Cog468 Cognitive Science Capstone Seminar

Classic Paper (CP) Study/Discussion Assignment

In Search of the Engram

K.S. Lashley

Biographical Sketch

Born and educated in the United States, Lashley began to collaborate with Shepherd J. Franz in the study of intelligence and the role of the frontal lobes. He formulated the theory of cortical specialization for sensory and motor functions. He challenged the ongoing concept of cortical localization. The controversy between localization and holistic emphasis of brain function was brought into focus by Lashley. He is remembered as a great psychologist who approached learning and memory by assessing the effects of brain damage in laboratory animals.

Learning Outcomes

1. Psychology: Bechterew, Pavlov, and the behaviorist school in America attempted to reduce all psychological activity to simple associations or chains of conditioned reflexes. (page 334)

2. Big Idea: The motor cortex does not participate in the transmission of the conditioned reflex pattern, [visual discrimination tasks], but also that the transmission of impulses over well defined isolated paths from one part of the cortex to another is inessential for performance of complicated habits. (page 336)

3. Big Idea: Habit patterns cannot be acquired by the isolated spinal cord. Somehow, the control of the motor pattern essential for the performance of the complex acts traverses the network of short internuncial cells of the spinal cord. (page 338)

4. Big Idea: The visual habit can be formed in the absence of the visual cortex, and the rates of learning with and without the visual area are exactly the same. (page 341)

5. Psychology: This lack of definitive habit localization might really have been predicted by psychological data alone. Analysis of the effective stimuli in discriminative learning reveals that the association is independent of particular sensory nerve fibers. (page 342)

6. Careers and Applications: The series of experiments has yielded a good bit of information about what and where the memory trace is not. It has discovered nothing directly of the real nature of the engram. (page 347)
Interesting Ideas

1. After reading the article, it seems to me that Lashley probably thought he created more questions about the brains modularity than he realized. His findings do shed some light on specific brain area function compared to holistic brain function, but they also create many questions, such as the section where he details the severing of transcortical fibers in the frontal lobe of monkeys leaving only projecting fibers and this did not affect their performance in visual, tactile and kinesthetic tasks, which created a sense of puzzlement in Lashley.

2. A great deal of the experiments Lashley performed, at least on monkeys, are not possible today with animal protection laws pertaining to laboratory studies. There are many European countries that have banned any studies involving primates, I believe Canada and U.S. are some of the last remaining countries to still allow primate studies in a laboratory setting, I think rhesus monkeys are the main primates used now. However, it seems that there is not many laws against laboratory experiments on rats. Do we think monkeys have stronger or more emotions and a more complete concept of self than rats? Is that why there has been bans on studies with primates, or is it our selfish mind which believes that monkeys are our close evolutionary relatives and it is much harder for us emotionally to physically harm a cute monkey rather than a pesky rodent?

3. It seems to me that the conclusion of the article creates many more opportunities and possible fields of study. Lashley says himself that the studies answer many questions of where the memory trace is not located in the brain. With the type of experiments that he explained in this article describes almost a trial and error procedure. You must rule out one specific brain area at a time, by removal or separation usually, and then complete a test to figure out what that brain area function is. Thankfully there are now less evasive techniques to disable brain areas temporarily, such as TMS and brain cooling, used for experimentation. These methods are certainly less evasive than butchering, or slicing the brain.

4. Part three of Lashley’s summary on page 347 seems to me the most salient conclusion from his experiments. It entails that the associative brain areas are not store houses for specific memories, later we find out the hippocampus is a big part of memory storage. These associative areas seem to be concerned with modes of organization and facilitation of the level of vigilance of a memory storage process. Studies done after Lashley published this paper conclude that he is correct in this case, it is certainly easy to see after reading this paper that he laid the framework for future studies involving memory and brain function specialization versus holistic brain function.