Pairwise discrimination followed by reversal in C57BL6/J using mouse touchscreen operant boxes.

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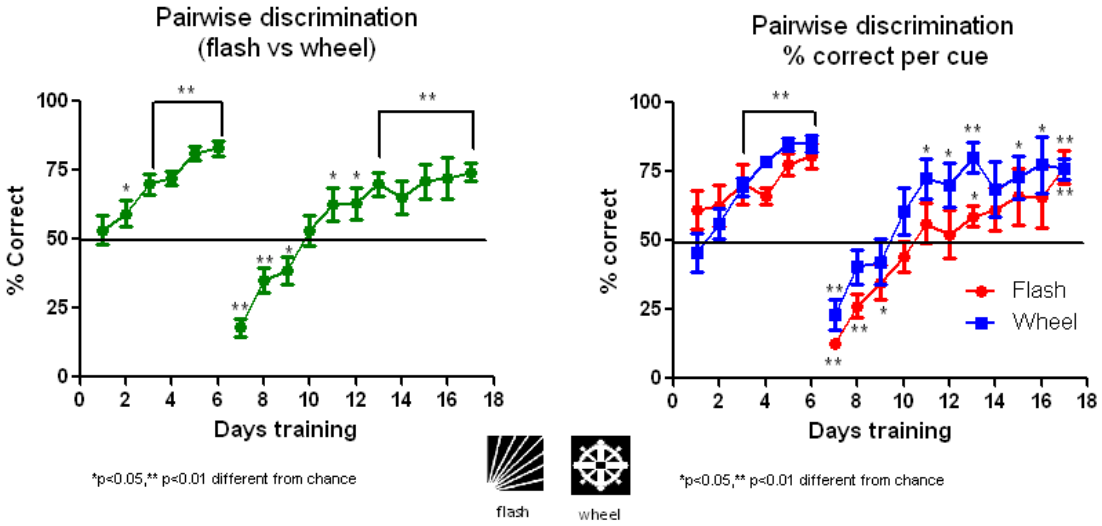
Touchscreen technology for rodent cognitive testing is increasingly reported in the published literature. This technology allows assessment of multiple rodent cognitive abilities in an experimenter independent fashion. Using the touchscreen also denotes a significant step forward for translational research, in that human cognitive tests can be back-translated easily to fit an animal's abilities, and vice versa, whilst still exploiting the same underlying neurobiological pathways and mechanisms.

Here, in a beta test of mouse touchscreen technology with Campden Instruments Ltd, we report the training of C57BL6/J mice (n=12) in the acquisition of a pairwise discrimination paradigm followed by a reversal, whereby the animals were trained to discriminate between two visual stimuli ("marble" and "fan") displayed on the touchscreen. A counterbalance strategy was adopted such that half the mice had the "marble" whilst the other half had the "fan" as the correct stimulus. A nosepoke to the correct stimulus was paired with a liquid reinforcer, whereas a nosepoke to the incorrect stimulus resulted in a 5 sec timeout and a repeat of that same trial. After a performance criterion of 70% correct for 2 consecutive days had been reached, mice were given a reversal in which the previously rewarded stimulus was now incorrect, and vice versa.

The acquisition curve revealed that mice reached performance criterion after 7 days ($p < 0.01$. However detailed analysis showed that the two visual stimuli used were not of equal salience; although this bias disappeared after 8 days of testing, it has the potential to confound the subsequent reversal data. Consequently, we assessed different pairs of visual stimuli in order to identify a suitable equal-salient pairing for subsequent use.

Having identified a visual pairing of equal salience, the acquisition and reversal performance of the mice was re-assessed. Mice achieved criterion performance in 3 days ($p < 0.01$). Again, at the reversal stage, all mice perseverated to the previously correct stimulus (% trial correct significantly different from chance performance, $p < 0.01$), prior to acquiring the reversal discrimination in 7 days.

In conclusion, touchscreen technology is an increasingly useful and widespread tool with the scope to assess many cognition domains in the rodent in a high throughput and translational manner. The present data support this view but highlight the importance of ensuring a subject's task performance is critically reviewed to minimise confounds in data interpretation.



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