



Seminar/Talk

Replay is Dynamically Influenced by Task Demands and Behavioural State

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Reactivations of hippocampal place cell sequences (replay) during behavioural immobility and rest have been linked with both memory consolidation and navigational planning. Yet, it remains to be investigated whether these functions are temporally segregated. We recorded, concurrently, CA1 place cells and grid cells from the deeper layers of the media entorhinal cortex (MEC V/VI) in 8 rats while animals carried out a self-paced spatial task and during a subsequent rest session. We observed that immediately before movement onset towards a reward location, or just after arrival at a reward location, hippocampal replay was task-focused; preferentially expressing places and trajectories consistent with the animals direction of travel. In contrast, during extended stops at reward locations, no such biases were evident. Importantly, the occurrence of task-focused replay predicted the accuracy of subsequent spatial decisions. Further, during extended immobility, but not during periods preceding or succeeding movement, we observed MEC (V/VI) grid cells were coherent with hippocampal replay. During the subsequent rest session we, similarly, observed grid-place cell replay coherence and found it was accentuated for replay sequences recapitulating the order in which cells fired during behaviour (forward replay) but that the grid cells lagged the place cells by ~11ms. Thus, hippocampal replay may dynamically and abruptly switch operational mode in response to task demands and behavioural state; plausibly reflecting a functional switch between planning and memory consolidation.

Monday, September 25, 2017 11:00am - 12:00pm

Seminar Room, Lab Building East



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