There is widespread agreement that Bayesian inference – combining sensory signals with prior knowledge or predictions – is critical for the perception of everyday sounds such as speech. Evidence from fMRI and MEG studies support an account in which a key computation in superior temporal gyrus (STG) involves comparing prior expectations (predictions), with sensory signals (speech sounds) and using the resulting prediction errors to update higher-level representations and perceptual outcomes [1]. However, the cortical circuits that combine predictions and speech sounds in the STG remain under-specified. We thus have an incomplete understanding of how these processes support successful speech perception, or how they are challenged when we misperceive degraded sounds, or when individuals prone to psychosis experience speech sounds that are not physically present (hallucinations). This project will combine high-resolution, ultra-high field 7T fMRI with multi-voxel pattern analysis methods to specify the laminar organisation of the neural representations of predictions, speech sounds and prediction errors in the STG. In the process we can more fully specify the cortical operations that produce our perceptual experience of speech.
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