Introduction

Background

There have been a number of attempts in the modern era to argue that the primitives of syntactic theory should be relations (or dependencies) between words rather than constituents. Frameworks as diverse as Relational Grammar (Perlmutter 1983, Perlmutter and Rosen 1984) and its descendant Arc-Pair Grammar (Postal 1980), Dependency Grammar (Tesnière 1959, Hays 1964, Gaifman 1965, Robinson 1970, Abney 1995, Debusmann 2000, Covington 2001), Word Grammar (Hudson 1990), and Form Dependency (Manzini 1995, Manzini and Savoia 2011) have tried in various different ways to implement such a program.[1] By and large, however, these attempts have not been persuasive to mainstream generative syntacticians. I believe that there are at least five main reasons for this. The first is simply that quite a mass of important empirical and theoretical insights has built up over the last five decades within mainstream generative grammar, up to and including Minimalism. Existing relation-based theories thus tend to suffer in both empirical coverage and theoretical depth in comparison with mainstream theories based on constituent structure. The second reason is that relation-based theories have not generally come to terms with the problem of predicting the linear ordering of words at the phonetic level on the basis of syntactic representations. Instead, they have assumed linear order as a primitive of the theory (as was also the case in classical Phrase Structure Grammars), made do with *ad hoc* generalizations, or simply ignored the problem. The third reason is that proponents of relation-based theories have been primarily concerned with representation, leaving it unclear how relational structures are to be derived. Fourth, existing relational theories have not attempted to incorporate the most fundamental insight of X-bar theory

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[1] See also Brody (1994) for an approach that includes both constituents and dependencies.

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and Minimalism, namely, that syntactic structure is derived in bottom-up fashion from the most basic lexical units of language. Finally, the important idea that syntax must contain so-called functional heads as well as lexical heads, which plays a crucial role in most current work in syntax, does not figure prominently in the various versions of Dependency Grammar with which I am familiar.

Despite these problems, I believe that the time is ripe to consider seriously the idea that an optimal theory of syntax must in fact be based on relations between words rather than on constituent structure. One way of going about this is to utilize the logic of the Minimalist Program, which insists that it is necessary to examine critically the primitive concepts and operations of syntax, in order to eliminate anything that cannot be shown to be absolutely essential. Chomsky (2000) suggests that the irreducible minimum required by any theory of syntax are two interface levels, SEM and PHON, whose representations are "legible" to (can be "read" by) the conceptual-intentional (CI) systems and the sensorimotor (SM) systems, respectively. In addition there must be a lexicon LEX, consisting of a finite set of words or lexical items (LIs), from which an infinite set of sentences can be constructed. The fundamental minimalist question is: What else is needed?

Chomsky himself has already gone quite far in the direction of simplifying syntax, eliminating X-bar theory as well as unnecessary levels such as D-structure and S-structure entirely, leaving just the primitive operations of Merge, Move (partially reducible to Merge), and Agree. However, the resulting theory, though considerably simpler, is still firmly based on the notion of constituent structure. The Merge operation produces a new syntactic object which is simply a set consisting of just the two objects that are the input to Merge. The syntactic object produced in this way can in turn be part of the input to another application of Merge. The syntactic object produced by each application of Merge is thus carried along throughout the derivation, building up a full constituent structure for each sentence. The question is whether even a system this pared-down is still too rich. I believe that it is and that a still simpler theory in which the primitive objects are not constituents but relations (or dependencies) between words will suffice. If so, then the notions of constituent structure and movement can be eliminated entirely from syntactic theory and replaced with a set of asymmetric relations between words. Going a step further, I would argue that not only is a relational theory of syntax *possible* but that it comes very close to being the optimal solution to the problem of relating the representations of SEM and PHON, given the most basic legibility conditions imposed on those levels by CI and SM, respectively, and assuming that the only place that

semantic, syntactic and phonetic information is stored is in a finite set of lexical items (LIs) contained in the lexicon (LEX) of each language.

Overview

The goal of this book is to achieve a radical simplification of syntactic theory by eliminating the notions of constituent structure and movement from narrow syntax, replacing them with asymmetrical dependency relations between words. In its final form, the theory proposed here generates such relations by means of a simple binary operation *Form Relation* (FR), which takes as input a pair of lexical items α and β and produces an ordered pair $<\alpha,\beta>$, where β satisfies a selection condition required by α. FR applies in strictly bottom-up fashion. Crucially, relational derivations are bottom-up not only in the obvious sense that each application of FR adds a new relation, but also in the sense that the item containing the selection condition (the head) is always lower than the selected item (the dependent). An important consequence of this approach is that the notion of an "extended projection" in the sense of Grimshaw (1990) is built directly into the structure of the theory without having to be stipulated.

