Effects of the Hippocampus and Medial Caudate Nucleus on Short-term Memory

A proposal has been made that mapping of the external environment into short-term memory is accomplished through the utilization of many spatial features. These features are distance, direction and spatial location. Experiments have shown that the hippocampus plays an important role in processing distance and spatial location information. However, its role in processing direction information has not yet been investigated. In addition to the hippocampus, vestibular connections in the medial caudate nucleus (MCN) have made it a second region of interest in processing direction information.

A task was designed to assess memory for direction. Long-Evans rats completed trials consisting of test and study phases. During the test phases, the rats traversed a maze arm oriented in one of three directions. In the study phases, a choice between the test phase direction (correct) and a foil direction (incorrect) were presented. Once rats reached a learning criterion, they were given hippocampus, MCN, or cortical control lesions. Unlike control animals, rats with hippocampal and MCN lesions exhibited marked impairments when re-tested. These results suggested that both the hippocampus and MCN mediate short-term memory for direction information.