Reflection Rumination Reduces Negative Emotional Processing During Goal-Directed Behavior.

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Introduction

Depression places grueling burdens on communities(Ferrari et al., 2013), disrupts an individual's ability to function, and is complicit in causing hundreds of thousands of suicides each year(World Health Organization, 2017). The precise mechanisms of the depressed mind remain a relative mystery, contributing greatly to the difficulty in creating effective treatments. Depression is characterized by several cognitive biases (irregular responses) including an individual's proclivity to fixate on negative information; this is known as rumination. Rumination results in greater emotional reactivity in the brain than in non-depressed individuals, resulting in disrupted function across different cognitive domains. Studying how the mechanisms of these disruptions function and their significance for depressed individuals could hold the key for new treatment development to alleviate the suffering of millions

Study Purpose

This study aims to elucidate the relationship between rumination in depression, emotional reactivity, and cognitive performance. We will measure participant's rumination scores and utilize EEG to measure the late positive potential (LPP) while participants perform a working memory task. The LPP is thought to represent emotional processing in individuals and reflects emotional reactivity to a specific stimulus. We can then examine differences in the LPP to test if emotional reactivity and task performance change as a function of and individual's rumination style.
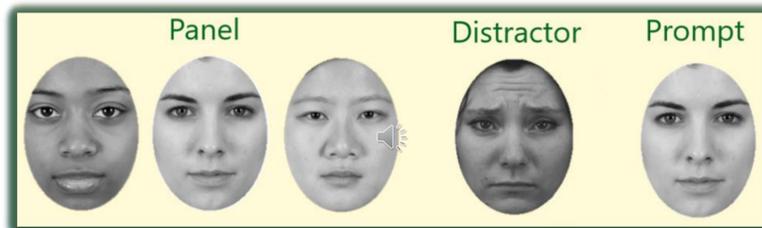
Predictions

Hypotheses:

1. We predict that outcomes in emotional reactivity will change as a function of BDI/rumination style.

2. That emotional reactivity will impact performance on the working memory task.

Methods

Participants were selected from SONA, a USF experiment recruiting system. Participants' neural activity was recorded with EEG during a facial recognition task with happy, sad, and neutral distractors. Patients were shown three faces, then told to ignore a distractor face. One more face was shown, and the participant was asked to indicate if this face belonged to the initial three faces. Participants (n = 22) were chosen between the ages of 18 and 40, and who had more than a 50% hit rate in performance scores, indicating more than a chance level of success in the task

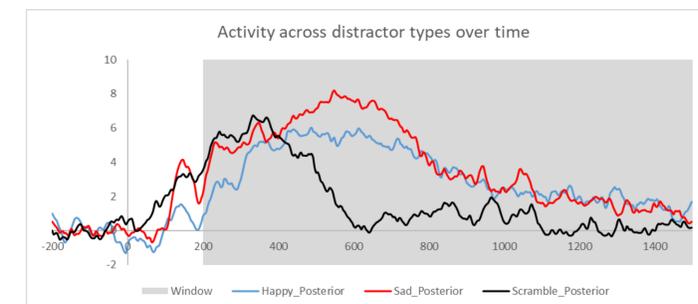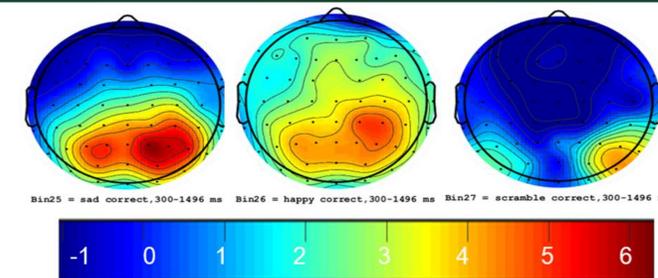Panel   Distractor   Prompt

Differences in Rumination Style Predict Emotional Reactivity to Sad Faces

A repeated-measures ANOVA was conducted with distractor type (happy, mixed, sad) as the within-subjects factor. Rumination styles (brooding, reflective) and BDI scores were included as continuous covariates to examine their specific relationships with emotional processing.

Distractor type had a significant main effect on neural activation, $F(2, 22) = 6.642$, $p = .003$. Neural activity was significantly different for happy faces (M= 2.82, SD = 2.56), sad faces, (M= 4.61, SD = 3.52), and neutral faces (M= 1.55, SD = 5.00).

This relationship changed as a function of an individual's rumination style. A significant interaction between reflection and distractor type emerged. Neural activity in response to sad faces versus neutral faces changed as a function of an individual's use of reflection as a rumination style $F(2, 22) = 5.037$, $p = .036$. Neural activity did not differ significantly from happy to sad faces, $F(2, 22) = 3.768$, $p = .066$.

Neural Activity in Response to Emotional Distractors

Bin25 = sad correct,300-1496 ms   Bin26 = happy correct,300-1496 ms   Bin27 = scramble correct,300-1496 ms

-1 0 1 2 3 4 5 6

Activity across distractor types over time

Window   Happy_Posterior   Sad_Posterior   Scramble_Posterior

Discussion

The findings from this research indicate that rumination style (reflection/brooding) may play a role in an individual's interpretation of emotional stimuli. Those who utilize reflection as a rumination style are more likely to inhibit their emotional response to distracting emotional content such as a sad face.

This may indicate cognitive inefficiency. While task performance is consistent across participants, neural activity across participants differs. This suggests that while participants high in reflection scores can successfully complete a working memory task at the same level as their peers, doing so may elicit differing neural processes to maintain this success

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