

Merge-Generability as a Crucial Concept in Syntax: An Experimental Study

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Computational linguistics focused on the Chomsky hierarchy defined on weak generation (the size of the set of output strings). On the other hand, human language does not fit well in the Chomsky hierarchy, i.e., human language is said to be “mildly” context-sensitive. Nested dependencies are frequently observed in human language, while cross-serial dependencies are quite limited. We hypothesized that dependencies are possible only when they are the results from the structures that can be generated by Merge (Merge-generable). Therefore, the most important research topic for both linguistics and neuroscience of language is to elucidate the neural basis of Merge-generability. In the present study, we will first present our recent study with functional magnetic resonance imaging (fMRI), which demonstrated that the complexity of the hierarchical structures generated by Merge modulates cortical activations in the left inferior frontal gyrus (L. IFG), a grammar center in the brain. In the latter part, we will explain our on-going study that tries to examine the Merge-generability of dependencies is crucial for the syntactic computation in the brain. By directly contrasting sentences with Merge-generable and non-Merge-generable dependencies, we found that the main effects of Merge-generability activated the L. IFG, indicating that Merge-generable dependencies—and only Merge-generable dependencies—were handled by the Faculty of language.

References:

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