
Preface

This book attempts to bring together in a single framework and a uniform notation a number of strands in a project that my colleagues and I have been pursuing over several years. The purpose of the research has been to develop a principled theory of natural grammar more directly compatible on the one hand with certain syntactic phenomena that flagrantly disrupt order and constituency, including coordination, extraction, and intonational phrasing, and on the other with psychological and computational mechanisms that can map such surface forms onto interpretable meaning representations. The book follows other computational approaches in claiming that syntactic structure is merely the characterization of the process of constructing a logical form, rather than a representational level of structure that actually needs to be built—hence its title. Syntactic structure so understood can depart quite radically from the standard notions of surface constituency, offering in return a simpler and more explanatory linguistic theory of these phenomena.

The work covers topics in formal linguistics, intonational phonology, computational linguistics, and experimental psycholinguistics, many of which have been presented previously in different frameworks and addressed to diverse specialized audiences. In every case the early results have been extended and reworked here for the present purpose, which is to present them as a whole in a form accessible to the general reader starting from any one of those fields.

This research has had the goal defined in Chomsky's earliest work, of formalizing an explanatory theory of linguistic form. Such a theory must do more than just capture the grammars of various languages, via a finite generative specification of all and only the sentence-meaning pairs that each allows. It must also explain why all such grammars appear to be drawn from a curiously restricted set subject to universal constraints.

The origin and even the precise nature of grammatical universals remains in

many cases obscure. Potential sources are: the conceptual base (which means for example that it is hard for languages to do without verbs); the semantics (which means that it is hard for them to do without relative clauses); learnability by young children (which means that languages tend to have consistent head-complement linear order across related categories); and finally the inherent expressive power of the natural computational system itself, as reflected in the formal system of representation.

The influence of the last of these factors is much harder to illustrate with known universals of the kind that linguists usually find of interest. But since the expressive power of natural grammars (as distinct from the devices that process them) must be at least that of context-free grammars and the associated push-down automata, it is interesting to identify those phenomena that seem to require greater expressive power, and to ask how much greater power is needed to capture them. In this book, particular attention is paid to coordination, and to its interaction with other constructions, in a number of languages. In its explicit adherence to a formalization of low expressive power, the theory of Combinatory Categorical Grammar (CCG) that is presented here is most closely related to Generalized Phrase Structure Grammar (GPSG, Gazdar 1981), and to what Joshi, Vijay-Shanker and Weir (1991) have called “mildly” context-sensitive formalisms of Head Grammar (HG, Pollard 1984) and Tree-adjoining Grammar (TAG, Joshi, Levy and Takahashi 1975).

Because the emphasis has been on explanation and generalization across languages and constructions, CCG has like other explanatory frameworks been a prey to overgeneralization in the analyses that have been offered for particular constructions in particular languages. It is harder for the working descriptive linguist to control CCG than some other formalisms, because the emphasis in combinatory rules for combining types is towards generality. I have always been less worried by this tendency than my critics, because the overgeneralizations have usually seemed to be in the direction of phenomena that are attested in other languages, and hence which are allowed under universal principles. However, this attitude has understandably provoked a certain amount of irritation among my colleagues. In returning in the middle part of the book to purely linguistic concerns with the grammar of Dutch and English word order and coordination, I have tried to respond to their criticisms, and to bring the analysis under the same level of control as more orthodox grammars.

I have no doubt that both undergeneralizations and overgeneralizations remain. “All grammars leak,” as Sapir (1921) says in a slightly different context, and this one is surely no exception. The test of a good theory of grammar is

whether the specific places at which it leaks suggest ways forward to better theories. I hope that much at least will hold good.

At a number of points, the theory presented here offers dynamic and computational solutions, rather than the purely declarative ones that are more standard. (Examples are the analysis of scope ambiguity of natural language quantifiers in chapter 4, and the presuppositional analysis of theme and rheme in chapter 5.) This approach is common among computer scientists, because the objects that they formalize are inherently dynamic, and need to be thought of at the most basic level in those terms. The present claim is that human language users have the same characteristic.

Nevertheless, dynamic accounts always are declarativizable (for example using Dynamic Logic, (Harel 1984) or Temporal Logic (Gabbay, Hodkinson and Reynolds 1994)). The dynamic aspects of the present proposals should not be taken as standing in opposition to declarative approaches to the theory of grammar, much less as calling into question the theoretical autonomy of grammar itself.

The work that is described here owes more than the standard form of acknowledgment can properly express to early collaborations with Tony Ades and Anna Szabolcsi. More recently Polly Jacobson and Mark Hepple, among many others listed below, have been very important influences. Polly, Bob Carpenter, and Mark Johnson read the manuscript for the MIT Press. They, Jason Baldridge and Gann Bierner gave extensive comments, keeping me from numerous errors. While this is not my first book, it is the one that I began first. This preface therefore seems a good place to record my debt to those who taught me the various cognitive sciences that I have tried to apply here: Stuart Sutherland, Rod Burstall, Christopher Longuet-Higgins, Stephen Isard, Jimmy Thorne, John Lyons, Keith Brown, Gillian Brown, and Phil Johnson-Laird.

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Chapter 1

Introduction

... to investigate speech as a natural phenomenon, much as a physiologist may study the beating of the heart, or an entomologist the tropisms of an insect, or an ornithologist the nesting habits of a bird.

George Kingsley Zipf, *The Psychobiology of Language*

This book argues that the Surface Syntax of natural language acts as a completely transparent interface between the spoken form of the language, including prosodic structure and intonational phrasing, and a compositional semantics. The latter subsumes quantified predicate-argument structure, or Logical Form, and discourse Information Structure.

That is to say that although surface forms of expression in all languages notoriously disorder elements that belong together at the level of meaning, and although information-structural distinctions like theme and rheme appear somewhat independent of traditional predicate-argument structure, there is a theory of grammatical operations that allows a unified semantic representation to be built directly from surface forms, without the intervention of any intermediate level of representation whatsoever. According to this theory, syntax subsumes Intonation Structure and semantics subsumes Information Structure, the two standing in what Bach (1976) has called a “rule-to-rule” relation. This means that each syntactic rule is paired with a rule of semantic interpretation, such rules being entirely compositional—that is, defined as a function of the interpretation of the constituents to which it applies. This position is closely related to the by now widely accepted requirement for “monotonicity” among modules of grammar—that is, the requirement that no component of grammar should have to modify a structure resulting from an earlier stage.

This is not a particularly startling claim, since some such direct relation between sound and meaning might be expected on evolutionary grounds, or from any other standpoint for which considerations of parsimony and economy are paramount. A similar assumption lies behind programs as apparently different as those of Montague (1970) and Chomsky (1995). However, the nature of the phenomena manifested by the languages of the world has made it extraordinarily difficult to deliver such theories, and in practice most theories of