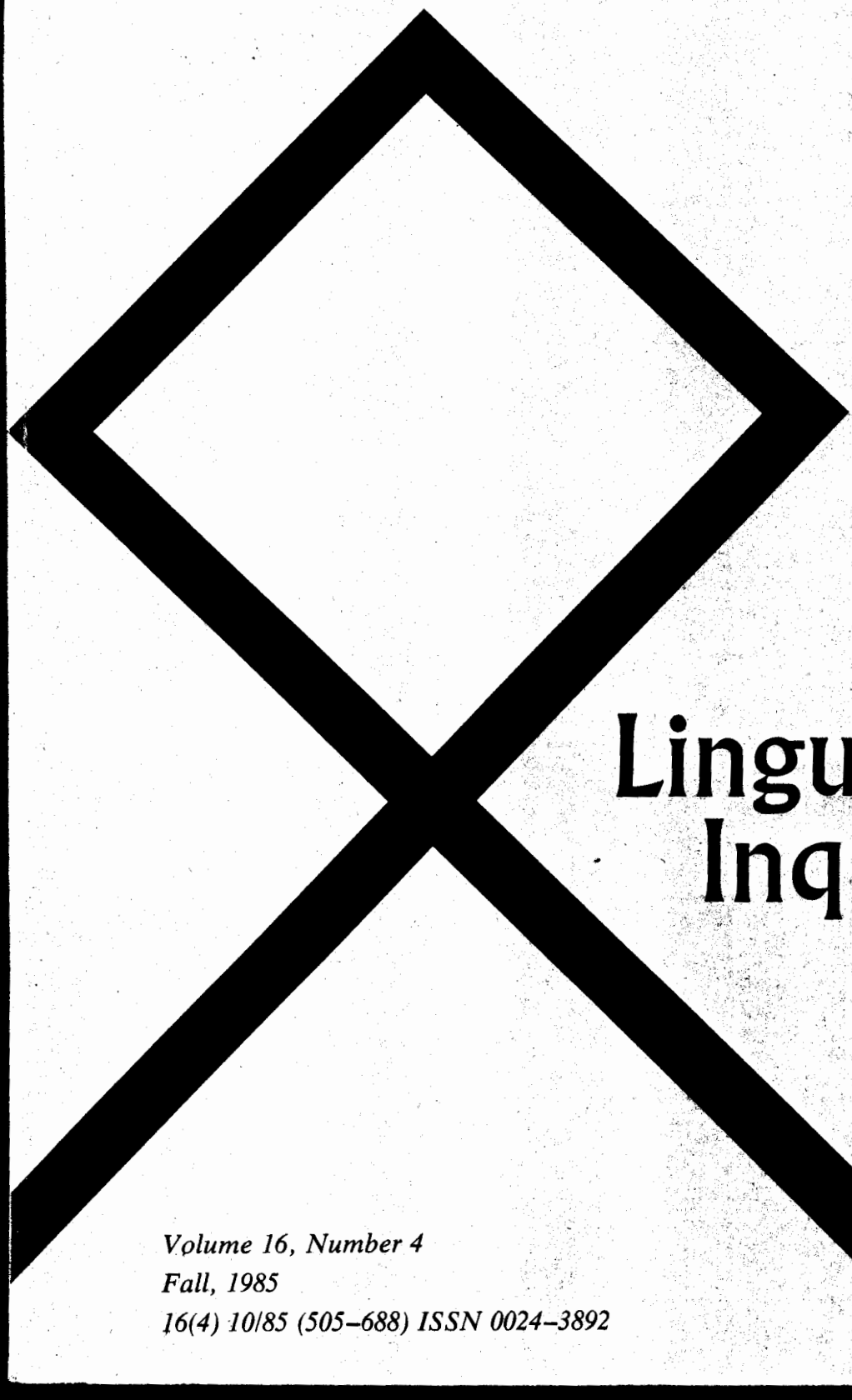

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On Semantics

In this article I will formulate and partly develop one conception of semantic inquiry in generative linguistics. In conjunction with specific applications, I will address questions about domains of investigation, the data in those domains that ought to be accounted for, and their characteristic forms of explanation. Much of the semantic discussion will require syntactic assumptions that are not defended here. However, I believe that these assumptions are not the only ones out of which the general point of view would emerge.

1. Data and Explanations

If it is an aim of linguistic theory to characterize those systems of human linguistic knowledge that result from native endowment and the ambient environment, then semantic theory, as a chapter of linguistics, will be concerned with those aspects of meaning that emerge in the course of normal maturation of the faculty for language. These aspects will be independent of context; that is, they will be determined by the design features of human language, and not by the way language is put to use. Perhaps nothing at all that people say has its meaning wholly independently of context. It does not follow that semantic theory has little to say, or that it is in any way intrinsically incomplete. On the contrary, it is only through the context-independent features of meaning that we know what aspects of a context to take as relevant in the first place to the interpretation of the utterances around us.

