

## Structural and functional asymmetry of the language network emerge in early childhood

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### Abstract

Structural and functional neuroimaging studies show language and reading processes are left-lateralized, and associated with a dispersed group of left brain regions. However, it is unclear when and how asymmetry of these regions emerges. We characterized the development of structural and functional asymmetry of the language network in 386 datasets from 117 healthy children (58 male) across early childhood (2–7.5 years). Structural asymmetry was investigated using diffusion tensor imaging (DTI) and manual

delineation of the arcuate fasciculus. Functional connectivity asymmetry was calculated from seed regions in the inferior frontal gyrus (IFG) and middle temporal gyrus (MTG). We show that macrostructural asymmetry of the arcuate fasciculus is present by age 2 years, while leftward asymmetry of microstructure and functional connectivity with the IFG increases across the age range. This emerging microstructural and functional asymmetry likely underlie the development of language and reading skills during this time.

**Keywords:** Diffusion tensor imaging, Resting State fMRI, Asymmetry, Lateralization, Prereading, Arcuate Fasciculus