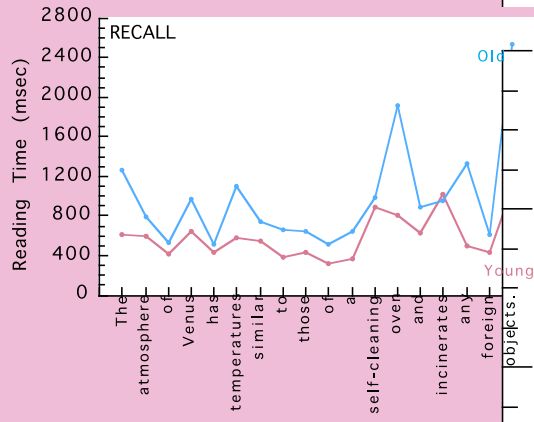
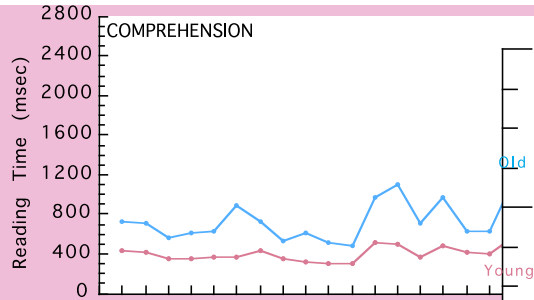


Mental processes underlying sentence comprehension

- Recognize individual words
- Isolate their meanings in context to represent the meaning (“concept”)
- Integrate the concepts
 - Internally to the sentence
 - With earlier text
 - With knowledge



Peaks reflect time for conceptual Integration -- binding concepts together!

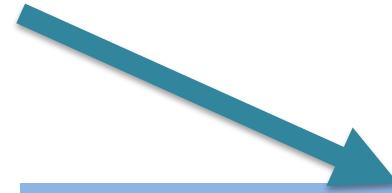
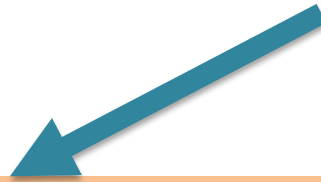


Readers with larger peaks remember more of what they have read.



With age, we peak more frequently – and that is good for memory!

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Knowledge ✓

Mechanics ?

?

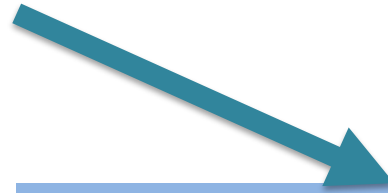
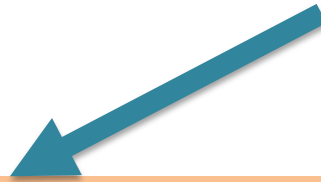
✓



Q&A

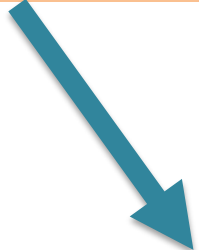


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Knowledge ✓

Mechanics

?

✓



Can We Grow Mechanics?

- Skill Training



- Engagement



Brain Training!

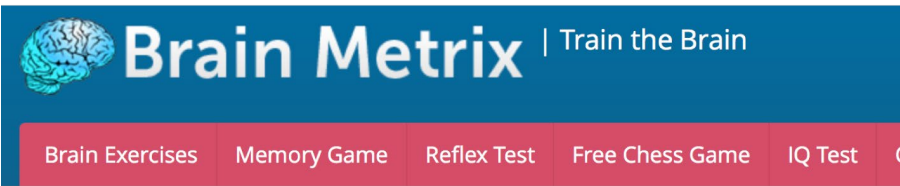


lumosity

Scientific Brain Training



Start now



Brain Training

Brain Metrix is an educational website dedicated to [brain training](#) programs; you can achieve optimum fitness by visiting your gym, and engaging in a brain fitness program that is both fun and stimulating. Here you stretch and train your brain to the limit, you can train and [test your memory](#) or [test your reflexes](#) or even your brain creativity and improve it and much more. Just check the menu on the left for a full list of our brain training games and activities which are all loads of fun.

