

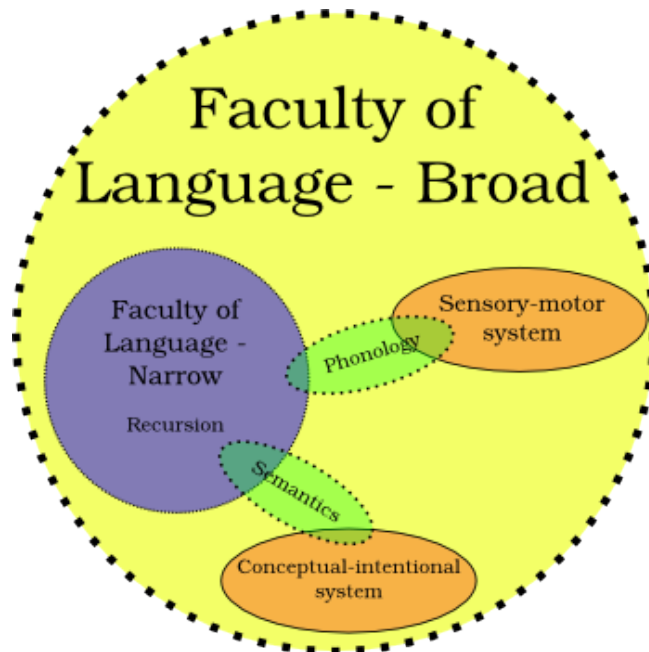
IS THERE A HUMAN-SPECIFIC LANGUAGE FACULTY?

Joshua A. Hansen
Brigham Young University

Tomalin 2006 highlights the genesis of recursion as a key component in linguistic theory since the early days of generative grammar (Tomalin 2006:60-67,168-174). Recent developments in syntactic theory, neuroscience, and brain imaging techniques have thrust recursion once again to the forefront of debate concerning language – now focusing on how the language capabilities of humans fit within the broader neurological framework of the brain, as well as on whether there exist any features of the human language faculty not found in other animals.

In an article targeted at a broad audience (Hauser 2002), a group of researchers associated with and including Noam Chomsky sparked a vigorous debate concerning the biological underpinnings of language. They began by segmenting the human capacity for language into two components. The first of these is termed by them the “faculty of language – narrow sense,” also known as FLN. The FLN is defined as a system for executing language-specific computations (Hauser 2002:1570).

Faculty of language – broad sense, or FLB, includes the FLN and adds to it at least the “sensory-motor” and “conceptual-intentional” systems (Hauser 2002:1571). Presumably the FLN feeds the results of its computations to the sensory-motor system via a phonological component and to the conceptual-intentional system via a semantic component, although the phonological and semantic systems are not explicitly situated inside of



see Hauser 2002:1571

Figure 1. Relationship of the broad and narrow language faculties

either the broad or the narrow language faculties (Figure 1).

The inevitable response came in 2004 when Pinker and Jackendoff submitted for publication an article asserting that the FLN should be viewed as a much more expansive component than proposed by Hauser et al., involving elements of phonology, perception, production, and syntax (Pinker 2005). However, the real crux of the paper is an assault on Chomsky's Minimalist Program. Chomsky and his associates responded in kind, returning fire on Pinker and Jackendoff's purported misunderstanding and mischaracterization of both the FLN/FLB debate and the Minimalist Program (Fitch 2005). Most recently, the Jackendoff camp continued the abuse by issuing another response, Jackendoff 2005.

The natural issue is whether the human-specific segment of human language capabilities consists merely

of syntactic recursion, or if more cognitive processes should be included in that category. It's clear, however, that there is another issue at stake. After the publication of their 2005 article, Chomsky and associates released via the World Wide Web an appendix including material that the editor of *Cognition* cut from publication. The focus of this appendix is summed up in Liberman 2005:

“I'll limit myself to observing that [the appendix is] entirely "inside baseball": seven pages of text that mention no linguistic facts and no specific languages, nor any simulations, formulae, or empirical generalizations. Aside from a very general and abstract account of Chomsky's view of the goals of his research, the only topic is who said what when, sometimes with a very abstract explanation of why. It's an odd document -- I can't think of anything at all comparable from a major figure in a scientific or scholarly field, except perhaps some controversies over precedence (which is not an issue here). I agree with the judgment of Jacques Mehler, the editor of *Cognition*, who asked for it to be cut; and it seems to me that it's a distraction for outsiders (including most of the normal readership of *Cognition*) to try to understand it” (Liberman 2005).

