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Positive Relationship between Set-Shifting, Learning Rate and Delay Discounting

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Heightened delay discounting (more relative preference for smaller, sooner rewards over larger, later rewards) and impaired executive function (i.e., set-shifting, inhibition, memory updating) have independently been implicated in substance use disorders. This study aimed to identify the relationship between delay discounting and set-shifting, using a reversal learning task. We hypothesized that heightened delay discounting would be correlated with slower reversal learning, due to reward learning system deficits. Heterogeneous stock rats (N=48) completed a delay discounting task assessing choice between a small, immediate sucrose solution reward and 150 μ l delivered following a delay. Then they completed a set-shifting task. During acquisition, rats learned to press a specific lever to earn sucrose solution rewards based on the auditory tone playing. After two consecutive sessions of 90% accurate responding, the tone assigned to each lever reversed, and we recorded the number of sessions to re-attain 90% accurate performance. Analyses revealed that heightened delay discounting was not correlated with the number of sessions required to learn the reversed contingency unless the number of sessions to learn the task initially was taken into account ($r = .313$, $p = .03$). That is, individuals that discounted the value of delayed rewards more severely also required more sessions to change behavior in a reversal task, when baseline learning rate was taken into account. Future research will determine genetic overlap between performance on delay discounting and set shifting/perseveration. Supported by DA 046077.