Harvard Psychiatry
Research Poster Session and Mysell Lecture

Modeling reveals slower learning from positive but not negative outcomes in depression

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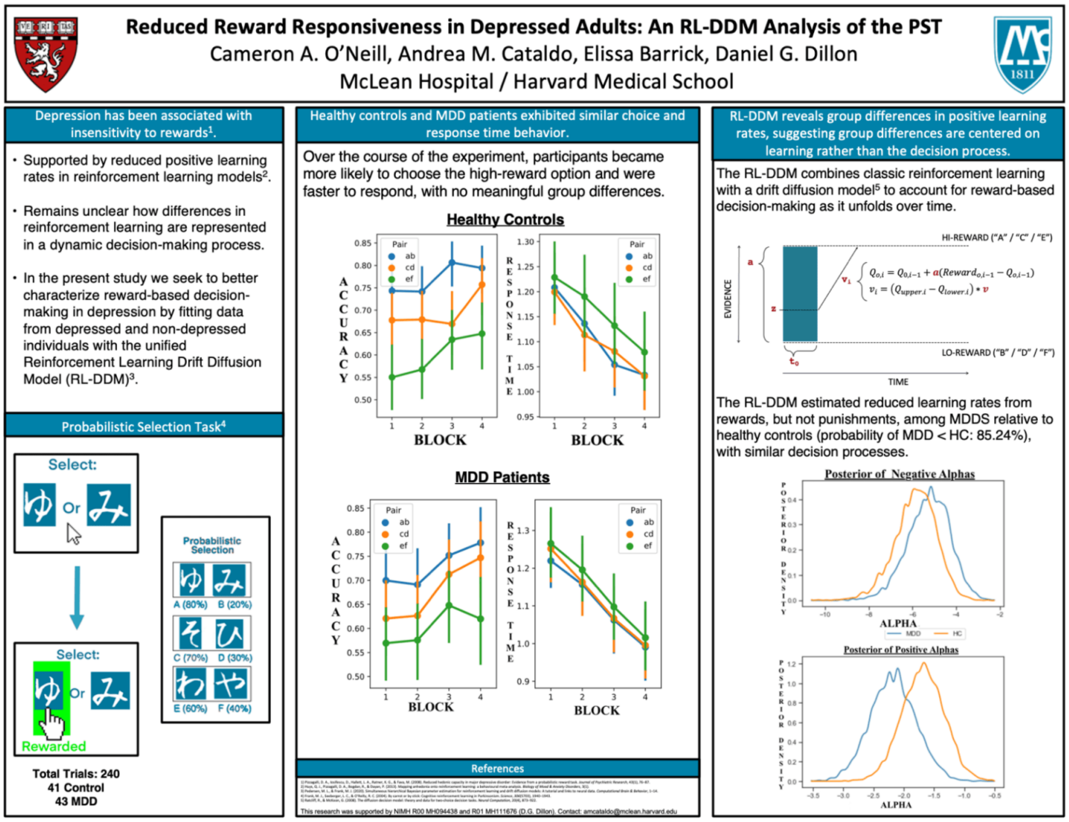

SCIENTIFIC ABSTRACT

Background. Anhedonic depression may reflect dopaminergic abnormalities (Pizzagalli, 2014), suggesting impairments in signaling reward prediction errors (RPEs; Schultz, 1998) critical for reinforcement learning (Huys et al., 2013). Importantly, however, few prior studies have investigated how participants make decisions based on learned values, which the reinforcement learning drift diffusion model (RLDDM; Pedersen & Frank, 2020) can do. We therefore investigated the impact of depression on learning and decision-making by fitting the RLDDM to data from healthy and depressed adults.

Methods. Forty-three unmedicated adults with Major Depressive Disorder (MDD) and 41 healthy controls (HC) completed the Probabilistic Selection Task (PST; Frank et al., 2004). In the PST, participants use probabilistic feedback from 240 training trials to learn to select the more frequently rewarded symbols out of three pairs. The data were fit with the RLDDM, a Bayesian hierarchical model that uses Q-learning to model value assignment but models choice with the DDM (Ratcliff, 1978), providing a more comprehensive treatment of decision-making than the commonly used Softmax. Our implementation included parameters for positive and negative learning rates, the speed of evidence accumulation, and the width of decision thresholds.

Results. Both groups learned to quickly choose the high-reward image in each pair. The RLDDM did not reveal group differences in decision parameters, but it did estimate slower learning rates following rewards in MDD vs. HC (posterior probability of MDD < HC: 85.24%).

Conclusions. The RLDDM revealed slower learning following rewards in depressed adults vs. healthy controls. Although was modest, this result supports the hypothesis that anhedonic depression may impair reinforcement learning by disrupting RPEs. Moreover, this work demonstrates that, by modeling learning and decision-making simultaneously, the RLDDM provides a sensitive assessment of the negative impact of depression on behavior. In subsequent analyses, we will integrate these modeling results with functional neuroimaging.

SEARCH POSTERS

LIVE ZOOM SESSION – APRIL 21ST

1:30-2:10 pm

Join by Zoom

RESEARCH AREAS

COGNITION, COMPUTATIONAL MODELING, DECISION MAKING, DRIFT DIFFUSION MODEL, LEARNING, MOOD DISORDERS

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