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Edited by

Harry van der Hulst



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Preliminaries

Re Recursion¹

Harry van der Hulst

“We hypothesize that FLN only includes recursion and is the only uniquely human component of the faculty of language.” (Hauser et al. 2002: 1569)

“If you already know what recursion is, just remember the answer. Otherwise, find someone who is standing closer to Douglas Hofstadter than you are; then ask him or her what recursion is.”²

“An apparently new speech disorder a linguistics department our correspondent visited was affected by has appeared. Those affected our correspondent a local grad student called could hardly understand apparently still speak fluently. The cause experts the LSA sent investigate remains elusive. Frighteningly, linguists linguists linguists sent examined are highly contagious. Physicians neurologists psychologists other linguists called for help called for help called for help didn’t help either. The disorder experts reporters SpecGram sent consulted investigated apparently is a case of pathological center embedding.”³

1. Introduction

The present volume is an edited collection of original contributions which all deal with the issue of recursion in human language(s). All contributions (but one⁴) originated as papers that were prepared for presentation at a conference organized by Dan Everett on the topic of recursion in human

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1. I wish to thank the following people for comments on an earlier draft of or ideas contained in this chapter: Jonathan Bobaljik, Marcel den Dikken, Laszlo Hunyadi, Fred Karlsson, Simon Levy, Marianne Mithun, Geoffrey Pullum, Barbara Scholz and Arie Verhagen. Needless to say that some points that I did not remove from this final version met with strong disagreement.
 2. Attributed to Andrew Plotkin (<http://en.wikipedia.org/wiki/Recursion>).
 3. <http://specgram.com/CLI.2/03.bakery.disorder.html>
 4. The exception is chapter 17. In an earlier draft of this introductory chapter I included a section on phonology that I had to remove because it was too long. The reviewers suggested that I turn this section into a separate contribution to this volume, which I did.

language (Illinois State University, April, 27–29 2007).⁵ For the purpose of this collection all articles underwent a double-blind peer-review process. The present chapters were written in the course of 2008.

The characterization of language as a potentially infinite number of expressions that can be produced with finite means has been noted for a long time, among others by the linguists Panini and Wilhelm von Humboldt. Chomsky's early work (e.g. Chomsky 1955 [1975]) proposes various ways to build recursive mechanisms into the grammar (cf. below) and since then many linguists have adopted one of these mechanisms, namely a rewrite or phrase structure component which contains recursive rewrite rules or recursive rule sets (cf. below). However, no general agreement seems to exist concerning the empirical status as well as the formal status of this 'characteristic' of human languages or the grammars that underlie them.

Renewed interest in this subject was sparked by claims made by or attributed to, Hauser, Chomsky and Fitch (2002) which I paraphrase as follows:⁶

- (1) a. Recursion essentially constitutes the innate human language faculty⁷
- b. Recursion is the sole uniquely human trait of human language
- c. Recursion is unique to the language faculty
- d. Recursion is universal (i.e. present in all human languages)
- e. Recursion is unique to the human mind

As one might expect, all these bold claims are controversial. According to the first claim, language results from several mental faculties whose intersection leads to language, as well as from necessary 'natural laws' of some kind that take scope over language (and, presumably many other phenomena). However the *recursion faculty* (also called the *narrow language*

5. Dan Everett wishes to thank Bernard Comrie and the Max Planck Institute for Evolutionary Anthropology and the College of Arts and Sciences and the Provost of Illinois State University for financing this conference.

6. There is some uncertainty on what the authors of this article say precisely and different interpretations can be found in reactions to it. My focus here is on the kinds of claims that linguists have attributed to the article.

7. Together with the so-called interfaces to the sensory-motor system and the conceptual system, it forms the 'narrow language faculty'. This claim constitutes an interesting and indeed minimalist interpretation of Chomsky's Innateness Hypothesis which, originally, had it that human are born with a richly articulated universal grammar.

faculty) is properly contained in this intersection. The second claim adds that all other language-relevant faculties than recursion (which together with recursion make up the *broad language faculty*) can also be attested in non-human animals, while recursion cannot. Pinker and Jackendoff (2005) contest the first claim by pointing to other aspects of language that specifically serve language (being confined to the intersection, which goes against claim a). Thus, for them, the innate language faculty contains more than recursion. They also imply that at least some of these other aspects may also be unique to human minds (which goes against claim b). They also note that recursion seems to play a role in other human cognitive systems such as the ‘mathematical module’, or ‘social intelligence’ which runs against claim c. Hauser, Chomsky and Fitch have responded to their article (Fitch, Hauser and Chomsky 2005) which has sparked a further rebuttal by Jackendoff and Pinker (2005). With respect to claim (d), Everett (2005) finds that Pirahã, a Muran language from the Brazilian Amazon, does not exhibit any recursive structures at the syntactic level. His claim has been called into question in Nevins, Pesetsky and Rodriguez (to appear) to which Everett (2007, to appear) is a response. This claim, which has attracted a lot of attention in the professional literature and in the popular press, has contributed to further interest into the matter of recursion.⁸ Finally, claim (e) has been called into question by Genther et al. (2006) who report on experiments which show that European starlings can be trained to make a distinction between strings that result from recursive or from non-recursive grammars. These findings, which also gained media attention, have received alternative interpretations (cf. Language Log⁹; Marcus 2006), notably the idea that making a distinction between $a^n b^n$ and random combination of a’s and b’s may point to an ability to ‘count’ (in itself still a remarkable capacity). In fact, Hauser, Chomsky and Fitch (2002) themselves note that animal navigation capacities can be analyzed as containing recursion, which implies that recursion may not be entirely limited to the human mind.

