

## X. Memories are Made of This

Learning occurs whenever we confront a new circumstance, experience, or environment which require us to change our behavior in order to achieve some goal. Learning is necessary in order to adjust to circumstances, profit from experiences, and adapt to one's environment.

Circumstances are the exigencies of the day which require thought, decision, and action. Experiences are the results of these thoughts, decisions, and actions which build up a personal inventory of events that shed light on future decision making.

Environment refers to the *Zeitgeist* in which one functions. You may agree or disagree with its structure but you must make adjustments to its requirements in order to coexist with others. As you move through life, these events serve to place into the engrams of your brain different classifications of memories.

1. Episodic Memory: Memory of specific events, places, or situations.
2. Semantic Memory: Knowledge of facts and their meaning without reference to when they were learned.
3. Declarative Memory: The accumulation of what you know including both episodic and semantic memory.
4. Iconic Memory: Extremely short-term visual memory, e.g., a telephone number.
5. Procedural Memory: Memory referring to motor skills, or "how" to do something. These various classifications of memory may be retained by the brain in one of two ways:
  1. As Short-Term Memory: Lasts about 10 seconds with a limited capacity of 7 items but which may be retained with repetition.
  2. Or, Long-Term Memory: Believed to have a limitless capacity and endurance and may be retrieved into the conscious mind with proper stimulation.

That knowledge which is utilized in the present status of the conscious mind is called Working Memory.

The learning of facts or general information changes your behavior since knowledge influences one's thought, decisions, and actions.

Learning occurs in the context of events, places, and situations and influences behavior. How depends upon whether these events, places, and situations are pleasant, rewarding, and beneficial, or unpleasant, painful, and damaging.

Iconic memory changes behavior only briefly as you acquire the knowledge to perform a mundane task and once done it is forgotten.

Procedural memory changes behavior in that ignorance of how to perform a given task is altered by the inculcation of instructions. Repetition makes the person better and better at the task and involves coordination of the mind with muscle.

In every case, learning produces some level of behavioral change. In every case, specific neurons in the central nervous system change their properties. These changes can be measured in the following ways:

1. Morphologically: Modifications to the structure of neurons and their synaptic connections may be observed under an electron microscope.
2. Dynamically: Changes in blood flow and oxygen uptake by the neurons during the processes of learning or of recall can be measured.

3. Biochemically: Processes which lead to the morphological changes can be measured in body chemistry, specifically the synthesis of new proteins which are then inserted into the synapses by means of complex intercellular signals.
4. Physiologically: Changed electrical properties of the neurons can be measured.

All these processes are necessary for memory to be permanently recorded in the human brain. If any of these processes are interrupted, or prevented from occurring, then the memory is not recorded.

Therefore, information taken into the brain is processed by its various compartments and academic understanding of its meaning is accumulated in the association cortex of the brain. It is at this point, with regard to declarative knowledge, that human volition must make a decision whether to accept or reject the content of that information as true or false.

It now becomes important to define a new vocabulary term which will be very important in our future studies.

(Transparency: Cerebral Cortex/Association Areas) The Cerebral Cortex is what makes human beings what they are.

Within this cortex lie the secret of human consciousness, sensory capacities, motor skills, aptitudes for reasoning, and language abilities. The cerebral cortex is the brain's outer covering of cells. It is composed of neurons and other kinds of cells and forms a layer about an eighth of an inch thick over the rest of the brain.

The cerebral cortex is composed of six layers of neurons, each layer many neurons thick. We have learned that sensory information coming from sense organs such as the eye and the ear project to specific areas of the cerebral cortex. Visual information projects to the back or occipital region. Information from the skin and body projects to a middle or parietal region. Auditory information projects to the auditory cortex. In fact, it appears that there is a sound-frequency map in the auditory area. In front of the parietal region is the motor cortex, the area most concerned with the control of movement. The remainder of the cerebral cortex is called Association Cortex, which occupies the greatest portion of the cerebral cortex in humans.

All indications are that decision-making originates in the association cortex. All incoming information is gathered in the association cortex which in effect functions as a central processing area. This is where all data comes together and presents to the conscious mind the content, meaning, and syntax of what is to be considered.

Thus, the association cortex is the area of the brain which we may consider the equivalent of what we have been calling the “*left lobe*” or the *nous*. This is where incoming information is presented to the volition for a decision, what we refer to in the doctrine of the Grace Apparatus for Perception as, “*academic understanding*.”