You will find some brain fitness workouts that can help your mind process information more quickly, and more efficiently, as well as the ability to perform multiple tasks at the same time. You can get help to [concentrate](#) more and increase your [brain reflection](#) speed; you will find simple but very effective brain training games and exercises like solving [math problems](#) to achieve greater mind fitness. You may be the smartest person in the world and you don't even know it. If you'

Included you w
stretching exer

Brain Training THAT WORKS



Raising the bar on brain training

There are a lot of "brain games" out there. BrainHQ is much more.

Sign up

FREE EXERCISES

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Science

Big Business!

- Continued growth of the industry (SharpBrains; <http://sharpbrains.com>)
- U.S. Federal Trade Commission files complaints for deceptive advertising
 - Lumosity (Jan 2016; <https://www.ftc.gov/news-events/press-releases/2016/01/lumosity-pay-2-million-settle-ftc-deceptive-advertising-charges>)
 - LearningRx (May 2016; <https://www.ftc.gov/news-events/press-releases/2016/05/marketers-one-one-brain-training-programs-settle-ftc-charges>)

Does any of this work?

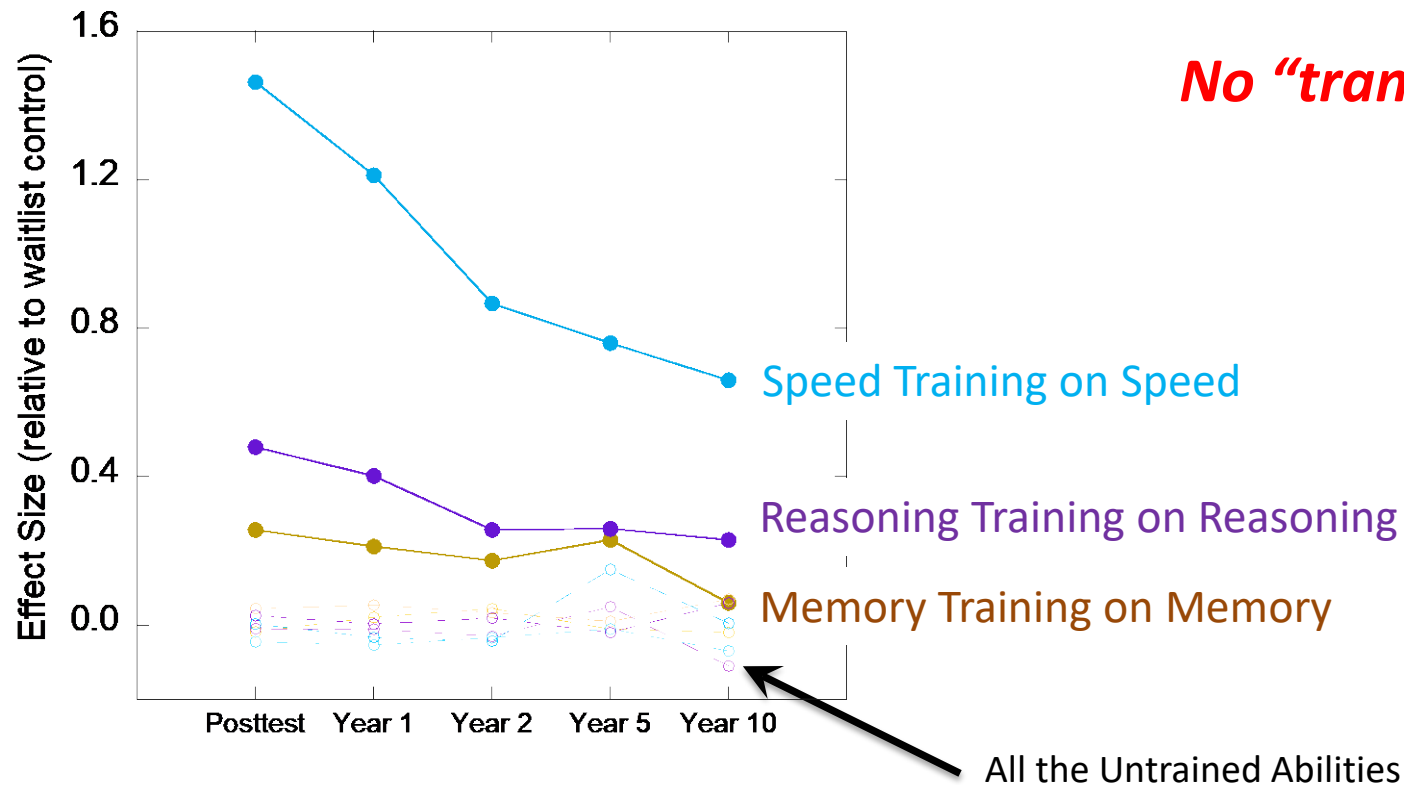
Does any of this work?

