ENCODING IN STM &LTM, CHUNCKING

AJITABH KUMAR

GUEST FACULTY

DEPARTMENT OF PSYCHOLOGY

- **Memory Encoding** is the crucial first step to creating a new memory. It allows the perceived item of interest to be converted into a **construct** that can be stored within the brain, and then recalled later from **short-term** or **long-term memory**.
- Encoding is a biological event beginning with **perception** through the senses. The process of laying down a memory begins with **attention** (regulated by the **thalamus** and the **frontal lobe**), in which a memorable event causes neurons to fire more frequently, making the experience more intense and increasing the likelihood that the event is encoded as a memory. **Emotion** tends to increase attention, and the emotional element of an event is processed on an unconscious pathway in the brain leading to the **amygdala**. Only then are the actual **sensations** derived from an event processed.

- The perceived sensations are decoded in the various **sensory areas** of the cortex and then combined in the brain’ s **hippocampus into** one single experience. The hippocampus is then responsible for analyzing these inputs and ultimately deciding if they will be committed to long-term memory. It acts as a kind of sorting centre where the new sensations are **compared** and **associated** with previously recorded ones.
- The various threads of information are then stored in various different parts of the brain, although the exact way in which these pieces are identified and recalled later remains largely unknown. The key role that the hippocampus plays in memory encoding has been highlighted by examples of individuals who have had their hippocampus damaged or removed and can no longer create new memories.It is also one of the few areas of the brain where completely new neurons can grow.

- Although the exact mechanism is not completely understood, the encoding occurs on different levels, the first step is the formation of short – term memory from the ultra-short-term sensory memory, followed by the conversion to along-term memory by a process of memory consolidation. The process begins with the creation of a **memory trace** or **engram** in response to the **external stimuli**. An engram is a hypothetical biophysical or biochemical change in the neurons of the brain, hypothetical in the respect that no-one has ever actually seen, or even proved the existence of, such a construct.
- An organ called the **hippocampus**, deep within the **medial temporal lobe** of the brain, receives connections from the primary sensory areas of the cortex, as well as from **associative areas** and the **rhinal** and **entorhinal cortexes**. While these **anterograde** connections converge at the hippocampus, other **retrograde** pathways emerge from it, returning to the primary cortexes. A **neural network** of cortical **synapses** effectively records the various associations which are linked to the individual memory.

- **There are three or four main types of encoding:**
- **Acoustic encoding** is the processing and encoding of sound, words and other auditory input for storage and later retrieval. This is aided by the concept of the **phonological loop**, which allows input within our **echoic memory** to be sub-vocally rehearsed in order to facilitate remembering.
- **Visual encoding** is the process of encoding images and visual sensory information. Visual sensory information is temporarily stored within the **iconic memory** before being encoded into long-term storage. The **amygdala** (within the **medial temporal lobe** of the brain which has a primary role in the processing of **emotional reac**tions) fulfils an important role in visual encoding, as it accepts visual input in addition to input from other systems and encodes the positive or negative values of **conditioned stimuli**.

- **Tactile encoding** is the encoding of how something feels, normally through the sense of touch. Physiologically, neurons in the primary **somatosensory cortex** of the brain react to vibrotactile stimuli caused by the feel of an object.
- **Semantic encoding** is the process of encoding sensory input that has particular **meaning** or can be applied to a particular **context**, rather than deriving from a particular sense.
- It is believed that, in general, encoding for short-term memory storage in the brain relies primarily on **acoustic encoding**, while encoding for long-term storage is more reliant (although not exclusively) on **semantic encoding**.

Thank you