

Logical Phonology carves a path toward the first truly modular account of I-language

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The standard assumption in cognitive (neuro)science is that the human mind is modular [1, 3, 5, 7, 14, 15, 16, 23, 26, 29]. A module is a domain-specific, informationally encapsulated, hardwired cognitive system governed by principles that are not completely shared by any other part of cognition [26]. Furthermore, modules can have their own encapsulated components—submodules [11]. Each (sub)module consists of a finite set of primitive, atomic symbols (basic representations) and a finite set of operations that manipulate those symbols (basic computations); (sub)modules communicate via interfaces, which transduce between the types of symbols that are uniquely characteristic of each (sub)module [16, 23, 31]. Generative linguistics assumes that I-language is one such cognitive module and that it consists of a few submodules including syntax, semantics, morphology, and phonology [4, 6, 7, 8, 9, 11, 27, 28]. The problem is that if I-language is indeed a module, then by definition its functioning needs to be expressible in terms of *the same type* of cognitive operations. However, to date, no one has managed to demonstrate that this is the case. Here, I argue that, due to the recent advent of Logical Phonology [2, 12, 17, 18, 21, 24, 25, 30], the entirety of I-language can for the first time be formally described using only one type of operations: set theory. Syntax has long since been formalized in terms of a binary set-formation operation MERGE [8, 10, 20], and semantics has followed suit more recently [22]. If Distributed Morphology [13, 19] is correct in claiming that words are assembled by the same (type of) syntactic operations that build sentences, then word-formation can also be modeled by MERGE-style set-formation. Finally, Logical Phonology posits that set-theoretic operations such as set unification and set subtraction account for the entirety of phonological competence [24, 30]. Thus, what *unites* I-language into a single module is its reliance on set-theoretic operations to build larger structures from primitive representational elements. What *divides* I-language into submodules are, first, the unique representational primitives of each submodule (e.g., phonology deals with phonological features, which are absent from all the other submodules), and second, the particular properties of set-theoretic operations (e.g., syntactic MERGE is binary and recursive, which does not seem to hold true for phonological unification).

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