Non-Transformational Syntax
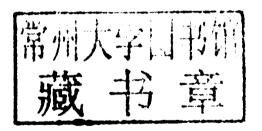
Formal and Explicit Models of Grammar

Edited by

Robert D. Borsley
and Kersti Börjars

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Contributors

Farrell Ackerman, University of California, San Diego

Jason Baldridge, University of Texas at Austin

James P. Blevins, University of Cambridge

Kersti Börjars, University of Manchester

Robert D. Borsley, University of Essex

Joan Bresnan, Stanford University

Georgia M. Green, University of Illinois

Ray Jackendoff, Tufts University

Andreas Kathol, SRI International

Helge Lødrup, University of Oslo

Rachel Nordlinger, The University of Melbourne

Richard T. Oehrle, Cataphora, Inc.

Adam Przepiórkowski, Polish Academy of Sciences

Ivan A. Sag, Stanford University

Mark Steedman, University of Edinburgh

Gregory T. Stump, University of Kentucky

Jesse Tseng, CNRS and University of Toulouse

Aline Villavicencio, Federal University of Rio Grande do Sul

Thomas Wasow, Stanford University

Gert Webelhuth, University of Göttingen

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Introduction

Robert D. Borsley and Kersti Börjars

In his *Syntactic Structures* (Chomsky 1957), Noam Chomsky introduced two very important ideas to the linguistics community: generative-grammar and transformational grammar. These are rather different ideas but it is not uncommon for them to be confused and used interchangeably. Generative grammar is a view of how to model language. It emphasizes the importance of precise and explicit analyses. Thus, Chomsky (1965: 4) remarks that "If the grammar is ... perfectly explicit ... we may ... call it a generative grammar," and Chomsky (1995a: 162, fn.1) comments that "I have always understood a generative grammar to be nothing more than an explicit grammar."[1] In contrast, transformational grammar is a specific type of theory developed within this view. Its hallmark is the assumption that grammars involve movement processes so that the superficial position of a word or phrase may be quite different from its underlying position.

It is not uncommon for the term "generative grammar" to be used to mean transformational grammar, which has developed through different stages and is currently known as the Minimalist Program or Minimalism. It is quite possible, however, for approaches that eschew the movement processes of transformational grammar to be precise and explicit. The three theoretical frameworks dealt with in the first six chapters of this book all fall into that category. Equally it is possible for transformational approaches to be imprecise and inexplicit, and in fact this is one of the main criticisms that outsiders have of contemporary transformational work.

Until the mid-1970s, generative grammar and transformational grammar were more or less coextensive. However, at that time, a number of influential linguists developed concerns about aspects of transformational grammar. For instance, concern about the over-reliance on structural factors in explanations led to the development in the 1970s of Relational Grammar, an approach within which direct reference can be made to grammatical relations such as

subject and object, allowing generalizations to be stated as changes in relational status rather than as structural transformations (see Perlmutter 1983; Perlmutter & Rosen 1984; Blake 1990; Postal & Joseph 1990).[2] As we shall see, within Lexical-Functional Grammar it is also possible to make direct reference to grammatical relations, though they are no longer primitives in recent versions of LFG (see Lødrup, this volume).

Around the same time, some linguists also noted problems relating to the lack of clear, formal, and explicit descriptions within transformational grammar. With implicit reference to then current work in transformational grammar, Gazdar et al. (1985: ix) stated that one cannot "evade the entire enterprise of generative grammar by announcing 'We assume some recursive function that assigns to each grammatical and meaningful sentence of English an appropriate structure and interpretation.' One must set about constructing such a function, or one is not in the business of theoretical linguistics." In this spirit, Generalized Phrase Structure Grammar (GPSG) was developed. It is a precise, monostratal framework, which uses alternatives to capture generalizations expressed through movement in transformational frameworks. Such generalizations are captured instead through the introduction of complex categories or the use of meta-rules that map specific phrase structure rules to other phrase structure rules.

