Memory and Thought

Memory: The storage and retrieval of something that has been learned or experienced.

To recall information, you use one memory process that relies on two other processes to occur.

- Encoding – transfer of information to process
- Storage – information is maintained
- Retrieval – obtaining stored information

Three stages of memory

- ***Sensory*** – brief memories are stored following stimulation of a sensory receptor. Last a fraction of a second, includes all senses at once.
  - Visual sensory memory is called iconic memory
    - Info is held for up to a second
  - Auditory (hearing) sensory memory is called echoic memory
    - Info is held for 1-2 seconds

Three stages of memory

- ***Sensory***
  - Serves three functions:
    - Prevents you from being overwhelmed
    - Gives you decision time
    - Allows for continuity and stability of environment

Three stages of memory

- ***Short-Term memory***
  - Memory that is limited in capacity, but is everything stored in your conscious mind at any one time. (not listening, but able to repeat)
    - Maintenance Rehearsal – repeating information to remember, but not find meaning
      - Looking up telephone numbers
    - STM lasts for up to 20 seconds without rehearsal
    - **Complete letter exercise**

Memorize – 10 seconds

A B C C B S A A A M

T V U S A N B C C N

N

Memorize – 10 seconds

A B C

C B S

A A A

M T V

U S A

N B C

C N N

Three stages of memory

- ***Short-term memory***
- Chunking – grouping items to make them easier to remember
  - We can remember 7 items, + or – two
  - We can chunk items to remember larger groups of items
  - ABC CBS, etc.
  - Again, 20-30 seconds without rehearsal
  - Rehearsal w/ intent to learn will transfer to long term, rehearsal without will not transfer (*prim)

Three Stages of memory

- ***Short-term memory***
  - Primacy-Recency Effect
    - The effect that we are better able to remember things at the beginning or end of a list
    - Primacy effect occurs when you remember the first part of a list because of time to rehearse
    - Recency occurs because the most recent items are still present in short-term memory
    - Working memory – short-term memory and information that is currently recalled from long term memory in order to process events

Three stages of Memory

- ***Long-term memory***
  - Stored over an extended period of time
  - Categories and features
  - Capacity appears to be limitless
    - Short term memory forms chunks, those are stored, but only the striking facts remain, after years, only some details

Three Stages of memory

- Types of Long-term memory
  - Semantic
    - Memory of language, including rules, words, meaning
  - Episodic
    - Memory of your life, including time of occurrence
  - Declarative
    - Memory that is called forth consciously
  - Procedural
    - Memory of learned skills that does not require consciousness

Memory and the Brain

- How are memories stored in the brain?
- Some physiological changes occur
  - Neuronal structure change
  - Molecular or chemical changes
  - Changes depend on the level at which learning is occuring

Memory and the Brain

- Where does learning/memory occur?
  - Striatum (cortex) – front of the brain – procedural memories
  - Hippocampus – declarative memories
  - Amygdala – associate memories with emotions
  - Thalamus – processes sensory info. for memories

Memory and the Brain

- Not clear how individual nerve cells establish connections for learning
  - Complex chemical processes
    - Increases in calcium
    - Decreased potassium
    - Increased protein synthesis
    - Heightened glucose levels

    - Unsure of how this all fits together

Retrieving Information

- The key to retrieval is organization!
- Studying retrieval helps us learn about how memory is organized

Recognition

- Identifying whether or not a person has experienced a object, idea or situation with accuracy
- Helpful with multiple choice tests
- Shows memories may be stored in more than one way
- The more categories it is saved in, the easier it is to recognize

Recall

- Reconstructing information that had been learned
- Involves knowledge, attitudes and expectations
- Influenced by:
  - Reconstructive processes
  - Confabulation
  - Schemas
  - Eidetic memory

Recall

- Reconstructive processes
  - Alteration of a memory to be simplified, enriched, or distorted, depending on the individual
  - Confabulation is when a person fills in the gaps of memory that may or may not be true
  - Schemas are used to help reconstruct memories
    - Cars and contacted, hit, bumped, smashed speeds

Recall

- Eidetic memory
  - 5% of all children; less adults
  - Photographic memory
  - Very specific details
  - Very rare in adults
  - Short observation time, with vivid details in entirety later remembered

State-dependent learning

- Recalling information easily when in the same physiological or emotional state as when information was originally encoded
  - Study for a test in the location
  - Listen to the same music
  - Conditions are made to be similar to when memory was formed

Relearning

- Measure of both declarative and procedural memory
  - Learning a poem as a child, makes it easier to relearn later

Forgetting

- When information can not be retrieved from long term memory
  - Decay
  - Interference
  - Repression

Forgetting

- Decay
  - Fading away of memories over time
  - Items quickly decay in short-term memory
  - This may not function in long-term memory
  - Even a bump on the head, or brain trauma can cause forgetting, but it is always more recent memories

Forgetting

- Interference
  - A memory being blocked or erased by previous or subsequent memories
  - Two kinds
    - Proactive interference – earlier memories prevent you from remembering new information
    - Retroactive interference – later information prevents you from remembering old memories
    - Example: moving….new numbers vs. old numbers

Amnesia

- Loss of memory due to brain damage, injury, drug use, or severe stress

- Infant amnesia – lack of early declarative memories
  - Emotional trauma
  - Lack of language
  - Hippocampus not mature enough
  - Sense of self not developed enough

Flashbulb memories

- Vivid recollection based on events that are shocking, emotional, or have serious consequences
- Involves special encoding
  - JFK assassination
  - 911
  - Death of a close relative
  - You can describe in detail where, when, what, who, etc.

Improving memory

- Based on efficient organization
- chunking

Meaningfulness and Association

- Elaborative rehearsal – linking new material to information that is already known
  - Make a connection!!
- Connect to senses
- Avoid learning similar material together
  - History, biology, then government
- Distributed practice - study a little at a time; cramming doesn't work!

Mnemonic Devices

- Using associations to memorize information
- Method of Loci
  - Greeks used this to memorize speeches
  - Walked around houses, etc. Each spot represented part of the speech
- Every good boy does fine
- Form a mental picture
  - John Updike wrote Rabbit, Run visual

Tip of Your Tongue

- Phenomena when you cannot remember the information you currently need
- Because of insufficient retrieval cues or due to interference