Memory

Memory performance depends on three stages:
- **Encoding**: learning
- **Storage**: retention
- **Retrieval**: finding information when needed

Code of information in memory:
- Verbal (acoustic)
- Visual-spatial (picture)
- Semantic (meaning)

Memory dissociations

- Short-term memory vs working memory vs long-term memory
  - Pure storage vs. storage plus processing
  - Digit recall vs. reading span task
- Semantic vs episodic
  - Knowledge vs specific learned event
  - Vocab test vs list recall test
- Implicit vs explicit
  - Effortful and conscious recollection vs memory without awareness
  - Recognition test (multiple choice) vs perceptual identification

Explicit vs. Implicit memory

- **Explicit memory**
  - Effortful, conscious recollection
  - Memory tasks:
    - Recall
    - Cued-recall
    - Recognition
- **Implicit memory**
  - Remembering without awareness
  - Memory tasks:
    - Word-stem or word-fragment
    - Perceptual identification
    - Repetition priming

Implicit measures

- Word-stem or fragment completion
  - See list of words (e.g. rose)
  - Fill-in with first thing that comes to mind (e.g. r__e)
- Word identification (perceptual identification)
  - See list of words
  - Word flashed (38ms), asked to identify it
- Repetition priming
  - See list of words (e.g. fruit)
  - Judge if correct pair (e.g. fruit – apple or fruit – dog)
  - Faster when previously exposed to word

Read these *non-famous* names

- Valerie Marsh
- Sebastian Weisdorf
- Linda Whalen
- Adrian Marr
- Lucca Richards
- Daniel Tucker
- Harold Evans
- Kylie Shea
- Charlie McFadden
Famous or non-famous?
- Don Imus  F
- Luca Richards  F
- Minnie Pearl  F
- Sebastian Weidorf  NF
- Valerie Marsh  NF
- Bonnie Blair  F
- Tim Robbins  F
- Daniel Tucker  NF
- Harold Evans  NF
- Roger Clemens  F
- Charlie McFadden  NF
- Linda Whalen  NF
- Pierce Brosnan  F
- Adrian Marr  NF
- Chris Rock  F
- Jon Secada  F

Jacoby’s: Misinformation effect

- False fame effect
  - Effect of familiarity on recollection
  - Explicit and implicit memory can work together for better memory
  - Or can work against each other to create errors
  - Ironic effect of implicit memory

- “I told you so” scam
  - Guessing
  - Rely on familiarity, not recollection

False memory study: Recall only after I have given the signal, “Go”.

<table>
<thead>
<tr>
<th>55% BREAD</th>
<th>SWEET</th>
<th>SLEEP</th>
<th>CHAIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butter</td>
<td>Candy</td>
<td>Bed</td>
<td>Table</td>
</tr>
<tr>
<td>Food</td>
<td>Bake</td>
<td>Rest</td>
<td>Sit</td>
</tr>
<tr>
<td>Eat</td>
<td>Sugar</td>
<td>Tired</td>
<td>Legs</td>
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<tr>
<td>Sandwich</td>
<td>Taste</td>
<td>Dream</td>
<td>Seat</td>
</tr>
<tr>
<td>Lunch</td>
<td>Tooth</td>
<td>Night</td>
<td>Desk</td>
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<tr>
<td>Milk</td>
<td>Honey</td>
<td>Blanket</td>
<td>Wood</td>
</tr>
<tr>
<td>Jelly</td>
<td>Chocolate</td>
<td>Snore</td>
<td>Cushion</td>
</tr>
<tr>
<td>Crust</td>
<td>Good</td>
<td>Nap</td>
<td>Hard</td>
</tr>
<tr>
<td>Slice</td>
<td>Cake</td>
<td>Peace</td>
<td>Rocking</td>
</tr>
<tr>
<td>Toast</td>
<td>Pie</td>
<td>Yawn</td>
<td>Bench</td>
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</tbody>
</table>

False memories

- Roediger & McDermott (1995)
- DRM list learning paradigm: semantically similar
- False memory for critical lure (40%)
  - Middle serial position for studied words: Recall 40%
  - Recognition (below): 4 = sure old, 3 = probably old

<table>
<thead>
<tr>
<th></th>
<th>Old</th>
<th>New</th>
<th>Rating</th>
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<tbody>
<tr>
<td>Studied</td>
<td>.75</td>
<td>.11</td>
<td>.86</td>
</tr>
<tr>
<td>Unrelated</td>
<td>.00</td>
<td>.02</td>
<td>.02</td>
</tr>
<tr>
<td>Weak lure</td>
<td>.04</td>
<td>.17</td>
<td>.21</td>
</tr>
<tr>
<td>Critical lure</td>
<td>.58</td>
<td>.26</td>
<td>.84</td>
</tr>
</tbody>
</table>


- Question
  - “whether the higher rates of false memories in older adults occurred because they were less likely to monitor the source of the CL ("critical lure") during remembering.”

