

Role of the hippocampal formation in sequence memory

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It is suggested that episodic memory is defined as a context-dependent sequence memory, and that the hippocampal formation (HF) is essential in such memory. To investigate HF involvement in a context-dependent sequence memory, multiple single unit activities were recorded from the monkey HF during performance of real translocation and virtual navigation tasks. The results indicated that place-related neuronal activity in the HF was task- or context-dependent, and cross-correlation data suggest that the context-dependent information may be encoded by interaction among pyramidal neurons based on asymmetrical connections. Rat CA1 HF neurons were also recorded during a conditional sequence memory task. Consistent with the computational studies, 2 types of the HF neurons were found; some neurons responded to single item regardless of sequences in which the item was presented, while other neurons displayed sustained firing during serial presentation of several items. In humans, event-related potentials (ERPs) were recorded during a sound-sequence memory task. The results suggest that the ERPs around 300-700 msec latency were specifically involved in sound sequence information processing. Furthermore, equivalent dipoles for the ERPs were localized in the medial temporal lobe including the HF and parahippocampal gyrus. These results suggest that the HF is crucial in context-dependent sequence information processing, which may be the neural basis of episodic memory.