

Assessment of impulsivity and attentional performance in the IntelliCage

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In previous research, C57BL/6 and DBA/2 mice have been found to differ in attentional performance level in the 5-choice serial reaction time task. We modified this procedure in order to develop a protocol which assesses impulsivity and attention of socially housed mice in the fully-automated testing device IntelliCage. After a short adaptation phase to the cage, eight modules were applied. In these modules the mice were allowed to drink in each of the four learning corners upon a nosepoke made during a light stimulus. This stimulus appeared at a random delay (1-3 seconds) from the start of the corner visit. Both a pre-stimulus (PR) and a post-stimulus (PS) nosepoke were recorded as errors. In the first module (training), a PR nosepoke had no consequence and mice were still able to get water during the same visit. In all subsequent modules, stimulus duration (SD) progressively decreased from 5 to 0.5 seconds and a PR nosepoke prevented the light to turn on and therefore the access to the water. In the last module, SD was kept at 0.5 seconds and the PR delay was modified to a random value between 2 and 4 seconds. Results show that during training, the error rate was similar between the two strains and it decreased with time. In the module with a SD of 5 seconds, the error rate was significantly lower in DBA/2 than in C57BL/6 except on the first two days during which DBA/2 showed a stronger increase in activity level. At the end of the module with SD of 4 seconds, the performance of the strains did not differ anymore and stayed approximately stable until SD was reduced to 0.5 seconds. Then, the error rates increased for both strains and significantly more for DBA/2 than for C57BL/6. A further decrease in performance occurred during the last module and strain difference persisted. These results suggest that the IntelliCage may be used to assess impulsivity and attention in different strains and/or mouse models of the attention deficit hyperactivity disorder (ADHD).

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