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🌐 Mouse Behavior - Open Field and T-Maze

Robert Edwards[1], Shweta Jain[1]

[1]University of California San Francisco

⬤ kelsey.barcomb

ABSTRACT

This protocol describes two behavioral tasks for mice. The first is the Open Field Test, which is used to asses motor behavior, and the second is the T-Maze, which is used to assess spatial learning.

Open Field Behavior

1   On each behavior day, bring mice in their home cages to the behavioral area. Blind experimenter to all test variables (e.g. genotype, drug condition, etc.).

2   On days 1 and 2, habituate mice to an open field chamber (clear acrylic cylinder, 25 cm diameter) by placing them in the chamber for 30 minutes undisturbed

> **Note**
>
> The chambers should be at least 30-40 cm tall so that the mice are not able to easily escape. During habituation some mice may attempt to jump out.

3   On day 3, perform test session by placing mice in chamber for 30 minutes and recording their location using an overhead mounted camera

4   Calculate average movement velocity and total distance traveled using commercial video tracking software (Noldus EthoVision)

T-Maze

5   Prior to T-Maze task, handle mice every day for one week and calorie restrict to reduce weight to ~85% of original body weight; measure weight daily.

6 For two days before the task
- familiarize mice with the food reward by providing 10 reward pellets in their home cage
- familiarize mice the T-maze by allowing each mouse to explore the maze freely for 10 minutes with 5 rewards in each arm

7 Simple uncued task (food provided in the left arm of the T-maze); repeat for 10 trials on each test day

7.1 Place mouse in the start area for 60 seconds

7.2 Remove sliding door, give mice 60 seconds to choose the left or right arm; if choice is not made within 60 seconds, nudge into either the left or right arm on an alternating basis

7.3 Place door in front of the entered arm, give mice 60 seconds to consume the reward pellet or remain in the non-reward arm

8 Uncued task
- add a mold over the arms of the T-maze with vertical stripes for the reward side and horizontal stripes for the non-reward side
- the striped visual cue is assigned pseudo-randomly to the left and right arms, maintaining a 50:50 ratio overall

Task is repeated for 20 trials each test day, except in β3B KO experiments (in Jain et al., 2023) where 14 trials were performed on days 1-4 and 20 trials were performed on subsequent days

8.1 Place mold with striped visual cues on maze; add food reward pellets to the vertical striped side

8.2 Place mouse in the start area for 60 seconds

8.3   Remove sliding door, give mice 60 seconds to choose the left or right arm; if choice is not made within 60 seconds, nudge into either the left or right arm on an alternating basis

8.4   Place door in front of the entered arm, give mice 60 seconds to consume the reward pellet or remain in the non-reward arm