Theoretical questions arise in linguistics whenever we find a realm where we know far more than we are taught. By this standard, as Hornstein (1984) emphasizes, the semantics of complex expressions raises questions of the same type as those that occur in phonology and in syntax. Very likely the same considerations apply also to lexical semantics, in the sense that the appearance of a word in a restricted number of settings suffices to determine its position in the language as a whole. My first concern here will be to make some of these questions of semantics explicit.

In much the same way as the data for syntax include observations about sentencehood and those of morphology include the pronunciation and significantly recurring features of complex words, the data for semantics certainly include observations about

The initial impetus for writing down some of the material presented here was an invitation to speak at the University of Massachusetts Conference on Parameters and Language Acquisition. I am grateful to the organizers for inviting me. Besides the specific acknowledgments noted, I should like to express my thanks to the anonymous reviewers, to the students in my spring 1984 classes, to the audience at the Princeton Cognitive Studies Colloquium, and to Noam Chomsky, Howard Lasnik, Daniel Osherson, Scott Weinstein, and Edwin Williams, for their friendly attention no less than for their criticism.

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the meanings of sentences. These are obvious facts about what things mean, known to native speakers, that an adequate semantic theory must have among its consequences. As Donald Davidson especially has emphasized, the *disquotational* truths—that is, statements like (1)—are already a rich source of material (Davidson (1967; 1984)):

(1) *John saw Mary* means that John saw Mary.

They set a fundamental semantic problem, namely that of showing how a string of words under a grammatical description constitutes a sentence with a definite meaning. Of course, Davidson ultimately believes that statements like (1) are best replaced for theoretical purposes by what we might call *directives* for theory construction, and specifically for the construction of a theory of truth. The directive corresponding to (1) would be (2):

(2) Make your theory such that it is provable that:
John saw Mary is true if and only if John saw Mary.

I will follow Davidson in this view. However, I will freely use simple statements like (1) in discussion. Application of the theory to (1) itself, and particularly to the question of the semantic status of the *that*-clause, might proceed as in Higginbotham (1984a).

Directives like (2) are assumed for expressions of other categories than that of declarative sentences, with the notions appropriate for those categories used in place of that of truth. It will be part of semantic theory, for example, to show both that the expression *Mary's mother* refers to Mary's mother (if it refers to anything) and how the individual words, and their specific mode of combination, bring this about. The theory of the context-independent aspects of truth and reference, flowing from the interpretation of the combinatorial devices of language, forms a significant chapter of semantics. The categories of expressions that have meaning are not limited to the single category of sentences.

In generative syntax, as formulated in Chomsky (1957), one addresses the problem of explicitly defining, for given natural languages L, the notion "sentence of L." The native speaker of L knows what the sentences of L are; the linguist, if successful, reveals something of the nature of the native speaker's knowledge, by constructing a *grammar* of L. Of the first significance in this enterprise is that a datum to the effect that something is *not* a sentence constrains grammar equally with a datum to the effect that something *is* a sentence. Similarly, I think, the data of semantics should be seen in both their positive and their negative aspects: for any given expression, that it *does* mean X, or *can* mean X, and that it *does not* mean Y, or *cannot* mean Y, are facts to be deduced in semantic theory. A standard picture of a language as a syntax and semantics, for example as outlined in Lewis (1975), contains both of these aspects. Sentences or their structural descriptions are paired with meanings, or with ranges of meaning, so that what is excluded from the range of meaning of a sentence comprises those things that it does not mean (Lewis (1975, 3)). However, I think that something is missing from Lewis's picture, which I will endeavor to bring out by example.

Consider the facts in (3):

(3) a. *The men told the women to vote for each other* can mean that the men told each of the women to vote for the other woman.
b. *The men told the women to vote for each other* cannot mean that each of the men told the women to vote for the other man.
c. *The men told the women to vote for each other* cannot mean that each of the men told the women he would vote for the other man.

(3a–c) should all be deduced in semantic theory. Let us consider how these deductions might be carried out.

In the syntactic framework assumed here, roughly following the lines of Chomsky (1981), linguistic objects are represented at the four distinct levels of *D-Structure, S-Structure, Phonetic Form* (PF), and *Logical Form* (LF). Whatever the nature of LF, it is supposed that all grammatically determined information that is relevant to interpretation is to be found there. The levels of S-Structure and LF, where understood elements are explicitly represented, will chiefly occupy us (for the following discussion, we need not distinguish S-Structure from LF). The S-Structure representation of the sentence in question is as shown in (4):

(4) [[the men] told [the women][PRO to vote for [each other]]]

If in this structure we assign antecedence as in (5) (following the method of Higginbotham (1983a)),

(5) [[the men] told [the women][PRO to vote for [each other]]]

then it is up to semantic theory to show that (5) means that the men told each of the women to vote for the other woman. Demonstration of this proposition falls naturally into two parts: first, the account of the structures (6),

(6) NP told NP [(that) S] [1]

and second, the account of the anaphoric relations shown (see below, and Higginbotham (1984a), for a sketch). The datum (3a) will then follow.

