

## Exploring the role of the visual ventral stream in processing sign language

Sign language, by virtue of its visual modality, engages both the classical fronto-temporal language network and visual regions. Yet, the contribution of the ventral visual stream remains insufficiently understood. In this study, we examined the role of anterior and posterior subregions of the Visual Word Form Area (VWFA), along with other occipitotemporal regions—including the fusiform face area (FFA), occipital face area (OFA), extrastriate body area (EBA), and hand-selective regions (Hand ROI)—in distinguishing real from pseudo-signs. We further tested how sign language expertise shapes neural activation, comparing proficient signers with non-signers. Using representational similarity analysis (RSA) of fMRI data, we found distinct representations for real versus pseudo-signs in the anterior VWFA, FFA, OFA, EBA, and Hand ROI, with expertise significantly modulating these effects. A complementary searchlight analysis revealed a distributed network spanning both ventral and parietal streams that supports sign processing. These findings highlight the anterior VWFA as a key hub for visual linguistic processing, operating within a broader network that integrates ventral and parietal regions to accommodate the complex visual-spatial demands of sign language.