Unit #3:

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Lecture #22: The Three Stages of Memory

- In recent years, psychologists have attempted to develop theories of memory using the computer as a model. These information-processing theories of memory are based on the apparent similarities between the operation of the human brain and that of the computer.
- The ***Information-processing Model*** – information can be followed as it moves through the following operations: input, storage, and retrieval. At each point in the process, a variety of control mechanisms (attention, storage, and retrieval) operate.
    - Information enters the memory system through the sensory receptors. This is like you entering a term paper into your computer by typing on the keyboard.
        - Attention operates at this level to select information for further processing. The raw sensory information that is selected is then represented, or ***encoded*** – To represent information in some form in the memory system. Information is encoded ***visually, acoustically, or semantically***.
    - Other control mechanisms might then transfer selected information into a more permanent memory storage, like saving your term paper on a disk. When the stored information is needed, it is retrieved from memory.
    - With computers, just like the human brain, some information may be lost or irretrievable.
- Some information needs to be stored in memory for only brief periods of time, while other information must be tucked away permanently. If you look up a phone number you are about to use, you need to remember that bit of information for only a few seconds. However, we must remember our social security numbers and our family member's names for our entire lifetimes.
- ***Stage Theory of Memory*** – A model of memory based on the idea that we store information in three separate but linked memories.
    - One memory holds information for no more than 30 seconds unless rehearsed
    - A second memory holds information for brief intervals.
    - A third memory holds information more permanently.
    - Information must pass through each stage of memory to get to the next. The three stages are known as the ***sensory stage, short term memory, and long term memory.***
    - ***Sensory Stage –*** The first stage of memory, in which an exact image of each sensory experience is held briefly until it can be processed or is ignored. Information is held here less than 1 second until it is transferred or forgotten.
    - ***Short Term Memory –*** The second stage of memory, in which five to nine bits of information can be stored for brief periods of time. Information in the STM is received from the sensory memory.
        - Not always an intentional transfer; just paying attention to the information is enough to transfer it.

- Once information has been transferred to short term memory, a variety of control processes may be applied. ***Rehearsal*** and ***Chunking*** are two important examples of these control processes.
- ***Rehearsal*** – Mental repetition of information to retain it longer in short term memory.
    - If you rehearse a list of terms, it can be held in the short term memory, if not, it will be soon forgotten.
- ***Chunking*** – dividing information into units. We can usually retain 5 to 9 chunks of information.
    - Each chunk can contain more than one bit of information (social security numbers, phone numbers).
- Short term memory serves another purpose that limits its already small capacity. It serves as our ***working memory***. This means that the space in STM is used when old memories are temporarily brought out of long term memory to be used or updated. Space in STM is also used when we think about this information. Thinking takes up space in STM
- One advantage of the small storage capacity of STM is that it is easy to search through. When we try to remember something in STM, we examine every item that is stored there

- ***Long Term Memory*** – The third stage of memory, involving the storage of information that is kept for long periods of time.
- Long term memory differs from STM in four major ways: The way in which information is recalled, the form in which information is stored in memory, the reasons that forgetting occurs, and the physical location of these functions in the brain.
    - 1. We cannot scan the entire contents of LTM when we are looking for a bit of information as we do in STM. We retrieve information from LTM using cues. This retrieval can be intentional (what was your first grade teacher's name?), or unintentional (a certain song brings back memories).
    - 2. LTM information is mostly in terms of its meaning while STM information is mostly in terms of the physical qualities of the experience (what we saw, did, tasted, touched, or heard).
    - LTM is permanent and STM must be rehearsed to be retained.
    - STM is primarily a function of the frontal lobes while information in the LTM is first integrated in the hippocampus and then transferred to the areas of the cerebral cortex involved in language and perception for permanent storage.

- ***Types of Long Term Memory:***
    - ***Procedural Memory –*** Memory for motor movements and skills. Usually never forgotten (riding a bike, driving a car, swimming).
    - ***Semantic Memory –*** Memory for meaning without reference to the time and place of learning. Also called Generic Memories. Consists of general knowledge that you do not specifically associate with an experience.

