

## **ENGRAMS AND IMPRINTS: PRIMITIVE AND SUB-CORTICAL**

This little history is included to introduce the position that 1) M's memory is primitive and stored sub-cortically, probably in the cerebellum and 2) the concept of open/closed windows of developmental opportunity will be exemplified in the fetus during the mother's labor (Part 2).

M's first LSD experience could be a prime example of the engram, a term used by neurophysiologists and popularized by the Scientologists. To a neuropsychologist, an engram is defined as a hypothetical process producing a memory trace lodged somewhere in the unconscious to affect the central nervous system (CNS) by some unknown, unconscious process. The word, "engram" was borrowed by the scientologists to define a buried memory having unconscious adverse influence on mental and physical behavior to be monitored by skin conductivity and "cleared" by various associations. To the early 20th century biologist Richard Wolfgang Semon (1859-1918) it was a mneme, from the ancient Greek Muse of memory, Mnemosyne or Mneme, (as in mnemonic) representing much the same thing (Semon, 1921). This concept was adopted by behaviorists and extended to the idea of the "meme" as a cultural unit (Dawkins, 1976). "Imprint", might be another name for this kind of phenomenon, since the character of M's LSD experience, like that of experimental animals, is argued below to be sub-cortical. The word "imprint" might better suggest the nature of this memory as encoded and non-verbal recognition of associations. The LSD recall to be described clearly conforms to these definitions of an engram, imprint or memory trace, where LSD unlocked some "storage area" within the brain and allowed impulses from this memory to flow—once again---into thalamic and cerebral cortical areas that specialize in interpreting them as conscious awareness.

A well known example of imprinting is seen in the behavior of young geese, as they lock onto and follow the first image they see, whether it is a mother goose or a human being in a motorized hang-glider. For them, as will be argued for the fetus, it is a critical time, in which they are in a condition to receive and store the image. Beyond this time, the image is locked away in some memory crypt and their impulse to follow any figure other than the initial image is gone.

Importantly, this line of research extended into Pavlovian experiments on rabbit eye-blink/sound association by Thompson and coworkers, and discussed as the scientific precedent for the “ON-OFF” nucleus analogous to the properties to be postulated here for a reticular/cerebellar nucleus interaction (Thompson and Krupa 1994).