Pinker and Jackendoff's article “The faculty of language: what's special about it” serves both as counterpoint to the Hauser, Chomsky, and Fitch article and as an attempted beachhead for a full-out assault on the kingpin, Chomsky. Many of the paper's claims echo those put forward in Jackendoff's solo book, “Foundations of Language.” A favorite attack is on Chomsky's past position that language is non-redundant (Chomsky

1995:168; compare Jackendoff 2002:152-154 and Pinker 2005:227-229). Pinker 2005 forwards the previously voiced assertion that the Hauser/Chomsky/Fitch article was “a major recantation” of Chomsky's previous position – the position that they still defend – that the human language faculty involves a substantial number of processes unique to our species (Pinker 2005:204). As examples they cite “Conceptual structure,” “Speech perception,” “Speech production,” “Phonology,” “Words,” and “Syntax” as possibly human-specific capabilities related to language. Much of this “inside baseball” is a reaction by Jackendoff and Pinker in the face of what they see as Chomsky and his associates abandoning ship on the human uniqueness position.

In the meantime, Gentner et al. published a study seriously challenging Chomsky's position that syntactic recursion constituted the only human-specific element of language by demonstrating the ability of European starlings to recognize recursive patterns (Gentner 2006).

1. HUMAN LANGUAGE IS 'INNATE'. While Hauser, Fitch, and Chomsky formally allow for a multifaceted FLN, in practice they assert that the FLN only includes the recursive processing mechanism (Hauser 2002:1573). They argue that the recursion capability is the only language faculty unique to humans. They address various issues using counterexamples from empirical studies to eliminate other capabilities from the “uniquely human” list. For example, recognition of syllable structure in human infants has been replicated in non-human primates, suggesting that the computational mechanism for such recognition is not unique to humans (Hauser 2002:1577).

2. RECURSIVE COMMUNICATION FOUND IN NON-HUMAN ANIMALS.

Sampson 1997 presents the case against innateness. He focuses on the work of Bickerton and seeks to demonstrate that the oft-cited gap between pidgins and creoles, or between pre-grammatical utterances and post-grammatical sentences of children, is not such a gaping chasm of unexplained transformation as scholars have previously taken it to be. He uses the example of Seth, a child whose language was observed at 21 months and 27 months old (Sampson 1997:66). The difference between the 21-month old's one- and two-word utterances and the 27-month old's full sentences is not a gulf whose sudden onset is only crossable by means of an innate Universal Grammar, he claims.

Sampson works at reinforcing his claim through comparison to evolutionary theory. He satirizes:

For millions of years, hominids had grunted at one another in staccato utterances which would have translated into the equivalent of 21-month-old Seth's 'Get up. Please. Apple'. Then, one particular day, at one particular spot on the savannah, in one particular 2-year-old's head, a light came on. She opened her mouth; and adverbial phrases, relative clauses, sequence of tenses, concord of number and gender, flowed out in an articulate stream of eloquence. Unlike 27-month-old Seth, she made no errors: there were no standards against which her usage could have been judged erroneous. And we are all her many-times-great-grandchildren (Sampson 1997:69).

His point is that neither the original evolution of language capability nor the acquisition of individual languages in modern human children should for any

reason be assumed to be exceptions to the naturalistic hypothesis dominant since Darwin: gradualness.

3. METHODOLOGY

Hauser et al. sketch a robust (albeit incredibly vague) methodology for assessing the FLN scope debate:

“Although we have argued that most if not all of FLB is shared with other species, whereas FLN may be unique to humans, this represents a tentative, testable hypothesis in need of further empirical investigation” (Hauser 2002:1578). They state further:

It is currently unclear whether this limitation [Tamarins' inability to acquire a unrestricted grammar] generalizes to other animals, and whether it is similarly imposed on humans at different stages of development. Nonetheless, such experiments provide an empirical approach to exploring key differences between humans and animals relevant to FLN (Hauser 2002:1578).

