Top down control of emotion: a specific example of a general mechanism?

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Abstract

Several studies point to a cortical circuit involved in emotion regulation, in which specific prefrontal and cingulate regions regulate the activity of subcortical regions involved in emotion. Whilst most researchers acknowledge that many of these areas are also implicated in non-emotional cognitive control, there is little if any research that has directly probed which neural processes are modality independent and which are specific to emotions. We propose that much of the circuitry should be considered in terms of its domain general cognitive regulatory function, with emotion regulation being a specific application of this. We suggest that two prefrontal regions in particular, the ventrolateral PFC and the dorsal ACC, play a general role in cognitive control that encompasses the role played in emotion regulation. In the current fMRI study 19 healthy adult participants performed a visuospatial WM task with two load conditions in the presence and absence of anxiety induction using threat of electric shock. The same subjects completed a directed dichotic listening task as a measure of non-emotional top-down control. Threat of shock interfered with task performance in the low cognitive-load condition; however this interference was eradicated in the high cognitive-load condition. Activation in a cingulate region identified by a ThreatxDifficulty interaction contrast positively correlated with performance in the working memory task under threat of shock, as well as with performance on the dichotic listening task. Thus we propose that this region is part of a domain general network involved in cognitive control, one application of which is emotion regulation.

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