Right Middle Frontal Gyrus

The right middle frontal gyrus (MFG) has been proposed to be a site of convergence of the dorsal and ventral attention networks, by serving as a circuit-breaker to interrupt ongoing endogenous attentional processes in the dorsal network and reorient attention to an exogenous stimulus.

Japee et al probed the contribution of the right MFG to both endogenous and exogenous attention by comparing performance on an orientation discrimination task of a patient with a right MFG resection and a group of healthy controls. On endogenously cued trials, participants were shown a central cue that predicted with 90% accuracy the location of a subsequent peri-threshold Gabor patch stimulus. On exogenously cued trials, a cue appeared briefly at one of two peripheral locations, followed by a variable inter-stimulus interval (ISI; range 0-700 ms) and a Gabor patch in the same or opposite location as the cue. Behavioral data showed that for endogenous, and short ISI exogenous trials, valid cues facilitated responses compared to invalid cues, for both the patient and controls. However, at long ISIs, the patient exhibited difficulty in reverting to top-down attentional control, once the facilitatory effect of the exogenous cue had dissipated. When explicitly cued during long ISIs to attend to both stimulus locations, the patient was able to engage successfully in top-down control. This result indicates that the right MFG may play an important role in reorienting attention from exogenous to endogenous attentional control. Resting state fMRI data revealed that the right superior parietal lobule and right orbitofrontal cortex, showed significantly higher correlations with a left MFG seed region (a region tightly coupled with the right MFG in controls) in the patient relative to controls. We hypothesize that this paradoxical increase in cortical coupling represents a compensatory mechanism in the patient to offset the loss of function of the resected tissue in right prefrontal cortex [1].

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Japee S, Holiday K, Satyshur MD, Mukai I, Ungerleider LG. A role of right middle frontal gyrus in reorienting of attention: a case study. Front Syst Neurosci. 2015 Mar 3;9:23. doi: 10.3389/fnsys.2015.00023. eCollection 2015. PubMed PMID: 25784862; PubMed Central PMCID: PMC4347607.