**Using FreeSurfer to Quantify Cortical Thickness and Surface Area in Young Children**

**Abstract**

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150-250 words

FreeSurfer, developed by researchers at Harvard University, has become a key software used by multiple neuroimaging labs, including UNC's Child Imaging Research on Cognition and Life Experience Lab, for the analysis of brain data. Freesurfer can be used to acquire measurements of brain structure, such as cortical thickness and surface area. By utilizing images acquired by Magnetic Reasoning Images (MRIs), FreeSurfer identifies white and gray matter and uses a template to mark those gray and white matter boundaries. Additionally, FreeSurfer is able to assign "names" to subcortical and cortical areas. However, FreeSurfer is not always able to provide accurate white and pial matter boundaries, so multiple rounds of edits have to be done, utilizing control points, skull stripping and white matter edits. Each type of edit either works to extend, adjust or rein in boundaries. Making the boundaries as exact as possible provides the most accurate measurements of cortical thickness, making data analysis more precise. FreeSurfer is utilized in a variety of research projects to investigate associations between cortical structure and behavioral outcomes. For example, a study published just this year (Machlin et al., 2023) measured associations of deprivation and threat with alterations in brain structure in early childhood and utilized FreeSurfer to ensure that measures of cortical thickness were as close to their actual values as possible. The study found that threat was associated with widespread decreases in cortical surface area across the prefrontal cortex, and deprivation was associated with increased thickness in the occipital cortex, insula, and cingulate.