The Aging Mind & Brain: Implications for Language Learning

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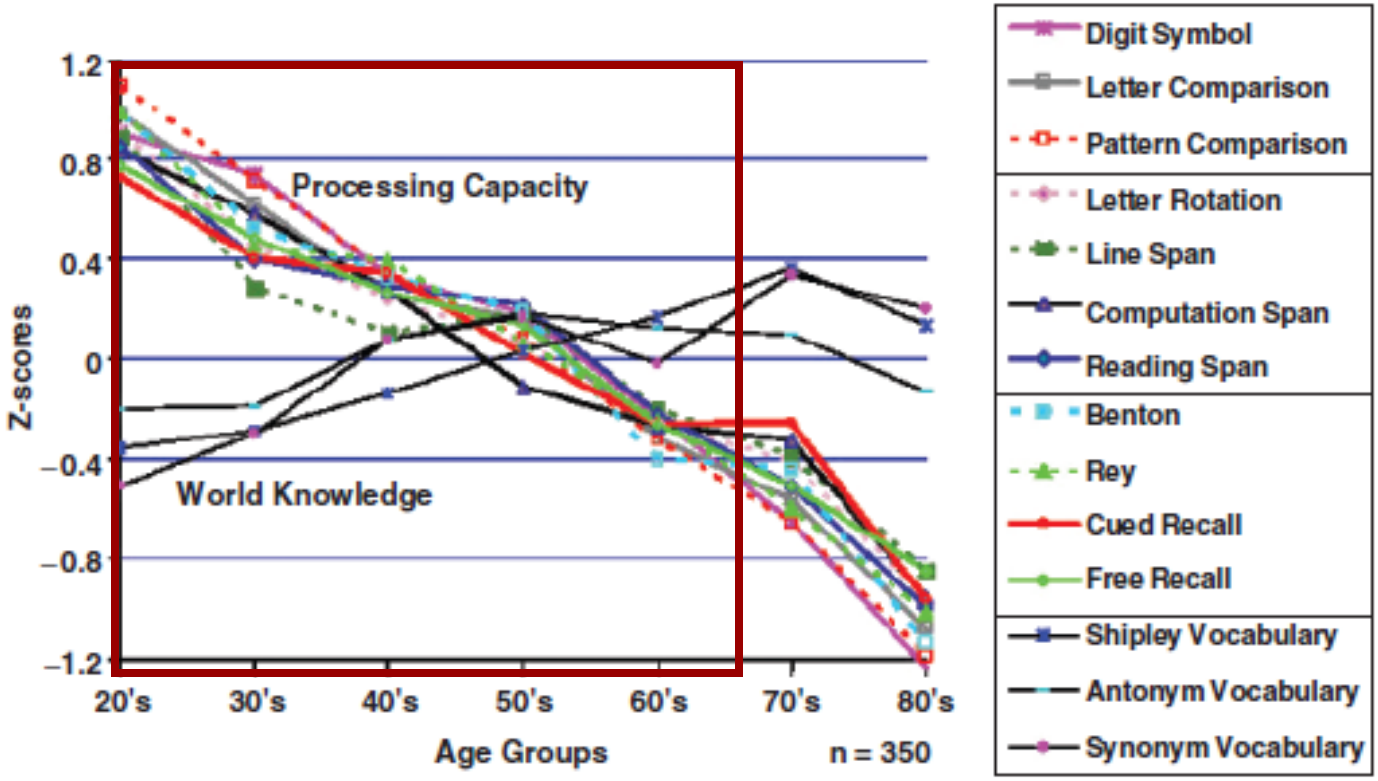
Conclusions

- Aging changes many, but not all, aspects of mind & brain
- Changes vary widely across people, and are partially under individual's control
- None present major impediments to language learning
- But taking changes into account can inform learning & teaching

Aging Mind & Brain

- Snapshots of the Aging Mind & Brain
  - What changes and what doesn't?
  - People differ
  - Compensation
  - Lifestyle matters, e.g.,
    - Exercise
    - Bilingualism
- Maximizing learning & memory

Different Patterns of Change



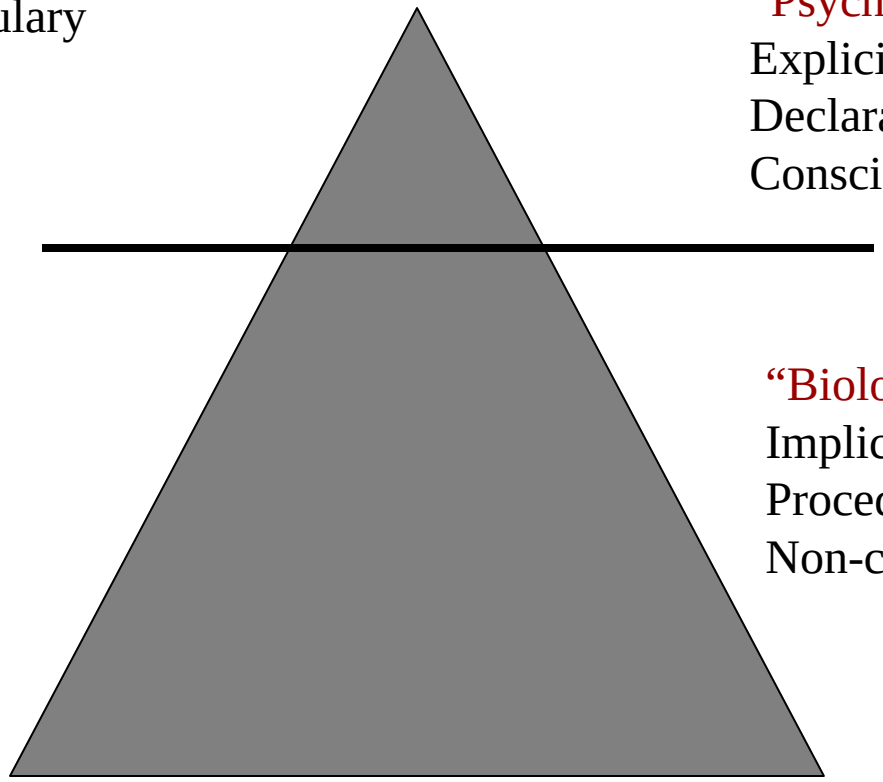
- Gradual across adult years
- Some functions spared