In the 1960s, psycholinguistic work was carried out to test the psychological reality of assumptions made within transformational theory at the time. In particular the Derivational Theory of Complexity was tested. According to this theory, transformational complexity should lead to psychological complexity; that is, we would expect that it would take longer to process or produce a sentence the more transformations it involves. The early psycholinguistic work found evidence for syntactic categories and syntactic structures, but not for transformations. Bresnan (1978: 2) then describes transformational grammar as presented in Chomsky's work as "psychologically unrealistic." Her desire to develop a more realistic theory of grammar resulted in LFG in the early 1980s. Like GPSG, LFG uses mapping rules to account for some of the relations that were captured by transformation; however, unlike GPSG, within early LFG the rules relate lexical elements in the lexicon.[3]

The development of Categorial Grammar (CG) differs from those approaches described so far in that its early development predates transformational grammar and does not take place in reaction to it in the way development does in other approaches. CG can be traced back to Ajdukiewicz's work in the 1930s (Ajdukiewicz 1935) and has been developed in various ways since the 1950s. The early developments were closely linked to the first attempts at computational linguistic work (e.g. Bar-Hillel 1953). In some earlier work, CG was in fact combined with transformational grammar (e.g. Lyons 1968; Partee 1975), but this development never took off. However, there are aspects of Minimalism that bring it closer to CG (see e.g. Vermaat 2004, 2005).

In the mid-1980s, Head-Driven-Phrase Structure Grammar (HPSG) appeared as a monostratal theory exploiting the potential of complex categories even more fully than GPSG had done and incorporating ideas from CG, LFG, and other approaches. Since the mid-1990s, it has utilized hierarchies of constructions to capture generalizations of various kinds.

Since the mid-1980s, LFG, CG, and HPSG have developed into well-worked-out alternatives to transformational grammar, and they have been joined in recent years by the Simpler Syntax framework developed by Peter Culicover and Ray Jackendoff, which has a lot in common with HPSG. This is the subject of Jackendoff (this volume).

The aim of this book is to give an insight into some of the well-developed alternatives to transformational grammar. This is done in two parts. The first part (chapters 1–6) contains introductions to HPSG, LFG, and CG. As one would expect, slightly different analyses have developed within the theories. In the case of HPSG and LFG, the chapters included here (Green, ch. 1; Kathol et al.; Nordlinger & Bresnan; Lødrup) indicate alternatives where they exist, but present a generally accepted core. In the case of CG, the chapters

(Steedman & Baldridge; Oehrle) present two different versions of the general approach. The second part of this book (chapters 7–12) discusses specific or general issues from a non-transformational perspective. There are many other approaches we could have included in the first part, among them Functional Grammar (Dik 1978, 1983; Siewierska 1991), Role and Reference Grammar (Van Valin 1993; Van Valin & La Polla 1997), and Dynamic Syntax (Cann et al. 2005). The motivation for our choice is partly one of personal preference, but the three theories discussed share a number of properties, for instance in being feature based and involving some form of unification, while also involving interesting differences. Though there are many plausible and well-developed alternatives, transformational grammar remains the most influential approach to syntax. In our view, these alternatives deserve to be more influential. One thing we want to achieve with this book, then, is to make some of the alternatives more accessible.

When non-transformational approaches were developing in the 1980s, transformational grammar in the form of Government and Binding (GB) theory was very influential. As Newmeyer (1986: 224) notes, a large number of syntacticians found "its premises convincing and its results impressive," and as a result a large number of linguists turned to it both for theoretical analysis and for essentially descriptive work. It also won some converts from other theories. In recent years, however, there is evidence of a growing disenchantment with the Minimalist Program (Chomsky 1995a). This has been subject to criticism not only from long-standing critics of transformational grammar, such as Postal, but also from syntacticians once quite close to the transformational mainstream, such as Culicover, Jackendoff, Newmeyer, and Webelhuth.[4]

