

Minimal Phrase Structure Theory

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The two basic **concepts** of the theory of syntax are *category* and *structure*.¹ A particular syntactic theory consists largely of elaboration (and defense) of specific **conceptions** of these concepts by means of (1) a theory of category (2) a theory of structure, and (3) a theory of the relation between (1) and (2). This chapter develops my versions of (1), (2), & (3). Most of the novelty inheres to (2), as seen in Sections 1 and 2. With respect to (1), I largely adopt the position defended in Speas (1990). It then develops that these theories mutually support one another in such a way that an approach to (3) virtually falls out. My primary finding, then, is that these independently justified theories of category and of structure find further justification in their interaction.²

A further finding is an explanation for a hitherto unremarked on theoretical problem: why are *dominance*-mediated predicates and relations not parameterized. That is, why is it not suggested that grammars differ with respect to, say, the hierarchical position of complements or of specifiers?³ The theoretical problem becomes clearer when we contrast this situation with *precedence*-mediated relations and predicates. Grammars do differ, it is often claimed, with respect to linear position of, say, heads and complements, heads and specifiers, or governors and governees. We can, then, sharpen the original problem: why should there be this asymmetry with respect to parameterization of relations and predicates mediated by dominance and precedence, respectively? Essentially as a by-product, our theory solves this problem.

It is worth pointing out that our theory of structure is *formal* and our theory of category is *substantive*, in senses that will become clear below. A recurrent theme of this book is that formal and substantive issues can and should be separated from one another, given

independent theoretical elaboration, and that once this is done, convergences between the two may be discoverable. Finding such convergence supports the independent theoretical inquiries; correspondingly, lack of such convergence should lead us to question one or the other theory.

I turn now to a preview of the chapter.

0.1

Sections 1 and 2 deal with (the theory of) the conception of structure by way of an investigation of formalization of phrase markers (hereafter, PMs) and trees. In Section 1, some conventional ideas are canvassed; in Section 2, some alternatives are discussed and my own position is presented. The point of the investigation is to argue that PMs have only one basic formal relation, viz., *dominance*, not two—*dominance* and *precedence*. The argument hinges on a problem within those formalizations which both (1) take account of the empirical possibility of “discontinuous constituents” and (2) assume and include a (putatively) basic precedence relation. The problem is that such formalizations can use precedence only insofar as they (1) incorporate elements not founded in their conceptions of the basic syntactic concepts of category and structure for basic precedence relations and (2) mediate other precedence relations by means of the dominance relation.⁴ This is in contrast to the dominance relation, which is internally well-founded, and this contrast supports our conclusion that precedence is not formally primitive.

Note that the claims to be advanced are neither that there are no precedence relations nor that no syntactic phenomena can be sensitive to precedence facts. Rather, the claim is that there is—and will be—no general theory based on a primitive, formal precedence relation in syntax in the sense that X-Bar theory is a general theory in syntax based on the primitive, formal relation of dominance. And this is because there is no primitive, formal relation of precedence for syntax.

Section 3 turns to the substantive area: the theory of category and Speas’s (1990) approach to X-Bar theory. Speas has “reduced the content” of X-Bar theory, following and completing the research program initiated by Stowell (1981). Familiar notions from earlier X-Bar theory such as “bar-level,” “rule-schemata,” or “cross-categorical harmony” play no role in the current view. There is now but “one rule [or principle—RC] of the base” (Speas 1990: 43).

The Stowellian program of “X-Bar reduction” has not been

without detractors, notably Pullum (1985) and Kornai & Pullum (1990). To clear the decks for what follows, in Section 3.3 I discuss Kornai & Pullum's objections. I argue that their positive findings are in many cases the same as Speas's and that one of their apparently most telling objections is based on a misunderstanding. Therefore, we need not (yet) give up our "reduced X-Bar" theory.

Section 4 summarizes the argument and shows how the theory explains the asymmetry with respect to parameterization of dominance-versus precedence-mediated relations and predicates.

The theory I develop consists of a reduced formal conception of PMs and a reduced substantive conception of X-Bar relations which, I show, dovetail with each other. Indeed, a major point of this book is that, if you work with what I propose, you can get rather a lot out of some apparently meager resources.⁵ We move now to PM formalization.

1.0

There is a standard view of the formal nature of PMs. On this view, PMs are trees, in a sense that is close, though not identical, to the conception of tree employed in graph theory. A standard linguistic axiomatization for trees is given by Partee, ter Meulen, & Wall (1990: 443–44).