Adapted from Park & Gutchess,
Current Directions in Psychological Science, 2006

The Iceberg of Learning & Memory

Learning Vocabulary

"Psychological Memory"
Explicit
Declarative
Conscious & Intentional



Learning Syntax

"Biological Memory"
Implicit
Procedural
Non-conscious & Unintentional

Theodule Ribot (1882) *Diseases of Memory*

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Minireview

Memory systems of the brain: A brief history and current perspective

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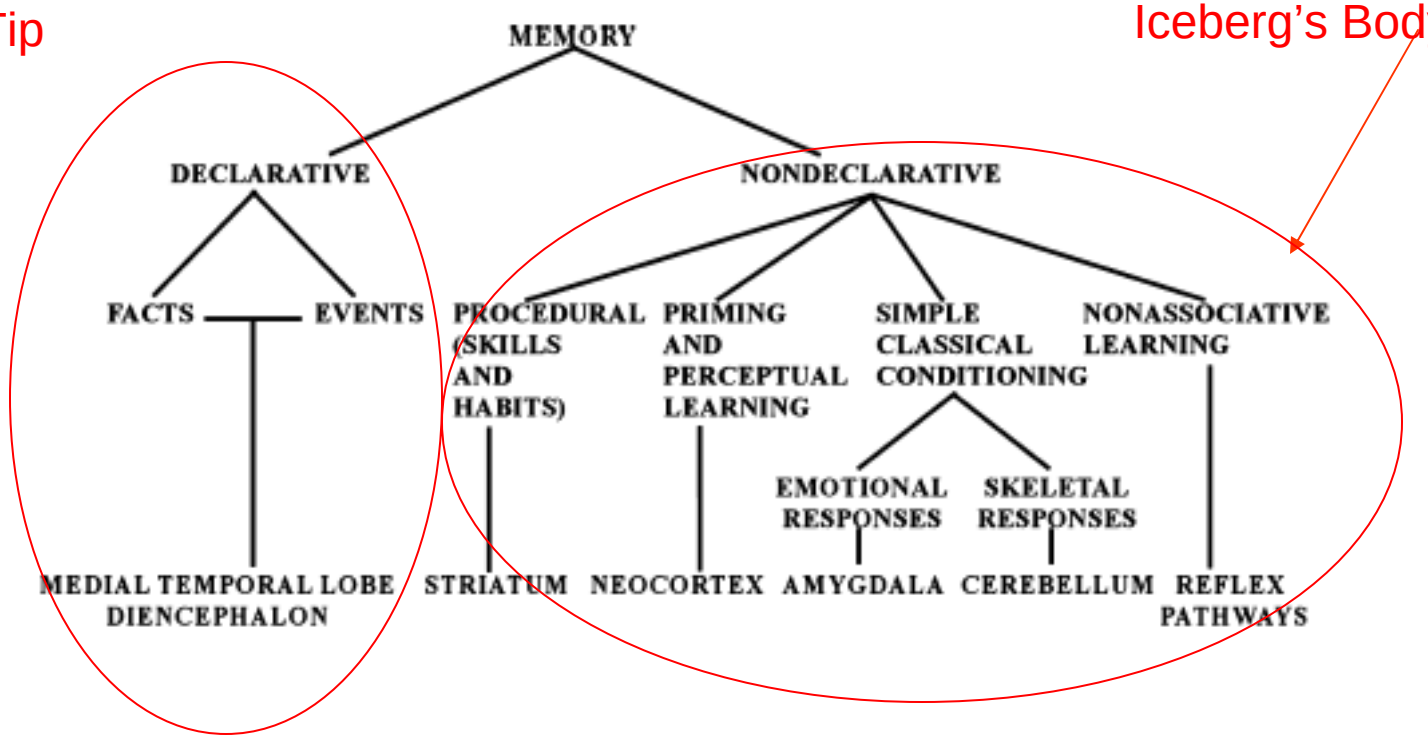
Iceberg's Tip

