Explicit memory

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Explicit memory is the conscious, intentional recollection of previous experiences and information. People use explicit memory throughout the day, such as remembering the time of an appointment or recollecting an event from years ago. Explicit memory involves conscious recollection, compared with implicit memory which is an unconscious, unintentional form of memory. Remembering a specific driving lesson is an example of explicit memory, while improved driving skill as a result of the lesson is an example of implicit memory.

Types

Episodic memory consists of the storage and recollection of life-events. These can be memories that happened to the subject directly or just memories of events that happened around them. Episodic memory allows for mental time travel - recalling various contextual and situational details of one's previous experiences.

Semantic memory refers to general world knowledge (facts, ideas, meaning and concepts) that can be articulated.[1] Semantic memory is distinct from episodic memory, which is our memory of experiences and specific events that occur during our lives, from which we can recreate at any given point.[2] For instance, semantic memory might contain information about what a cat is, whereas episodic memory might contain a specific memory of petting a particular cat. We can learn about new concepts by applying our knowledge learned from things in the past.[3]

Autobiographical memory is a memory system consisting of episodes recollected from an individual's life, based on a combination of episodic (personal experiences and specific objects, people and events experienced at particular time and place) and semantic (general knowledge and facts about the world) memory.[4]

Spatial memory is the part of memory responsible for recording information about one's environment and its spatial orientation. For example, a person's spatial memory is required in order to navigate around a familiar city, just as a rat's spatial memory is needed to learn the location of food at the end of a maze. It is often argued that in both humans and animals, spatial memories are summarized as a cognitive map. Spatial memory has representations within working, short-term and long-term memory. Research indicates that there are specific areas of the brain associated with spatial memory. Many methods are used for measuring spatial memory in children, adults, and animals.

Encoding and retrieval

The encoding of explicit memory depends on conceptually driven, top-down processing, in which a subject reorganizes the data to store it.[5] The subject makes associations with previously related stimuli or experiences.[*citation needed*] The later recall of information is thus greatly influenced by the way in which the information was originally processed.[5] The depth-of-processing effect is the improvement in subsequent recall of an object about which a person has given thought to its meaning or shape. Simply put: To create explicit memories, you have to *do* something with your experiences: think about them, talk about them, write them down, study them, etc. The more you do, the better you will remember. Testing of information while learning has also shown to improve encoding in explicit memory. If a student reads a text book and then tests themselves afterward, their semantic memory of what was read is improved. This study – test method improves encoding of information. This Phenomenon is referred to as the Testing Effect.[6]

Retrieval: Because a person has played an active role in processing explicit information, the internal cues that were used in processing it can also be used to initiate spontaneous recall.[5] When someone talks about an experience, the words they use will help when they try to remember this experience at a later date. The conditions in which information is memorized can affect recall. If a person has the same surroundings or cues when the original information is presented, they are more likely to remember it. This is referred to as encoding specificity and it also applies to explicit memory. In a study where subjects were asked to perform a cued recall task participants with a high working memory did better than participants with a low working memory when the conditions were maintained. When the conditions were changed for recall both groups dropped. The subjects with higher working memory declined more.[7] This is thought to happen because matching environments activates areas of the brain known as the left inferior frontal gyrus and the hippocampus.[8]

Neural structures involved

Several neural structures are proposed to be involved in explicit memory. Most are in the temporal lobe or closely related to it, such as the amygdala, the hippocampus, the rhinal cortex in the temporal lobe, and the prefrontal cortex.[5] Nuclei in the thalamus also are included, because many connections between the prefrontal cortex and temporal cortex are made through the thalamus.[5] The regions that make up the explicit memory circuit receive input from the neocortex and from brainstem systems, including acetylcholine, serotonin, and noradrenaline systems.[9]

Traumatic brain injury and explicit memory

While the human brain is certainly regarded for its plasticity, there is some evidence that shows traumatic brain injury (TBI) in young children can have negative effects on explicit memory. Researchers have looked at children with TBI in early childhood (i.e. infancy) and late childhood. Findings showed that children with severe TBI in late

childhood experienced impaired explicit memory while still maintaining implicit memory formation. Researchers also found that children with severe TBI in early childhood had both increased chance of having both impaired explicit memory and implicit memory. While children with severe TBI are at risk for impaired explicit memory, the chances of impaired explicit memory in adults with severe TBI is much greater.[10]

Memory loss and explicit memory

Alzheimer's disease has a profound effect on explicit memory. Mild cognitive impairment is an early sign of Alzheimer's disease. People with memory conditions often receive cognitive training. When an fMRI was used to view brain activity after training, it found increased activation in various neural systems that are involved with explicit memory.[11] People with Alzheimer's have problems learning new tasks. However, if the task is presented repeatedly they can learn and retain some new knowledge of the task. This effect is more apparent if the information is familiar. The person with Alzheimer's must also be guided through the task and prevented from making errors.[12] Alzheimer's also has an effect on explicit spatial memory. This means that people with Alzheimer's have difficulty remembering where items are placed in unfamiliar environments.[13] The hippocampus has been shown to become active in semantic and episodic memory.[14] The effects of Alzheimer's disease are seen in the episodic part of explicit memory. This can lead to problems with communication. A study was conducted where Alzheimer's patients were asked to name a variety of objects from different periods. The results shown that their ability to name the object depended on frequency of use of the item and when the item was first acquired.[15] This effect on semantic memory also has an effect on music and tones. Alzheimer's patients have difficulty distinguishing between different melodies they have never heard before. People with Alzheimer's also have issues with picturing future events. This is due to a deficit in episodic future thinking.[16]