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Title:

On certain core properties of the language faculty: an analysis of embedding, recursion and conceptual embedding

M.D. Hauser et al's paper posited FLN/FLB distinction² and hypothesized that "FLN comprises only the core computational mechanisms of recursion as they appear in narrow syntax and the mappings to the Sensory-Motor and Conceptual-Intentional interfaces" (Hauser et al., 2002, p. 1573). Lately, this hypothesis has been vigorously challenged (Jackendoff & Pinker, 2005; Parker, 2006; Pinker & Jackendoff, 2005). First, we will focus on the logical contingencies of embedding and recursion. Second, as the narrower claim of Hauser et al. that recursion is unique to our species has subsequently been questioned (Marcus, 2006; Okanoya, 2007; Watanabe & Huber, 2006), we will argue that recursion in non-human animal communication has so far not been attested.

There is a confusion underlying the notion of recursion. In fact, there are two logically independent notions of recursion. In computer science and Chomsky's phrase structure grammar, recursion is a procedure or rule (Chomsky, 1956, 1964, 1975). For some other theorists, recursion is a type of structure: a situation where an instance of an item is embedded in another instance of the same item (Jackendoff & Pinker, 2005; Parker, 2006; Premack, 2004). For the sake of convenience, let us call the former procedural and the latter structural recursion. Procedural recursion implies infinity, whereas structural recursion does not. Procedural recursion is possible in non-parallel communication, structural recursion is not. Parallel communication pertains to communication systems that have parallel interface and/or parallel interpretation. Examples of parallel communication are, for example, NL and bees' dance.

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² The faculty of language in the narrow sense or FLN = unique aspects of the language faculty. The faculty of language in the broad sense or FLB = the whole language faculty, including the aspects shared with other species or faculties.

We propose another notion instead of syntactic recursion as an underlying feature of the many critical aspects of the language faculty: a hierarchical way of conceptualization termed conceptual embedding (the ability to nest concepts within concepts). We argue that conceptual embedding is a prerequisite for natural language. A complex communication system cannot evolve until there is motivation to convey complex information (Bickerton, 2003; Nowak & Komarova, 2001). We hypothesize that such motivation requires the perception of reality in terms of independent, combinable concepts that can be embedded to form interdependent conceptual categories that provide the functional basis for the meaning of natural language expressions.

More experiments are needed to prove or refute conceptual embedding (CE) in non-humans but we hypothesize that CE may turn out to be a uniquely human trait. We suggest that CE is at the top of the hierarchical continuum of associative processes performed by the nervous system. As the nervous system evolved, increasingly higher-order associative processes became available which resulted in the emergence of CE in human ancestors. We hypothesize that, initially, the selective force driving the development of the language faculty was towards enhanced conceptualization of reality. According to this scenario, the invention of linguistic communication was a secondary event, dependent on CE which supports the sophisticated conceptual underpinnings of linguistic meaning.

Phrases, sentences or any syntactic structures in human languages implicate CE. Two pervasive features of natural language syntax are concatenation and syntactic embedding. It seems that, instead of syntactic embedding, as in the corresponding adult usage, children process relative clauses initially as concatenations of a fixed form with a sentence (Diessel & Tomasello, 2005; Diessel et al., 2007). We argue that syntactic embedding presupposes concatenation and CE (but not vice versa), and that CE enables the processing of syntactic structures in the absence of syntactic embedding. We show that a primitive language that lacks syntactic embedding or even concatenation could support coherent communication and contribute to fitness insofar as it relies on consistent and shared constraints on CE.

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