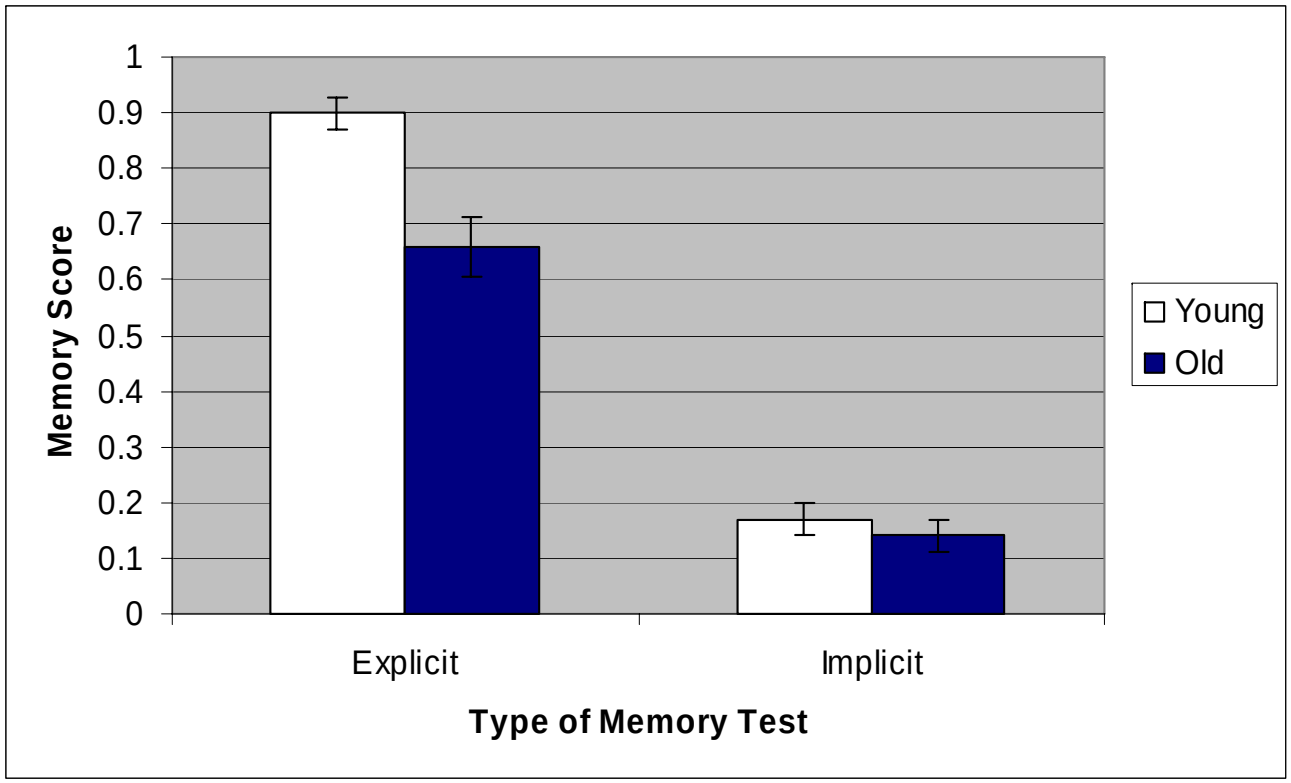
Iceberg's Body



Age Impairs

Age Spares (Some of These)

Implicit Memory for Word Pairs is Spared



Study: hamper-dragon
Test: hamper-dra____ ?

Based on Howard, Fry, & Brune,
Journal of Experimental Psychology: Learning, Memory & Cognition, 1991

- What is spared?
  - Some forms of implicit learning & memory
  - Vocabulary & World knowledge
  - Emotional regulation

- What declines?
  - Declarative/explicit learning
  - Speed
  - Executive control /Working memory capacity

  - BUT EVEN HERE. . . . . People Differ

People Differ . . . Variability

Processing Speed

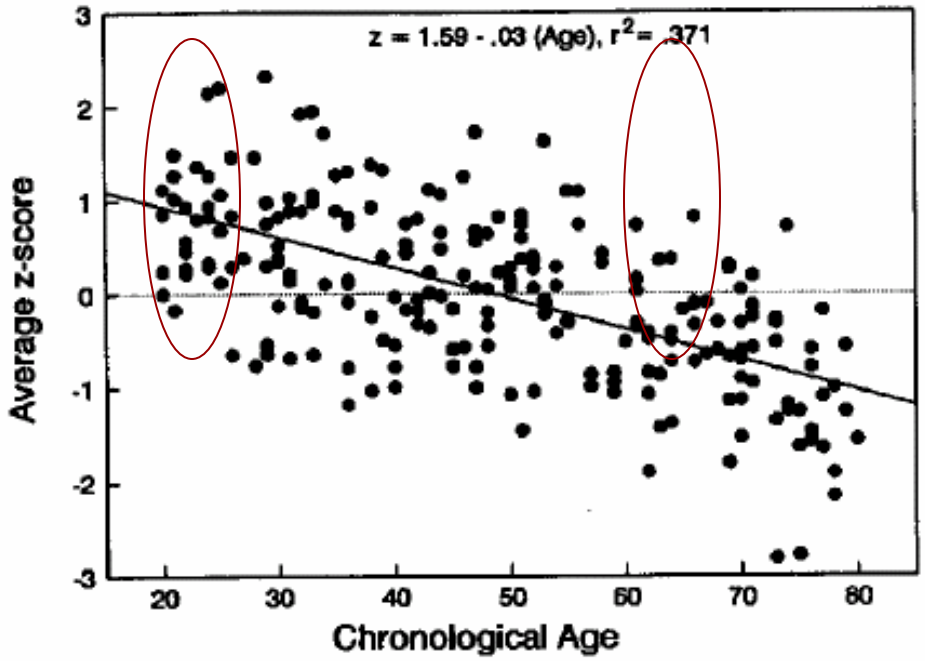
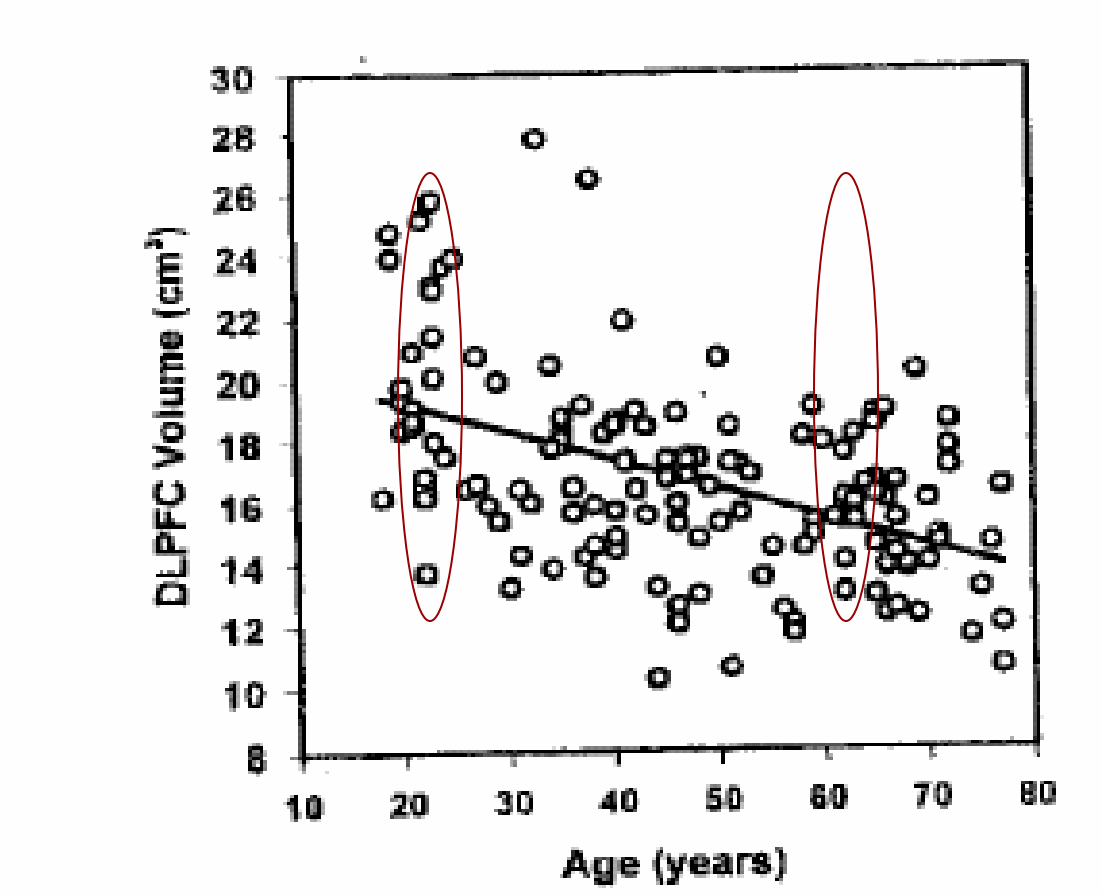