What many see in the framework is a great deal of rhetoric but little in the way of real achievement. Thus, Newmeyer (2003: 586) remarks that "one is left with the feeling that Chomsky's ever-increasingly *triumphalistic* rhetoric is inversely proportional to the actual empirical results that he can point to." Expanding on this observation, Newmeyer (2003: 589, fn. 7) notes that when Chomsky is asked in an interview what the "results" of our field are, "he responds by citing descriptive generalizations uncovered in pre-minimalist work, such as the distinction between strong and weak islands, rather than pointing to concrete empirical problems solved under the [Minimalist Program]" (see Chomsky 2002: 151, 153). Occasionally it is claimed that there are some important results, but then qualifications are made, which suggest that the claims should not be taken very seriously. Thus, Chomsky (1995a: 249) suggests that "phrase structure theory can be eliminated entirely, it seems, on the basis of the most elementary assumptions," but then he remarks later that "we still have no good phrase structure theory for such simple matters as attributive adjectives, relative clauses, and adjuncts of different types" (1995a: 382, fn. 22). In an apparent attempt to justify the absence of results, proponents of Minimalism insist that it is "just a program." But if it is only a program, it is not clear why it should not be considered less advanced than other frameworks, for example those represented here, which have precise and detailed analyses of many syntactic phenomena.

Turning to the rhetoric of Minimalism, a central feature is the idea that language may be "perfect." Thus, Chomsky (2002: 58) remarks that "it has become possible to pose in a productive way the question of the 'perfection of language': specifically, to ask how closely human language approaches an optimal solution to design conditions that the system must meet to be usable at all." This idea does not fit very comfortably with another central Chomskyan idea, the idea that linguistics is "an approach to the mind that considers language and similar phenomena to be elements of the natural world, to be studied by ordinary methods of empirical inquiry" (Chomsky 1995b: 1). We are not aware of any other element of the natural world where the central research question is: how perfect is it? Moreover, Minimalists do not appear to take this question very seriously. Thus, one textbook introduction, Radford (2004), mentions the idea on p. 9 but ignores it thereafter, while another, Adger (2003), ignores it altogether and rightly in our opinion.

Another feature of Minimalist rhetoric, which it inherits from earlier transformational work, is the claim that transformational analyses explain while non-transformational analyses only describe. Thus, Chomsky (2000) remarks that the Minimalist Program "encourages us to distinguish genuine explanations from 'engineering solutions' – a term I do not mean in any disparaging sense." It seems to us that there is absolutely no basis for this idea. Let us consider a concrete example, namely English non-finite relative clauses. Unlike finite relative clauses, they allow only a PP and not an NP as the clause initial *wh*-constituent. Thus, we have the following contrast:

(1)   someone $\left\{ \begin{array}{l} \text{who you can rely on} \\ \text{on whom you can rely} \end{array} \right\}$

(2)   someone $\left\{ \begin{array}{l} \text{*who to rely on} \\ \text{on whom to rely} \end{array} \right\}$

This data raises the following question:

(3)   Why do non-finite relatives allow only a PP in this position?

In a detailed HPSG discussion of relative clauses, Sag (1997) proposes that non-finite relatives are instances of a phrase type whose non-head daughter is required to be a PP. Thus, HPSG gives the following answer to (3):

(4)   Because the relevant phrase type allows only a PP as a non-head daughter.

Minimalism assumes just three main syntactic mechanisms: Merge, Agree, and Move. Hence, for Minimalism, the properties of phrases are a consequence of the feature makeup of their heads. In the case of relative clauses, the head is a complementizer that is phonologically empty when there is an overt filler. Thus, Minimalism must give the following answer:

(5)   Because the relevant phonologically empty complementizer allows only a PP as
       its specifier.

