
Neural Connectivity Underlying Individual Differences in Personality and Behavioral Reactions to Emotional Stimuli

Hadas Okon-Singer^{*†1,2}, Felix Dreyer³, Christiane Rohr^{1,2}, Daniel Margulies^{1,2}, Matthias Schroeter^{1,4}, Stefan Frisch⁵, and Arno Villringer^{1,2}

¹Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany – Germany

²Mind and Brain Institute and Berlin School of Mind and Brain, Berlin, Germany – Germany

³Institute for Psychology, University of Leipzig, Leipzig, Germany – Germany

⁴Day Clinic of Cognitive Neurology, University of Leipzig, Germany – Germany

⁵Department of Neurology, J. W. Goethe University Hospital, Frankfurt am Main, Germany – Germany

Abstract

Individuals differ in their ability to control emotional reactions. This study focused on the neural networks underlying individual differences in the relation between emotion-related personality traits and individual cognitive control abilities. 24 healthy subjects (11 female; age=24.75±2.49 years) participated in a behavioral battery including neuropsychological tests and personality questionnaires. The scores in the behavioral battery entered a principal component analysis. Resting-state fMRI data was collected on a 3T-Siemens scanner, and analyzed using seeds in bilateral amygdala, with the individual scores of the first principal component entered as a covariate-of-interest in the group level. Results were threshold at $p < 0.05$ and corrected for multiple comparisons. The behavioral scores were further correlated with performance in an emotional task. The principal components combined scores in cognitive tests and emotional questionnaires. The first principal component was composed from scores of chronic stress, neuroticism, negative affect and cognitive interference. This suggests a relation between emotional behavior and executive functions, possibly related to emotion control. Resting-state fMRI analysis revealed a negative correlation between the score in the first principal component and the strength of connectivity between the left amygdala and bilateral orbitofrontal cortex and sub-genua anterior cingulate cortex, regions recently suggested to be related to emotion regulation (Etkin, Egner, & Kalisch, 2011). In line with the latter suggestion, the scores of the first component were correlated with the performance in a behavioral task: The higher the score on this component, the more difficult it was for the participants to ignore task-irrelevant but highly emotional pictures.

*Speaker

†Corresponding author: okonsinger@cbs.mpg.de