

Caring For A Loved One With Dementia

a practical
guide
for family
caregivers
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How the Brain and Memory Works



Introduction

The way our brain stores memories is a complex process across many areas of the brain.

Luckily, memories are not all stored in one place. They are spread out across different brain regions, or lobes, and allow us to keep and recall memories even if one area of the brain is damaged.

Although the brain's process for storing memories is sometimes compared to a filing cabinet, the processes are extremely complex and still not fully understood.



Creating memories

The human brain is made up of neurons. Neurons are nerve cells that talk to each other through a synapse- a connection between cells that sends information. Neurons receive and carry information to the parts of the brain to process or store information. The brain has approximately 100 billion nerve cells, give or take 15 billion.

To create memories, the brain must accomplish the following processes:

1. Encode information

This process allows something of interest to be stored in the brain, then recalled later from short or long term memory. The encoding process can be affected by paying close attention. The more attention we give a piece of information, the more likely it is to be coded. We are also more likely to remember emotional events as emotions tend to increase attention.

2. Memory Consolidation

This is, simply put, the process of moving memories from short-term to long term. Different strategies may help speed up this process, such as practice, rehearsal, and using mnemonic devices will help consolidate information. Sleep has also been shown to improve consolidation, so studying for an exam over a couple of days rather than in one cram session should produce better long term storage of information.

3. Store information

This is the process of retaining the information in short term, or more permanently in long term memory. An area of the brain called the Hippocampus plays an important role in storing long term memories.

4. Recall

Memories that are frequently recalled become stronger than those accessed less frequently. The neurons linked to this information create a neural pathway- a road to that memory. Think of it as walking along a path. The more frequently you walk on the same path, the more defined the trail becomes.



The different types of memory

The human brain works to store information using three basic modes; short term memory, long term memory, and sensory memory. Within these are multiple different types of memory. For example, the way that the brain stores a fact, an event, or a motor skill may all require different parts of the brain and have different processes for storage and recall.

1. Sensory memory

Sensory memories are memories that last one second or less. An example of a sensory memory is smelling something that you store as an olfactory memory. Although you may not continue to smell it, you remember the smell when it occurs again and associate it with other memories (freshly cut grass or baking bread).

2. Short term or working memory

Short term memories are memories that last 1 minute or less. Short term memory is the ability to remember and process information at the same time, such as shopping and remembering items on a grocery list. Short term memory is typically 30 seconds to one minute long. These include things like temporarily remembering a phone number, an acquaintance's name, or a shopping list.

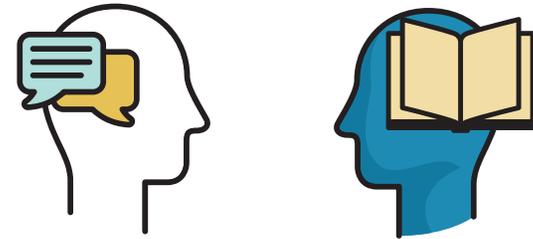
3. Long-term memory

Long-term memories are memories that last a lifetime. Not all long-term memories are created equal. Events and information that are of greater importance to the person are more likely to have stronger recall. For example, you can usually remember important people and events, such as your parents or

your wedding day. These types of memories are called crystallized memories, and tend to stay with us throughout life, even being among the last memories to subside in memory disorders.

4. Semantic memories

Semantic memories are memories of factual dates or events. Example of semantic memories might include historical knowledge, like who won the Civil War; scholastic concepts like reading and math; the definition of words we use in conversation; or geographical knowledge.



Normal Aging

Forgetting is a common event, and very frequently, perfectly normal. There are many reasons why we forget: distraction and interference, lack of attention, failure to encode or store, and stress. Many times a person who is concerned about forgetting is experiencing normal life events, such as walking in a room and forgetting why they were going there. Forgetting car keys. Forgetting the name of an acquaintance they just met. Searching for your sunglasses and finding them on your head. These are all normal events and happen to everyone at all ages.

There are many changes that occur in our brains that are normal. It is a part of the normal aging process to take longer to learn new information. It may also take more effort to learn, organize, and store new information. As people age, they have a greater susceptibility to distraction, and are slower in recalling information and switching mental gears between tasks. For instance, it may take longer to remember directions when driving. All of these changes describe normal changes related to aging. It is important to note, however, that memory loss is NEVER a normal part of aging, at any age!

