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The role of AMPA receptor exchange in systems memory reconsolidation: A computational model

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Abstract

In the mammalian brain, a newly acquired memory depends on the hippocampus for maintenance and recall, but over time the neocortex takes over these functions, rendering the memory hippocampus-independent. The process responsible for this transformation is called systems memory consolidation. Interestingly, retrieval of a well-consolidated memory can trigger a temporary return to a hippocampus-dependent state, a phenomenon known as systems memory reconsolidation. The neural mechanisms underlying systems memory consolidation and reconsolidation are not well understood. Here, we propose a neural model based on well-documented mechanisms of synaptic plasticity and stability and describe a computational implementation that demonstrates the models ability to account for a range of findings from the systems consolidation and reconsolidation literature. Based on the computational model, we derive a number of predictions and suggest experiments that may put them to the test.