Memory

Memory –

– Capacity to retain & retrieve info
– Structure that account for this capacity
– Give us our past and guides our future
– Confers competence
– Gives us a sense of personal identity
  • We are a sum of our recollections
  • Sense of coherence and meaning
50 First Dates
50 First Dates?

- Patient H. M.
- seizures
- Remove most of hippocampus
- Remove part of amygdala
- Islands of memory in vast sea of forgetting
- Thinks he is younger than he is
- Can not recognize a picture of self
Manufacture of Memory

• Ancient philosophers
  – Memory as soft wax tablet
  – Preserve anything than mad an imprint on it
• Current times
  – Tape recorder
  – Movie camera
• Both are wrong
  – Memory is selective
  – If not filled with too much information
Manufacture of Memory

Sir Frederic Bartlett (1932)

• Memory is reconstructive
  – Simple info by rote
  – Complex: alter to make sense

• Told subjects stories about different culture
  – Delete or change parts that did not make sense

• People draw on many sources
  – Remember part
  – Remember photo or video of another part
  – So….piece it together

• Source misattribution – inability to distinguish an actual memory or an event from information you learned about the event elsewhere
  – H. M. and red wrapper
Flashbulb Memories
Fading Flashbulb

• Flashbulb memories
  – Vivid seems like photographic
  – Really remember the *gist* of event

• Study
  – 54 college students events of and around 9/11
  – 1 week later; 6 weeks later; 32 weeks later
  – Each felt confident in vivid memory than mundane
  – Although each suffered same amount of inconsistencies
  – In reconstruction $2 + 2 = 5$

• **Confabulation** – confusion of an event that happened to someone else with one that happened to you or belief that you remember something when it never actually happened
Conditions of Confabulations

1. Thought, hear, or told about the imagined event many times
   - Colorful story can see in minds eye
   - Imagination inflation – more you think more believe

2. The image of the event contains a lot of details that make it feel real
   - Real = more details
   - Can think about it often = seem real

3. The event is easy to imagine
   - Easy = real memory
   - Difficult = cue that may not be real
   - Imagination inflation – false seem real
NEVER FORGETS
SOMETIMES FORGETS
ALWAYS FORGETS
Quick Quiz

1) Memory is like (a) was tablet, (b) gigantic file cabinet (c) a video camera (d) none of the above?

2) True or false: because they are so vivid, flashbulb memories remain perfectly accurate over time?

3) Which one of the following confabulated “memories” might a person be most inclined to accept as having really happened to them and why?
   a) Getting lost in a shopping center at age 5
   b) Taking a class in astrophysics
   c) Visiting a monastery in Tibet as a child
   d) Being bullied by another kid in the 4th grade
If you watch TV shows such as *Law & Order*, you might assume that lineups help witnesses identify criminals. But, in fact, lineups can mislead witnesses, who may wrongly identify a person simply because he or she resembles the actual culprit more closely than the other people standing there do. Psychologists are now studying other methods, such as having witnesses look at photos of suspects one at a time without being able to go back to an earlier photo.
Eyewitness on Trial

• Not always reliable
• Focus on ethnicity not detail
  – He was black; she was white, they were Arab
• Memories influenced by suggestion
  – View video of car crash
    • How fast was car going when they **hit** each other?
    • Subtle change in wording:
      – Smashed = 40.8
      – Collided = 39.3
      – Bumped = 38.1
      – Hit = 34.0
      – Contacted = 38.1
    – **Leading question** – suggestive comments and misleading information affect peoples memories for self and events
Saw photo of straight hair
Heard report of curly hair

1/3 reconstructed w/ misleading detail of curly hair
5% contained curly hair that was not mentioned
Children’s Testimony

1. **Analyze assumptions and biases**
   - Some think children suggestible so unreliable
   - Others children never lie about abuse

2. **Ask a better questions**
   - Do children ever lie
   - Under what circumstances are children suggestible
   - Found depends on questioning
   - Leading questions = false information
   - Leading question + influence technique = +++ false
   - Influence technique = “other kids said”, praise / threat

3. **Do not oversimplify**
   - Some kid not swayed at all (verbal skills, self control)

4. **Examine a widely held assumption**
   - Children’s memory have variables
Study

• Young man visited pre-school
  – Read a story and handed out treats
    • Later questioned what happened
    • 1 group leading questions
      » “Did he bump the teacher?”
      » “Did he throw a crayon?”
    • 2\textsuperscript{nd} group leading questions and influence technique
      – “Other kids said…”
      – Praise for desired response
      – Scold for undesired response
• So….truthful testimony = NO leading questions!
Quick Quiz

A) T or F: Mistaken identifications are more likely when a suspect’s ethnicity differs from that of the eyewitness, even when the witness feels certain about being accurate.