Why memory fails

Memory can be impacted by so many factors, that the experience of forgetting does not instantaneously add up to Alzheimer's disease or another dementia. A person's memory can be affected by physical stressors, such as an infection or pain. We are not built to think clearly when our bodies are fighting off infection or dealing with a painful situation.

Psychological factors may also affect a person's memory. Depression can have a significant impact on one's ability to think, articulate, and make clear decisions, and may last for as long as the depressive episode.

When a memory disorder is diagnosed, such as Alzheimer's disease, the neurons in the brain that are responsible for receiving and communicating information are affected. The first type of memory to be affected is usually short term, or working memory. A person may have more difficulty remembering information, learning new information or may repeat the same questions multiple times.

There are many different changes that occur in the brain, some are not well understood. For example, in some cases of Alzheimer's disease, the brain may have plaques and tangles. These are an accumulation of proteins. In a healthy brain, these proteins would be picked up and carried away, but in the Alzheimer's brain they become hard deposits, and interfere with communication between neurons. Tangles come from a protein called Tau, which in the Alzheimer's brain is twisted and abnormal, and interferes with function. Memory and thinking depend on the 100 billion neurons in the brain to pass messages. Alzheimer's disease interferes with the transmission of the messages, and with brain chemicals called neurotransmitters. The jumbled chemistry and interference scrambles the messages, impacting the ability to learn, remember, and communicate.

Other diseases and conditions may also affect the brain, and ultimately, memory. Other types of dementia, such as frontotemporal dementia or Parkinson's disease, affect the brain as the neurons die, and are no longer able to store new information or recall memories. Vascular dementia also affects the brain through damaging the neurons due to strokes, which deplete the cells of oxygen, leading to neuron death and impaired memory.

Additionally, other conditions, such as an infection in the brain, blood, a tumor or mass, or autoimmune diseases such as Multiple Sclerosis can also all affect the brain and memory function. The variety of causes and explanations, many of which are treatable, are a good reason to get an assessment and find out what the cause of the trouble is.

Boosting your brain

There are several ways to give your brain and memory a boost. Activities such as reading, crossword puzzles, and memory games exercise working memory, problem solving and attention. The following strategies help encode the memories and store them.

Make a List

Your short-term memory is built to handle 7 items for up to one minute. It's unrealistic to keep all the items in your short-term memory. Write it down!

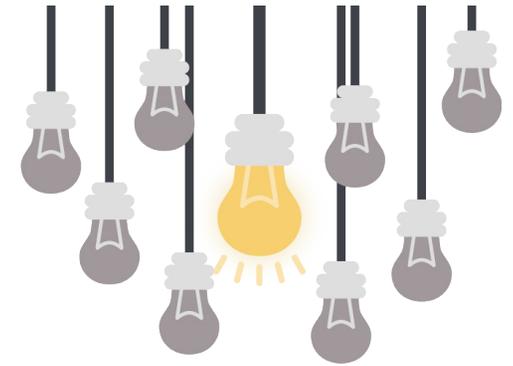
Grocery lists and to-do lists help your brain de-stress and your memory work better.



Rehearsal

This strategy helps the brain encode and store making it more committed to memory through repetition. Try it with meeting a new acquaintance!

"It's nice to meet you Jim. Tell me about yourself, Jim. Please join our party Jim."



Associations

When we receive new information and are able to associate it with something personal, it makes it easier to remember and recall.

Image associations:
Your new friend Daisy arranging flowers.

Mnemonic associations:
a car license plate is 5PBM555- calling it the Peanut Butter Machine.

Personal associations:
Your client's name is Dave, you have a brother named Dave.

Mindful Focus

This strategy is the ultimate in paying attention. Mindful focus is the act of intentionally removing competing thoughts by focusing on one thing at a time.

Take several minutes to focus on a memory you wish to store, allowing your mind to give that item total and complete attention free from distraction.

Conclusion

Knowing how the brain works and the different types of memory are key to understanding what is normal aging or what is not. Be sure to keep active cognitively and to boost your brain and memory as you age.

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