

Hippocampal Pattern Separation Supports Reinforcement Learning

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Presentation Abstract Summary Humans and animals can learn to respond differently to very similar situations. Standard learning models struggle to learn in these settings because the value of individual features depends on the other features present. We sought to establish a role for the hippocampus in reinforcement learning in a task that requires pattern separation of strongly overlapping input. Subjects learned response contingencies for singleton and conjunctive stimuli of the form (AB+, B-, AC-, C+). No linear set of weights on features can solve this problem, and so the brain needs to form conjunctive representations of AB and AC that are distinct from their components. Because the hippocampus is adept at quickly forming conjunctive representations, we hypothesized that hippocampal representations would support learning in this task. Using representational similarity analysis, we find evidence that the hippocampus forms orthogonal representations of the conjunctions and these representations in turn influence striatal prediction errors.

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