Figure 1. Relation between age and a composite measure of processing speed (data from Salthouse, 1993b, Study 1).

Salthouse, *Psychological Review*, 1996

People Differ . . . Variability

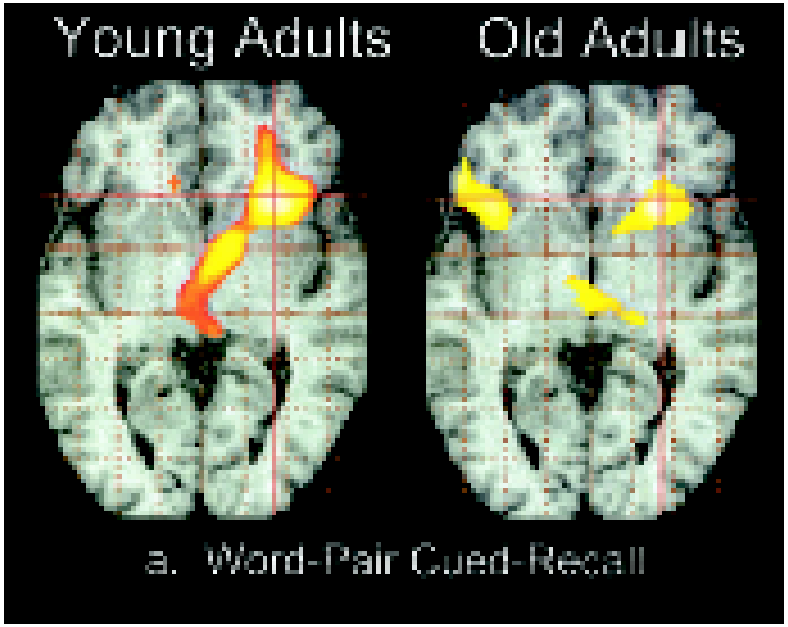
Prefrontal Cortex Volume

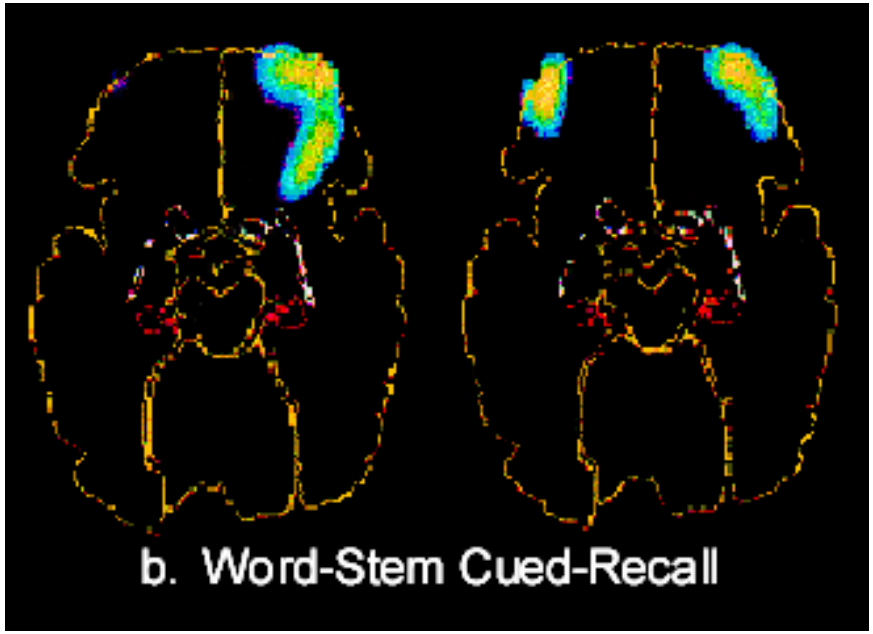


From Cabeza, *Handbook of Functional Neuroimaging of Cognition*, 2001; Data from Raz et al 1997

