

Spatial and Non-Spatial Information: Representation in Lateral Entorhinal Cortex (LEC)

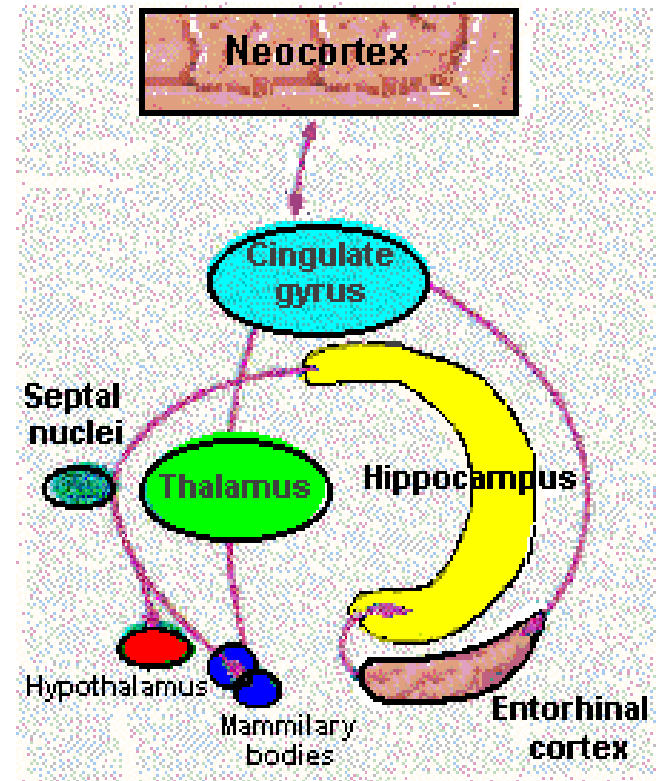
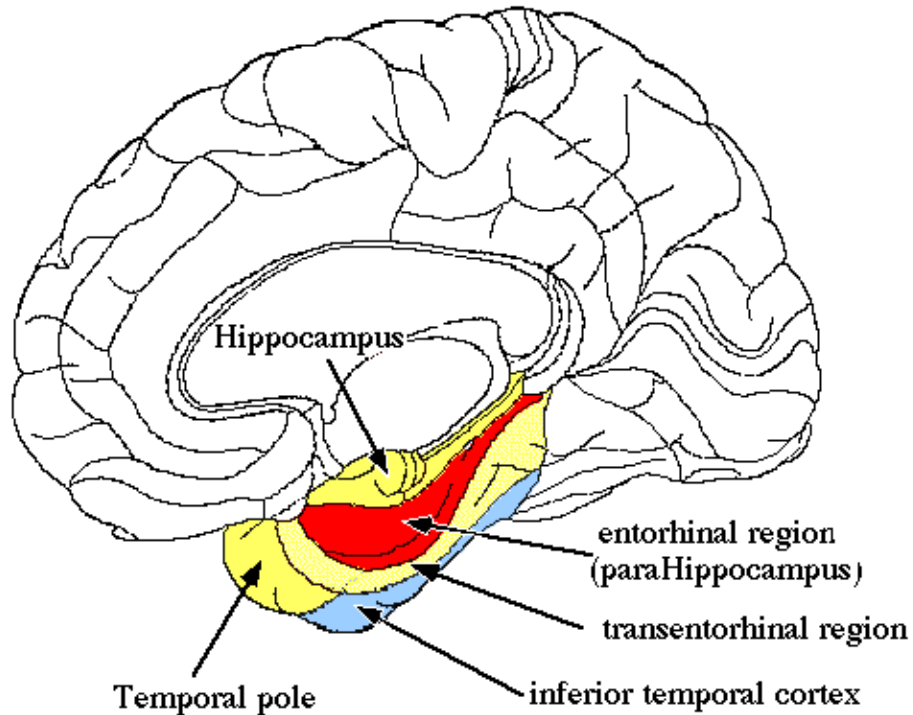
by

