



REGIONAL CENTRE FOR BIOTECHNOLOGY
Seminar series

**Objects, space, and memory: how the
hippocampal cognitive map comes
together**

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Abstract

Episodic memory is autobiographical recollection of events in a person's past. A conjunctive encoding of "what" happened "where" may be the crucial representation that binds together the various elements of an experience in a way that allows the storage and retrieval of episodic memories. Hippocampal "cognitive map" is thought to organize the nonspatial ("what") information in the context of a spatial ("where") framework. Understanding the hippocampal computations involved in the creation of the cognitive map requires a detailed knowledge of the information that is encoded in its inputs. Cortical inputs to the hippocampus are channelled through the medial entorhinal cortex (MEC) and the lateral entorhinal cortex (LEC). MEC inputs convey spatial information. In contrast, my experiments show that LEC inputs to hippocampus can carry nonspatial as well as landmark-derived spatial information. This suggests that the functional dichotomy between LEC and MEC can be described as LEC conveying external sensory input—both spatial and nonspatial—to the hippocampus, in contrast to the self-motion based, internal processing of MEC. To further understand the role of LEC as part of a neural processing circuit, I compared its activity to that of its input structures and its output targets. Overall, these results show the information transformation along the perirhinal cortex-LEC-hippocampus pathway that is responsible for formation and function of the cognitive map. In the future, I plan to study how LEC selectively allows only the relevant sensory information to flow to the hippocampus and thus plays a role in determining the nature of information hippocampus can use for its spatial and memory computations.