Compensation Occurs

Study word pairs (outside scanner): tree –lawyer

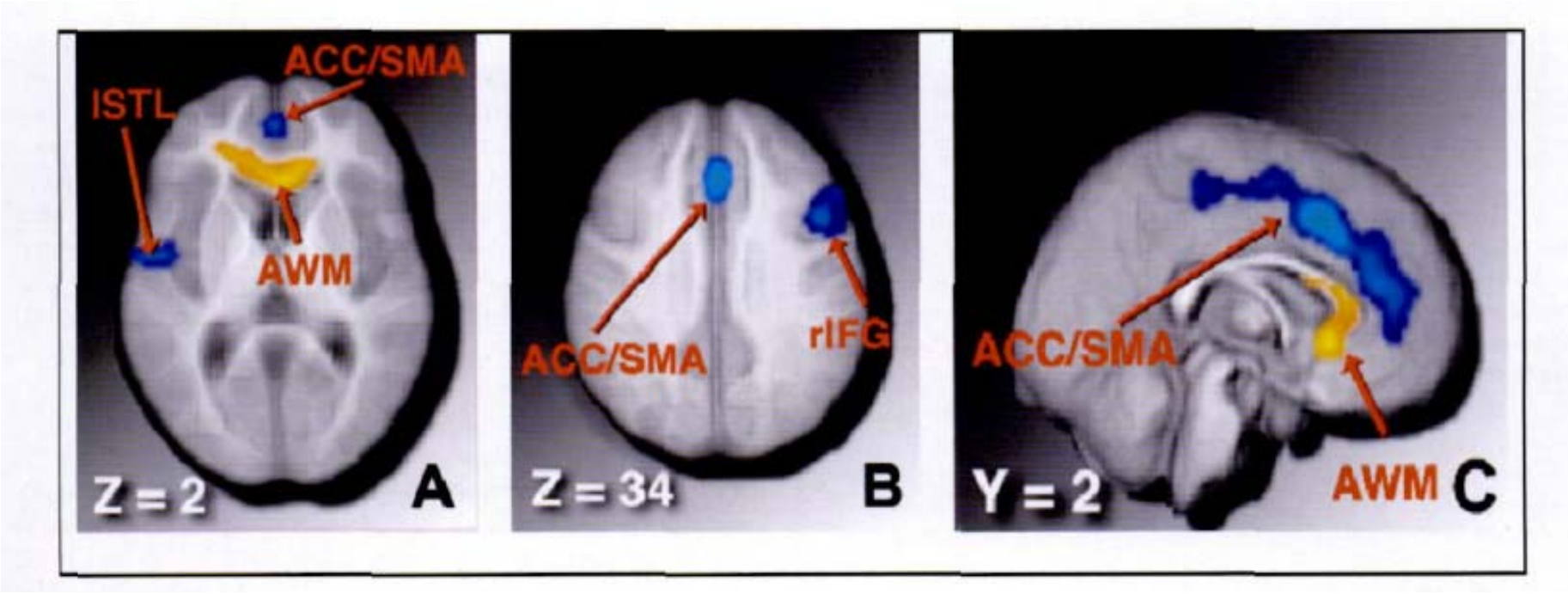




Test (while scanning) : Tree-

(Cabeza, *Psychology & Aging*, 2002)

Lifestyle Matters: Exercise



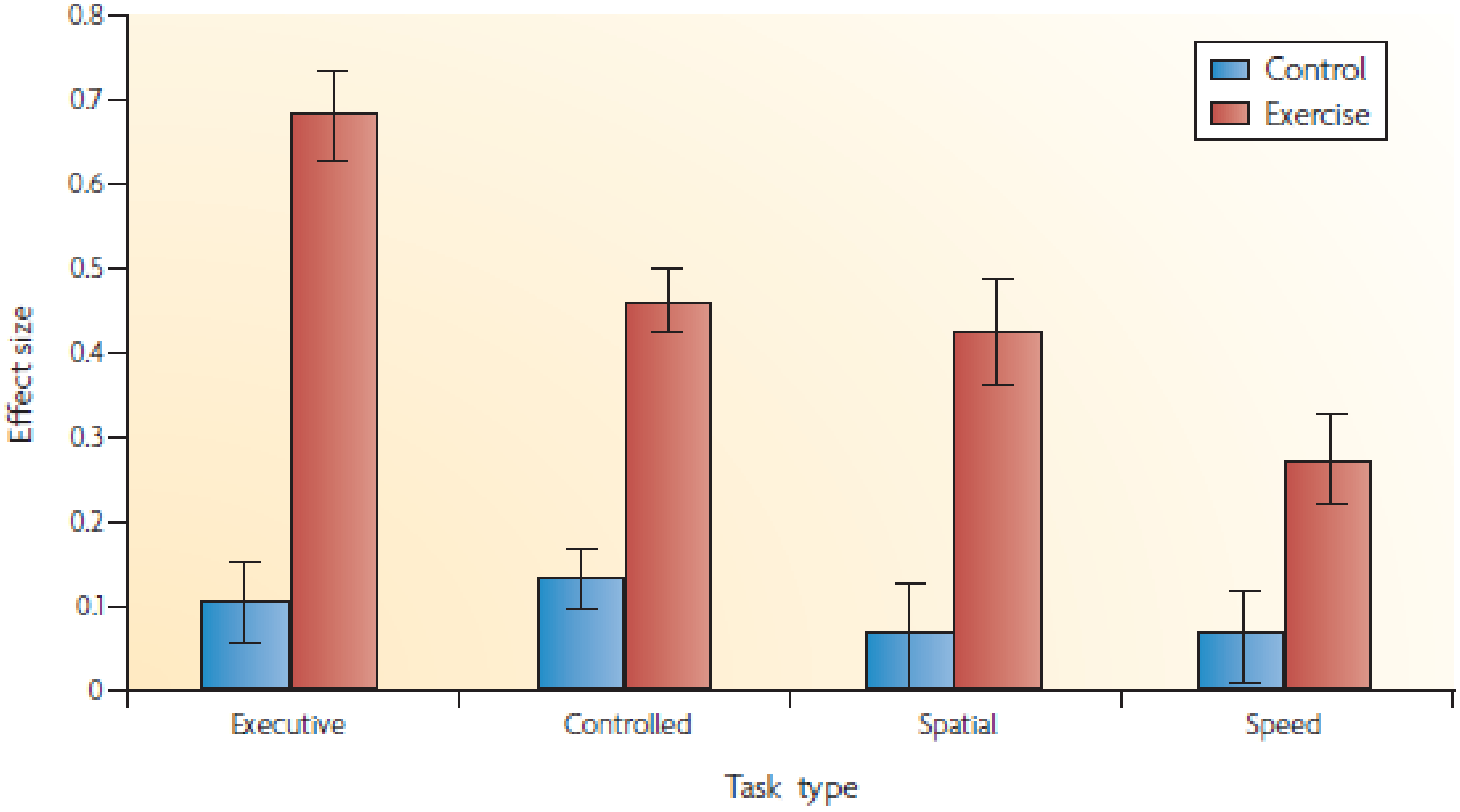
Aerobic vs. Non-aerobic:

