

Dissertation Abstract

Report no.	(Course-based) No.987	Name	MANOJ KUMAR ERADATH
Dissertation title	TIME CONTEXT OF VISUAL CUE-OUTCOME ASSOCIATIONS REPRESENTED BY NEURONS IN PERIRHINAL CORTEX OF MACAQUE MONKEYS (嗅周皮質神経細胞による手掛かり-結果連合の時間的文脈の表現)		
<p>Forming associations between different attributes of objects and extracting related regularities are the fundamental mechanisms of semantic memory formation. Perirhinal cortex (PRh) is a polymodal area which has reciprocal connections with later-stage cortical areas of various sensory modalities, orbitofrontal cortex, amygdala and entorhinal cortex and dopaminergic projection from the ventral tegmental area. With these diverse connections, PRh is thought to contribute to the semantic memory formation by associating various types of information about objects. However, it remains unexplored how extensive the type of associations in which PRh participates is. Many authors have suggested that PRh is specific to item or object information processing while hippocampus integrates item information with contextual information. The present study aimed at determining the extent of associations represented by PRh cells, in comparison with cells in area TE, from which PRh receives most of its visual object inputs. We let monkeys experience a consistent contingency between visual cues and different outcome types (water reward and sound-only acknowledgement) in a particular time context for many days and then recorded neuronal activities from PRh and TE. We found that PRh cells represented the coming outcome type in their responses to the visual cues and that this representation was specific to the time context in which the monkeys had experienced the cue-outcome contingency. Thus, PRh cells represented not only the cue-outcome contingency but also the time context in which the contingency had occurred. In contrast, the representation of outcome type by TE cells was independent from the time context, i.e., the cells expressed the outcome information whenever the cue appeared. We further found that the representation of time context in PRh developed slowly compared to the animal's learning. The integration of time context with stimulus-outcome contingencies occurred only after many repetitions of the experience over more than a week. Our study shows that PRh is not specific to the representation of sensory and associative properties of objects themselves, but also involved in associating broader range of information of objects including the time context in which objects are associated with particular outcomes. The associations represented by PRh cells are highly inclusive in nature, encoding regularities in past experiences to form representations that are stable but adaptable to repeating regularities. In contrast, association memories represented by TE cells are less inclusive and probably related primarily to their selectivity for visual features. The stable, inclusive associations represented by PRh cells may form a core part of animal's semantic knowledge about the environment.</p>			