

EPISODIC & SEMANTIC MEMORY

http://www.human-memory.net/types_episodic.html

Declarative memory can be further sub-divided into **episodic memory** and **semantic memory**.

Episodic memory represents our memory of **experiences** and specific **events** in time in a serial form, from which we can reconstruct the actual events that took place at any given point in our lives. It is the memory of **autobiographical events** (times, places, associated emotions and other contextual knowledge) that can be explicitly stated. Individuals tend to see themselves as actors in these events, and the **emotional charge** and the entire **context** surrounding an event is usually part of the memory, not just the bare facts of the event itself.

Semantic memory, on the other hand, is a more structured record of **facts, meanings, concepts** and **knowledge about the external world** that we have acquired. It refers to general factual knowledge, shared with others and **independent of personal experience** and of the **spatial/temporal context** in which it was acquired. Semantic memories may once have had a personal context, but now stand alone as simple knowledge. It therefore includes such things as types of food, capital cities, social customs, functions of objects, vocabulary, understanding of mathematics, etc. Much of semantic memory is abstract and relational and is associated with the meaning of **verbal symbols**.

The semantic memory is generally **derived** from the episodic memory, in that we learn new facts or concepts from our experiences, and the episodic memory is considered to **support** and underpin semantic memory. A gradual **transition** from episodic to semantic memory can take place, in which episodic memory reduces its sensitivity and association to particular events, so that the information can be generalized as semantic memory.

Both episodic memory and semantic memory require a similar encoding process. However, semantic memory mainly activates the **frontal and temporal cortexes**, whereas episodic memory activity is concentrated in the **hippocampus**, at least initially. Once processed in the hippocampus, episodic memories are then consolidated and stored in the **neocortex**. The memories of the different elements of a particular event are distributed in the various visual, olfactory and auditory areas of the brain, but they are all connected together by the hippocampus to form an episode, rather than remaining a collection of separate memories.

For example, memories of people's faces, the taste of the wine, the music that was playing, etc, might all be part of the memory of a particular dinner with friends. By repeatedly reactivating or "playing back" this particular activity pattern in the various regions of the cortex, they become so strongly linked with one another that they no longer need the hippocampus to act as their link, and the memory of the music that was playing that night, for example, can act as an **index entry**, and may be enough to bring back the entire scene of the dinner party.

Our **spatial memory** in particular appears to be much more confined to the hippocampus, particularly the right hippocampus, which seems to be able to create a mental map of space, thanks to certain cells called "**place cells**". Episodic memory does also trigger activity in the **temporal lobe**, but mainly in order to ensure that these personal memories are not mistaken for real life. This difference in the neurological processing of episodic and semantic memory is illustrated by cases of anterograde amnesia cases (a good example being a case known as "**C.L.**") in which episodic memory is almost completely lost while semantic memory is retained.

A further category of declarative memory, referred to as **autobiographical memory**, is sometimes distinguished, although really it is just one area of episodic memory. Autobiographical memory refers to a memory system consisting of episodes recollected from an individual's own

life, often based on a **combination** of episodic memory (personal experiences and specific objects, people and events experienced at particular times and places) and semantic memory (general knowledge and facts about the world).

One specific type of autobiographical memory is known as a "**flashbulb memory**", a highly detailed, exceptionally vivid "snapshot" of a moment or circumstances in which surprising and consequential (or emotionally arousing) news was heard, famous examples being the assassination of John Kennedy, the terrorist bombings on 9/11, etc. Such memories are believed by some to be highly **resistant to forgetting**, possibly due to the strong emotions that are typically associated with them. However, a number of studies also suggest that flashbulb memories are actually not especially accurate, despite apparently being experienced with great vividness and confidence.

Experiments on rats in the 1970s showed that there are over a million "**place cells**" in a rat's hippocampus, each of which only becomes active when the rat is located in a very specific part of its environment. All together they can form a very precise **cognitive map** that tells the animal where it is at any given time.

Recent research into links between memory and **handedness** suggest that "**mixed-handers**" (who typically perform some tasks with one hand and some with the other) tend to show better autobiographical memory than "**strong-handers**" (who perform almost all tasks with either one hand or the other). It is hypothesized that mixed-handers may have more, or better, **communication** between the brain's hemispheres than strong-handers, and possibly even a thicker **corpus callosum**.