

The differentiation of lexical and postlexical processes in the evolution of the grammatical category 'word'.

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In this talk I take up the question of the evolution of the category 'word'. Much work on the evolution of language assumes this category as a pre-adaptation to the development of true grammar (i.e. in connectionist modeling studies (Kirby 2002)), yet it is, itself, a complex grammatical entity (both phonological and morphological). Furthermore, in discussions, some have suggested that an elaborated phonology is a later development in human language (Hurford 2003). I will argue that opposite is likely to be the case: that phonology is likely to be essential to the development of the category 'word' from the earliest stages, and that the development of the category 'word' is highly likely to be coterminous with the development of syntactic grammar, and not prior to it. That is to say the category 'word' is not by definition a 'less complex' entity, but indicates that all the pieces of the grammar are likely to be in place.

The argument presented here rests on two aspects of the hypothesis: statistical learning and the differentiation of lexical and postlexical processes in modern grammars and the essential duality of patterning associated with this distinction.

Significant to the grammatical category 'word' is the fact that there are units smaller than morphemes that are meaningful; that is the sounds (or effects / features) are that are legitimate combinatorial units, and those that *for a given system* are not. I will demonstrate this pattern duality with field data from two phenomena, pitch and duration. Pitch may be used lexically (tone) and postlexically (intonation), sometimes both within the same system (Ladd 1996), yet it is only the lexical tone that can be used to build meaning units. Likewise, while attempts exist to find meaning units within intonational groups (Beckman & Pierrehumbert 86) and to assign meaning to intonational groups and sub groups (Ward and Hirschberg 85), intonation and its parts remain qualitatively distinct from the lexical pitch or tone. The same is true of duration, which may be used as a meaningful unit in the phonology in a length contrast, or it may be used in the larger domain, postlexically, such as final lengthening. Recent studies in online speech processing have shown that listeners are able to distinguish these uses of duration well enough to influence word recognition (Crosswhite et al 2001). However, crucially, at the phonetic level, it is not possible to determine what the effect or status of an occurring duration fact or pitch event is. Independent of its role in the grammar, pitch is fundamental frequency of the voice as it rises and falls throughout the utterance, and duration is a raw score. It is higher level organization that determines the actual function of these phenomena in the grammar. Uncovering the phonemes and words of a language in fluent speech requires building a contrast set that reflects minimally this duality of patterning.

The second aspect of this hypothesis starts from MacNeigle's (1998) frame-content theory of syllable structure, which argues for a structural hierarchy based in lateralization sufficient to ground the development fine oral articulations within the frame of a primitive call, I will argue that the increasing complexity of articulation plausibly developed from pressure to increase 'meaningful' sound features as distinct from those that are not. Saffran's work on statistical learning suggests that the output of pattern recognition processes in humans is constrained by prior generalizations and/or existing knowledge bases (Saffron 2002). If this is the case, one quite plausible preadaptation hypothesis for human language is the need to differentiate between sounds and features that are associated to meaning units and those that are not. The existence of meaning units such as calls indicates a distinction between call and no-call sounds. An increase in call learning or call meaning may plausibly pressure an increase in the complexity of articulations that can be *used* in meaningful ways, in much the same way that complex inventories in contemporary languages (Maddieson & Lindblom 1988) often co-occur in what Trubetskoy called 'wasteful' languages, that is languages with severe phonotactic constraints on the distribution of these contrasts, such as Athabaskan (McDonough 2003) or Ju|'hoansi (Miller-Ockhuizen 2000).

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