

A novel behavioural task to study the neuronal representation of long-term spatial memories

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We developed a fully automated spatial navigation task that serves as a long-term memory test to quantify recall. The task consists of a daily training session (15-20 min) where mice search for a rewarded water port from eight possible port locations, eliciting large number of correct trials (up to 60 per day). Trials are self-initiated every time the animal finds a hidden trigger zone that varies randomly from trial to trial. After trial onset, animals have 6 sec to find the rewarded port. Transient inactivation by infusion of muscimol, confirmed the hippocampal dependency to solve the task by a drastic decrease in performance ($p < 0.05$). Higher number of visits to the rewarded port compared to the non-rewarded ones ($p < 0.05$) on a recall non-rewarded session, confirms 2 and 24 hrs long-term memory. Summarizing, this novel hippocampal dependent navigation task yields a large number of trials per session with a uniform coverage of the arena. This will allow a detailed characterization of the changes in hippocampal neuronal activity during spatial learning and retrieval, once it is combined with population calcium imaging or electrophysiology.

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