EQ - What are the tasks involved in memory retrieval? What are the different types of forgetting?

Agenda:
1. Daily Sheet
2. Retrieval Tasks
3. Memory Notes Part 2
4. Memory in Three’s Brochure
5. Crossword Puzzle

Table of Contents:
123. March 2
124. Memory Notes Part 2
125. Memory in 3’s Brochure
126. Memory Crossword

Homework: Finish your memory crossword and study for Memory Quiz!
Which of the following increases the chance that an individual will remember a telephone number that has been called several times within a short period?

a. spacing  
b. retrieval  
c. rehearsal  
d. free recall  
e. spontaneous recovery

According to the information-processing view of memory, the first stage in memory processing involves:

a. retrieval  
b. storage  
c. rehearsal  
d. encoding  
e. transfer

An individual’s ability to remember the time he first swam the length of a swimming pool is most clearly an example of which of the following kinds of memory?

a. semantic  
b. flashbulb  
c. procedural  
d. priming  
e. episodic
Key Vocabulary

**Context-Dependent Memory** - memories are more easily remembered when we are in the same setting as we were when we stored them.

**State-Dependent Memory** - memories are more easily remembered when we are in the same emotional or psychological state as we were when we stored them.

**Serial Position Effect** - the idea that we remember things based on where they appear in a series.

**Decay** - the normal fading away of a memory over time.

**Interference** - when information gets in the way of the storage of other information.

**Amnesia** - the loss of large chunks of memory.

**Repression** - the idea that we bury memories that are painful or traumatic.
List the names of the seven dwarves.
Select the names of the seven dwarves!

<table>
<thead>
<tr>
<th>Grouchy</th>
<th>Gabby</th>
<th>Fearful</th>
<th>Sleepy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smiley</td>
<td>Jumpy</td>
<td>Hopeful</td>
<td>Shy</td>
</tr>
<tr>
<td>Droopy</td>
<td>Dopey</td>
<td>Sniffy</td>
<td>Wishful</td>
</tr>
<tr>
<td>Puffy</td>
<td>Dumpy</td>
<td>Sneezy</td>
<td>Lazy</td>
</tr>
<tr>
<td>Pop</td>
<td>Grumpy</td>
<td>Bashful</td>
<td>Cheerful</td>
</tr>
<tr>
<td>Teach</td>
<td>Shorty</td>
<td>Nifty</td>
<td>Happy</td>
</tr>
<tr>
<td>Doc</td>
<td>Wheezy</td>
<td>Stubby</td>
<td></td>
</tr>
</tbody>
</table>
Lessons from each of these demonstrations:
1. our **storage** and **recall** capacity is virtually unlimited
2. our capacity for **recognition** is greater than our capacity for recall
3. **relearning** can highlight that memories are there even if we can’t recall forming them
In the late 1800s, Hermann Ebbinghaus studied another measure of memory functioning: how much time does it take to relearn and regain mastery of material? He studied the memorization of nonsense syllables (THB YOX KVU EHM) so that depth of processing or prelearning would not be a factor. The more times he rehearsed out loud on day 1, the less time he needed to relearn/memorize the same letters on day 2.
Priming: Retrieval is Affected by Activating our Associations

- **Priming** triggers a thread of associations that bring us to a concept, just as a spider feels movement in a web and follows it to find the bug.
- Our minds work by having one idea trigger another; this maintains a flow of thought.

Priming Example: Define the word “bark.”

*Now* what is the definition of “bark”?
The Power of Priming

- Priming has been called “invisible memory” because it affects us unconsciously.
- In the case of tree “bark” vs. dog “bark,” the path we follow in our thoughts can be channeled by priming.
- We may have biases and associations stored in memory that also influence our choices.

Study: People primed with money-related words were less likely to then help another person.

Study: Priming with an image of Santa Claus led kids to share more candy.

Study: people primed with a missing child poster then misinterpreted ambiguous adult-child interactions as kidnapping.
Context-Dependent Memory

- Part of the web of associations of a memory is the context. *What else was going on at the time we formed the memory?*

- We retrieve a memory more easily when in the same context as when we formed the memory.

  → Did you forget a psychology concept? Just sitting down and opening your book might bring the memory back.

