The role of hippocampal formation in spatial learning

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Abstract: In the hippocampus, place cells might help animals to solve spatial learning tasks by preferentially representing goal locations. We have trained animals to locate hidden food rewards on a cheeseboard maze, which led to the formation of new place maps, which incorporated the location of the new reward locations. During sleep periods following learning, the firing patterns of goal-encoding cells preferentially reactivated during sharp-wave/ripples (SWR) in sleep. They exhibited stronger reactivation than other place cells and their reactivation predicted subsequent memory performances. Altogether, these results suggest that the reorganisation and reactivation of goal-related population firing patterns sustain spatial learning and memory retention abilities and SWRs have a role in in the consolidation of spatial memories.