

# Long Term Memory Encoding

## Overview of Long-Term Memory

The video begins by introducing the concept of long-term memory (LTM), which is responsible for storing a wide range of information such as life events, facts, knowledge, and mathematical rules. Long-term memory is often the type of memory people refer to when discussing memory. It plays a crucial role in storing information transferred from short-term memory through processes such as rehearsal. The Atkinson-Shiffrin model is referenced, which divides memory into three parts: the sensory register, short-term memory, and long-term memory. Unlike short-term memory, LTM is not an active store but rather a vast repository of information.

## The Structure of Long-Term Memory

The existence of long-term memory is supported by experiments on serial position effects, like the primacy and recency effects. These experiments indicate that both short-term and long-term memory stores are needed for proper memory function. Long-term memory is divided into two major categories:

1. Declarative Memory: Conscious and retrievable, declarative memory allows us to recall facts and events. It consists of two subtypes:

- Semantic Memory: Stores general knowledge, facts, rules, and truths.
- Episodic Memory: Relates to personal experiences and specific life events.

2. Procedural Memory: This type of memory is unconscious and involves learned skills and habits, such as riding a bicycle or typing. Procedural memory includes actions that are performed without

conscious thought. The concept of childhood amnesia is also introduced, describing the inability to recall early childhood experiences.

## Types of Memory and Their Organization

The video explains the difference between declarative and procedural memory in greater detail. Declarative memory includes semantic and episodic memory, with semantic memory storing general facts and episodic memory related to personal experiences. Procedural memory, on the other hand, governs habits, skills, and priming (a phenomenon where information provided before encountering an object aids in its recognition). Two types of priming-semantic and perceptual-are discussed. [eg: blurry umbrella](#) Semantic priming deals with meaning, while perceptual priming involves recognition of sensory features. [PRIMING: activation of one concept due to another](#)

The speaker then discusses the vast capacity of long-term memory, which is estimated to be nearly infinite. This capacity is likened to an archiving system, where information is compressed and stored with access keys, similar to file compression in computers. The difference between short-term and long-term memory is emphasized, with experiments demonstrating that LTM is organized semantically, meaning that it groups similar concepts together.

## Memory Encoding and Experiments

Long-term memory is believed to be stored through synapses in the brain. An estimate is provided that suggests there are approximately  $10^{13}$  synapses in the cerebral cortex, providing LTM with a near-infinite capacity for storing information. A specific experiment discussed involves the effect of semantic similarity on memory retrieval. Participants performed an n-back task where they had to keep track of a sequence of items. Results showed that semantically similar words caused confusion, supporting the theory that LTM is organized by meaning.

Another experiment, Evan's forgetting curve, is mentioned, which supports the existence of long-term memory stores. The experiment showed that people were able to retrieve about 20% of items from a list even after 30 days, indicating the durability of long-term memories.

## Theories of Forgetting

Several theories explaining forgetting in relation to long-term memory are discussed:

1. Poor Encoding Theory: Suggests that forgetting occurs because the information was never properly encoded in the first place.
2. Decay Theory: Proposes that memories fade or decay over time if not used. The theory is compared to unused railway lines that deteriorate when not maintained.
3. Interference Theory: Explains that new information can interfere with the retrieval of old memories.
4. Retrieval Failure Theory: Suggests that information is stored in memory but cannot be retrieved due to a lack of appropriate cues. [cues- stimulus that triggers the retrieval of memory](#)

## Decay Theory and Interference

The decay theory is further elaborated, explaining that memories fade away over time if the connections between neurons are not used. The brain, if it doesn't engage with the memory, allows the connections to erode. However, decay theory has fallen out of favor with modern researchers, who are more inclined toward interference theory. Interference theory posits that memories are blocked by other memories, which leads to forgetting.

The fan effect theory is introduced, explaining that forgetting results from one memory interfering

with another. The more associations a memory has, the harder it becomes to recall because the retrieval cue is shared among multiple targets. When similar memories compete, retrieval is less efficient. Two types of interference are highlighted:

- Proactive Interference: Old memories interfere with the learning of new information.
- Retroactive Interference: New memories interfere with the recall of older memories.

## Retrieval Cue Theory

The retrieval cue theory explains how we retrieve memories. A retrieval cue acts as a key to access a specific memory. A memory can have multiple cues, but the most potent one will be most effective in retrieval. If a wrong or weak cue is used, retrieval will fail. The speaker gives an example: trying to recall a memory using an event like a party, but the key to the memory was actually the emotion felt during the event.

## Recall vs. Recognition

The distinction between recall and recognition is also explored. Recall involves actively retrieving information without cues, while recognition involves identifying the correct information from a set of options. Recognition is considered easier than recall because it only requires matching rather than active retrieval. Multiple-choice questions, for example, are a form of recognition test and are widely used in examinations.

## Conclusion

The lecture concludes with an exploration of long-term memory encoding and forgetting, emphasizing the complexity of memory systems. It underscores the importance of proper encoding, correct retrieval cues, and the different forms of interference that can hinder memory. It also

highlights the differences between recall and recognition, showing how they are both critical to understanding how we remember and forget information.