- Well, sort of.

ACTIVE Trial

Advanced Cognitive Training for Independent and Vital Elderly

Randomized clinical trial (N = 2832) to compare the effects of THREE types of cognitive training against a wait-list control



Do “Brain-Training” Programs Work?

**Daniel J. Simons¹, Walter R. Boot², Neil Charness^{2,3},
Susan E. Gathercole^{4,5}, Christopher F. Chabris^{6,7},
David Z. Hambrick⁸, and Elizabeth A. L. Stine-Morrow^{9,10}**

¹Department of Psychology, University of Illinois at Urbana-Champaign; ²Department of Psychology, Florida State University; ³Institute for Successful Longevity, Florida State University; ⁴Medical Research Council Cognition and Brain Sciences Unit, Cambridge, UK; ⁵School of Clinical Medicine, University of Cambridge; ⁶Department of Psychology, Union College; ⁷Geisinger Health System, Danville, PA; ⁸Department of Psychology, Michigan State University; ⁹Department of Educational Psychology, University of Illinois at Urbana-Champaign; and ¹⁰Beckman Institute for Advanced Science and Technology, University of Illinois at Urbana-Champaign

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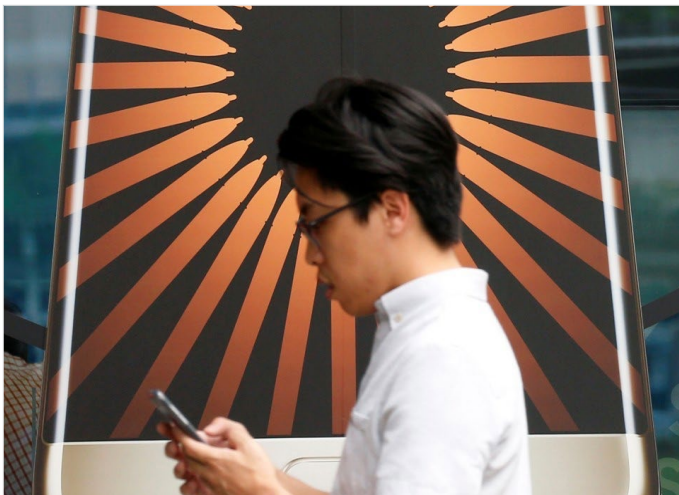
→Any small benefits are not worth the cost.

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The Atlantic



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THE WALL STREET JOURNAL

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<http://www.wsj.com/articles/brain-exercises-dont-live-up-to-the-hype-researchers-say-1476109608>

LIFE | HEALTH | YOUR HEALTH

Brain Exercises Don't Live Up to the Hype, Researchers Say

Brain training purports to improve cognitive function, but may deliver much less, a study finds



Screenshot of Posit Science's brain-training exercise Double Decision. Players at an advanced level have to distinguish between objects and find the location of the Route 66 sign. PHOTO: POSIT SCIENCE

By

SUMATHI REDDY

Updated Oct. 10, 2016 11:05 a.m. ET

“[The authors] are moral monsters for making that argument, and you can quote me on that.”

-- Henry Mahncke,
CEO of Posit Science





A More Promising Path... An Engaged Lifestyle

- Education throughout the lifespan (Manly et al., 2004; LeCarret et al., 2003)
- Novel information processing activities (Hultsch et al., 1999)
- Diverse activities (Verghese et al., 2003; Carlson et al., 2011)
- Stimulating work (Schooler et al., 1999, 2004)
- Stimulating leisure (Schooler & Mulatu, 2001)
- Literacy practices (Wilson et al., 2002)
- Social activities and perceived social integration (Fratiglioni et al., 2014)



