

Modeling dynamic aspects of language variation through time and space
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We aim to understand the dynamic aspects of language variation on the basis of notions that have been shown to shed light on the dynamics of complex systems such as biology and physics, namely the notions of symmetry, asymmetry and symmetry-breaking. These notions, we claim, ensure essential conceptual unification between language and biology. We explore the properties of language variation through time and space from a biolinguistic perspective.

We raise the question of the specificity of human language, as well as the connection between the Faculty of Language, experience and factors reducing complexity for the understanding of language variation. We relate variation in language to variation in biology. Because language variation is biologically grounded, and that variation is a central concept in biology, a deeper understanding of linguistic diversity can be foreseen, that is an understanding that goes beyond explanatory adequacy.

In this perspective, we address the question whether variation in language correlate with variation in biological features. We take language variation to be brought about by experience, and consider the impact of factors reducing complexity, so called 'third factor' in Chomsky (2005, 2013), on language variation and development. Following Di Sciullo (2011), we consider symmetry breaking as part of the third factor and discuss two consequences of the *Directional Asymmetry Principle* (DAP) on the basis of the development of Prepositions (P) in the phylogeny of Indo European languages. We formulate a model of language variation including third factor principles. We relate symmetry breaking in developmental biology to language development. We identify the predictions of the DAP and provide empirical evidence supporting it. We detail the properties of the computational procedure deriving the variation in the development of P. We identify the consequences of the model for the understanding of language variation.

We argue that a model of language variation including third factors principles provides an account for dynamic aspects variation in a way that is not accessible to other models. For example, in the Principles and Parameters model (Chomsky 1981, and related works), parameters are options left open by Universal Grammar and are generally thought of as being associated with the lexicon (Borer 1984). In the Principle and Parameters model, parameters fails to predict residual cases of variation arising from stages of fluctuating asymmetry, as it is the case in the historical development of P and in the development of other functional categories. Furthermore, it does not provide a rational for why parameters have to be reset at a latter point in time.