Long term memory: types and the main aspects

Science, Biology

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Memory is a central component of the mind. It affects all of human functioning and is central to the development of the self. Various philosophers have explored the concept and tried to connect memory with several others ideas. John Locke was of the view that a continuity of consciousness and memory helps in the creation of the self. Psychology defines memory as the structures and processes by which we store and retrieve information. Memory is the means by which we draw on our past experiences in order this information in the present. In 1968, Atkinson and Shiffrin gave the multi-store model of memory in which they described three memory units, they are as follows:

- Sensory Memory
- Short term Memory (Working Memory)
- Long term Memory.

The focus of this discussion is on ‘ long term memory’.

Long term memory is the final memory unit which holds information for an extended period of time. Information that enters long term memory is held on a semi-permanent or permanent basis. The long-term store is a fairly

permanent repository for information, information which is transferred from the short-term store (R. C. Atkinson and R. M. Shiffrin).

Subdivisions of long term memory

1. Explicit memory (Declarative memory)

These memories are consciously available to the individual. Endel Tulving argued that explicit memory has two distinct yet interacting systems. One system holds memory for events while the other holds memories for general knowledge. So, explicit memory further came to be subdivided into ‘ episodic memory’ and ‘ semantic memory’.

Episodic memory: Episodic memory is the system that holds memory for events. These memories usually hold personal experiences of an individual. Memories that are episodic are usually based in events.

Semantic memory: Semantic memory is knowledge-based memory. It is factual in nature. It includes concepts, meanings that an individual has learnt in his lifetime.

1. Implicit memory (Non-declarative memory)

Implicit memories are those memories which are not consciously available to the individual.

1. Procedural memory

Procedural memory stores information of procedures. It is skill-based memory and holds memories of various skills and procedures.

Aspects of long term memory

Capacity: Long term memory is a relatively permanent memory store. Information that enters long term memory is stored for an extended period of time. The capacity of long term memory has been said to be unlimited. Duration of storage might range from few minutes to decades or even a lifetime. Previously it was believed that the size of human memory is equivalent to the number of synapses in the cerebral cortex of the brain. Since the cerebral cortex has 1013 synapses, it was believed that human memory can hold 1013 bits of information. It was also estimated that 1020 bits of information or electrical messages are transmitted in the brain of a person in his lifetime. According to Thomas Landauer (1986) these estimates were too high. He stated that it wasn’t necessary that every neural impulse or synaptic connection would result in a memory. Landauer tried to estimate the rate at which information is learnt and forgotten through analyses. He concluded that an adult can process about 1 billion bits of information at midlife (about age 35). The virtually unlimited capacity of storage in LTM does not mean that information is not lost in LTM. Forgetting occurs in LTM as well.

Coding: Semantic confusion can lead to errors in recall of information from LTM. Semantic similarity can affect LTM. Thus, it is believed that coding in LTM is semantic.

Retention duration and forgetting: Long term retention is a battle with forgetting. Forgetting refers to failure to recall or retain information that was once encoded and stored. Retention duration in LTM can range from a few

hours to decades. Harry Bahrick (1984) found that large portions of originally acquired information remains accessible for over 50 years even without rehearsal or revisiting of the information.

Forgetting curve: Ebbinghaus discovered the forgetting curve. The forgetting curve is a mathematical equation which explains the rate at which forgetting of information occurs after it is initially learned. Forgetting is very steep in the first twenty minutes of learning the material and then forgetting slowly levels out.

Role of interference in forgetting

Studies show that forgetting in long term memory often occurs because of interference. Interference occurs when information that is similar in format gets in the way of information that one is trying to recall. Following are the two types of interference:

- Proactive interference: Proactive interference is when older information interferes with the newer information.
- Retroactive Interference: Retroactive interference is when more recent information interferes with the older information.

Retrieval of information: Retrieval is the re accessing of information that an individual has already stored as and when the need to do so arises. Retrieval of information can be improved using the mnemonic techniques. Mnemonic is a learning technique that aids information retention and retrieval of information. Following are the two popular mnemonic techniques:

- Method of Loci: Method of loci relies on visualization. It is a visual filing system that allows individual to memorize and recall items in a fixed order.
- Peg words: This technique relies on imagery and association. One remembers a short rhyme first and then pegs or cues items to be remember to set of retrieval cues in the rhyme.