These are different answers but there is absolutely no reason to think that one offers a description and the other an explanation.[5]

A further aspect of the rhetoric is the suggestion that a transformational approach is "a kind of conceptual necessity, given the undeniable existence of the displacement phenomena" (Chomsky 2001: 8–9, n. 29). Clearly, if transformational grammar were conceptually necessary, a book on non-transformational approaches would make no sense. It would be akin to a book on round squares. In fact, however, transformational processes only appear necessary because of two quite dubious assumptions. The first is that sentences have multiple levels of syntactic structure, which arises from the assumption that different types of information, such as constituent structure, grammatical relations, and semantic relations, are all represented in the same way, namely as a binary branching tree structure. As Culicover and Jakendoff (2005) show, it is only certain unargued "uniformity" assumptions that necessitate this view of syntactic structure. The second assumption is that grammars are sets of procedures. As Postal (2003b) shows, this is not at all a necessary. Instead grammars can be viewed as sets of constraints. All the approaches that are the focus of the present volume reject the first of the assumptions that lead to transformational operations and all except CG reject the second as well. Hence, they have no need for transformational operations.

There are many other features of Minimalism that lead to the skepticism of outsiders. One is the absence of the kind of detailed and precise analyses that one would expect within generative grammar. There is a sharp contrast here with the approaches represented in this book. It is not

uncommon in HPSG work in particular to find appendices setting out formal analyses. Ginzburg and Sag (2000) has a 50-page appendix and Sag et al. (2003) a 34-page appendix. Such appendices are unheard of in Minimalist work. It is also common for these approaches to be utilized in computational work. In HPSG, the LKB (Linguistic Knowledge Builder) grammar engineering system (Copestake 2002) has allowed the development of broad coverage computational grammars. Perhaps the most notable is the LinGO English Resource Grammar (ERG) developed in Stanford. Within the projects ParGram and ParSem, LFG is used to produce computational grammars of a wide range of languages.[6] There is little computational work drawing on Minimalism. Curiously, though, the word "computational" is used extensively in Minimalism.

An important example of the lack of precision is the lexicon. As indicated above, the features of lexical items, especially those of phonologically empty functional heads, are of fundamental importance for Minimalism in that they are the main source of syntactic variation. One might think, then, that the nature of the lexicon would be a central concern. Surprisingly however, it seems to have received very little attention. Newmeyer (2005: 95, fn. 9) comments that "in no framework ever proposed by Chomsky has the lexicon been as important as it is in the MP. Yet in no framework proposed by Chomsky have the properties of the lexicon been as poorly investigated." This is in contrast to work within the theories on which this book focuses, where there are formal and explicit descriptions of the features of words and the role they play in the construction of phrases (for a discussion, see Blevins, this volume).

Connected to features and the lexicon is the role of morphology. The features that are crucial to syntactic movement are also in many cases responsible for the shape of the word, that is, they are morphological features. In spite of this central role, morphology has received little attention within any version of transformational grammar. Essentially the assumption has been that words are constructed in much the same way as phrases, and morphological phenomena that cannot be accounted for under this assumption, such as suppletion or defectiveness, have largely been ignored. Since the early 1990s, an approach to morphology has been developed within the general assumptions of the Minimalist Program that takes such phenomena more seriously: Distributed Morphology (DM; Halle & Marantz 1993). DM very explicitly rejects the Lexicalist Hypothesis, which essentially assumes a distinction and separation between morphological and syntactic processes. As in previous versions of transformational grammar, DM instead assumes that the processes that are traditionally associated with the lexicon and with morphology are distributed over other components. The theories included in this volume assume some version of the Lexicalist Hypothesis and are more natural associates of approaches to morphology such as A-morphous Morphology (Anderson 1992) or Paradigm Function Morphology (Stump 2001). For a thorough discussion of versions of the Lexicalist Hypothesis and its role particularly within LFG and HPSG, see Ackerman et al. (this volume).