Words learned underwater are better retrieved underwater.
State-Dependent Memory

- Our memories are not just linked to the **external** context in which we learned them.
- Memories can also be tied to the **emotional state** we were in when we formed the memory.
- Mood-congruent memory **refers to the tendency to selectively recall details that are consistent with one’s current mood.**
  → This biased memory then reinforces our current mood!

Memories can even be linked to physiological states:

“I wonder if you’d mind giving me directions. I’ve never been sober in this part of town before.”
The Serial Position Effect

Priming and context cues are not the only factors which make memory retrieval selective.

The serial position effect refers to the tendency, when learning information in a long list, to more likely recall the first items (primacy effect) and the last items (recency effect).

Which words of your national anthem are easiest to recall?

In what situation is the recency effect strongest?
Forgetting

Normal Forgetting:
• decay
• Interference

Extreme Forgetting
• Repression
• Amnesia
  • Retrograde
  • Anterograde
• Infantile

THAT FACE YOU MAKE
WHEN YOU REALIZE YOU HAD
HOMEWORK
In 1953, the removal of H.M.’s hippocampus at age 27 ended his seizures, but also ended his ability to form new explicit memories.

H.M. could learn new skills, procedures, locations of objects, and games, but had no memory of the lessons or the instructors. Why?

H.M. also retained memories from before the surgery. What is his condition called?

H.M., like another such patient, “Jimmy,” could not understand why his face looked older than 27 in the mirror. Why not?
The Two Types of Amnesia

Retrograde amnesia refers to an inability to retrieve memory of the past.

- Retrograde amnesia can be caused by head injury or emotional trauma and is often temporary.
- It can also be caused by more severe brain damage; in that case, it may include anterograde amnesia.

Anterograde amnesia refers to an inability to form new long-term declarative/explicit memories.

- H.M. and Jimmy lived with no memories of life after surgery.
- See also the movie Memento. Most other movie amnesia is retrograde amnesia.

Lifespan  ➔  Trauma/injury/surgery

R.A.: Old memories inaccessible  ➔  A.A.: No post-trauma memories formed
Infantile Amnesia

• We all have it!
• No episodic memories before the age of three
• Hippocampus is not fully formed yet
• BUT! We do have implicit memories... Why???
Penny Memory Test

Which of these has the design of an actual U.S. cent?

Retrieval test: what words and numbers, in which locations, are on the front of a U.S. one cent coin? This should be easy because it was in the book.

Recognition test: choose the correct design from among these pictures:
• If we got the penny image wrong, did we fail to **retrieve** the information?
• It could be that we never paid attention to the penny details and didn’t select them from sensory memory to hold in working memory.
• Even if we once looked at the penny and paid attention to it, we still didn’t bother rehearsing it and **encoding** it into long term memory.
Storage Decay

- Material encoded into long term memory will decay if the memory is never used, recalled, and re-stored.

- Decay is LTP in reverse (or like pruning). Unused connections and networks wither while well-used memory traces are maintained.

- Decay tends to level off. Memory for both nonsense syllables and Spanish lessons decays rapidly.

- However, what hasn’t decayed quickly tends to stay intact long-term.
Tip of the Tongue: Retrieval Failure

- Sometimes, the memory itself does not decay. Instead, what decays are the associations and links that help us find our way to the stored memory.
- As a result, some stored memories seem just below the surface: “I know the name...it starts with a B maybe...”
- AKA the “feeling of knowing” phenomenon
- To prevent retrieval failure when storing and rehearsing memories, you can build multiple associations, linking images, rhymes, categories, lists, and cues.
Interference and Positive Transfer

- Another downside of not forgetting is that old and new memories can interfere with each other, making it difficult to store new memories and retrieve old ones.

- Occasionally, the opposite happens. In positive transfer, old information (like algebra) makes it easier to learn related new information (like calculus).

- **Proactive interference** occurs when past information interferes (in a forward-acting way) with learning new information.
  
  - You have many strong memories of a previous principal, and this memory makes it difficult to learn the new principal’s name.
  
  - You had to change email passwords, but you keep typing the old one and can’t seem to memorize the new one.
Retroactive interference occurs when new stimuli/learning interferes with the storage and retrieval of previously formed memories.

