

Brain Regions Involved in Resisting Emotional Distraction

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Emotional stimuli that communicate survival relevance often demand immediate attention re-allocation. However, there are times when emotional distractions need to be suppressed in the service of ongoing goals. Humans have the unique ability to resist distraction and orient attention in a goal directed fashion. This ability involves a dorsal frontal-parietal network that is engaged in a wide range of cognitive operations. One such process is maintenance and manipulation of information in working memory (WM). In the context of WM function, previous work has shown that emotional distracters have a different effect on dorsal and ventral prefrontal regions. However, one question not fully explored is the relationship between signals in these cortical regions during emotional interference and behavioral performance. Here we examine these relationships using slow event-related fMRI at 3T allowing us to discern signals at different phases of a WM task. First, we show that frontal, but not parietal nodes of the dorsal network show a within subject, trial-by-trial relationship with performance during emotional distraction. Specifically, less deactivation was associated with better performance. Conversely, in ventral frontal regions more activation was associated with better performance. Also, we demonstrate that, across-subjects, less amygdala signal correlates with better performance during emotional distraction. Lastly, using trial-based functional connectivity, we show that amygdala signal is negatively correlated with frontal, but not parietal nodes of the dorsal network during emotional distraction. Together, these findings suggest that the source of emotional regulation may originate from dorsal and ventral frontal, but not parietal cortical regions.