

Differential effects of D-amphetamine on cognitive (initiation) and motor (execution) performance in the two-choice reaction time task

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The reaction time task is a versatile task, well suited to disentangle different aspects of operant conditioning such as response output and motor (pre)programming. This can be useful to evaluate treatment effects on both central and peripheral processes. Here, we tested the effect of D-amphetamine on different aspects of performance in this task. Ten food-deprived male Lewis rats were trained in the Skinner box for a two-choice reaction time task. In this set-up, rats were trained to press the food-reinforced lever (left or right) in response to the corresponding tone (high or low, respectively). Reaction time, time to press the lever (motor time), number of premature responses, and number of correct responses were taken as indices of behavioural performance. D-amphetamine had a marked differential effect on the various aspects of reaction time performance. A highly stimulant effect on reaction time was present, in agreement with previous findings. Remarkably, this 21% decrease in reaction time was not accompanied by higher numbers of errors. In fact, a small but significant increase in the number of correct responses was found. Motor time was increased, yet the size of this effect was small. The number of premature withdrawals was significantly increased, indicative of enhanced impulsive behaviour. Taken together, our results indicate that D-Amphetamine improves reaction time performance with a bias towards the cognitive aspects. The findings indicate that the reaction time task can be valuable in dissociating drug effects on different aspects of cognitive processing.

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