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Neural Correlates of Analogical Reasoning of Syntactic Rules

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Abstract

Analogical reasoning is central to thought and learning, with a key focus on similarities where the same relations hold across different sets of elements. The current research investigated analogical reasoning in first-order and second-order relations, represented in word-like symbols following syntactic rules. Since most previous studies in this field have focused on visuospatial and semantic analogy, the primary goal of this paper was to specify the neural substrates for analogical reasoning based on syntactic rules. We found the activation locates in both anterior and posterior MFG, and these two regions correspond to parts of rlPFC and dlPFC respectively. The results reveal that although analogical reasoning with syntactic rules recruits similar brain regions as those in visuospatial and semantic analogy, their activation patterns are not the same. The role of rlPFC, the core area for analogical reasoning, needs to be reconsidered, and the complexity of syntactic-related activation is worth more attention.