Memory

The Three Threes
What is memory?

- Process by which we recall prior experiences, information, and skills learned in the past
How do you use memory?

- How do you recall things?
- Do you have any special techniques?
Human Memory is good when:

• Information on which attention is focused
• Information in which we are interested
• Information that arouses us emotionally
• Information that fits with our previous experiences
• Information that we rehearse
Superior Autobiographical Memory

Amazing Memory
Three Kinds of Memory
Episodic Memory

- Memory of an event
- Flashbulb Memories
- Remember special memories and things we pay more attention to
Generic Memory

- Who was the first president?
- When did you learn that information?
- General knowledge
- Know the what, not the when
Procedural

• Skills
• How to throw a ball
• How to ride a bike
Three Processes of Memory
1. Encoding

- Storing data – change the information
- Translate it into a form to be stored
Try to remember these letters. No writing them down.
How did you try to remember them?
Types of Coding

- Visual
  - Mental Pictures
- Acoustic
  - Hear it
- Semantic
  - Relate it to something else
What were those letters again? How did you try and remember them?
Want to learn something?

- OTTFFSSENT
- 12345678910
2. Storage

• Maintaining information over time
• Telling your brain to save it
Storage Strategies

Ways to remember
Maintenance Rehearsal

- Repeating it over and over
- Try it: Remember these words by repeating them.
- Awesome  Glorious  Famous  Time
Elaborative Rehearsal

- Make it meaningful by connecting it to other knowledge you have
- Try it now:
- Octonauts  Train  Clark Gable
Organizational Systems

- Memories are warehouses
- How is your warehouse organized?
3. Retrieval

- Locating stored information and bringing back to consciousness
- Levels of memory
- What memories are easier to recall?
Speaking of retrieval

• What words did I have you repeat?
  • Awesome    Glorious    Famous    Time

• What are the words that you used elaborative rehearsal to remember?

• Octonauts    Train    Clark Gable
One more question...

- No looking at your notes
- Which is spelled correctly?
- RETRIEVAL
- or
- RETREIVAL
- What helped you make your decision?
Context-Dependent Memory

- Code information in context
- Being in the place that you learned the information helps you to remember
- Do better on a test if you take it in the room where you learned the information
- How can they use this in court?
State-Dependent Memory

- Remember better when your emotional states match
Tip-of-the-Tongue Phenomenon

• Why can’t you remember it?
• Could be mis-stored, not organized, or incomplete
• How to fix?
• Try going through the alphabet
3 Stages of Memory

Any guesses?
1. Sensory Memory

- Senses pick up information
- Lasts seconds
- Make an effort to keep it
Types of Sensory Memory

- **Iconic Memory**
  - Quick, visual snapshots

- **Eidetic Memory**
  - Remember visual stimuli over time
  - Photographic memory
  - Kids good at this – fades over time

- **Echoic Memory**
  - Sound traces last longer
  - Why you learn songs – more time to code
The First Stage: Sensory Memory

• How many can you recall?
2. Short Term or Working Memory

- Hold onto sensory memories
- Used often
- Information will fade if not encoded
Encoding at this level:

- **Primary Effects**
  - Remember first things on a list better

- **Recency Effects**
  - Remember last things on a list better
  - Most recent

- **Chunking**
  - Breaking information into manageable bits
  - George Miller – 7 to 10

- **Interference**
  - Shelf of STM only holds so much – something has to go
Encoding and Storage in Working Memory

• *Levels-of-processing theory* – Explanation for the fact that information that is more thoroughly connected to meaningful terms in Long Term Memory will be better remembered
Examples

• Given a word to remember, the levels of processing change based on how the work is encoded:
  • bear- count the letters
  • bear- does it rhyme with chair?
  • bear- is it an animal?
3. Long Term Memory

- Have to work at storing information
- Maintenance Rehearsal and Elaborative Rehearsal
- Tons of information here
Types of Long Term Memory

- *Procedural memory* – Division of LTM that stores memories for how things are done
- *Declarative memory* – Division of LTM that stores explicit information – takes more conscious effort (also known as fact memory)
Types of LTM

- *Episodic memory* – Subdivision of declarative memory that stores memories for personal events, or “episodes” when, where, how, who - *autobiography*

*Semantic memory* – Subdivision of declarative memory that stores general knowledge, including meanings of words and concepts - *encyclopedia*
The Biological Basis of Long-Term Memory

- **Consolidation** – The process by which short-term memories are changed to long-term memories
- Gradual
- Hippocampus to cortex
The Brain and Memory

- Hippocampus – component of the limbic system involved in long term memory
- Converts memories from short to long term
• Amygdala – component of the limbic system involved in memory and emotion
• Strengthens emotional memories
• 9-11
• May be relevant to PTSD
How Do We Retrieve Memories?