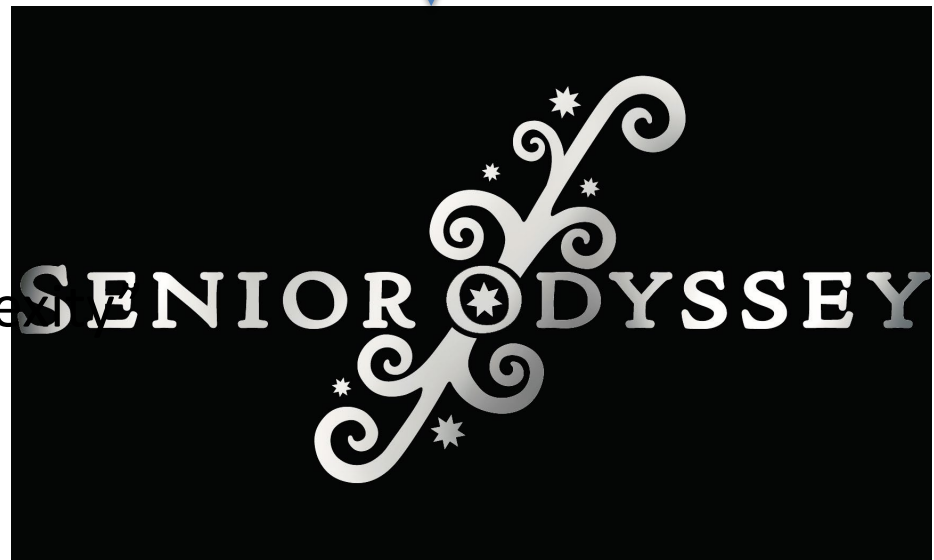
Two lines of work from our lab...

Creative Problem Solving

**ODYSSEY
OF THE MIND**



- Exercise of multiple skills in context
- Team-based
- Competitive
- Social
- Model of "environmental complexity"
– (Schooler et al., 1999, 2001)



SENIOR ODYSSEY





SENIOR ODYSSEY

14 program weeks over ~ 6 mo. (N = 462)

“TROY”
Engagement Model

Creative Problem Solving

- ❖ Team-based creative problem solving
- ❖ Collaboration within teams that engage in tournament competition
- ❖ Activities built around creativity and ideational fluency

