

# Neuroimaging approach for understanding visual streams

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## **Abstract:**

Vision is an essential sensory modality for humans and animals for survival. Over the last decades, neuroscience studies on the primate visual system have distinguished two major streams of visual processing; dorsal stream involves spatial information processing and ventral stream involves categorical information processing. While this dual stream hypothesis has been widely supported, this talk will describe results of recent neuroimaging studies, which demonstrated that these streams are not strictly independent, rather interact with each other from a relatively early stage of cortical visual processing. I first discuss a series of recent works using diffusion-weighted MRI (dMRI) to identify the Vertical Occipital Fasciculus (VOF), which is a white matter tract connecting dorsal and ventral visual streams. Analysis of dMRI data on the human and non-human primate brains revealed that VOF connects dorsal and ventral extrastriate areas (V3, V3A, V4), suggesting that interaction between streams occur during mid-level visual processing. This evidence is further supported by high-resolution anatomical data acquired by polarized light imaging. I will then discuss the anterior extent of connection between visual streams, including posterior arcuate fasciculus in humans and apparently homologous fasciculus in non-human primate brains. Finally, I will discuss whether similar pathways can be seen in non-primate brains to understand the evolution of the VOF.