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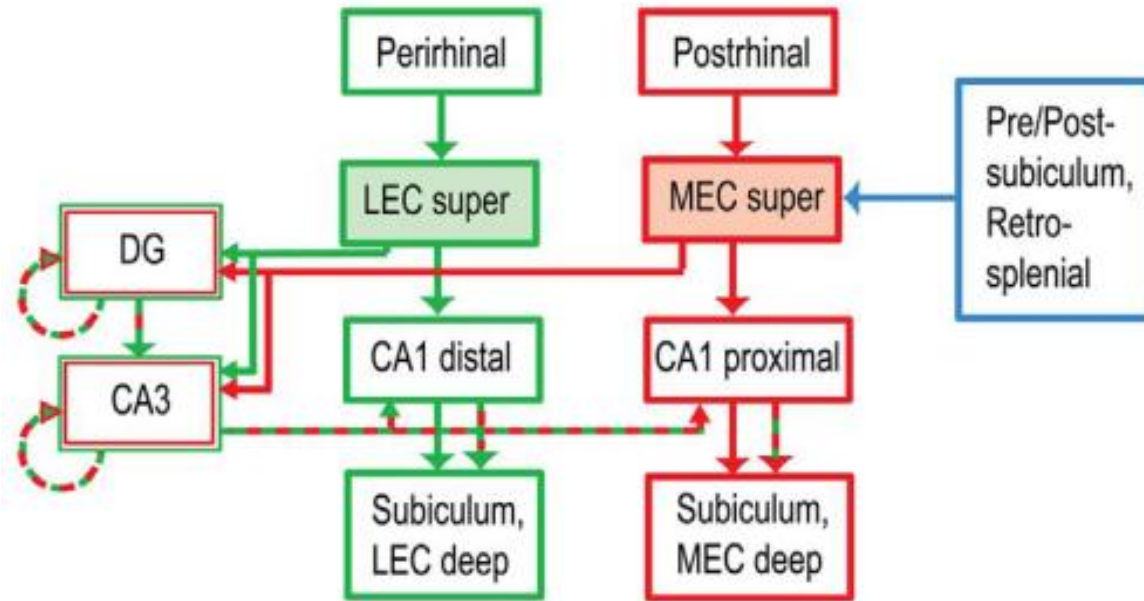
2011: Sachin S. Deshmukh & James J. Knierim