B) Research suggests that the best way to encourage truthful testimony by children is to:

1. Reassure them that their friends have had the same experience
2. Reward them for saying that something happened
3. Scold them if you believe they are lying
4. Avoid leading questions

C) In psychotherapy, hundreds of people have claimed to recall long-term memories of having been part of satanic rituals involving animals and human torture and sacrifice. Yet investigators and the FBI have been unable to confirm any of these reports. Why?
Measuring Memory

• **Explicit memory** –
  – Conscious;
  – Intentional recollection of event or piece of information

• **Recall** –
  – Ability to retrieve & reproduce from memory previous material
  – Trivial pursuit or short answer on test

• **Recognition** –
  – Ability to ID previously encountered material
  – Multiple choice or T / F on test

• **Implicit memory** -
  – Unconscious retention in memory
  – Effect of previous experience/info on current thoughts/actions

• **Priming** -
  – Method form measuring implicit memory
  – Read/listen to info & later tested on effect on performance

• **Relearning** –
  – Learn something again; quicker 2nd time = must be remembering
3 Processes of Memory

- **Encoding** – convert to form understand
- **Store** – retain over time
- **Retrieval** – recover for use
3 Models of Memory

• Information processing (Three Stage)
• Parallel distribution processing (PDP)
• Level-of-processing model
Information Processing Terms

- Input
- Output
- Accessing
- Information retrieval
- Cognitive schema – mental networks of knowledge
Information Processing Memory Model

3 Stage Process Model

1. Sensory register
   • Retains incoming info for 1-2 seconds

2. Short term memory
   • Holds limited info for up to 30 seconds

3. Long-term memory
   • Longer storage; few minutes to decades

• Info can pass from the sensory register to short term memory and in either direction between short term and long term
3 STAGE MODEL

- **Sensory memory**
  - All information lost within a second or so.

- **Short-term memory**
  - Unrehearsed information is lost in about 15 to 30 seconds.

- **Long-term memory**
  - Information is retained indefinitely although some information may be difficult to retrieve.

- **Encoding**
  - External sensory events

- **Selective attention**

- **Maintenance rehearsal**

- **Consolidation**

- **Retrieval**
Information from environment

Sensory register
1. Large capacity
2. Contains sensory information
3. Very brief retention of images (up to 1/2 second for visual; 2 seconds for auditory)

Short-term memory (STM)
1. Limited capacity
2. Brief storage of items (up to 30 seconds if no rehearsal)
3. Involved in conscious processing of information

Long-term memory (LTM)
1. Unlimited capacity
2. Storage thought by someone to be permanent
3. Information organized and indexed

Retrieved

Forgotten
Transferred
Forgotten
Transferred/Retrieved
Three Stage Model

1) **Sensory Register**: Fleeting Impressions
   - Entry way for memory
   - All incoming info stops here
   - Includes separate memory subsystems
     - Visual ½ second
     - Auditory up 2 seconds
   - A holding bin
   - Retains information in a highly accurate form until we select items for attentions (use of long term)
   - What does not goes to short term memory is lost forever
     - Message written in disappearing ink
   - Fleeting nature of incoming info = no duplication
The 3 Stage Model

2) Short term memory
   – Limited capacity
   – Retains info temporarily (30 seconds – 2 min)
   – Info no longer an exact sensory image
     • Encoded = a word or phrase
   – Either transfers into long term or is lost forever
   – H. M. can hold together for a while then see problem
     • Not able to transfer short term to long term
   – Used to hold information retrieved from long term for temporary use
The 3 Stage Model
Short Term (continued)