“ITHACA”
Training Model

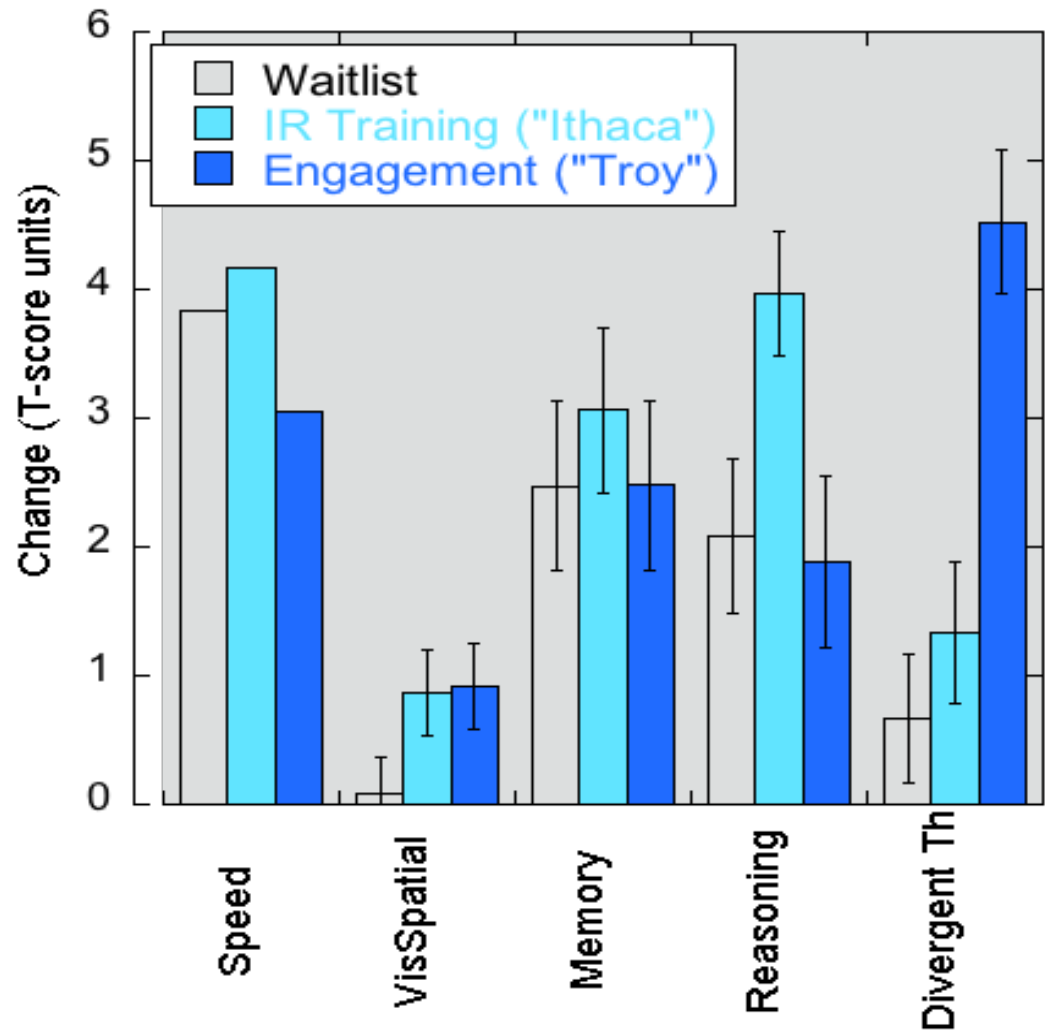
Inductive Reasoning

- ❖ Home-based inductive reasoning training (ACTIVE)
- ❖ Puzzles (crosswords, sudoku)

WAITLIST
CONTROL

“Substantive Complexity” (Schooler et al., 1999, 1001, 2004)

- We can learn skills **implicitly** – clear transfer from everyday exercise to the psychometrically measured skill.
- BUT even the effects of this complex experience were narrowly focused on the core skill that was valued and practiced through all the activities.



🌸 Different sorts of people benefited differently from the different programs!

🌸 BOTH: Compensatory for those with lower verbal ability, but differential benefits for those with better cognitive status (mental mechanics).

🌸 TROY: Differential benefits for those who started with larger Social Networks and higher levels of Openness.

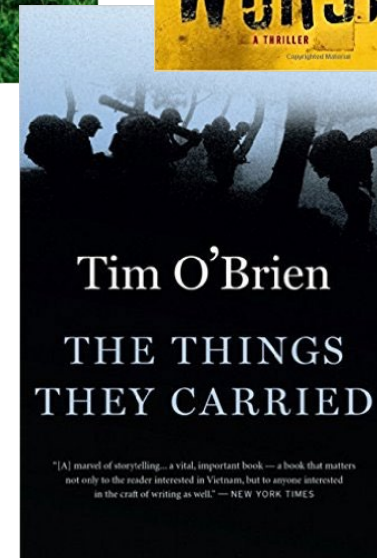
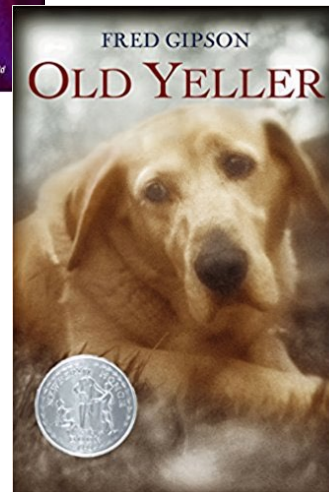
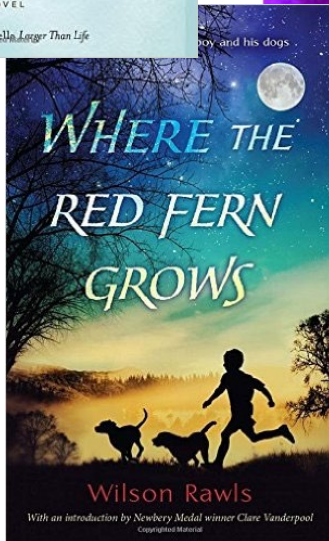
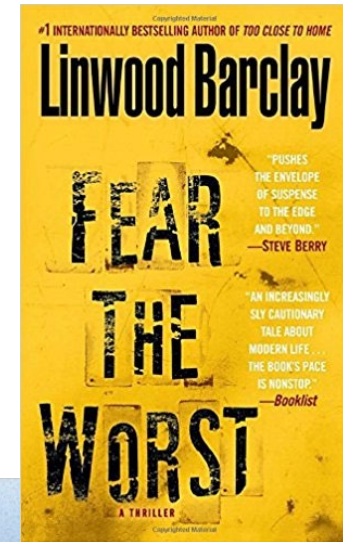
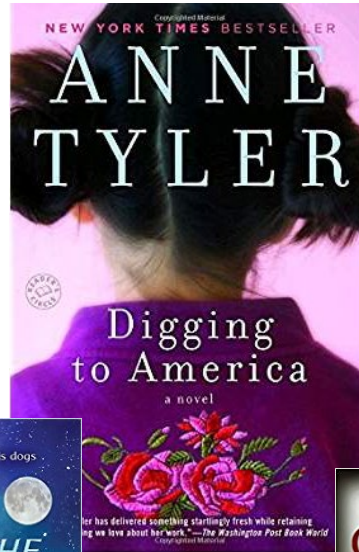
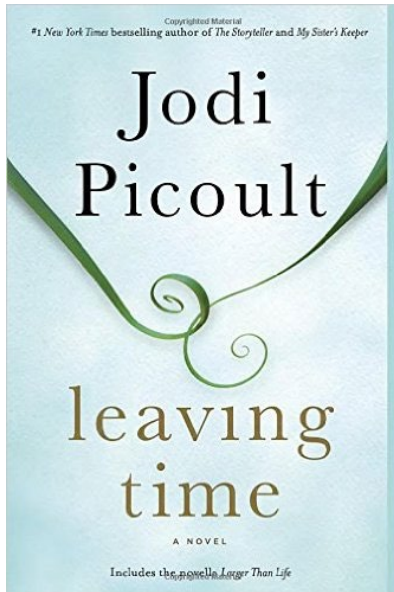
Moderator of Change	Ithaca – IR	Troy - DT
MoCA (cognitive status)	0.59*	0.34*
Openness to Experience	0.15	0.27*
Verbal Ability	-0.30*	-0.45*
Social Network Size	0.18	0.30*