- Method – experiment 1
  - Phase 1
    - List (15 words); 30s distractor; recall (any order w/o guess)
  - Phase 2
    - Rate confidence of recalled words (5pt scale)
  - Phase 3
    - Write any words that came to mind but didn’t previously say
    - Examined recalled lists to do same task
  - Phase 4
    - Rating for words experimenter did not say (5pt scale)


Experiment 1 results
Rybash & Hrubi-Bopp (1997)

- Participants: 1st graders, college students, older adults
- Study phase: 10 DRM lists (12 words/list)
- After each list:
  - Generate condition: word associated with list
  - Control condition: word associated with misc. category
- Test phase: free recall (avoid guessing)
- HYP:
  - Generate: reduce FM if source memory intact

<table>
<thead>
<tr>
<th>FALSE Targets</th>
<th>TRUE Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generate</td>
<td>Control</td>
</tr>
<tr>
<td>Children</td>
<td>.52</td>
</tr>
<tr>
<td>College</td>
<td>.42</td>
</tr>
<tr>
<td>Older</td>
<td>.58</td>
</tr>
</tbody>
</table>

Autobiographical memories

- Memory for names, faces, events, info
- First memories
- Flashbulb memories

Bahrick, Bahrick, & Wittlinger (1975)

- “Fifty years of memory for faces and names”
- 17 – 74 years old: retention for HS graduating class

First memories / Remote memory

- What is your first memory of your life?
  - First memory approx when 4-7yrs old
    - Infantile amnesia
    - No significant age differences
      - Yng avg 3.3 yrs old
      - Old avg 4.4 yrs old
  - Age of first memory correlated with intelligence!
    - FM correlated with backward digit span
    - FM correlated with vocabulary test

St. Jacques et al. (2011)

- Autobiographical Memory and Elaboration
- Older adults recall less episodically rich autobiographical memories (AM)
Reminiscence bump

Method:
- Ask for memory associated with word (e.g. boat) and ask for age when event occurred

Reminiscence bump

- Three reasons to explain effect
  - Life-narrative hypothesis
    - Develop identity and schemas
  - Cognitive hypothesis
    - Brain is more efficient
  - Cultural life script
    - Novel, unique, important experiences
- Schrauf & Rubin
  - Emigrants: Bump at 16-24 and again when emigrated
  - Interpretation?

Schuman & Scott (1989)

- “the most important public or political event of past 70 years”

Janssen, Chessa & Murre (2005)

- Examine effects of age, gender, education and culture on reminiscence bump
- 2000 participants from US and Netherlands from 11-70 yrs old (via internet)
- Reminiscence bump in all age groups
- Bump at age 15-18 for men; 13-14 for women
- Age group and education didn’t influence bump


- Ss aged 20-94 asked how old when felt most:
  - Afraid, proud, jealous, in love, angry
- Asked when experienced most important event and if it was positive or negative
- Result: bump for positive not negative events
- Conclusion: culturally shared life scripts for positive, not negative, events

Autobiographical memory over lifespan

- Ask for memory associated with word (e.g. boat) and ask for age when event occurred
- Remember recent events and events from 11 – 20 years old (Rubin, 1987)

Recency effect

Reminiscence bump

Subject’s age in 1989

If 60 in 1989:
Ss was 11-15 during WWII
If 30 in 1989
then Ss was 11-15 during Vietnam

WwII         Vietnam
Flashbulb memories

- Highly detailed, vivid memory for event
  - Surprising, emotional (pos or neg), important event
- What is remembered (Brown & Kulik, 1977)?
  - Where were you?
  - What were you doing when found out?
  - Who told you? Or how you found out
  - How did you and others feel?
  - What was it like afterwards?
- Research:
  - Accuracy
  - Effect of emotionality
  - Effect of rehearsal
  - Direct or non-direct experience
- Are flashbulb memories different than other memories?
- Age differences are NOT specific to flashbulb memories

Cohen et al (1994)

- Event: Nov 22, 1990 Thatcher resignation as British prime minister (had been for 11yrs; surprising event)
- Method: Yng (22yr) & older (72yr) Ss recall personal memory within 10-14 days of event; retested approx. 1mo later
- Scoring memory match: 0 forgot/new detail, 1 basically correct; 2 exactly same
- Flashbulb memory if scores on 5 details is mostly exact match
  - Yng: 90% flashbulb memory
  - Older: 42% flashbulb memory

Davidson, Cook & Glisky (2006)

- Event: 9/11
- Method: Yng and Older (high and low frontal lobe functioning) recalled 9/11 and “most interesting event” in days before 9/11
  - 1st test 3-21 days after 9/11
  - 2nd test 1yr later (surprise)
- Same scoring method
- Results: All Ss retained ~75% of 9/11 info a yr later
  - Only 65% of yng able to recall interesting event, 42% of old retained everyday memory
- Mixed findings regarding age differences in flashbulb memories

Prospective memory (PM)

- Remember to do something in future
- Methods:
  - Naturalistic vs. laboratory-based
  - Event-based vs. time-based
    - Event-based: when see target word “rake” press the key
    - Time-based: 1 week send back postcard
  - IVs: difficulty of ongoing task, delay, repetition of PM task, type of cue
- Findings:
  - Henry et al. (2004) – meta-analysis
    - Yng outperform old on time- and event-based PM, although time-based PM creates larger age difference
    - Older perform better than yng in naturalistic studies for event or time-based PM

Graf & Uttl (1993): Episodic spatial memory

- Exhibit on human memory at local science center
- Intentional vs. incidental encoding
  - 15yrs – 74yrs
- Fill-in letters in picture to right (photo book)
- DV: # correct

Graf & Uttl (1993): Episodic spatial memory

- Episodic memory age difference in real-life situation
Strategies to improve memory

- Strategies rely on:
  - Attention
  - Connections to already stored info
  - Visualization
  - Good retrieval cues
- EIEIO framework
  - Explicit vs implicit
  - External vs internal memory aid
- Elaborative rehearsal
- Chunk information
- Repetition and spacing effect
- Memory drugs (Ginkgo!)