Episodic Memory

- Experience: WHERE-WHAT-WHEN

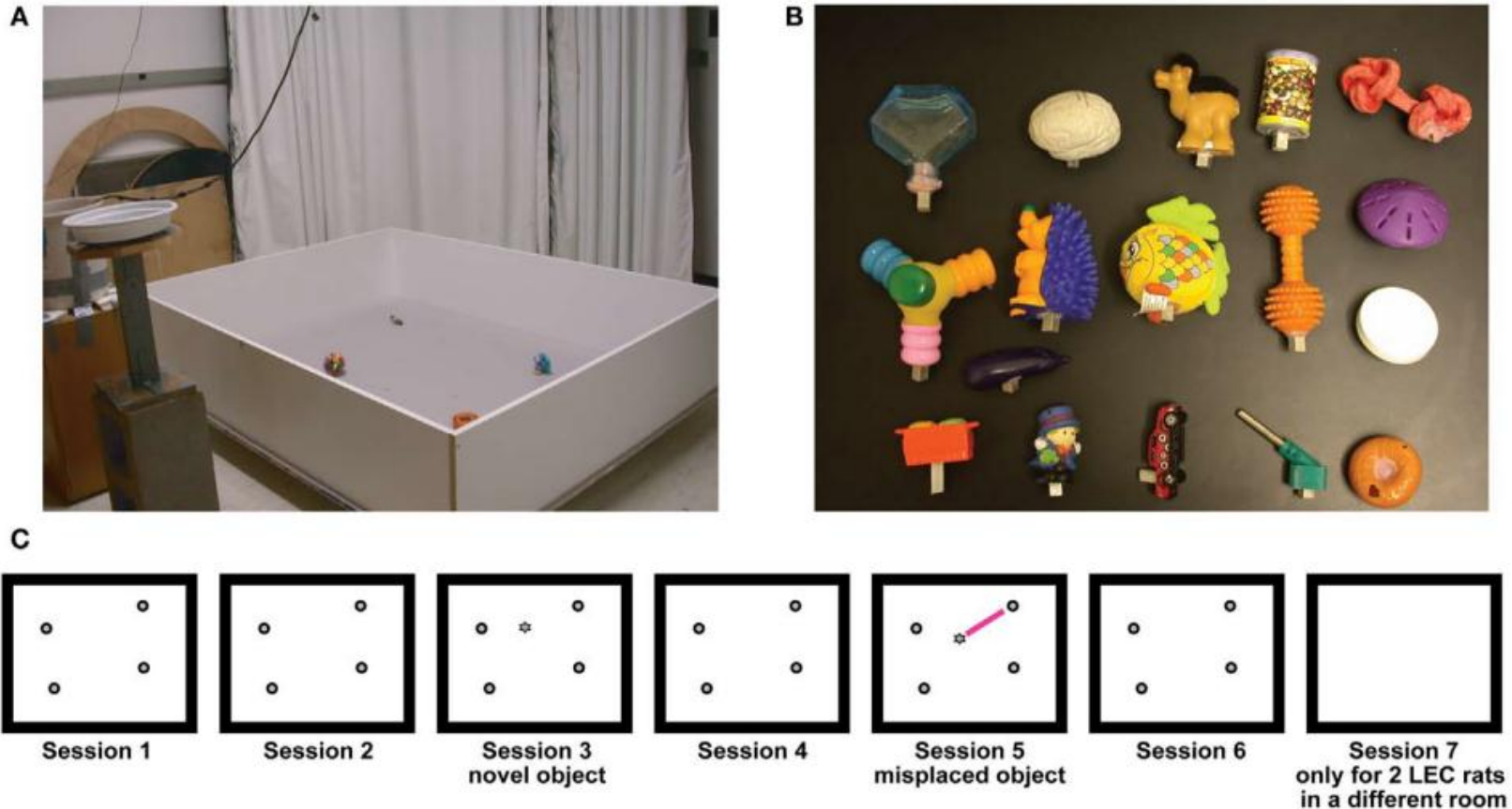


Related Work: MEC and LEC



- MEC : spatial information – walls or edges
- LEC : individual objects, odors, pictures etc.

The Experiment



- Objective: Double dissociate between LEC and MEC
- Conditions: Exploration

Measurements

- Firing Rate Map: $\frac{\text{No. of spikes in the bin}}{\text{Time spent in the bin}}$
- Information Score: Amount of information(in bits) per spike
- Object Responsiveness Index: $\frac{On - A}{On + A}$

Results

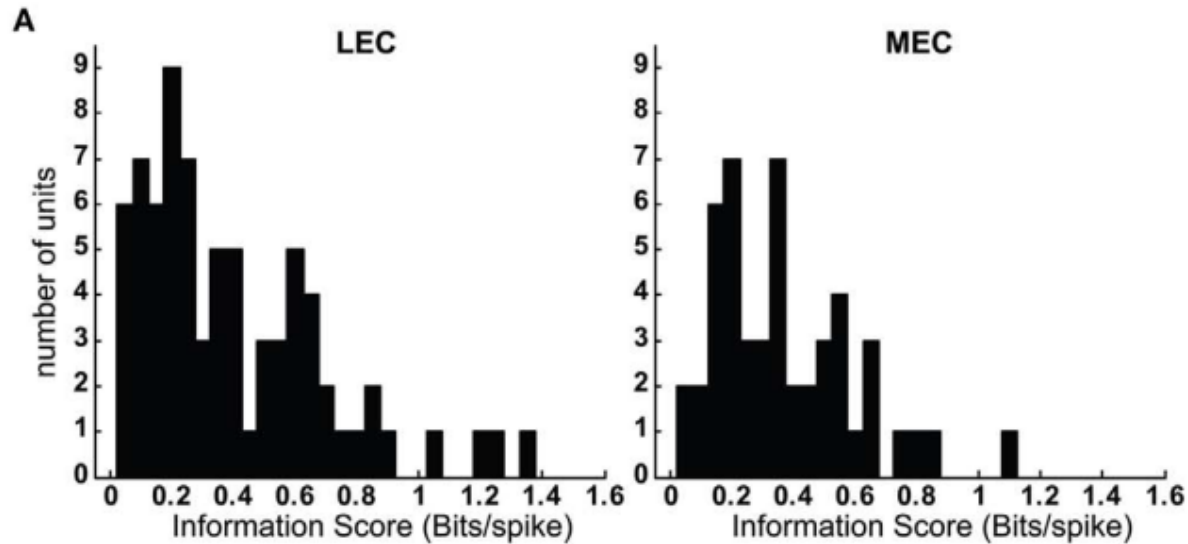


Table 1 | Distribution of cells with putative object-related activity across rats.

