

Radial maze and water maze learning of B6/129 F2 hybrid mice – a factor analysis

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Water maze learning and radial maze learning is widely used for behavioral characterization of mice. In the context of a validation procedure for novel cognitive tests, we have tested 30 female mice of the second filial generation derived from crosses between C56BL/6J and 129X1/SvJ. Both parental strains are used for the generation of genetically modified mouse models. Water maze testing followed a standardized protocol (3 days acquisition, 6 trials/day, intertrial interval 30-40 min; 2 days of platform reversal learning using the same schedules, the first trial of platform reversal taken as probe trial). For radial maze learning, animals were adapted to the maze, food deprived overnight to 85% of body weight, and then tested during 5 days. Each daily session lasted maximally 15 min. For both tasks, behavior of the mice was analyzed using off-line videometric analysis of swim paths, swim speed, movements in the radial maze and choice patterns of arms. Exploratory factor analysis served to extract common factors first separately for the water and the radial maze. In a second step, selected variables characterizing the main factors were combined for a factor analysis involving both tasks. This revealed a strong common factor including performance in acquisition of both the water maze and radial maze task, explaining 41% of the overall variability, while the other factors reflected covarying variables specific for one of the tasks. The best individual correlation was the average failure rate in finding the platform during acquisition in the water maze versus the average percentage of errors in the radial maze ($r = 0.75$, $p < 0.0001$). This implies that the common cognitive factor in both tasks was the ability to modify initial search strategies.

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