Blue regions: Gray matter volume increased

Yellow regions: White matter volume increased

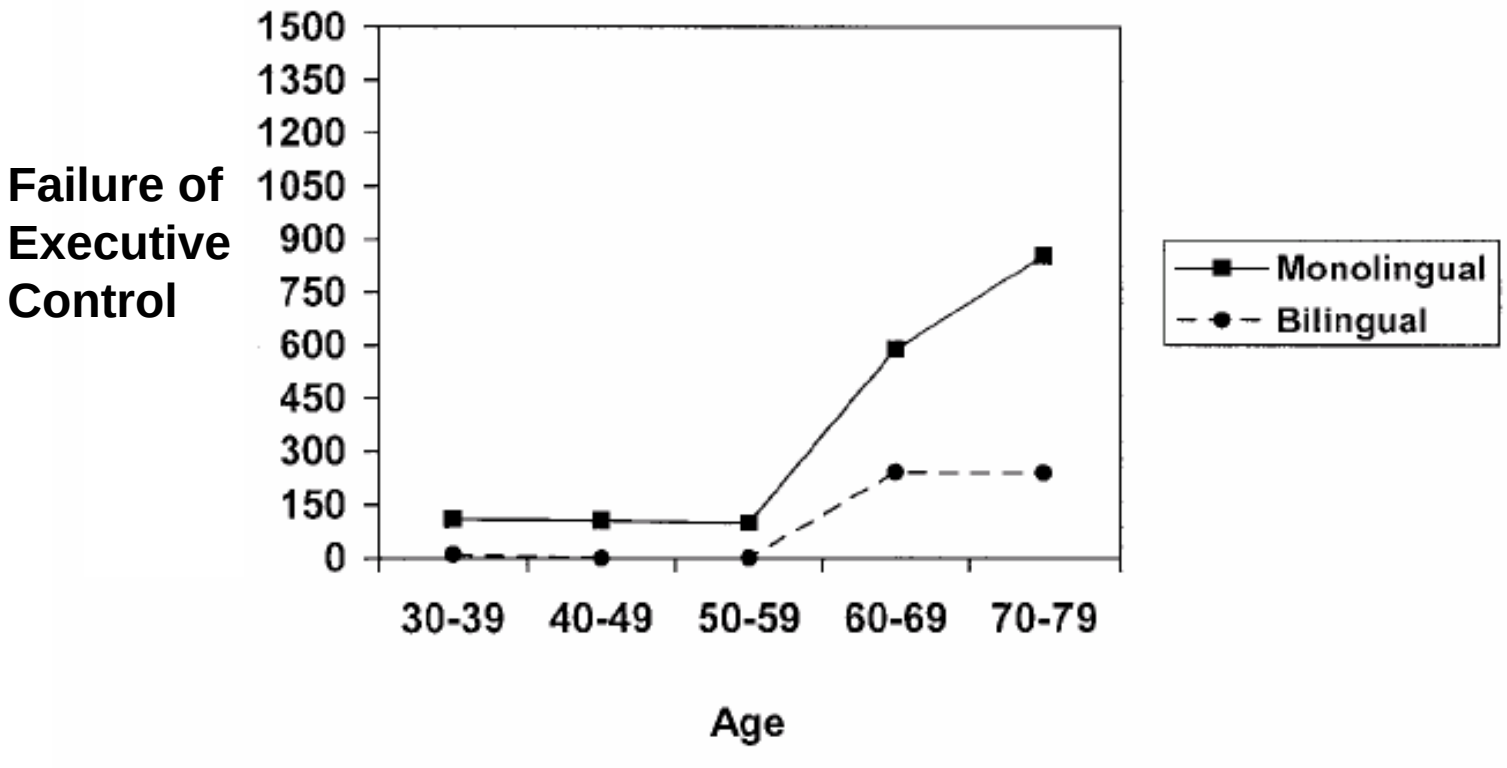
From Colcombe, Erickson.. . . Kramer,
Journals of Gerontology: Medical Science, 2006

Lifestyle Matters: Exercise



From Hillman, Erickson, & Kramer, *Nature Reviews Neuroscience*, 2008 meta-analysis

Lifestyle Matters: Bilingualism



Bialystok, Craik, Klein, & Viswanathan, *Psychology & Aging*, 2004

Good News & Bad News

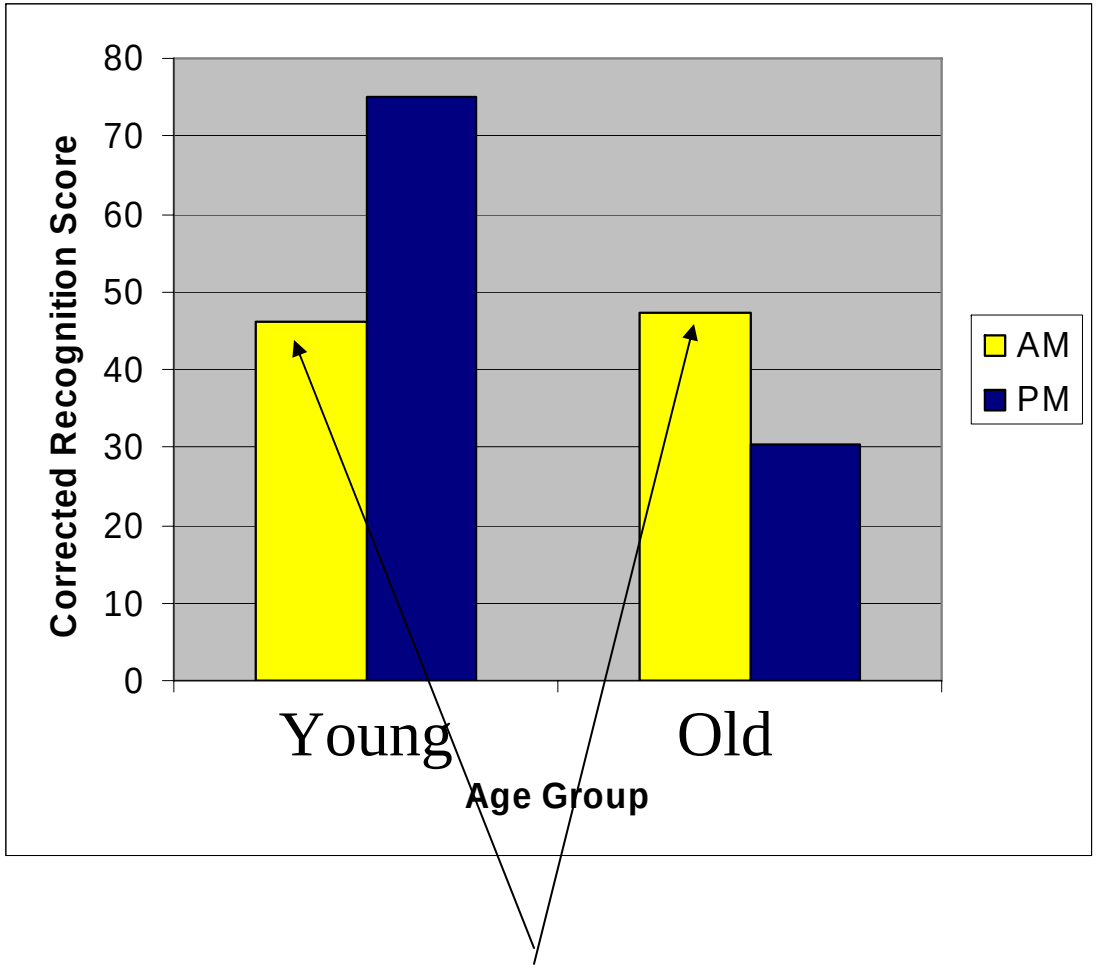
- Some functions impaired, but others spared
- People differ—much overlap across ages
- Compensation is possible, common
- Lifestyle matters--examples
    - Exercise (well established)
    - Bilingualism