They also note:

Despite [the] attractive simplicity [of finite-state grammars], such rule systems are inadequate to capture any human language. Natural languages go beyond purely local structure by including a capacity for recursive embedding of phrases within phrases, which can lead to statistical regularities that are separated by an arbitrary number of words or phrases. Such long-distance, hierarchical relationships are found in all natural languages for which, at a minimum, a “phrase-structure grammar” [context-sensitive grammar] is necessary. It is a

foundational observation of modern generative linguistics that, to capture a natural language, a grammar must include such capabilities (Hauser 2002:1577).

Following this cue from Hauser et al., a research program surveying animal communication for patterns that cannot be reasonably explained without resort to higher-order language formalisms such as context-sensitive grammars would serve to resolve much of the innateness debate. If an animal is discovered natively using communication patterns only likely to be modeled using a context-sensitive grammar, it can be concluded that such complexity of communication is not unique to humans.

3.1 SEARCH FOR RECURSION AND CONTEXT-SENSITIVE GRAMMARS.

Some cases of animal communication will not exhibit patterns requiring context-sensitive grammars. More complex cases, however, will require researchers to distinguish between animals actually employing a CSG and others simulating CSG using lower-order grammars on the Chomsky Hierarchy. Gentner 2006 provides a useful model of a method for distinguishing between the two possibilities. Although their paper dealt only with pattern *recognition* rather than production and dealt with discrimination between finite-state and context-free grammars, some elements of their analysis will apply to our search.

In attempting to create a methodology to discriminate between different levels of grammars in the Chomsky Hierarchy, difficulty arises regarding matters of parsimony. Parsimony is often a matter of subjective judgment. Additionally, dogmatic adherence to parsimony introduces risks because the most

parsimonious solution is not always the best model of reality (Wikipedia : Parsimony). In our case, the greater the increase in complexity of a finite-state or context-free grammar trying to model a context-sensitive grammar, the less likely that a species would have evolved the elaborate neurological circuitry needed to sustain such modeling and the more likely the parsimonious solution will be correct.

Subject to debate and potential contradiction by future discoveries about the neurology of individual species, I propose an arbitrary, rule of thumb benchmark to judge between such situations: any lower-level grammar requiring ten times or greater the number of non-terminal rules and symbols in comparison with a higher-order grammar should be considered non-parsimonious and therefore not adequate in explaining the animals' abilities (Gentner 2006: Supplementary Information). If, through application of this guideline, animal communication is observed that cannot be adequately explained without resorting to a context-sensitive grammar, it will be concluded that claims of human-uniqueness of CFG's are not supported by empirical evidence.

4. ANALYSIS

Because Gentner 2006 focused on birds' ability to discriminate between finite-state and context-free patterns rather than to generate them, our analysis will not utilize the detection theory elements they employed. Instead, it is presumed that demonstrating that there exist no finite-state or non-deterministic pushdown automata that account for communication patterns observed in animals is sufficient evidence upon which to conclude that a grammar of at least as high a degree as a context-sensitive grammar was required to produce such

output. As most researchers agree that natural human languages utilize at least a context-free and most likely a context-sensitive grammar, this would be sufficient evidence to indicate that human grammars at a fundamental level are not distinct from grammars produced by other animals.

5. CONCLUSION

Human uniqueness advocates have the most to lose through a survey of animal communication, as their hypothesis is what might be called the *reigning default* in danger of being disproved. While I would encourage researchers to follow through on such a program, it serves only as a single segment of an approach to empirically validate or invalidate the work of Chomsky et al.; Jackendoff and Pinker; and Sampson. Other more general approaches are outlined in Hauser 2002 and serve as valuable material for further planning.

Confirmation or disconfirmation of human uniqueness by means of a survey of animal communication has significant implications at the confluence of science and theology. Prior research such as the discovery of the FOXP2 gene in humans responsible for various language capabilities has pushed theologians towards reconciling human uniqueness with the possibility that much of that uniqueness arose from a single point mutation (Wikipedia : FOXP2). FSG/CFG/CSG comparisons could prove a more substantial difficulty by forcing reassessment not only of the unique genesis of the human language faculty but also of the uniqueness of that faculty itself. This should not, however, result in an insurmountable obstacle for thoughtful persons of faith (Science Blog 2002).

6. FUTURE WORK

Future work beyond the program outlined in this paper might include further investigation non-communication cognitive capabilities in non-human animals. If, as has been suggested in Sereno 2005, the communicative and semantic components of language evolved separately and for different reasons, we might expect to discover significant semantic representations within animals not possessing sophisticated communicative abilities.

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