        - ***Episodic Memory –*** Memory for specific experiences that can be defined in terms of time and space. Memories of episodes. *Flashbulb Memories?*
    - The LTM is able to store procedural and semantic memories very effectively, but LTM does not store episodic memories as well.
- ***Organization in Long Term Memory:***
    - Organization of long term memory makes recall much easier.
        - ***Associative network*** – memories are associated, or linked together through experience. Your experiences form links between a song and an event, for example.
    - ***Retrieval of Long Term Memories***:
        - Three ways of Testing Retrieval:
            - ***Recall Method*** – A measure of memory based on the ability to retrieve information from long term memory with few cues. (Completion questions on a test).
            - ***Recognition Method*** – A measure of memory based on the ability to select correct information from among the options provided. (Multiple choice question).
            - ***Relearning Method*** – A measure of memory based on the length of time it takes to relearn forgotten material. If unable to recall or recognize, it may be possible to relearn previously memorized information. If the relearning takes less time that the original learning, then the information has been remembered.
        - ***Serial Position Effect*** – The finding that immediate recall of items listed in a fixed order is often better for items at the beginning and end of the list than for those in the middle. (primacy and recency effect).
        - ***The Tip of the Tongue Phenomenon*** – Almost remembering. When something is in the memory, but cannot be retrieved at the moment. Most of these items are retrieved within a minute or so, but some take more time.

Levels of Processing: An Alternative to the Stage Model

- The model suggesting that there are three separate stages of memory has been helpful in making sense of memory. However, others have proposed and alternative ***Levels of Processing Model*** – States that the distinction between STM and LTM is a matter of degree rather than different kinds of memory based on how incoming information is processed. Believes there is only one memory store beyond sensory storage.

Lecture #23: Forgetting and Why It Occurs

- ***Why do some memories become lost or irretrievable? What causes forgetting to occur?*** There are four major theories of forgetting that should be discussed in some detail: *Decay Theory, Interference Theory, Reconstruction (schema) Theory,* and the *Theory of Motivational Forgetting*.
    - ***Decay Theory –*** The theory that forgetting occurs as the memory trace fades over time.
        - Memories that are not used fade gradually over time.

        - It is said that entire memories never decay from LTM, but traces of those memories do decay over a period of time.
- ***Interference Theory*** – The theory that forgetting occurs because similar memories interfere with the storage or retrieval of information.
    - Imagine trying to remember three behaviorists, and then three more, and then three more. The similarities between each may make it difficult to store the information or later retrieve the information that has been stored.
    - ***Proactive Interference –*** Interference created by memories from prior learning.
        - On vacation, you meet two people, Jim and John. Jim tells you his room number and you listen carefully and commit it to memory. The next day, John tells you his room number and you memorize it. Later, you try to go to John's room, but you end up in Jim's room. This is proactive interference. The recall of John's number was blocked by interference from the memorization of the number of Jim's, who preceded it.
    - ***Retroactive Interference –*** Interference created by memories from later learning.
        - If you would have tried to remember Jim's number, you might not have been able to remember it because of John's number.
    - These are examples of retrieving LTM's. Interference can also occur in STM by overloading its capacity or by weakening or completely knocking and item out of storage.
        - If you look up the telephone number 225-6356 and some says "maybe it's 225-5663," before you can dial, you may experience interference in STM.
- ***Reconstruction (schema) Theory –*** The theory that information stored in LTM sometimes changes over time to become more consistent with our beliefs, knowledge, and expectations.
    - Basically, this says that a memory is forgotten in its true sense, but can be recalled in a distorted, incorrect manner.
    - For example, imagine that you hear a story about a teacher, whom you believe is a bad person. The story is mostly favorable about him but contains a few bits of negative information. The next day, when you tell this story to a friend, you will tend to recall the negative points about him and minimize the positive points.
    - (Examples on page 253, alternate text)
    - ***False Memory –*** Remembering an event that did not occur or that occurred in a way that was substantially different from the memory of the event.
        - *This is the ultimate type of reconstruction error.*
- ***Motivated Forgetting Theory –*** Forgetting that is believed to be based on the upsetting or threatening nature of the information that is forgotten.
    - Freud believed that the conscious mind often dealt with unpleasant or dangerous information by pushing it into unconsciousness, by and act of ***repression*** – Sigmund Freud's theory that forgetting occurs because the

conscious mind often deals with unpleasant information by pushing it into unconsciousness.