# (Biolinguistic) Primitives Lost in Translation

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Approaching language from a biolinguistic perspective entails adopting a view of Language that is tenable from a biological, neuro-cognitive point of view. Making progress in biolinguistics corresponds to making progress in terms of viewing language as a biological organ, which implies interdisciplinarity and emphasis on the way linguistics communicates with interfacing fields. Similarly, a shift of focus from language-specific, feature-based, supposedly U(niversal) G(rammar)-represented particularities to principles of general cognitive architecture is highly likely to be progress with respect to what Poeppel & Embick (2005) define as the "Granularity Mismatch Problem" (GMP).

The goal of the present work is two-fold: First, it revisits linguistic primitives of the kind that Poeppel & Embick (2005) list. We propose that these *linguistic* primitives should not be taken as *biolinguistic* primitives, since they are not necessarily informative once the focus is on Language as a biological organ and not on specific languages. We concede that some of these primitives are helpful in describing some language-specific particularities, and therefore might be empirically useful when discussing certain phonological or morphosyntactic phenomena. However, they are less informative with respect to the biological character of language or when language is viewed in relation to other modules of human cognition (Boeckx 2011). The highly language-specific character of these primitives is what leads to problems like GMP. In this context, the second part of the present discussion relates to the fact that one of the main desiderata of the re-emerging biolinguistic enterprise is to find its own primitives. This can be achieved through selecting from the two interfacing fields that comprise it those units that are informative in terms of its biological makeup.

GMP boils down to the fact that linguistic and neuro-cognitive research are operating on units of different granularity. According to Poeppel & Embick's (2005) formulation of GMP, "linguistic computation involves a number of fine-grained distinctions and explicit computational operations. Neuroscientific approaches to language operate in terms of broader conceptual distinctions". This applies mainly to what linguistics "canonically" takes as primitives: features, syllables, morphemes, etc. Most of these, however, seem to be strictly linguistic concepts and even within linguistics their status has not been immune to points of criticism. For example, features are the kind of primitives that linguists usually resort to in order to explain a grammatical phenomenon but, in and of themselves, they offer no explanatory adequacy, in that they do not derive or construct the phenomena in question; they only reduce them to something allegedly pre-existing. In this sense, features cannot be of any interest from a biolinguistic point of view. From a linguistic point of view, the richness of features has long been assumed to give rise to distinct functional heads as argued by cartographers (Shlonsky 2010). In other words, linguistics posits two inventories (i.e. features in the lexicon and functional projections in the syntactic representation) that feed one another, to the point of giving rise to a highly stipulative, open-ended array of linguistic primitives.

Analogously, if we look at phonology, the field which spawned distinctive features (Trubetzkoy 1939), one can argue for their irrelevance to the computations at the core of what biolinguistics considers phonology to be. Phonological features are based on phonetic factors (articulatory and perceptual), which forces the assumption that these factors are somehow encoded in language. This assumption loses its robustness once different modalities are taken into account, as they lack the characteristics on which features are based. If we take *sign*, for example, it is hard to determine the role of a feature like [+coronal]. Faced with such a problem, we are left with two mutually-exclusive options: i) posit a unique set of features for each

modality, or ii) see phonology as modality-independent. The first option would require an extremely specific and complex UG, with features for every modality deemed possible. This alone should be enough for the second option to be favoured, although even if speech were the only modality for human language one could argue for a phonetics-independent phonology. Blevins (2004) shows that much of what is usually attributed to phonology can be accounted for on the basis of phonetics. This paves the way for a much simpler, autonomous, *substance-free* phonology, comprising of a computational system which is ready to operate on any kind of external units. The architecture and workings of such a system have more recently been discussed by Blaho (2008) and Samuels (2011).

The syllable, however, seems to be a special case. While a solely computational phonological system would imply that syllables, much like features, are external to it, some studies show that in fact that might not be quite the case. Giraud & Poeppel (2012) provide a synthesis of recent work that classifies the syllable as emerging from the brain's intrinsic oscillations, which somehow explains the entrainment of both the mechanisms that enter into speech production and perception. Therefore – and contrary to the examples mentioned above – one should not ask first whether syllables should be dispensed with. Rather, the main question ought to be whether they are linguistic primitives or biological primitives, as both seem to enjoy some degree of plausibility.

Given the narrow linguistic status of the primitives described above, biolinguistics should not ascribe them the same ontological status and presuppose them as primitives of its own. It is part of the biolinguistic agenda to rethink them, and doing so could help overcoming GMP-related issues. It is highly likely that turning away from feature-based accounts of variation makes progress related to how language is implemented in the brain, as it would allow for a better, GMP-free exploration of how language interfaces with other modules of human cognition in the brain.

With respect to the second goal of this study, we suggest that the formulation of an array of biolinguistic primitives entails bringing a neuro-cognitive perspective into the equation. In a nutshell, rethinking GMP in the context of biolinguistics requires adopting the perspective of neuroscience in understanding which primitives are informative for the biological makeup of the language faculty. Some of these might be: (i) *(oscillatory) syllable* (Giraud & Poeppel 2012), (ii) *long-distance dependencies* which are impaired in agrammatic populations (e.g., Grodzinsky *et al*. 1991), and (iii) processing *recursion* and different types of grammars (finite-state vs. phrase-structure; Friederici *et al*. 2006). By analyzing these primitives, we provide a solid basis for other interfacing fields to contribute to the biolinguistic enterprise.

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