How is (3b) to be deduced? Our account proceeds in this way. First, the structure (7) is ungrammatical in English:

(7) [[the men] told [the women][PRO to vote for [each other]]]

The anaphor, a direct object of the lower clause, does not have its antecedent within that clause. But (7) is the structure that would have to be assigned to the sentence, were

[1] The major philosophical questions here, centering around the interpretation of sentential arguments, are not critical for the present discussion.

it to mean that each of the men told the women to vote for the other man. Therefore, (3b) follows.

Semantic theory applies to (7) exactly as it applies to (5). In a language with "long-distance" reciprocals, there would be a *grammatical* structure like (7), expressing precisely the meaning that the English sentence would be able to express if (7) were not ungrammatical. Similarly, in a language for which the understood subject PRO of the embedded clause could be related to the subject NP *the men*, as in (8) (ungrammatical in English),

(8) [[the men] told [the women][PRO to vote for [each other]]]

the word-for-word translation of *The men told the women to vote for each other* could mean that each man told the women he would vote for the other man, which the English sentence cannot; the ungrammaticality of (8) is the basis for (3c).

Here, then, is what I think is missing from Lewis's picture. In that picture, sentences have various ranges of meaning, and some are meaningless, but nonsentences do not have any meanings. However, the last statement is false to natural languages: nonsentences must have definite meanings, as full-blooded as those of ordinary sentences, if the source of their intuitive uninterpretability (or merely partial interpretability) is just the violation of a rule of formal grammar.

In Higginbotham (1984a) I suggested that it was a misperception of the relation between syntax and semantics to suppose that syntax is simply the theory of well-formedness, and semantics, taking the results of syntax as given, the theory of the meanings of well-formed expressions. That expressions that are not well-formed can have definite interpretations was illustrated by the example (9), cited in Davidson:

(9) The child seems sleeping.

This and similar examples already suffice to show that a theory of meaning that limits itself to the well-formed expressions cannot be correct. However, the thesis just advanced about (3) has still stronger implications.

If we enlarge the realm of semantic inquiry beyond the piecemeal discussion of individual languages, to raise the epistemological question of the acquisition of language by human children under normal conditions, then we shall, I believe, be led to construct semantic theory for human language in such a way that a variety of expressions that do not, by ordinary standards, "mean anything" are seen to have fixed interpretations, deducible from general principles that connect form and meaning. The reasons for this are twofold. First, there is the variety of meaning that results in different languages from replacing words one-to-one with their translations; and second, the most fundamental principles of semantics are so remote from the data available to the child (situations of utterance, the behavior of other speakers, etc.) that it is quite plausible to suppose that these principles vary minimally or not at all from language to language, the differences that show up being attributable to local syntactic conditions.

Our discussion of (3c) already illustrates the point. The Italian sentence (10)

(10) Gli uomini dissero alle donne di votare gli uni per gli altri.
the men told (to) the women to vote the one (man) for the other

does indeed mean that each of the men told the women that he would vote for the other man (thanks to Alessandra Giorgi for the example, and for discussion). The reason is that the understood subject PRO in the Italian sentence can be controlled by the matrix subject *gli uomini* (as is clear from other examples). Thus, antecedence is assigned as in (11), where locality conditions are observed:

(11) [[gli uomini] . . . [PRO . . . [gli uni per gli altri]]

English disallows the comparable assignment.

Long-distance reciprocals are not clearly attested in natural languages, to my knowledge.[2] But long-distance reflexives are, as in Icelandic (Thráinsson (1979)). The analogue of (12) in Icelandic is fully grammatical and means that John wishes that Mary would visit him, John:

(12) John wishes Mary would visit himself.

Now, do children learning Icelandic grasp a rule of interpretation that English-speaking children do not? This seems implausible. We can suppose instead that Icelandic children learn about the lexical items of Icelandic exactly what English-speaking children learn about their respective English translations, the sole difference between them being that English-speaking children assume a condition that implies that reflexive forms have local antecedents, and Icelandic children (because translations of (12) and the like occur as part of their linguistic experience) do not. The principles that distinguish English from Icelandic in this regard are then syntactic, not semantic.

Generalizing, it is suggested that data of the form shown in (13) are to be deduced from the properties of LF as shown in (14),

(13) S can mean that p.
(14) There is an LF-representation Σ for S such that Σ means that p.

and that data of the form shown in (15) are to be explained by formal arguments of the structure (16):

(15) S cannot mean that p.
(16) Every derivation assigning an LF-representation Σ to S such that Σ means that p is ungrammatical.

