

Poster presented at the *Cognitive Neuroscience Society Meeting*; April, 2012

BEYOND THE ANTERIOR CINGULATE CORTEX: CONFLICT AND ERROR PROCESSING IN AN EXTENDED CINGULO-OPERCULAR NETWORK

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The successful regulation of behavior requires brain systems capable of detecting increasing cognitive demands and implementing control accordingly. Despite the wealth of data involving the anterior cingulate cortex on these processes, accurate performance monitoring and behavioral adjustments are unlikely to rely on a single region. Here we contrasted error and conflict activity during a change-signal task (n=32) in all regions identified to show error-related activity in the cingulo-opercular and cerebellar networks, and examined the relationship between brain activity and behavioral adaptations to error and conflict. Several key findings emerged 1) we replicated previous behavioral findings showing slowing in reaction time (RT) after error and conflict; 2) consistent with previous literature, more ventral/anterior portions of the ACC/msFC were sensitive to error versus more dorsal/posterior regions sensitive to conflict; 3) regions outside the ACC showed similar distinctions, with error-related activity in more ventral portions of the brain, and conflict activity more dorsally and superiorly to error-sensitive regions; and 4) in contrast to previous findings, a greater difference in activation in the ACC/msFC between correct and incorrect trials was associated with a smaller difference in RT between incorrect and correct trials. Taken together, our results suggest qualitative differences in the mechanisms supporting the up-regulation of control due to error or conflict, and line up with the hypothesis that posterior and dorsal regions may be involved in the initiation or selection of action sets, while more rostral portions may prepare control systems for task demands.