In this volume, the question of recursion is tackled from a variety of angles. It is perhaps fair to say that the conference call invited participants to take a critical stance regarding the claims in, or attributed to Hauser, Chomsky and Fitch (2002) and this is certainly reflected in the present

8. See the discussion on the Edge website (http://www.edge.org/3rd_culture/everett07/everett07_index.html)

9. <http://158.130.17.5/~myl/languageelog/archives/003076.html>.

very interesting collection.¹⁰ Some articles cover empirical issues by examining the kinds of structures in languages that suggest recursive mechanisms, focusing on the question to what extent recursive constructions can actually be attested in natural language use. Others focus on formal issues, notably what kind of devices can be used to describe the apparent recursive expressions, and whether the relevant devices have the specific function of making recursion possible or, perhaps lead to recursion as an epiphenomenon. Most articles discuss syntactic phenomena, but a few involve morphology, the lexicon and phonology. In addition, we find discussions that involve evolutionary notions and language disorders, and the broader cognitive context of recursion.

In this introductory chapter, section 2 offers a brief discussion of the use of the notion recursion in linguistics and, for the sake of discussion, some further remarks about the role and source of recursion as a morpho-syntactic device. Then, in section 3–9 I will review the content of the chapters in the order in which they appear in this volume.¹¹ In some sections I include some additional discussion, particularly in areas which are less well represented in this collection, such as derivational morphology and phonology. Section 10 summarizes what I believe to be the major claims or considerations that are contained in this volume.

2. ‘Recursion as hierarchical grouping’ allows ‘specific recursion’ as a possibility

A general problem with the HCF article is that it does not define precisely enough what it means by recursion (cf. Tomalin 2007: 1796). Tomalin (2007) and Parker (2006) clearly show that the concept of recursion and of recursive functions (in linguistics, mathematics and computer science) can be defined in several different ways. When one gets down to specifics, mathematical formalizations are intricate and inaccessible to most people, including most linguists. In addition, there are different notions of recursion around and to disentangle their formal differences is, again, largely a

10. Another conference on recursion was held May 26–28, 2009 at the University of Amherst. This conference reflected a less critical view of the centrality of recursion. The centrality of the recursion topic, or the related topic of complexity is further evident from two other conferences that focus on this issue, June 19–20, 2009 and February 24–26, 2010, both in Berlin.

11. The description of the articles’ content is based on abstracts that were provided to me by the authors.

topic for advanced mathematical minds. Tomalin (2007) presents an overview of the historical background of this notion in generative grammar, pointing to connections to work outside linguistics as well as different ways in which the notion appears within generative grammar, and, more specifically, within the Minimalist Program.¹² He shows how Chomsky, faced with the problem of designing a grammar that could generate an infinite number of expressions with finite means, introduces different ‘recursive devices’ in different parts of LSLT (Chomsky 1975 [1955]). In LSLT, chapter 7, it is suggested that a finite set of rewrite rules can be applied more than once. Then in chapter 8 rewrite rules are considered that have the symbol on the left of the arrow also appearing on the right side of the arrow. It is this notion of recursion that became more widely adopted in generative grammar, by Chomsky and others. Thirdly, in chapter 10, the recursive part of the grammar is located in the transformational component where “the product of a T-marker can itself appear inside the P-base of a T-marker.” (LSLT, 516–518; Tomalin 2007: 1793).

Tomalin also distinguishes at least five different notions of recursion and concludes that the type of recursion that HCF refer to (that conforms to the Minimalist Program) is perhaps best characterized as the idea of providing an *inductive definition* (indeed also called *recursive definition*) for linguistic expressions. In the MP “the operations of C_{HL} recursively construct syntactic objects” (Chomsky 1995: 226) which means that every syntactic object (i.e. linguistic expression) can be defined in terms of a combination of smaller syntactic objects, with lexical items being the ‘base case’ syntactic objects (that thus terminate a derivation). This characterization of recursion is more general than what most linguists usually have in mind when they define recursion as ‘embedding a constituent in a constituent of the same type’. However, it could perhaps be argued that this latter notion of recursion (which I here will call ‘specific recursion’) is entailed by the more general notion.

Let us agree that linguistic expressions (words, sentences) can be analyzed as hierarchically structured object (‘trees’) for which, following LSLT, we can formulate rewrite rules that capture parts of these structures, such as:

- (2) $A \Rightarrow B + C$
(often paraphrased as “An A can consist of a B plus a C”)

12. Parker (2006) also provides a detailed overview of the way linguists, mathematicians and computer scientists use or define this notion.