• The Leaky Bucket
  – If some info did not “leak out” it would overflow
  – Magical number of 7 (+/-) 2
    • Zip codes
    • Telephone numbers
  – Some say 2-10 other 4

• Chunking
  – Meaningful unit of information
  – Composed of smaller units
    • FBI
    • CSI
The 3 Stage Model
Short Term (continued)

• Working memory
  A. Short term memory plus
  B. The mental process that controls the rehearsal and retrieval if information from long term memory and interpret that information appropriately depending on task

• Arithmetic problem
  – Working memory contains numbers and instructions for doing the operation and carries out those operations and retains the intermediate results from each step
  – Also ability to control attention & avoid distraction
  – maintain information and retrieve it easily

• Good working memory
  – Reading comprehension; follow directions; note taking
The 3 Stage Model

3) Long Term Memory – final destination
   – long term storage of information
a) Semantic categories
   • Chair belongs to furniture
b) Clusters
   • Chair, table, dog, cat, red, blue
c) Sound
   • “tip of my tongue”
     – Name of famous persons; books etc
     – People come up with similar sounding names
d) Familiarity, association and relevance
Conceptual Grid of LTM
The 3 Box Model
Long Term Memory (Continued)

Contents of Long Term Memory
(Knowing How & Knowing What)

1. Procedural memories
   – *Knowing how*
   – Memories for the performance of action or skill
     • Comb hair; do a puzzle

2. Declarative memories
   – *Knowing what*
   – Memories of fact, roles, concepts and events
   – semantic memories –
     • general knowledge; fact rules; concepts and proposition
   – episodic memories –
     • personally experienced events and the contexts occurred
4 Types of Long Term Memories

- **LONG-TERM MEMORY**
  - **PROCEDURAL MEMORIES**
    - (“Knowing how”)
  - **DECLARATIVE MEMORIES**
    - (“Knowing that”)
  - **SEMANTIC MEMORIES**
    - (General knowledge)
  - **EPISODIC MEMORIES**
    - (Personal recollections)
Parallel Distribution Processing

Parallel Distribution Processing (PDP)

– Connectionist model
– Knowledge is represented as connections among thousands of interacting processing units
– Distributed in a vast network all operating in parallel.
– Memory processes are proposed to take place at the same time over a large network of neural connections.
Level of Processing Model

- Information that is more “deeply processed” or processed according to its meaning rather than just the sound or physical characteristics of the word or works, will be remembered more efficiently and for a longer period of time.
Quick Quiz

1) James solved a crossword puzzle a few days ago. He no longer recalls the words in the puzzle, but while playing a game of Scrabble, he unconsciously tend to form words that were in the puzzle, showing the he has __________ memories of some of the words.

2) The 3 basic memory process are ____ , storage and ____

3) Do the preceding 2 questions ask for recall, recognition or relearning (what about this question)?

4) One objection to traditional information processing theories of is that, unlike most computers, the brain performs many independent operations ____ or ____?
   A) Simultaneously or in parallel
   B) in recall or recognition
   C) implicit or explicit
   D) Priming or recency
Short Term to Long Term

• Serial Position Effect
  – Tendency to recall the first and last items on list over middle items
  – Primacy effects – first on list
  – Recency effect – last on list
Quick Quiz

1) The _______ holds images for fraction of a second.

2) For most people the abbreviation USA consists of  A) 1  B) 3  C) many D) no informational chunk(s).

3) Suppose you must memorize a long list of words that included the following: desk, pig, gold, dog, chair, silver, table, rooster, bed, copper and horse. If you can recall the words in any order you wish, how are you likely to group them in recall? Why?

4) When you roller-blade, are you relying on procedural, semantic or episodic memory? How about when you recall the months of the year? Or when you remember falling while roller-blading on an icy January day?

