Cardiovascular differentiation of emotions

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Abstract

We have explored how cardiovascular responses relate to the differential processing of emotions using a combination of detailed autonomic cardiovascular monitoring and functional magnetic resonance imaging of brain (fMRI) during the performance of emotional tasks. Across a set of studies, we have identified generators of efferent cardiovascular responses to affective stimuli within anterior cingulate cortices, orbitofrontal cortex, amygdala and hypothalamus / periaqueductal grey matter (PAG). The magnitude of evoked effect on the cardiovascular system is reflected in the amplitude and pattern of neural responses across these regions. In parallel work, we have shown that the state of cardiovascular autonomic arousal impacts on the subsequent processing (perceived intensity) of stimuli evoking different emotions, and is reflected in the engagement of regions including insula orbitofrontal cortex, amygdala and PAG suggesting again that there is distinct patterning linking autonomic response and emotion type. Our interpretation of these data attempts to understand emotions within of a predictive coding model of bodily arousal state.

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