The neural changes in connectivity of the voice network during error detection and correction

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Abstract

Voice control is critical to communication. To date, studies have used behavioral, electrophysiological and functional data to investigate the neural correlates of voice control using perturbation tasks, but have yet to examine the interactions of these neural regions. The goal of this study was to use structural equation modeling of functional neuroimaging data to examine network properties of voice with and without perturbation. Results showed that connections between left and right superior temporal gyrus are critical to voice control. Furthermore, the presence of a pitch shift, which was processed as an error in vocalization, generated an feedback loop to fine-tune the network between right STG and left STG. Other regions that revealed differences in connectivity during error detection and correction included bilateral inferior frontal gyrus, and the primary and pre motor cortices. Results indicated that STG plays a critical role in voice control, specifically, during error detection and correction. Additionally, error detection and correction elicits changes in the connectivity of the voice network, suggesting that the right hemisphere, specifically right STG, is critical to pitch modulation.