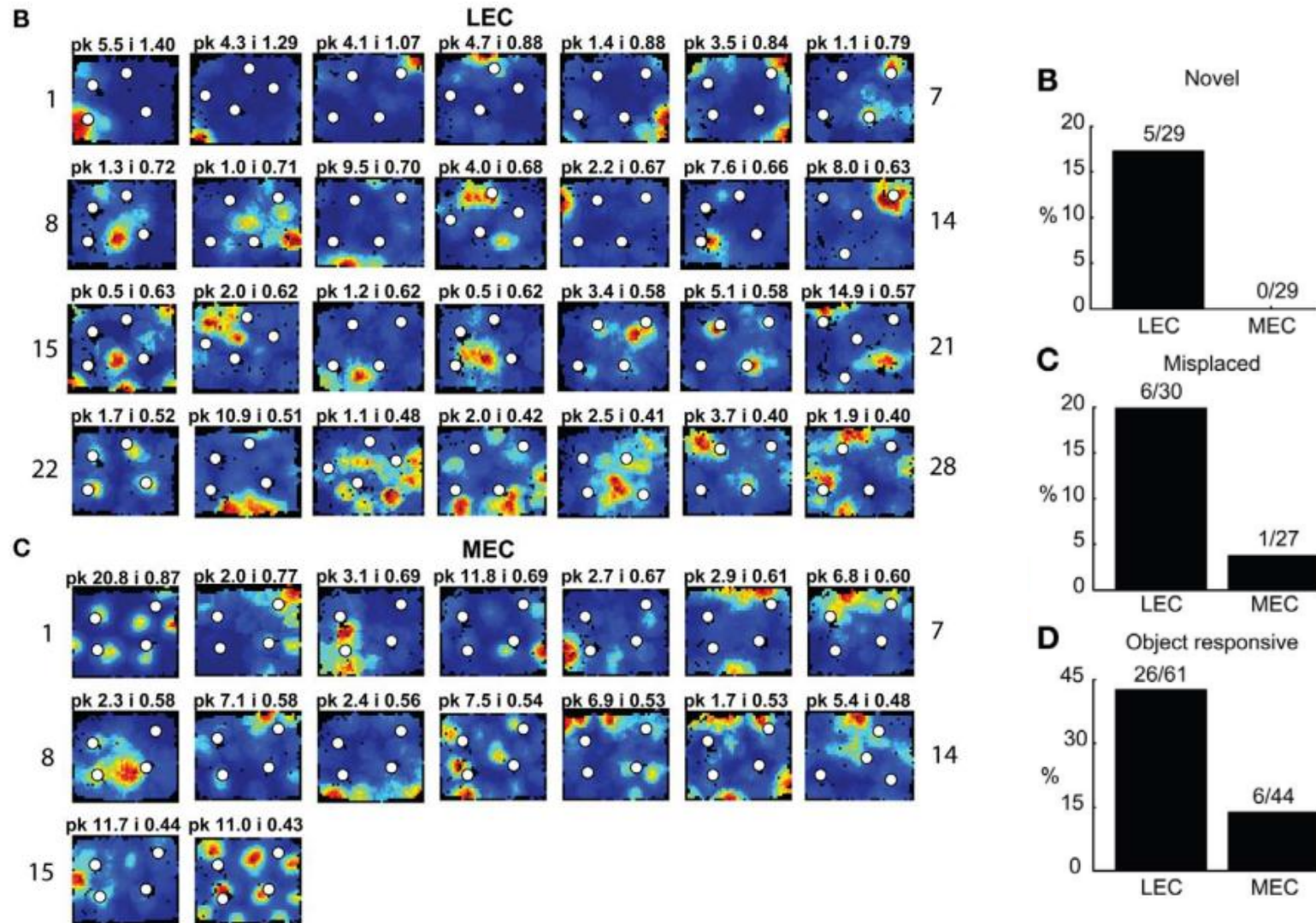
		Rat number						
		177	183	192	194	208	209	211
LEC	Total units ¹	14	14	1	8	36	10	4
	Units included in object-related analyses ²	13	9	0	4	28	4	3
	Putative object-responsive units	6	5	0	0	13	1	1
	Putative place cells ³	0	1	0	0	4	1	0
MEC	Total Units ¹			5	40			11
	Units included in object-related analyses ²			3	33			8
	Putative object-responsive units			0	5			1

¹Units with good isolation and at least 50 spikes in at least 1 session.

²Units with statistically significant ($p < 0.01$) spatial information score > 0.25 bits/spike in at least 1 session.

³This analysis was run only on LEC units.