Aging Mind & Brain

- Snapshots of the Aging Mind & Brain

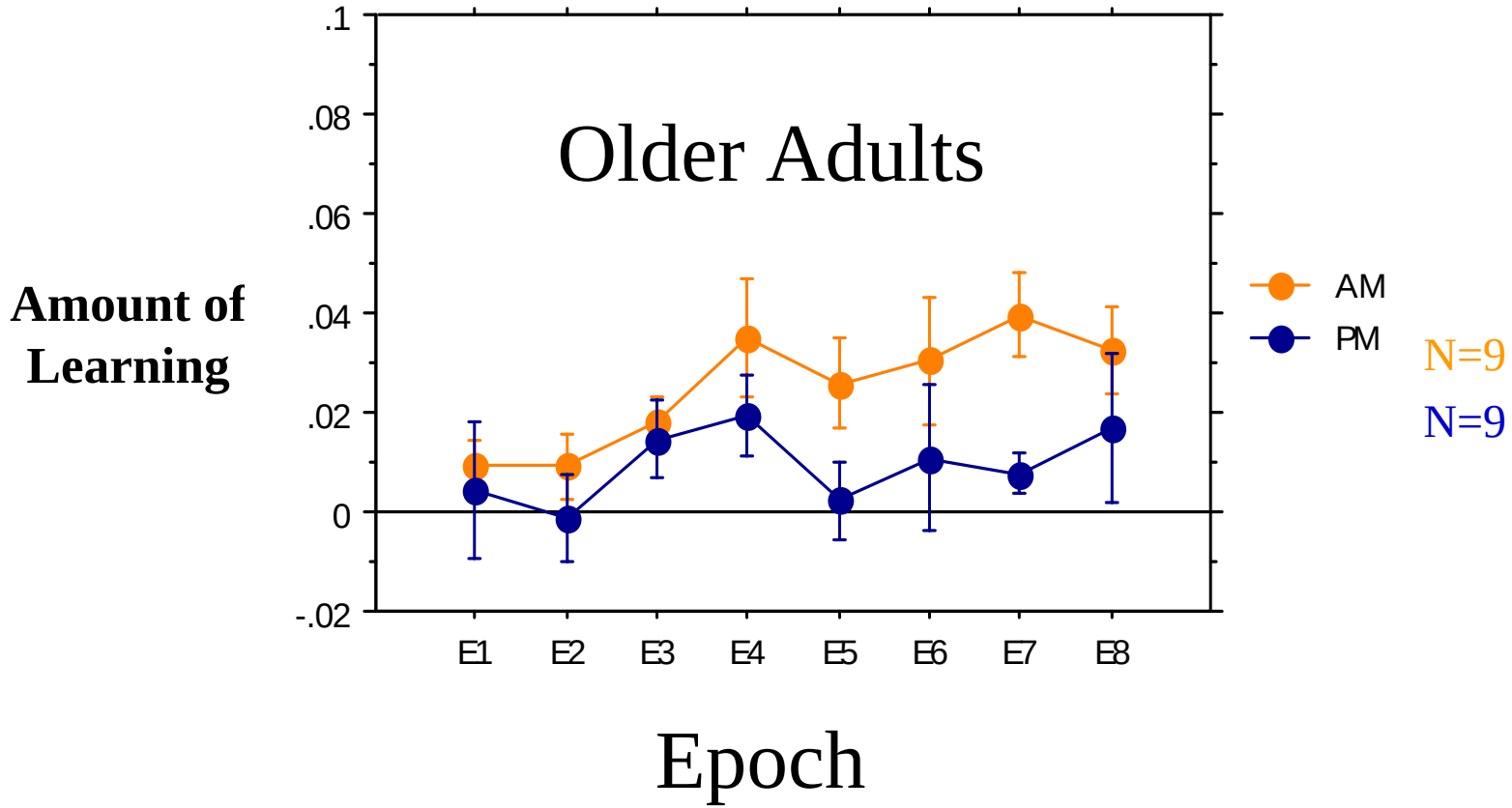
- Maximizing learning & memory
  - Time of day matters
  - Attitude matters (stereotype activation)

