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Hannah Orndorff
Belmont University, hannah.orndorff@pop.belmont.edu

Rachael Arnold

Caroline Gheen
Belmont University, caroline.gheen@bruins.belmont.edu

Grace Gray
Belmont University

Christopher Toepfer
Belmont Unviersity

See next page for additional authors

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Authors

Hannah Orndorff, Rachael Arnold, Caroline Gheen, Grace Gray, Christopher Toepfer, and Ivy Heusmann

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Assessing Cognitive Flexibility with the ID/ED Set-Shifting Task in Rats Modeling Depression

Rachael Arnold, Hannah Orndorff, Caroline Gheen, Grace Gray, Chris Toepfer, Ivy Huesmann

Abstract

Previous research has shown cognitive capabilities either increase or decrease risk factors of depression, there is a gap in research on the effects depression has on cognitive flexibility. Cognitive flexibility controls the appropriate way to respond to changing thoughts, behaviors, and environmental signals. Higher performing cognitive flexibility is associated with positive life outcomes (Dajani & Uddin, 2015). Therefore, there is a need to further understand the impacts depression can have on cognitive flexibility. The intra-dimensional extra-dimensional (ID/ED) set-shifting task is utilized in the present study to measure cognitive flexibility in rats modeling depression due to unlimited sucrose consumption in adolescence. The experimental group of rats was given unlimited access to 5% sucrose water and regular drinking water for three weeks prior to testing trials, while the control group was given access to only regular drinking water. Trials were conducted over three weeks. The rats were first habituated to the testing chamber with ceramic bowls of felt digging media versus bead digging media. They were next trained in a simple discrimination task to learn to correctly identify the bowl with the reward based on digging media (felt). After the rats met the required criterion of six consecutive correct trails, they moved on to compound discrimination trials in which an irrelevant odor was paired with media (lavender with felt, clove with beads), but the reward remained in the relevant media (felt). Upon the rats learning the compound discrimination, a reversal was performed where the previously incorrect digging media (bead) was rewarded. Finally, the digging media and odors were changed, and the rats were trained to continue attending to the digging media (ID shift) and lastly trained to attend to the odor (ED shift). Trials to criterion and times to complete were measured and recorded for all trials. We hypothesize that the experimental group of rats modeling depression will exhibit less cognitive flexibility than the control rats, with a higher number of trials to criterion and longer trial times for the ID and ED shifts.

Keywords: Cognitive flexibility, depression, unlimited sucrose, ID/ED set shifting, rats

References

Dajani, D. R., & Uddin, L. Q. (2015, September 3). *Demystifying cognitive flexibility: Implications for clinical and Developmental Neuroscience*. Trends in Neurosciences. Retrieved October 14, 2022, from https://www.sciencedirect.com/science/article/pii/S016622361500154X?casa_token=DgzMx3POVB4AAAAA%3A0lKlnTiKzMoJjvNHKso71ya7-SUhEHfhdVW6oLb349_3W52KE_rfDxf4WJxjtsc-h4MjxuM1iQ