An efficient coding theory for a dynamic trajectory predicts non-uniform allocation of entorhinal grid cells to modules

An efficient coding theory for a dynamic trajectory predicts non-uniform allocation of entorhinal grid cells to modules

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Grid cells encode a mammal's estimate of position by firing in multiple locations, arranged on the vertices of a triangular lattice. Recent experiments established that these cells are functionally organized in discrete modules with common grid spacing. Noga Mosheiff (with co-authors Haggai Agmon, Avraham Moriel, and Yoram Burak) proposes that grid cells may encode position while taking into account the spatiotemporal statistics of an animal's movement trajectory. Based on this hypothesis, Mosheiff et al introduce a theory for efficient encoding of trajectories in the brain. One of the main predictions of the theory is that different numbers of grid cells should be allocated to each spatial scale. In addition, the work identifies a simple scheme for readout of the grid cell code by neural circuitry, that can match in accuracy the optimal Bayesian decoder. Within this scheme, grid cell spikes influence the activity of post-synaptic cells, involved in the readout of the grid cells code, over widely varying time scales that increase monotonically with the grid spacing.

Full paper: [http://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1005597](http://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1005597)

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