A further dubious feature of the transformational tradition is the tendency to treat speculative ideas as if they were firmly established facts. A typical example is the idea that language variety is the product of a relatively small set of innate parameters. This is standardly presented as a well-established result. Thus, for example, Boeckx (2006: 59) writes that "grammarians came to the conclusion [in the 1980s] that something like a P&P [Principles and Parameters] account of the language faculty was essentially correct." More recently, however, Boeckx (forthcoming) concedes that "empirically the expectations of the traditional Principles and Parameters model have not been met. GB theorists expected a few points of variations each with lots of automatic repercussions throughout the grammar of individual languages ('macro-parameters'), but they found numerous, ever more fine-grained, independent micro-parameters." We would agree with Newmeyer (2006: 9) when he writes that "After a quarter-century of its well-documented failures and retreats, one is forced to conclude that the parametric program … is little more than an exercise in wishful thinking."

The approaches dealt with in this book differ in various ways, but it is important not to exaggerate the differences. Similarities tend to be obscured by differences of notation. However, it is possible to represent the analyses of the various frameworks in other notations.

For example, LFG or CG ideas can be represented in HPSG notation. Ackerman and Webelhuth (1998) might be seen as a version of LFG in HPSG notation. The general point is demonstrated in Shieber (1986).

All the approaches considered here have simpler and more concrete syntactic structures than transformational grammar in its various manifestations. They all reject movement processes and do not have multiple levels of structure.[7] They also make little or no use of the empty elements that have been central to transformational work since 1980. One consequence of this is that these approaches fit more easily into a model of linguistic performance than do transformational approaches. This point is developed in the present volume by Sag and Wasow.

Of course these approaches also have their limitations. An important one is that they have been largely concerned with synchronic syntax and semantics and related computational work. There has been very little diachronic work (though see, e.g., Butt & King 2001) and also very little work on acquisition. In both areas mainstream Chomskyan work has been largely unchallenged. Two chapters in the present volume, Green's chapter 11 and Villavicencio's chapter 12, consider acquisition from a non-transformational perspective. We hope they may provide a stimulus to further work.

In the preceding paragraphs we have outlined some of the background to the chapters that follow. We have said something about the origins of the approaches that are presented here. We have also drawn attention to the weaknesses of the Chomskyan approach. We do of course recognize the crucial positive impact the work of Chomsky and other transformationalists has had on the development of formal linguistics and the way it is viewed by those outside the field. However, we are concerned about the dominance that the transformational approaches have enjoyed over the last fifty years or so. It seems to us that the weaknesses raised in this introduction suggest that alternatives merit very serious consideration. This book is intended as a contribution to the accessibility of some of the alternative approaches.

Notes

1 The term "generative" (or "generative-enumerative") is sometimes used, e.g. by Pullum and Scholz (2001), to refer to procedural approaches to grammar and not declarative (or model-theoretic) approaches. We prefer the broader usage.
2 A slightly earlier alternative to transformational grammar was Systemic Grammar, as presented in Hudson (1971). A non-transformational version of generative grammar was also sketched in Harman (1963).
3 The exact nature of the mapping relations has changed as the theory has developed.
4 See Postal (2003a); Ackerman & Webelhuth (1998); Culicover & Jackendoff (2005); Pinker & Jackendoff (2005); Newmeyer (2003, 2005).
5 Postal (2003a: 5) argues that the Minimalist rhetoric about explanation and description displays a "thinly disguised contempt for getting the facts right" and involves "the fantastic and unsupported notion that descriptive success is not really that hard and so not of much importance." Many outsiders would agree.
6 See the projects' web page at www2.parc.com/isl/groups/nltt/pargram.
7 Rejecting movement processes does not automatically lead to simple and concrete syntactic structures. Relational Grammar and its relative Arc Pair Grammar reject movement processes but assume a variety of relation changing processes and has structures similar in complexity to those of transformational grammar.

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1

Elementary Principles of Head-Driven Phrase Structure Grammar

Georgia M. Green

1.1 Introduction

This chapter describes the theoretical foundations and descriptive mechanisms of Head-Driven Phrase Structure Grammar (HPSG), as well as proposed treatments for a number of familiar grammatical phenomena. The anticipated reader has some familiarity with syntactic phenomena and the function of a theory of syntax, but not necessarily any expertise with modern theories of phrase structure grammar. The goal of this chapter is not so much to provide a tutorial in some consistent (and inevitably dated) version of HPSG as to explicate the philosophy and techniques of HPSG grammars, and to familiarize readers with foundations and techniques of HPSG accounts of grammatical phenomena so that readers can access the primary literature.

