

NEURAL OSCILLATIONS MAY CODE SPATIAL LOCATION

The process of reminiscence involves a sensation of moving through previously visited locations, walking through the space of memories. This could involve regions of the cortex involved in memory function, including the entorhinal cortex. Research in the Hasselmo lab at Boston University's Center for Memory and Brain, supported by the NSF Center of Excellence for Learning in Education, Science, and Technology (CELEST), has used physiological experiments and computational modeling to link oscillations in single entorhinal cortex neurons to a mechanism for representing location in memory. Experimental data from the Hasselmo lab showed that individual neurons in different anatomical positions in the entorhinal cortex oscillate at different frequencies. Modeling shows that these oscillations could underlie differences in the spatial distance between firing activity of grid cells in entorhinal cortex. The model also shows that these single neuron oscillations could code the location of a rat in space, and mediate the retrieval of previously experienced trajectories through space. Our reminiscence may involve the shifting phase of these oscillations in entorhinal cortex. This research was published in the journal *Science* in 2007.

Giocomo LM, Zilli EA, Fransén E, Hasselmo ME. (2007) Temporal frequency of subthreshold oscillations scales with entorhinal grid cell field spacing. *Science*, 315(5819):1719-22