

How Memories Are Made: Stages of Memory Formation

Forming new memories is an incredibly complex and fascinating process. Understand how information is transformed into a memory from a psychological perspective.

Memory serves human beings in many complex ways. It enables us to process our environment. Improve behavior. Give context to our lives. Studies of this psychological phenomenon reveal that memory occurs in stages, which gives us valuable insight into the inner workings of the brain.

The Phenomenon of Memory

Brian Becker (<https://www.lesley.edu/about/faculty-staff-directory/brian-becker>), associate professor of neuropsychology at Lesley University, defines memory as “the process in which the mind interprets, stores, and retrieves information.” When you obtain information from the world around you, Becker explains, that material is kept in the brain as a mental representation and made retrievable for future use. A number of factors impact the way the brain retrieves a memory – if it’s recalled at all.

Stages of Memory Creation

The brain has three types of memory processes: sensory register, short-term memory, and long-term memory.

Sensory Register

In the sensory register process, the brain obtains information from the environment. This activity is short, lasting at most a few seconds. During sensory register, the brain gathers information passively through visual and auditory cues, known respectively as “iconic” and “echoic” memory.

Becker gives the examples of a computer screen and a conversation to illustrate how to recognize sensory register. When you look at a computer screen and then look away, but can still see the screen's image, this is iconic memory at play. Similarly, when you have conversations with others and ask them to repeat themselves, only to understand what they said a moment later, it demonstrates echoic memory.

In the memory-making process, attention is considered a stage between sensory register and short-term memory. Short-term memory formation can begin through giving your attention to the information received through sensory register.

Short-Term Memory

According to Becker, short-term memory occurs in two parts: traditionally termed “short-term memory” and “working memory.” Short-term memory is when the brain stores information temporarily so that it can be repeated, such as remembering a phone number you see on TV. Working memory refers to the brain storing information for the purpose of manipulating it, such as remembering a set of numbers while working on a math problem.

When psychologists talk about improving memory, they most commonly focus on working memory because you have the most control over it and can actively improve it.

Long-Term Memory

Many think of long-term memory as a permanent “bank” within the brain. Once a memory arrives there, the mind stores it completely and indefinitely. In truth, this is not the case. Although the long-term memory process allows information to remain in the brain for an extended period, nothing in the brain avoids risk. Information stored in long-term memory can stay in the brain for a short while (a day, a week) or last as long as a lifetime.

When long-term memories form, the hippocampus retrieves information from the working memory and begins to change the brain's physical neural wiring. These new connections between neurons and synapses stay as long as they remain in use. Psychologists divide long-term memory into two length types: recent and remote.

Long-term memory can also be described by the nature of the memories themselves, according to *The Guardian* (<https://www.theguardian.com/education/2015/sep/16/what-happens-in-your-brain-when-you-make-a-memory>):

- You remember **implicit memories** automatically, like driving a car.
- You are aware you are actively trying to remember **explicit memories**. These can further be divided into:

- ***Episodic memories:*** Contain events that happen to an individual specifically.
- ***Semantic memories:*** Contain general knowledge.

Forgetting

Forgetting can manifest as inattention or can happen because the brain does not reinforce a memory long enough to store it. Research suggests two main theories as to why memories are forgotten:

- **Decaying theory** infers that if a certain memory isn't repeated, it will eventually deteriorate.
- **Interference theory** infers that new information received by the brain replaces old information (such as the inability to remember an old password after you have created a new one).

Psychologist Daniel Schacter **further details (<http://www.apa.org/monitor/oct03/sins.aspx>)** the vulnerabilities of the mind in his book *The Seven Sins of Memory*. These specific failures, which Schacter calls “sins,” include:

- 01. Transience.** Memories may become increasingly difficult to access, due to either the natural aging process or damage to the hippocampus and temporal lobe.
- 02. Absent-mindedness.** Attention lapses and forgetting tasks.
- 03. Blocking.** When memories are temporarily inaccessible. (Also known as “tip-of-the-tongue syndrome.”)

- 04. Suggestibility.** When misinformation is incorporated into memories, such as when someone is asked a leading question.
- 05. Bias.** When memories are distorted because of your knowledge and belief systems.
- 06. Persistence.** When unwanted memories can't be forgotten, such as in post-traumatic stress disorder.
- 07. Misattribution.** When memories are attributed to an incorrect source or when you believe you have seen or heard something you never experienced.

Although memory remains susceptible to all sorts of problems, the brain's elasticity is unique and remarkable. Memory is just as capable of improving as decaying.