In my opinion, the best means to fully understanding this approach, and to being able to write and read HPSG grammars, is to build an HPSG grammar from scratch, inventing and revising the details as one goes along, in accordance with the constraints imposed by the formal model (but not necessarily by every constraint ever proposed in the language of that model).

This chapter assumes the reader is curious about HPSG, perhaps attracted by claims that it aims for psychological plausibility, or that it is computationally tractable and adaptable for computational implementations in both research and practical applications, or perhaps merely interested in seeing how HPSG accounts for the properties of natural languages that any adequate theory of natural language must account for. I have sought to provide an in-depth introduction to the guiding principles and the nuts and bolts, as well to the notation, and to forgo the hard sell. Section 1.2 describes the character of HPSG grammars, and the elements and axioms of the system. Section 1.3 describes how linguistic entities are modeled,

and how grammars describe the modeled entities. Section 1.4 describes the ontology of feature structure descriptions in HPSG, and section 1.5 deals with the expression of constraints, especially those involving the notion "same" or "matching." Section 1.6 discusses issues relating to selection, including the treatment of agreement. Section 1.7 describes the compositional treatment of semantics in HPSG. Section 1.8 discusses the representation of constituent structure, and section 1.9 addresses the treatment of the order of elements within constituents. HPSG is very much a lexicon-driven theory, and section 1.10 describes the organization of the lexicon, relations among lexical items, and the nature of lexical rules relating them. Section 1.11 describes treatments of complementation, including the treatment of Equi and Raising constructions, and their interaction with expletive noun phrases. Section 1.12 describes variations on the treatment of so-called extraction constructions and other unbounded dependencies (e.g. pied piping), with some attention to multiple extractions and so-called parasitic gaps, as well as the nature of alleged empty categories like traces and zero pronouns. It concludes with a discussion of constraints on where extraction gaps can occur. Section 1.13 describes the HPSG account of the binding of pronouns and anaphors, and the final section indicates further directions. Two appendices summarize salient aspects of the sort inheritance hierarchies discussed, and the constraints embedded within them.

1.2   Grammars, Types, and Constraints

Two assumptions underlie the theory defining HPSGs. The first is that languages are systems of sorts of linguistic objects at a variety of levels of abstraction, not just collections of sentence(-type)s. Thus, the goal of the theory is to be able to define the grammars (or I-languages) that generate the sets of linguistic expressions (e.g. English *You've got mail, seeks a unicorn, the*, and so forth) that represent the set of natural human languages, assigning empirically satisfactory structural descriptions and semantic interpretations, in a way that is responsive to what is known about human sentence processing.[1] The other is that grammars are best represented as process-neutral systems of declarative constraints (as opposed to constraints defined in terms of operations on objects, as in transformational grammar). Thus, a grammar (and for that matter, a theory of Universal Grammar) is seen as consisting of an inheritance hierarchy of sorts (an is-a hierarchy), with constraints of various kinds on the sorts of linguistic object in the hierarchy. More exactly, it is a multiple-inheritance hierarchy, which simply means that sorts can inherit properties from more than one "parent."

A simple sort hierarchy can be represented as a taxonomic tree representing the sort to which belong all the linguistic entities with which the grammar deals. For each local tree in the hierarchy, the sort names that label the daughter nodes partition the sort that labels the mother; that is, they are necessarily disjoint subsorts that exhaust the sort of the mother. For example, subsorts of the sort *head* can be "parts of speech" (not words!) of various kinds. (Words have phonological and morphological properties, but parts of speech are abstractions, and do not.) Some of the subsorts of *part-of-speech* are further partitioned, as illustrated in (1).

(1)   **A partial inheritance hierarchy for "parts of speech":**