- (1) Definition 16.6 A (*constituent structure*) *tree* is a mathematical configuration $\langle N, Q, D, P, L \rangle$, where

N is a finite set, the set of *nodes*

Q is a finite set, the set of *labels*

D is a weak partial order [i.e., it is transitive, reflexive, and antisymmetric—RC] in $N \times N$, the *dominance* relation

P is a strict partial order [i.e., it is transitive, irreflexive, and asymmetric—RC] in $N \times N$, the *precedence* relation

L is a function from N into Q , the *labeling function*

and such that the following conditions hold

- (2) $(\exists x \in N) (\forall y \in N) \langle x, y \rangle \in D$ (*Single Root Condition*)
- (3) $(\forall x, y \in N) ((\langle x, y \rangle \in P \vee \langle y, x \rangle \in P) \leftrightarrow (\langle x, y \rangle \notin D \& \langle y, x \rangle \notin D))$ (*Exclusivity Condition*)
- (4) $(\forall w, x, y, z \in N) ((\langle w, x \rangle \in P \& \langle w, y \rangle \in D \& \langle x, z \rangle \in D) \rightarrow \langle y, z \rangle \in P)$ (*Nontangling Condition*)

A number of assumptions—empirical assumptions—are embodied in these formal statements. First, there are two primitive relations that are, formally, on a par: dominance and precedence. Second, no node can bear more than one label; this is incorporated into the specification of the relation between the sets N and Q as a **function from N to Q** . Third, any two nodes are related either by dominance or by precedence, but not by both (Exclusivity). Finally, ancestor and descendant nodes maintain constant precedence relations; that is, if two nodes in a precedence relation each have descendants, then those descendants are also in a precedence relation, and the descendant of the preceding ancestor is the preceding descendant (Nontangling).

I will argue against and reject each of these assumptions in Sections 2.2–2.4.

1.1

Although (1) defines a tree as a (complex) 5-tuple, it can be useful to think of a PM—as Ojeda (1987) does—as a set of ordered pairs, where the members of the pairs are themselves pairs of a node and a label. In Chapter 3's analysis of the syntax of coordinate structures, we shall return to this idea, making it more precise. More generally, the idea can be helpful because it reminds us that the usual ways of representing trees, with *tree diagrams* or labelled bracketings, are just that, ways of representing. We turn to an example, adapted from Ojeda (1987: 258); we use a label alone to stand for a node-label pair.

- (5) a. $[_{VP} [_{V[PRT]} [_{V} \text{look}] [_{PRT} \text{up}]]] [_{NP} \text{something}]]$
 b. $D = \{(VP, VP), (V[PRT], V[PRT]), (V, V), (PRT, PRT), (NP, NP), (V[PRT], V), (V[PRT], PRT), (VP, NP), (VP, V[PRT]), (VP, V), (VP, PRT)\}$
 c. $P = \{(V[PRT], NP), (V, PRT), (V, NP), (PRT, NP)\}$

In (5), $V[PRT]$ is a nonce label for the verb and particle, similarly, PRT for the particle; D is the set of dominance pairs, and P is

the set of precedence pairs. The union of these two can be understood as a representation of the (constituent structure) tree for the phrase *look up something*. This union totally orders the labelled nodes, since as well as being transitive, reflexive, and antisymmetric, this set is also connected.

1.2

It may be noted that in (5b) and (5c) the lexical items do not appear. This is counter to the standard / traditional approach to trees, in which lexical items (referred to as *terminal elements*) are included as distinct syntactic nodes. This traditional view is incorrect, although, historically, it is understandable.⁶ Within the pre-Chomsky (1965) theory—that found in Chomsky (1957)—lexical items were introduced by means of phrase structure rules, just as the (rest of the) constituent structure tree was also licensed by phrase structure rules. Given this formal similarity, it was natural (though, perhaps, not inevitable) that it would be presumed that there is also a substantive similarity. That is, the presumption was encouraged, and encoded in the representation, that the relation between two labelled nodes in a dominance pair is the same relation as that between a lexical item and a node labelled with a lexical category name. But the former is the part-whole relation of constituency, whereas the latter is not; it is rather an exemplification relation that, following Richardson (1982), we can call **instantiation** (analyzed and formalized in Chametzky 1987a: 51f.).

Post Chomsky (1965) and the introduction of a separate lexicon and lexical insertion, there is no reason at all to continue conflating these distinct relations. Some recognition of this can be found in the literature (e.g., Higginbotham 1985, McCawley 1988). Indeed, this conflation should be theoretically and formally costly. This is because it no longer follows simply from the interpretation of phrase structure rules that both labelled node–labelled node relations and lexical item–labelled node relations are immediately accounted for. Because lexical items no longer are introduced by phrase structure rules, one would have to stipulate that the result of lexical insertion is identical to the result of (the interpretation of) phrase structure rules. This should be kept in mind should it seem that instantiation carries extra costs. In any event, lexical items do not constitute syntactic nodes distinct from those they instantiate. This will be of some significance to the argument against precedence in Section 2. This concludes the exposition of the standard formalization.