

GRID CELLS AND THE CORTICAL MAP OF SPACE

The medial entorhinal cortex (MEC) is part of the brain's circuit for dynamic representation of self-location. A key component of this representation is the grid cell, whose spatial firing fields tile environments in a periodic hexagonal pattern, like in a Chinese checkerboard. The circuit contains also other functional cell types, such as head direction cells, border cells and speed cells, which are intermingled among the grid cells. In this lecture, I will discuss how these cell types, all within the same neural circuit, form a rich representation of local space. I will discuss the putative mechanisms of the grid pattern and its developmental origins, as well as possible ways that grid cells could be used in the formation of hippocampal memory.