

VIII. Memory, the Brain's Electrochemical Filing System

Summary

Memory occurs when learning provides the stimulus that causes permanent changes to occur in neural tissue. This is the transformation process mentioned in Romans 12:2 which results in the renovation of thought.

New proteins are produced by the cell nucleus's DNA which then begins a process of permanently encoding the knowledge into a unique memory trace. This memory trace is recorded forever into long-term memory and may be recalled to the conscious mind by means of the proper stimulus.

Conclusion

The plasticity of the brain enables it to change its physical properties to accommodate a change in thought and to permanently record that change in a unique electrochemical memory trace.

IX. Repetition Enlarges a Trace into a Path of Least Resistance

Summary

Every learning experience plus every review, every repetition, and every application, causes the memory trace to enlarge. This enlargement involves the following changes in the neural structure of the brain:

- a. Axonal and dendritic branches elongate;
- b. existing synapses becomes more excited;
- c. new synapses are created;
- d. existing connections are rearranged while new ones come together; and
- e. the electrochemical signal is intensified.

Conclusion

As each repetition in learning occurs, alterations are made in the memory trace causing it to become more and more efficient. The more you study the subject, the better you understand it, the easier it is to recall, and the more it becomes a part of your lifestyle.

As an example, we constructed a memory trace for the doctrine of salvation and eternal security using John 3:16 as the initial input. We enlarged it by subsequently adding information from Ephesians 2:8, Ephesians 2:9, Romans 8:1, Galatians 4:7, Galatians 4:8, 1 Peter 1:3, 1 Peter 1:4, and 1 Peter 1:5. We concluded that the believer at this point was doctrinally invincible on the subject of his salvation and eternal security and noted 1 Corinthians 3:3 and Psalm 119:105.

X. Memories are Made of This

Summary

There are several different classifications of memories: episodic: specific events; semantic: meaning; declarative: content; iconic: visual short-term; and procedural: motor skills. These classifications of knowledge are retained in the brain briefly in short-term memory, or permanently in long-term memory. No matter which classification of learning is involved, if

long-term memory results, then a permanent change occurs in the neurons of the brain, most emphatically at their synapses.

When you learn, four measurable changes occur in the neurons and their synapses creating a memory trace:

- a. Morphological: Structural;
- b. Dynamic: Blood flow and oxygen uptake increases;
- c. Biochemical: Synthesis of new proteins; and
- d. Physiological: Electrical properties.

Conclusion

Learning causes the brain to expand its capacity for thought by initiating permanent change in the tissue of the brain. This change results in the creation of memory.

XI. The Association Cortex: Staging Area for Academic Understanding

Summary

The cerebral cortex is the outer covering and is unique to man. Human consciousness, reasoning capacity, language abilities, and decision-making occur in this cortex. In order for decision-making to occur, all pertinent data must be analyzed and brought to the individual's academic understanding.

Making up the greatest percentage of the cerebral cortex is the association cortex. This area comprises the central processing center for thought, decision, and action.

Human volition considers the information gathered in the association cortex and is thereby challenged to act or not act, accept or reject, believe or disbelieve. The decision to accept and believe the information initiates the electrochemical process which results in the establishment of a long-term memory trace.

Conclusion

The association cortex is what we have identified as the *nous*, the place where the Holy Spirit makes divine thought understandable to the finite human mind.

Since the believer is incapable of understanding divine thought, the Holy Spirit must make it perspicuous to him. At the point of academic understanding the believer is left free to accept or reject, believe or disbelieve the revelation.

However, even if he accepts and believes, his finite mind is incapable of processing divine thought into a memory trace. Transfer of doctrinal truth from the association cortex into a permanent memory trace must be the work of the Holy Spirit.

It is He who must initiate the synthesis of new proteins, it is He who must ignite the action potential of the first neuron, it is He who must coordinate the interconnections of the neural network which establishes the memory trace.

In short, it is the Holy Spirit who must convert *gnosis* into *epignosis* and store it in the seven compartments of the stream of consciousness. The biblical documentation for this was noted in a brief review of the corrected translation of 1 Corinthians 2:9–1 Corinthians 2:14, developed in lessons 18–22 of the Christian Way of Life series.

XII. Facilitation: Changing the Path of Least Resistance

Summary

Facilitation means to make a task easier to perform. In neurology it refers to the principle that a behavior pattern becomes more and more habitual with every repetition of the act.

We noted the technical process by which a positive charge fired from the cell nucleus causes that of a neighboring neuron to fire. This process is repeated over and over until a memory trace is created.

We then noted how the repetition of this sequence causes the memory trace to become habitual and thus facilitated into a path of least resistance. Likewise, an action is halted or even prevented from starting by the firing of a negative charge which fails to influence the neighboring neuron resulting in no action occurring.

Positive volition initiates a positive charge called an action potential and synaptic excitation. When this results in the message crossing the synaptic cleft it sets up an excitatory potential. If the signal is strong enough, the potential becomes a reality and the neighboring neuron fires.

Negative volition, on the other hand, initiates a negative charge and results in synaptic inhibition. This causes the individual to either stop an action or prevents it from ever starting.

Conclusion

A facilitated memory trace presents the volition with a path of least resistance. If that path is a wheel-track of wickedness, the likelihood of the believer doing the wrong thing is very high. If that path is a wheel-track of righteousness, the likelihood of the believer doing the right thing is very high.

Under the filling of the Holy Spirit inside the Divine Power System, the believer is enabled to recall the right wheel-track and is delegated the power to choose it.