

An Automated Maze for Studying Working Memory and Decision-Making in Rodents

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In rodents, the benchmark test for prefrontal cortex (PFC)-mediated working memory is a delayed alternation task utilizing variations of T-maze or Figure-8 maze, which requires the animals to make specific arm entries to secure reward. Often, manual procedures are involved in shaping target behavior, imposing delays between trials, and delivering rewards, which can potentially influence the animal's behavior on the maze. Our laboratory developed an automated Figure-8 maze which does not require experimenter-animal interaction during shaping, training or testing. This system incorporates a computer vision system for tracking the animal on the maze, pneumatic air cylinder-

controlled gates to impose delays, and automated reward delivery. The maze is controlled by custom software that records the animal's location and activates the gate according to the animal's behavior and a control algorithm. The program performs calculations of task accuracy, tracks movement sequence through the maze, and provides other measures such as running speed, time spent in different maze locations, and activity level during delay. This maze system can also be used to investigate decision-making in rodents by altering the reward volume, reward probability, reward delay, and reward effort.

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