- In one study, students who studied right before eight hours of sleep had better recall than those who studied before eight hours of daily activities.
- The daily activities retroactively interfered with the morning’s learning.
Motivated Forgetting

- Memory is fallible and changeable, but can we practice **motivated forgetting**, that is, **choosing to forget or to change our memories**?

- Sigmund Freud believed that we sometimes make an **unconscious** decision to **bury** our anxiety-provoking memories and **hide them from conscious awareness**. He called this **repression**.

- New techniques of psychotherapy and medication interventions may allow us to “erase” (prevent reconsolidation of) recalled memories.

Motivated forgetting is not common. More often:

1. recall is full of errors.
2. people try not to think about painful memories. If they fail to rehearse those memories, the memories can fade.
Why is our memory full of errors?

- Memory not only gets forgotten, but it gets constructed (imagined, selected, changed, and rebuilt).
- Memories are altered every time we “recall” (actually, reconstruct) them. Then they are altered again when we reconsolidate the memory (using working memory to send them into long term storage).
- Later information alters earlier memories.
- No matter how accurate and video-like our memory seems, it is full of alterations.

Ways in which our memory ends up being an inaccurate guide to the past:

- the misinformation effect
- imagination inflation
- source amnesia
- déjà vu
- implanted memories
The Misinformation Effect:

Incorporating misleading information into one’s memory of an event.

In 1974, Elizabeth Loftus and John Palmer asked people to watch a video of a minor car accident. The participants were then asked, “How fast were cars going when they hit each other?” Those who were asked, “...when the cars smashed into each other?” reported higher speeds and remembered broken glass that wasn’t there.
Implanted Memories

In one study, students were told a false story that spoiled egg salad had made them ill in childhood. As a result, many students became [even] less likely to eat egg salad sandwiches in the future.

In a study by Elizabeth Loftus, people were asked to provide details of an incident in childhood when they had been lost in a shopping mall. Even though there actually had been no such incident, by trying to picture details, most people came to believe that the incident had actually happened.

Lessons:
1. By trying to help someone recall a memory, you may implant a memory.
2. You can’t tell how real a memory is by how real it feels.

Imagination Inflation

- Simply picturing an event can make it seem like a real memory.
- Once we have an inaccurate memory, we tend to add more imagined details, as perhaps we do for all memories.
- Why does this happen? Visualizing and actually seeing an event activate similar brain areas.
Have you ever discussed a childhood memory with a family member only to find that the memory was:

- from a movie you saw, or book you read?
- from a story someone told you about your childhood, but they were kidding?
- from a dream you used to have?
- from a sibling’s experience?

If so, your memory for the event may have been accurate, but you experienced **source amnesia:** forgetting where the story came from, and **attributing** the source to your own experience.
Déjà vu (“Already seen”)

- Déjà vu refers to the feeling that you’re in a situation that you’ve seen or have been in before.
- We can feel very certain that we’ve seen a situation before even when we have not. This can be seen as source amnesia: a memory (from current sensory memory) that we misattribute as being from long term memory.
- Why does this happen? Sometimes our sense of familiarity and recognition kicks in too soon, and our brain explains this as being caused by prior experience.
- Because of dual processing: there is a slight delay in one of the processing messages going to our brains and we interpret this as having experienced it before
**Applying what we’ve learned about memory**

**Improving Memory to Improve Grades**

<table>
<thead>
<tr>
<th>Ways to save overall studying time, and build more reliable memory.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn the material in more than one way, not just by rote, but by creating many retrieval cues.</td>
</tr>
<tr>
<td>▪ Think of examples and connections (meaningful depth).</td>
</tr>
<tr>
<td>▪ Create mnemonics: songs, images, and lists.</td>
</tr>
<tr>
<td>Minimize interference with related material or fun activities; study right before sleep or other mindless activity.</td>
</tr>
<tr>
<td>Have multiple study sessions, spaced further and further apart after first learning the material.</td>
</tr>
<tr>
<td>Use chunking to break the material into smaller bits—this will help you remember it better.</td>
</tr>
<tr>
<td>Test yourself in study sessions: 1) to practice doing retrieval as if taking a test, and 2) to overcome the overconfidence error: the material seems familiar, but can you explain it in your own words?</td>
</tr>
</tbody>
</table>