Given a theory of this form, it can be shown that the appearance of constituent structure and movement simply arise from the incremental application of Spell-out, together with the most basic legibility requirements of phonetic representation. Minimally, these are (i) the phonetic representations of lexical items must be linearly ordered, and (ii) the phonetic representation of every head must be legible to SM. The illusion of constituent structure arises directly from requirement (i) together with the incremental nature of the Spell-out algorithm, which ensures that once a string is formed at PHON it cannot be disrupted by any later application FR. The illusion of head movement arises from (ii), via a general condition that permits a dependent containing an illegible symbol to be replaced by the phonetic form of its head. The illusion of constituent movement is more complex, arising from the fact that certain heads may have an athematic argument selection feature, combined with the legibility requirements of both PHON and SEM. In such a case, the linear ordering requirement of PHON, together with a requirement of SEM similar to the θ-Criterion, jointly require that the phonetic form of a previously selected head be displaced leftward. Finally, it turns out that Spell-out, given these assumptions, can be stated in the following maximally simple and general form without having to assume that order is a primitive of the theory as in Kayne

(2010): given a relation <α,β>, the phonetic form of β must precede the phonetic form of α, i.e. dependents precede heads.

In the theory proposed here there are just three basic types of selection: (i) lexical projection, (ii) argument selection, and (iii) modification. Each is strictly and exhaustively definable in terms of inherent formal properties of heads. Furthermore, it turns out that the possible orders in which these three relation-types may be formed is automatically determined by FR together with a universal constraint, termed *Immediate Gratification* (IG), which requires that selection requirements of heads be satisfied immediately. This principle, which is independently needed in order to ensure that derivations operate in strict bottom to top fashion, also solves a fundamental problem that has plagued constituent-based grammars, namely, the fact that there is no way to determine, except by arbitrary stipulation, the order in which two selection requirements associated with the same head are to be satisfied.

A theory of this form leads naturally to a novel approach to adverbial and adjectival modification, based on the idea that it is the modifier that has a selection feature and the modified that is selected. Modifiers can then be precisely defined as a third type of head that has selectors of its own but which, in contrast to both arguments and lexical projections, is not itself selected as an argument by any other head. Hence the modification relation falls out in an entirely natural way from the structure of the relational theory.

Another fundamental problem that a relation-based theory is able to shed light on is how to account for the range of word order variation found in human language. It turns out that a very small set of simple word order parameters—some very general in application, others highly specific—are sufficient to account for the observed range of cross-linguistic variation, while maintaining, with varying degrees of transparency, the universal order of projection of syntactic heads.

Another welcome consequence of a relational approach to syntax is that the range of morphosyntactic phenomena found in natural language, such as Case (both inherent and structural), agreement, and applicative morphology, can be explained as simple reflexes in PHON of the restricted range of possible relations between heads and dependents permitted by the theory, without having to introduce a new primitive relation analogous to the Agree operation assumed in current minimalist theories. This makes it possible, I argue, to eliminate the minimalist assumption that derivations are driven by the need to value and delete uninterpretable morphological features, replacing it with the more natural assumption that Case and agreement features are simply a means of making syntactic relations visible at PHON. Ultimately, then, what drives

relational derivations is simply and solely the need to satisfy the legibility requirements of both PHON and SEM.[2]

Similarly, the theory can accommodate the fundamental morphological and syntactic properties of A′-constructions without the addition of any new primitives, as well as providing a relational account of superiority, island effects, weak versus strong islands, factive versus non-factive complements, and multiple *wh*-movement. One particularly interesting result is that the well-known language-particular fact of English that lexical verbs fail to raise to T can be described in relational terms without having to assume either lowering operations or LF-movement. Likewise *wh*-movement can be interpreted in relational terms as a special case of selection that arises when an LI has one of a number of different operator features such as [wh].

Still another area illuminated by the relational approach is ellipsis. A novel approach to the phenomenon is proposed, based on the idea that identity of heads is the fundamental requirement for ellipsis, and it is shown that this approach solves a number of outstanding problems in the literature, while at the same time pointing the way toward a unified theory of ellipsis.

In the course of developing the approach to syntax proposed in this book, a number of important ideas in the minimalist literature are examined and reformulated in relational terms. It turns out, for example, that the notion of a "defective" category (such as TP), which has no real theoretical status apart from pure stipulation in theories based on constituent structure, is perfectly natural and expected in the relational theory. Likewise, the notion of a *v*-phase coincides with the "minimal category" (cf. Chapter 2, §2.1) needed to form a *v*-projection, while CP and DP phases can be identified as maximal *v*- and *n*-projections, respectively. Similarly, the fact that a head may "escape" from a phase under certain conditions is a consequence of the independently needed assumption *v*-phases are recursive.

In short, I hope to show that a relation-based theory of syntax developed along the lines proposed in this volume has both theoretical and empirical advantages over mainstream theories based on constituent structure, and, more importantly, that it suggests novel and fruitful lines of inquiry in a number of areas where the latter have been less than fully successful.

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[2] See Manzini (1995: 329), for a similar idea embodied in the "Principle of Interpretation" that she formulates as follows: "All and only dependencies are interpreted."