World Academy of Science, Engineering and Technology
International Journal of Psychological and Behavioral Sciences
Vol:18, No:12, 2024

Approach-Avoidance Conflict in the T-Maze: Behavioral Validation for Frontal EEG Activity Asymmetries

Authors : Eva Masson, Andrea Kübler

Abstract : Anxiety disorders (AD) are the most prevalent psychological disorders. However, far from most affected individuals are diagnosed and receive treatment. This gap is probably due to the diagnosis criteria, relying on symptoms (according to the DSM-5 definition) with no objective biomarker. Approach-avoidance conflict tasks are one common approach to simulate such disorders in a lab setting, with most of the paradigms focusing on the relationships between behavior and neurophysiology. Approach-avoidance conflict tasks typically place participants in a situation where they have to make a decision that leads to both positive and negative outcomes, thereby sending conflicting signals that trigger the Behavioral Inhibition System (BIS). Furthermore, behavioral validation of such paradigms adds credibility to the tasks – with overt conflict behavior, it is safer to assume that the task actually induced a conflict. Some of those tasks have linked asymmetrical frontal brain activity to induced conflicts and the BIS. However, there is currently no consensus for the direction of the frontal activation. The authors present here a modified version of the T-Maze paradigm, a motivational conflict desktop task, in which behavior is recorded simultaneously to the recording of high-density EEG (HD-EEG). Methods: In this within-subject design, HD-EEG and behavior of 35 healthy participants was recorded. EEG data was collected with a 128 channels sponge-based system. The motivational conflict desktop task consisted of three blocks of repeated trials. Each block was designed to record a slightly different behavioral pattern, to increase the chances of eliciting conflict. This variety of behavioral patterns was however similar enough to allow comparison of the number of trials categorized as 'overt conflict' between the blocks. Results: Overt conflict behavior was exhibited in all blocks, but always for under 10% of the trials, in average, in each block. However, changing the order of the paradigms successfully introduced a 'reset' of the conflict process, therefore providing more trials for analysis. As for the EEG correlates, the authors expect a different pattern for trials categorized as conflict, compared to the other ones. More specifically, we expect an elevated alpha frequency power in the left frontal electrodes at around 200ms post-cueing, compared to the right one (relative higher right frontal activity), followed by an inversion around 600ms later. Conclusion: With this comprehensive approach of a psychological mechanism, new evidence would be brought to the frontal asymmetry discussion, and its relationship with the BIS. Furthermore, with the present task focusing on a very particular type of motivational approach-avoidance conflict, it would open the door to further variations of the paradigm to introduce different kinds of conflicts involved in AD. Even though its application as a potential biomarker sounds difficult, because of the individual reliability of both the task and peak frequency in the alpha range, we hope to open the discussion for task robustness for neuromodulation and neurofeedback future applications.

Keywords : anxiety, approach-avoidance conflict, behavioral inhibition system, EEG
Conference Title : ICBM 2024 : International Conference on Behavioral Medicine
Conference Location : Bangkok, Thailand
Conference Dates : December 23-24, 2024