



**Theology of Neurology: How Memories Are Made: 5 Classifications of Memory; Facilitation: Changing the Path of Least Resistance: Intro: Neural Recipes**

10. **How Memories Are Made**
- 1) Learning is necessary in order to adjust to circumstances, profit from experiences, and adapt to one's environment.
  - 2) Circumstances are the exigencies of the day which require thought, decision, and action.
  - 3) Experiences are the result of these thoughts, decisions, and actions. They build up a personal inventory of events that influence future decision- making.
  - 4) 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.
  - 5) 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.
  - 6) 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.
  - 7) The knowledge that is recalled into the conscious mind is called Working Memory.
  - 8) Learning occurs in the context of events, places, and situations and influences behavior. How this happens depends upon whether these events, places, and situations are pleasant, rewarding, and beneficial, or unpleasant, painful, and damaging.
  - 9) In every case, learning produces some level of behavioral change.
  - 10) In every case, specific neurons in the central nervous system change their properties.
  - 11) 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 process 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.
- 12) All these processes are necessary for memory to be permanently recorded in the human brain.
  - 13) If any of these processes are interrupted, or prevented from occurring, then the memory is not recorded.
  - 14) Therefore, information taken into the brain is processed by its various compartments. Academic understanding of its meaning is accumulated in the association cortex of the brain.
  - 15) 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.
11. **Facilitation: Changing the Path of Least Resistance**

**A. Introduction:**

- 1) The word “facilitate” and its derivatives are defined as follows:

**Webster’s Ninth New Collegiate Dictionary,**

s.v. “facilitate”: “to make easier.”

s.v. “facility”: **1:** the quality of being easily performed. **4:** something that makes an action, operation, or course of conduct easier.

s.v. “facilitation”: **2a:** [increasing the efficiency of] a particular neural pathway especially from repeated use of that pathway. **b:** increasing the ease of a response by repeated stimulation.

**Oxford English Dictionary,**

s.v. “facilely” \fa' sel-lē\: **1.** With little exertion, labour, or difficulty; without effort or restraint.

s.v. “facilitate”: **5.** Easiness to be led or persuaded to good or bad; readiness of compliance; pliancy.

- 2) “Facilitation” is a term used in neurology to describe the enlargement of a memory trace into a path of least resistance.
- 3) (TXP: Neuron Tangle) The way one neuron communicates with another is through synaptic connections. The very lucid description of how this entire process works is offered by:

**Johnson, George. In the Palaces of Memory: How We Build the Worlds Inside Our Heads. (New York: Alfred A. Knopf, Inc., 1991); 20:**



As important as the neuron itself are the synapses that serve as junctions between the cells. While information is carried inside a neuron by electrical pulses, once the signal reaches the end of the axon it must be ferried across the synaptic gap by chemicals called neurotransmitters. On the other side of the synapse, the dendrite contains structures called receptors, which recognize these transmitting molecules. If enough are registered, then the second cell fires. A neuron can be thought of as a cell whose specialty is converting chemical signals to electrical signals, then back to chemical signals again.

- 4) This electrochemical coding system can have only two results. It can excite the neighboring neuron, or it can inhibit the neighboring neuron.
- 5) We will first observe what is called “synaptic excitation” and then subsequently its antithesis, “synaptic inhibition.”