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Differential Outcome Paradigm in D2R-OE Mice

Patients with schizophrenia often have difficulty anticipating positive future events. Some suggest this is due to a deficiency in their ability to weigh the values of future outcomes. This premise was tested in a mouse model of schizophrenia, mice that overexpress the dopamine D2 receptor (D2R-OE) in the striatum similarly to patients with schizophrenia. We tested these mice on their ability to use information about different reward values to learn a discrimination. Past research has indicated that mice learn a two-choice discrimination faster when each alternative is associated with either different types or quantities of reward; this is the differential outcomes effect. In the current experiment, mice must learn to differentiate between two stimuli paired with rewards of different magnitude: 1 or 3 pellets. If the D2R-OE mice cannot distinguish between reward values, they will have more difficulty learning the discrimination than control mice. The two groups of mice were placed in either a differential outcomes condition or a random outcome condition. In the differential outcome groups mice were trained to press either a right or left lever depending on whether a tone or white noise was presented to earn one or three pellets. In the random outcome group, the pellets were distributed randomly. We predict that the D2R-OE mice will have difficulty differentiating between different magnitudes of the same reward compared to control mice and not show a differential outcomes effect. The results for the D2R-OE mice should be the same for both the random and differential outcome conditions, whereas for control mice the differential outcome mice should learn the discrimination faster than the mice receiving random rewards. With thanks for support from Howard Hughes Medical Institute.