5) If a child is trying to memorize the alphabet which sequence should present the greatest difficulty: Abcdefg, klmnopq or tuvwxyz?
Biology and Memory

• Short Term Memory
  – Neurons temporally alter ability to release neurotransmitters

• Long Term Memory
  – Long term structural changes

• Long Term potentiating
  – Long lasting increase in strength of synaptic responsiveness
  – a biological mechanism of LTM

• Consolidation
  – Process where LTM becomes durable & stable
NICE TRY, BUT "MID-TERM MEMORY LOSS" ISN'T RECOGNIZED BY THE MEDICAL COMMUNITY!
Locating Memories

- Implicit = Blue
- Explicit = Orange
How We Remember

• Encoding
  – Correctly encode in the first place

• Rehearsal
  – Maintenance Rehearsal
    • Rote repetition to maintain availability
  – Elaborative Rehearsal
    • Associate new information w/ already stored info &
      analysis of new info to make it memorable
  – Deep Processing
    • Encoding of info
    • Processing of meaning rather than simply the physical or
      sensory features of a stimulus

• Mnemonics
  – Strategies or tricks to improve memory; verse or
    formula
    • Every good boy does fine
    • Thirty days hath September, April, June and November
"YOU SIMPLY ASSOCIATE EACH NUMBER WITH A WORD, SUCH AS 'TABLE' AND 3,476,029."
Well, for crying out loud! Al Towbridge! What is it, nine years, seven months, and twelve days since I last ran into you? Ten-thirty-two a.m., a Saturday, Felcher's Hardware Store. You were buying sealer for your blacktop driveway. Tell me, Al, how did that sealer work? Did it hold up?

Mr. Total Recall
Why We Forget

1. Decay
   – Information disappears if not accessed (STM)

2. Replacement
   – New info can wipe out old info

3. Cue-dependent Forgetting
   – Inability to retrieve info stored in memory because of insufficient cues for recall (retrieval cues)
   – State-dependent Learning
     • Remember when the rememberer is in the same physical or mental state as during the original learning or experience
       – Learn to play pool while intoxicated
     – Mood congruent
       • Remember experiences that are consistent with one’s current mood or forget experience that are not
       – Depressed only remember other depressing times
Why We Forget

4. Interference
   - **Retroactive** – forgetting that occurs when recently learned material interferes with the ability to remember similar material stored previously
   - New interferes with old
   - “New names at party”

   ![Retroactive Interference Diagram]

   - **Proactive** – forgetting that occurs when previously stored material interferes with the ability to remember similar, more recently learned material
   - Old interferes with new
   - “You can’t teach an old dog new tricks”

   ![Proactive Interference Diagram]
Why We Forget

5) Repression
   – Psychoanalytic theory
   – Selective, involuntary pushing of threatening or upsetting if into the unconscious

• Amnesia
   – the partial or complete loss of memory for important personal information
   – From brain injury, brain disease
     • Psychogenic Amnesia
       – Forgetting is psychological
       – Escape feelings of embarrassment, guilt or shame
     • Traumatic Amnesia = Repression
       – To bury traumatic event(s)
I recently recovered a crucial repressed memory. But then I forgot it.
Quick Quiz

1) When reading the novel Even Cowgirls Get the Blues years ago, Wilma became a fan of the author, Tom Robbins. Later, she developed a crush on actor/director Tim Robbins, but every time she tried to recall his name, she called him “Tom”. Why?

2) When a man at his twentieth high-school reunion sees his old friends, he recalls incidents he thought were long forgotten. Why?

3) What mechanism other than repression could account for a person’s psychogenic amnesia?

Word Bank for questions 1 and 2:

- Retrograde interference
- Proactive interference
- Retrieval cues
- Repression
Childhood Amnesia

• The inability to remember events and experiences that occurred during the first two or three years of life.

1. **Lack of sense of self**
   - No autobiographical memory of self until we have a self to remember

2. **Impoverished encoding**
   - Limited vocabularies and language skills

3. **A focus on the routine**
   - Focus on routine and familiar aspects of experience

4. **Children’s ways of thinks about the world**
   - Cognitive schemas used by preschoolers are very different from those of older children and adults
Memory and Narrative: Stories of Our Lives

Narratives to simplify and make sense of our lives have profound influences on our plans, memories, love affairs, hatred, ambitions and dreams.

“And here I am at two years of age. Remember? Mom? Pop? No? Or how about this one. My first day of school. Anyone?”
Quick Quiz

Don’t blame childhood amnesia if you have forgotten the answers to these questions.

A. Name four possible cognitive explanation for childhood amnesia.

B. Why are themes in our life “stories” so important?