- Key lessons from the Odyssey Project
 - We can grow abilities from engagement in mentally stimulating and socially integrated activities.
 - Benefits are increased when the form of engagement “fits” the person.



Literacy Engagement



Leisure Reading



Why Literacy?

- Self-directed activities that induces a cascade of neural activity (Chow et al., 2014; Federenko & Thompson-Schill, 2014; Speer et al., 2009; cf. Stine-Morrow et al., 2015)
- Poor literacy skill is associated with increased cognitive declines in late life (Manly et al., 2004) and risk of AD (Kaup et al., 2014; Lee et al., 2008; Yu, Wilson et al., 2017)
- Evidence that premorbid reading is protective against late-life pathologies (Lee & Chi, 2014; Wilson et al., 2000)



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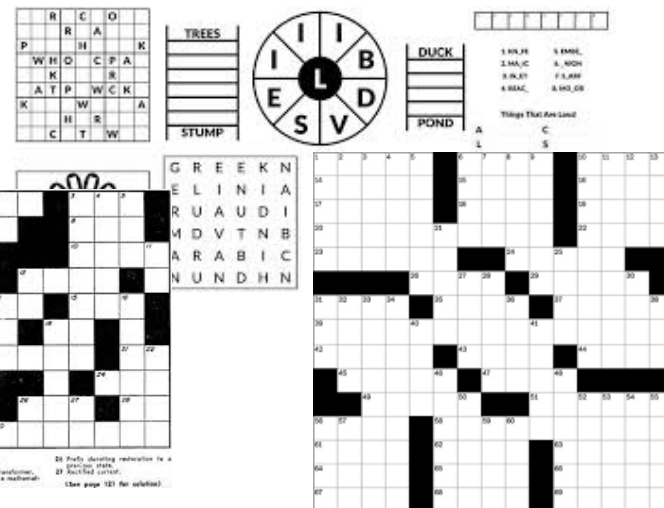
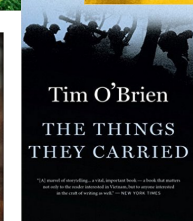
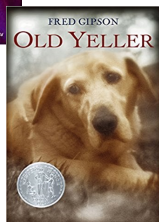
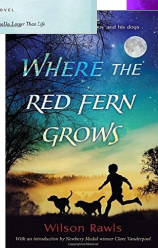
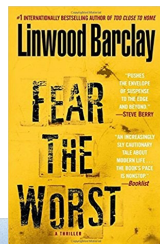
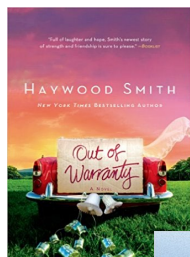
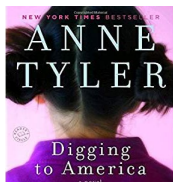
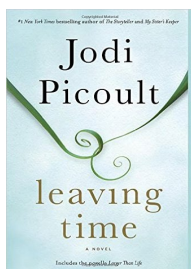
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TALL Clubs



