Etching the brain: memory encoding

Business

Sentient creatures are constantly bombarded with a range of stimuli through all their senses. However, in order to process these inputs and “ learn” from past experiences, creatures require a mechanism to convert the moment of interest into a physical change that can later be re-accessed for further analysis. This process of storing sensory input information as a “ construct” (Mastin) in the brain (for more complex creatures) is known as Encoding. There are multiple types of encoding depending on how the information is input and presented. Direct stimulation of our senses is the most common.

Visual encoding is when stimuli to the sense of sight are stored in the brain as “ mental pictures” in the visuo-spatial “ sketchpad” (Baddeley), while Tactile Encoding is when vibrations, odors, or tastes cause new memories of that sensation to be formed (Crawley), and Acoustic Encoding is when sounds, words, or vibrations are memorized as auditory experiences (Mastin). Interestingly, all these forms of encoding involve some sort of repetition or “ rehearsal” before the memory becomes more permanent, such as re-displaying of mental pictures or sub-vocal rehearsal of sounds in the “ echoic memory” (Baddeley). This echoing can be seen again in how direct-sense-stimulation types of encoding work together to form a cohesive set of memories of a given experience. For example, brief visual stimuli lead to initial mental “ images” that store much more information than can be retrieved later, while auditory impulses alone begin receding immediately. However, visual tasks can be encoded more permanently in the brain if auditory impulses are simultaneously rehearsed (Sperling), thus showing the synthesis of disparate stimuli in Encoding.

On the other hand, types of encoding that involve some organization (semantic encoding) or association (elaborative encoding) tend to stay in the memory for longer. In Semantic Encoding, the inputs are better ingrained if they can be organized in smaller groups due to similar characteristics, or can be associated together in a different context rather than its actual meaning, such as in mnemonics: Roy G. Biv is a person's name but actually stands for rainbow colors (Mastin). A fascinating example of this encoding type is Ebbinghaus' " Spacing Effect," in which long-term recall is much stronger for distributed learning sessions than for cramming. Just like the direct-sense-stimulation encoding methods, semantic encoding gets easier with repetition (Demb). Elaborative Encoding can be declared the most fundamental type of encoding in people, because human memory is considered Associative – it is easier to store new information permanently if it can be linked to memories already present in long-term storage (Mastin).

Amazingly, old information can often be a very strong influence on the way new data is encoded into our memory – " how we remember something depends on how we think about it at the time" (Brown). This " distorted form" (Mastin), also called Perception, plays significant roles in situations where unrelated previous knowledge is present, such as when learning new languages with grammar-biases of one's native language. Memory encoding is the first spark that lays down memories of an event as one experiences it occurring. Understanding the methods and patterns of Encoding is vital in better comprehending how prior remembrances can prejudice the memorization of new information and thus shape each individual's perceptions and reactions to new situations.