- *Implicit memory* – Memory that was not deliberately learned or of which you have no conscious awareness—how to brush your teeth, the color of a building

*Explicit memory* – Memory that has been processed with attention and can be consciously recalled—term from a lecture
Retrieving Explicit Memories

- Anything stored in LTM must be “filed” according to its pattern or meaning
Recall and Recognition

- **Recall** – Technique for retrieving explicit memories in which one must reproduce previously presented information
- **Recognition** – Technique for retrieving explicit memories in which one must identify present stimuli as having been previously presented
How much can we remember?

No one knows.
How is it stored?

In color
In stereo
All senses stored
Can we can reconstruct memories?

• Wilder Penfield 1969
• Brain surgeon
• Shocked different parts of brain
• People claimed to see “photographs” of memory
• Disproved

• Reconstruct our memories based on our POV
• Remember what we want to
• Why siblings have two different memories of the same event
Schemas

• Mental representations that we form of the world by organized the information into different bits

• Video #1
• Video #2
• Watch the two videos – be an eyewitness. Jot down your observations.
• Do your word choices affect your memories?
• How could you lead a witness?
Basic Memory Tasks
What we use it for
Memory Tasks

• Recognition
  ▫ ID objects seen before
  ▫ Multiple Choices
  ▫ Faces at 40 years

• Recall
  ▫ Bring it back to mind and reconstruct it

• Relearning
  ▫ Will you remember algebra in 10 years?
But I forget things...
Memory’s “Seven Sins”

- Transience
- Absent-Mindedness
- Blocking
- Misattribution
- Suggestibility
- Bias
- Persistence
Transience

• The impermanence of a long-term memory-based on the idea that long-term memories gradually fade in strength over time
  ▫ *Forgetting curve* – A graph plotting the amount of retention and forgetting over time for a certain batch of material
• Recall decreases rapidly, then reaches a plateau, after which little more is forgotten.
Absent-Mindedness

- Forgetting caused by lapses in attention
Blocking

• Forgetting that occurs when an item in memory cannot be accessed or retrieved
• interference – one item acts as an obstacle to accessing and retrieving another memory
• **Serial position effect** – remembering the beginning and end of a list of topics
• - Forgetting the middle
Misattribution

• Memory fault that occurs when memories are retrieved, but they are associated with the wrong time, place, or person
Suggestibility

- Process of memory distortion as a result of deliberate or inadvertent suggestion
  - *Misinformation effect* – The distortion of memory by suggestion or misinformation
Bias

- An attitude, belief, emotion, or experience that distorts memories
  - *Expectancy bias* – A tendency to distort recalled events to make them fit one’s expectations
Persistence

- Memory problem in which unwanted memories cannot be put out of mind
Improving Memory with Mnemonics

- **Mnemonics** – Techniques for improving memory, especially by making connections between new material and information already in long-term memory.
Problem Solving

• Good problem solvers are skilled at
  ▫ Identifying the problem
  ▫ Selecting a strategy
Selecting a Strategy

- **Algorithms** – Problem-solving procedures or formulas that guarantee a correct outcome if correctly applied

- **Heuristics** – Cognitive strategies used as shortcuts to solve complex mental tasks; they do not guarantee a correct solution – a rule of thumb
Heuristics

• Useful heuristics include:
  • Working backward
  • Searching for analogies
  • Breaking a big problem into smaller problems
Obstacles to Problem Solving

• **Mental set** – Tendency to respond to a new problem in the manner used for a previous problem

• **Functional fixedness** – Inability to perceive a new use for an object associated with a different purpose
Without lifting your pen from the page, can you connect all nine dots with only four lines?