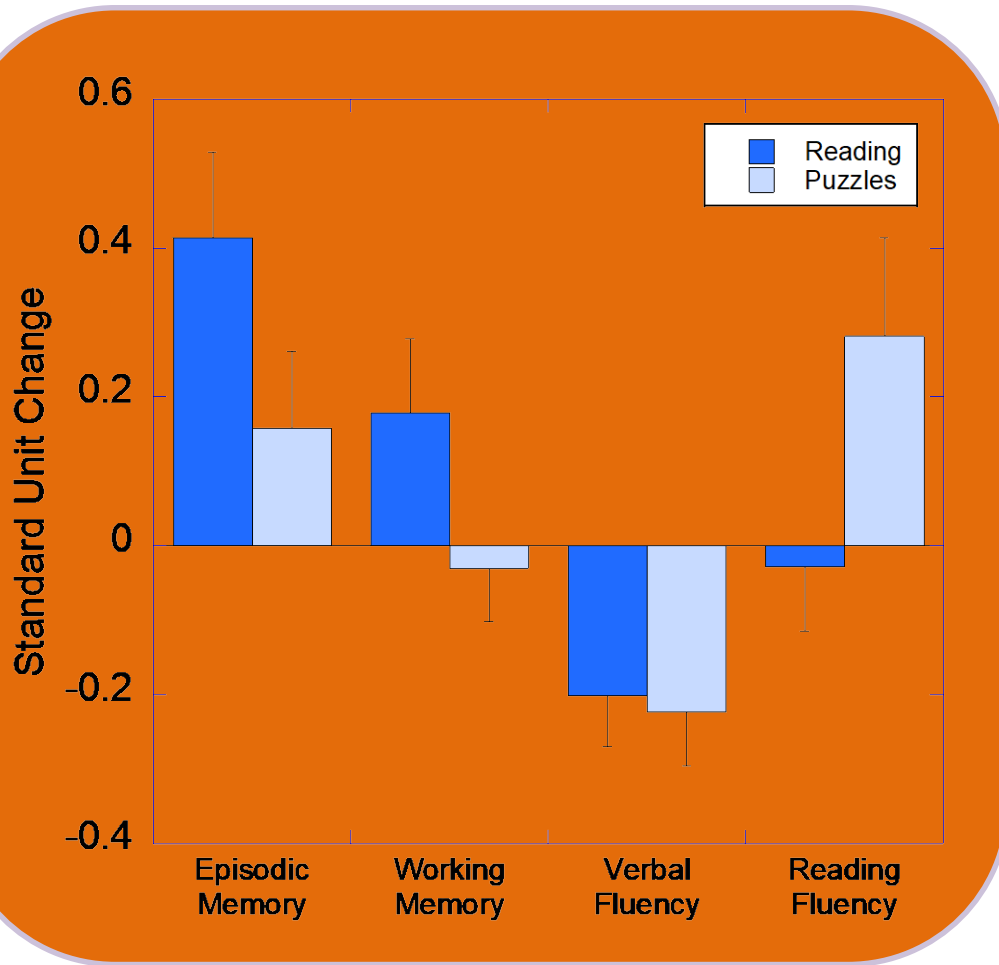
8 program weeks (N = 76)

“READING CLUB”

- ❖ Novels selected by adult literacy specialist at Champaign Public Library – choice
- ❖ Logbooks

“PUZZLE CLUB”

- ❖ Crossword puzzles and other verbal puzzles - choice
- ❖ Logbooks



- Reading group improved in
 - Episodic Memory
 - Working Memory
- Puzzle group improved in
 - Reading Fluency (???)

- More positive change in LE group for those who started off with lower scores
 - So compensatory!

Promising!



DITTE



Liz Stine-Morrow
eals@Illinois.edu

Lab Phone: 217-244-7336