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Study of compositionality and syntactic movement in the human brain using 7T fMRI

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Abstract

Linguists propose the existence of linguistic trees and define the merge operation to construct complex sentences from simpler elements. Previous neuroimaging studies, primarily utilizing 3T scanners, have identified an extensive fronto-temporal network involved in forming linguistic structures and executing merge operations. Intracranial recordings in these areas reveal a more distributed picture, with adjacent regions undertaking diverse linguistic tasks. We designed a 7T fMRI visual task to investigate the neural coding of syntactic operations. In healthy French-speaking participants, we initially identified the language network using a localizer. Subsequently, we employed short 3-word stimuli, presented briefly (200ms), to explore the response profiles within the language network. These stimuli included control conditions, affirmative statements, and interrogative sentences, all matched for letter and character count. Preliminary results indicate that 200ms is sufficient to differentiate between sentences and non-sentences, and suggest a finely-tuned specialization for syntactic operations within language network subregions.

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