Aging and Memory
PSYC 461: LEARNING & MEMORY
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Does aging affect memory?

- B.F. Skinner (1904-1990)
  - Major publication, *Verbal Behavior* (1975), at age 71!
  - APA address (1990): [https://www.youtube.com/watch?v=Bf-GKbcSFNo](https://www.youtube.com/watch?v=Bf-GKbcSFNo)
  - Older adults "can design a world in which we can behave reasonably well in spite of our deficiencies."
    - Umbrella example
What to discuss today

- Ways to study aging effects
- Effects of healthy aging
- Theoretical explanation of healthy aging effects in memory
  - Specific deficits support specific theoretical explanations
- Disorders of Memory

Ways of Studying Aging

- Longitudinal
  - Cons
    - Mortality/Attrition
    - Expensive/Time Consuming
    - Practice vs. Aging Effects
  - Pros
    - Precursors of diseases/disorders!
    - Prevention
Ways of Studying Aging

- Cross-Sectional
  - Cons
    - Cohort vs. Aging Effects
    - Learn nothing about precursors
  - Pros
    - Cheaper/faster!
    - Can study cohort effects

Ways of Studying Aging

- Do them both!
- Seattle Longitudinal Study (c.f., K. Warner Schaie)
Memory Systems Review

Memory Systems

- **SENSORY REGISTER**
  - Quick Scan for Information
  - Decoding
  - Rehearsal
  - Encoding

- **WORKING OR SHORT-TERM MEMORY**
  - Process
  - Store
  - Recall

- **LONG-TERM MEMORY**

Figure 2-2a. Information processing within the sensory register, working or short-term memory, and long-term memory includes complex encoding, storing, saving, and recall functions.

Effects of Healthy Aging

- **Short-Term Memory (Working Memory)**
  - Craik (1986)
    - Memory vs. Alphabetizing
    - Older golfers
  - Salthouse et al. (1984)
    - Multitasking
  - Rubin & Bernsten (2006)
    - “only as old as you feel”
Effects of Healthy Aging

- Long-Term Memory
  - Kemper (1990): Diary Study
    - Vocabulary (Semantic) Loss
  - Foos & Sarno (1998)
    - Older adults better at naming states if not timed

Theoretical Explanations

- Processing Speed Hypothesis (e.g., Salthouse, 1996)
  - Perceptual Slowing
  - “A canary can sing”: Verification times slower (Baddeley et al., 1992)
  - Dividing Attention (Craik & Byrd, 1975)

- Associative Deficit Hypothesis (e.g., Naveh-Benjamin, 2000)
  - Paired associate learning
  - Recollection vs. Familiarity
  - Recall vs. Recognition
A case of Prospective Memory

- Event-Based Prospective Memory (c.f., McDaniel & Einstein, 2005)
- Time-Based Prospective Memory (c.f., Marsh)

- Self-initiated processing vs. environmental support (Craik, 1986)
  - Older adults worse at TBPM than EBPM (Park et al., 1997)

- Naturalistic vs. Lab Tasks (Rendell & Craik, 2000)
- Motivation? Emotion (Clark-Foos et al., 2009)

Self-Fulfilling Prophecy

- Attribution Errors
  - A Vicious Cycle

  Metacognitive Belief: My Memory Sucks

  Impaired Encoding and Retrieval

  Anxiety disrupts Working Memory

  Anxiety during Memory Encoding and Retrieval

  Anxiety disrupts working memory
Neurological Changes

- **Hippocampus Volume**
  - 20-30% reduction by 80 years old (Squire, 1987)

- **Slower Processing Speed** (Pelosi & Blumhardt, 1999)
  - P300 slows by 2 ms for every year we age

- **Less Dopamine** (Antonini et al., 1993)
  - 5-10% decrease every decade

Disorders of Memory

- **Dementias and Impacts on Memory**
  - Alzheimer’s
  - Parkinson’s
  - Huntington’s
  - Frontotemporal dementia (Pick’s disease)

- **Anxiety & Stress**
- **Multiple Sclerosis**
Alzheimer’s

- Semantic and Episodic Loss
- Temporal Gradient
- Sentence substitution (Semantic loss)
  - Johnson & Hermann (1995)
- Neurofibrillary tangles (knots)
- Beta amyloid plaques (degrade axons)
- ApoE-1…ApoE-4
  - 2 is the best!

Quick Tips to Prevent Memory Loss in Healthy Aging

- By 2050, 20% of the population will be over 65!
- Cognitive and Emotional Health Project (NIH)
  - Most disorders affect cognitive health and explain most of the age-related changes in cognition
  
  “complete five crosswords a week and engage in regular social activity”