Place-preference boldness (Adult zebrafish)

The aim of this experiment is to measure boldness by recording the amount of time spent on the non-preferred side of a biased place preference tank. We have now replaced this experiment with the "Novel object boldness" protocol in order to record boldness in adult fish, in order to be in line with boldness measurements in other species (rat, mouse etc).

Fish are placed singly into place-preference setup, and the time spent on each side of the tank is recorded. These areas are defined using a programme that can videotrack the fish's position. Adult fish that are allowed to swim freely in this setup spend roughly 70% of the time on the brown side of the tank, and 30% of the time on the white non-preferred side of the tank. Bold fish should spend more time on the non-preferred (white) side of the tank.

Experimental setup

The tank is home-made, by covering the outside of a standard transparent plastic fish tank (approx. 20 high x 25 wide x 30cm long) with coloured paper. One side of the tank is white (the non-preferred side), and the other brown (the preferred side). We use white printer paper for one side, and brown envelope paper for the second side. Two black paper spots, 5cm in diameter, are placed in the middle of the white area of the tank. The tank is filled with 10L system water and light from both below (infrared light) and above (white light). All experiments were conducted in the afternoon (1pm onwards).

Experimental procedure

1) In this experiment, the amount of time spent on either side of the place-preference tank is recorded using commercially available videotracking software. We have used Zebralab from ViewPoint, but other companies also provide suitable software.

2) There is no need to habituate fish to this setup. The test will thus also record the reaction of the fish to the novel arena. Results tend to be robust and repeatable.

3) A single adult fish is gently placed into the setup and its position is videotracked for 10 minutes. The fish is then removed and placed in a holding tank. This procedure is repeated for each fish in a group.

4) Any fish which does not swim for a significant period during the experiment (more than seconds) is removed from the analysis, since this would bias the amount of time spent on either side of the tank.

5) The results are exported to Microsoft Excel for analysis. Parameters that can be compared include the percentage of time spent on either side of the tank, and the total distance swum during the experiment.

6) Appropriate statistical tests should be used to analyse the data. For a comparison of two genotypes, a T-test may be sufficient. For analysis of drug treatments in different genotypes, ANOVA followed by a posthoc test may be needed.

Associated publications

For a published example of this experiment, refer to Norton et al., 2011 (J. Neurosci. 31(39):13796-13807). The setup is modified from Ninkovic and Bally-Cuif, 2006 (Methods. 39(3):262-274).