Time of Day Effects: Declarative Memory



From May, Hasher, & Stoltzfus, *Psychological Science*, 1993

Time of Day Effects: Procedural Learning

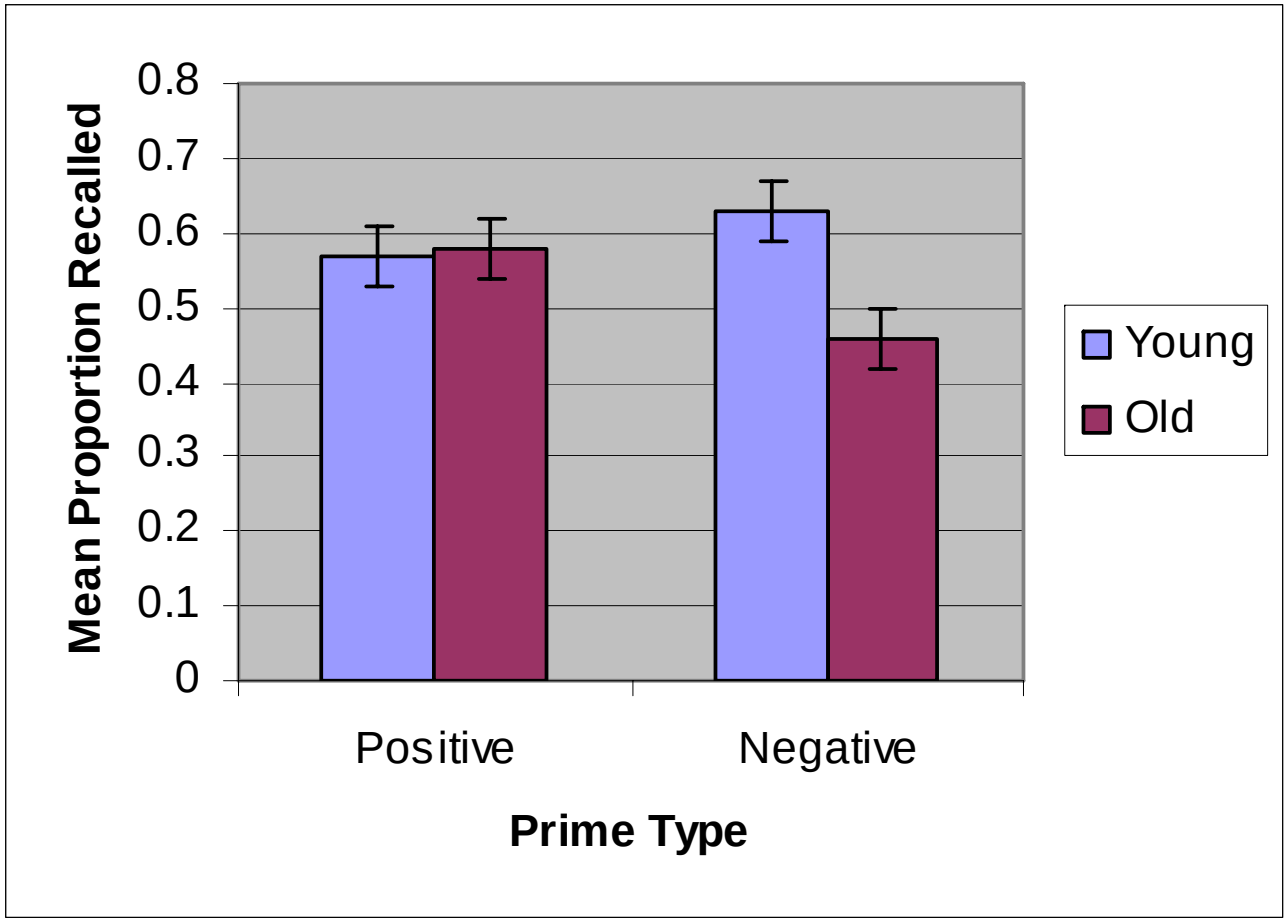


Harris, Negash, Howard, & Howard, *Cognitive Neuroscience Society Meetings*, 2003

Attitude Matters

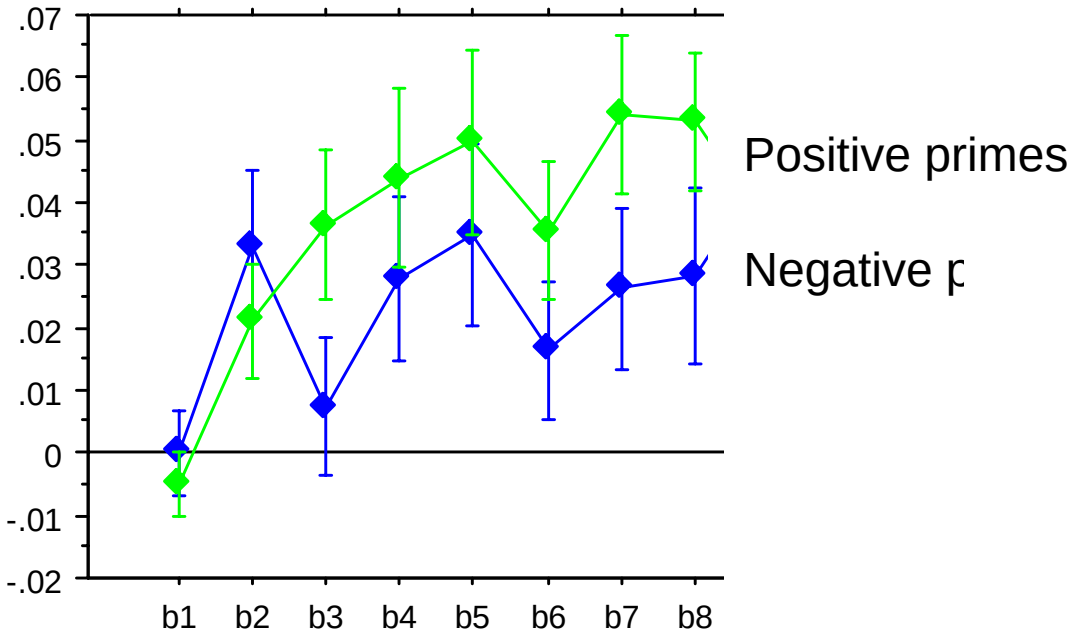
- Stereotype Activation
- Subliminally prime with either:
  - Positive primes: *sage, learned, wise*
  - Negative primes: *dependent, confused, slow*

Stereotype Activation Declarative Memory



From Hess, Hinson, & Statham, *Psychology & Aging*, 2004

Stereotype Activation Procedural Learning



From Ari, Filak, Howard, Howard, & Hess,
Association for Psychological Science Meetings, 2006

Implications

- Aging changes the mind & brain
  - But not drastically & not all components
- Some means of maximizing learning same for all ages
  - Mnemonics
  - Spaced retrieval
- Awareness of differences can inform learning & teaching, e.g.,
  - Time of day
  - Attitudes of teacher and learner