

Emotional influences on psychophysiological indices of focused attention and response anticipation in social anxiety: A combined neuroimaging and electroencephalographic study

Abstract:

Background

The processing of emotions from facial expression is an automatic process every day. However, how different emotional expressions affect our performance and social behaviour remains poorly understood.

Aim

The aim of the study is to investigate how the process of different emotional expressions modulate the neural activity supporting attention dependent behavioural responses. Specifically, by defining the mechanisms through which emotional processes interfere with basic cognitive and behavioural functions, we aim to provide a novel insight to the brain basis for Social anxiety.

Method

In the current study, we examined the impact of emotional face stimuli (presented in the interval of the forewarned reaction time task) on the Contingent Negative Variation (CNV) and related brain activity. CNV refers to anticipation related slow cortical potential that is a signature of attention related cortical excitation. 15 healthy participants and 5 patients with social anxiety disorder took part in a combined neuroimaging (fMRI) simultaneous EEG study.

Results

Contrary to our prediction, CNV amplitude increased significantly with presentation of both face and non-face stimuli during the delay period of the CNV task. Furthermore, there was a significant modulation of CNV amplitude by emotion type: CNV amplitude was greater for happy and angry compared to fear and disgust face stimuli. Correspondingly, neural activity within thalamus, supplemental motor area (SMA), dorsal anterior cingulate and orbitofrontal cortices was greater for happy and anger compared to fear and disgust CNV conditions. Activity within pons was attenuated for happy and anger conditions relative to fear and disgust. Negative face expressions (fear, disgust and anger) activated the amygdala providing a route for expression of social anxiety on preparatory attention.

Conclusion

Specific emotional expressions differentially affect CNV amplitude: specifically a difference is noted between the effects of approach emotions (anger, happiness) compared to withdrawal emotions (fear, disgust).

Keywords

Facial expression, Contingent Negative Variation (CNV), Attention, Supplementary Motor Area (SMA)

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