Results



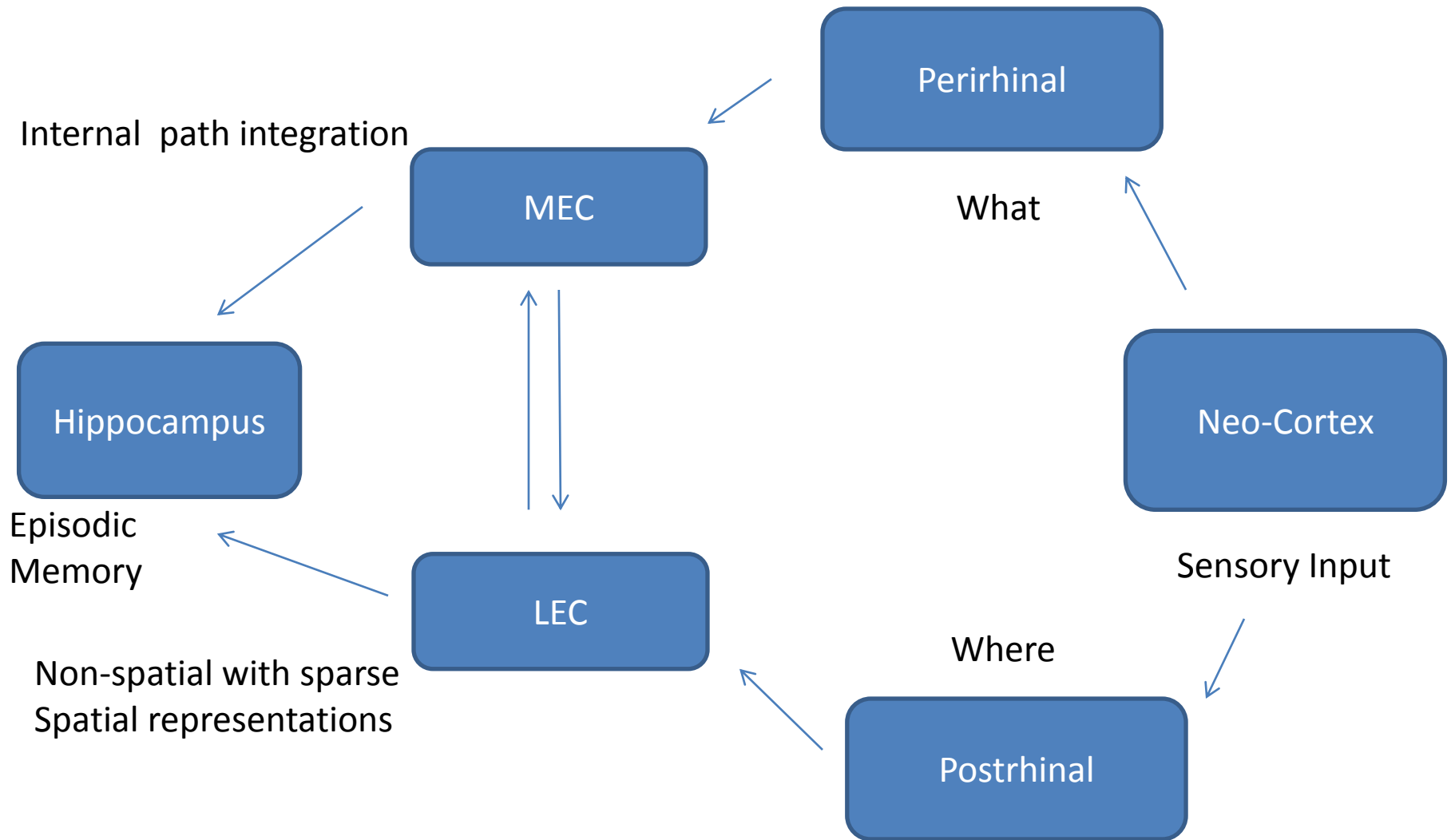
Questions ?

Thank You

Discussions

- Place-Related activity in LEC in presence of objects
- Object Selectivity in LEC: Saliency encoding
- Influence of objects on functional populations in MEC

Conclusion



References

- Deshmukh, Sachin S., and James J. Knierim. "Representation of non-spatial and spatial information in the lateral entorhinal cortex." *Frontiers in behavioral neuroscience* 5 (2011).
- Skaggs, William E., et al. "Theta phase precession in hippocampal neuronal populations and the compression of temporal sequences." *Hippocampus* 6.2 (1996): 149-172.
- Picture Credit: <http://www.freedomsphoenix.com/>