ABSTRACT

Language was arguably a key influence in the evolution of the human brain and the evolution of this behavior in humans was likely associated with gross morphological changes and novel neural networks. My dissertation looked at one such network and verified anatomical connectivity between regions of the cerebellum, thalamus, and frontal lobe active during language using a combination of magnetic resonance imaging (MRI) and diffusion tensor imaging (DTI). The results of the DTI analysis and fiber tracking support the hypothesis that there is discrete anatomical connectivity in a language-specific network.

The second aim of my dissertation to characterize and quantify this anatomical connectivity in the language-specific functional network between the cerebrum and cerebellum. We analyzed the language-specific cerebrocerebellar network (LSCN) in 59 right-handed neurotypical males through DTI images. My results show the white matter tracts in the LSCN have greater connectivity than that of the white matter in the whole brain, indicating that there is a discrete network between the cerebrum and cerebellum exclusively for language. This anatomical connectivity information about this neural network can now be used in conjunction with behavioral measures in future research on the evolution of the human brain, evolution of language, and pathologies that affect language production.