Furthermore, where there is no failure on the part of the vocabulary of S to mean that

[2] I am indebted here to discussion with Kenneth Hale. See also Yang (1982) for a descriptive and theoretical discussion of the comparative syntax of reflexives and reciprocals.

p, there will actually be an ungrammatical derivation with a Σ that means that p. In the cases discussed in this article, Σ itself will be ungrammatical.

The representations Σ may be ungrammatical in some or all grammars. For the explanation to be satisfactory, the basis for the ungrammaticality of the Σ either must be universal, and so supplied by the language learner, or, if particular, must be traceable to the conditions of experience in the languages in question.

The burden for the articulation of semantic theory is thus shifted to LF. Modulo the shift, explanations of data such as (13) in the manner of (14) are of course commonplace in linguistic theory; they are characteristic of the postulation of *structural ambiguities*, which are visible especially when S can mean either p or q, and p and q are conspicuously different (very often, the exact working-out of the semantics may be waived, since it is obvious that it will require no special additions to what must be done already for unambiguous sentences). Part of my point, then, is that structural ambiguities are involved in data of the kind in (15) as well as in data of the kind in (13).

Chomsky (1984) has emphasized that, in his view, the *objects* of linguistic theory are best taken to be the grammatical structures, not their spoken forms, noting that this conception is something of a departure from the expressed point of view in Chomsky (1957), cited earlier. For this reason, to speak of "structurally ambiguous sentences" can be misleading, as though the grammar were merely a device for classifying sentences; it would be better to talk of homonymous syntactic structures. No one supposes that English [pʰēšənts] is a word with two interpretations, one for a trait of behavior and one for persons treated by physicians. If we used the word *sentence* in the way that we customarily use *word*, then we should say of the classic examples, such as *Flying planes can be dangerous*, not that they are single sentences that are ambiguous, but rather that they constitute two sentences that happen to sound alike.

I have spoken of what seems to be an omission from the discussion of Lewis (1975). I am not certain that it affects one philosophical thesis that he formulates there, concerning the conditions under which languages belong to certain human populations. Lewis speaks of sentences as "strings of signs or marks," suggesting that only what is heard belongs to the language (on this view, the silent PRO of (4), for example, would have no place). He also expresses the view that the grammar for a given L is indeterminate, except insofar as it is tested by its consequences for the class of sentence-and-meaning pairs. Since this view directly contradicts the idea that the grammatical structures are the object of theory, it seems that the omission is a matter of principle.

On the conception advanced here, the central statements of semantic theory must have the character of empirical laws. Under the conditions of my experience, the reciprocal sentence in (3) came to have within its range of meaning that the men told each of the women to vote for the other woman; and anyone who had had my experience would be able to mean that by it too. Inversely, if I had had experience comparable to that of the typical Italian child, except with English words instead of their Italian translations, then it would have meant that each of the men told the women he would vote

for the other man, which it cannot now do. The generalizations about meaning that flow from the nature of the faculty for language, maturing under normal conditions, must be capable of supporting counterfactual statements in this way.

The theorems of semantic theory are mediated by the notion of a *grammar*, within which they have a mathematically determinate character. In my grammar G, reciprocal expressions must have local antecedents; and if that were not the case, then I would not have *that* grammar. Still, the inquiry does not lose its empirical status. It is an empirical fact that *my* grammar is G, and if my experience had been different it would not have been G, but something else; likewise, anyone with my experience would have had G. Support for empirical counterfactuals does not lag under this conception; at the same time, grammars are to be considered as formal systems, individuated by their syntax and semantics.[3]

Quine (1972) observed that linguistic theory seemed to take as objects of inquiry, not only the expressions classified as sentences or other parts of speech, but also the grammatical constructs that were posited in the course of effecting the classification. Whether the point of view that Quine discerned is justified will depend, I think, on the outcome of comparative studies and the theory of the acquisition of language, of which the small story I have told about the examples in (3) is a modest instance.

2. Values

Semantic theory proceeds from assumptions both about the nature of syntactic structures and about the nature of semantic values. On the syntactic side, I will suppose that the objects having values are the points or nodes on *phrase markers*, where a phrase marker is a structure of points, each of which bears a syntactic or lexical label, having the usual hierarchical and linear relations between them.[4] Each point p of a phrase marker Q determines a *sub–phrase marker* P of Q, obtained by taking as the elements of P exactly those points in Q that are dominated by p (including p itself). I recognize also linguistic *relations* between points in phrase markers, of which two that are prominent in recent linguistics are *antecedence*, responsible for semantic relations of anaphora, and *predication*. These relations, like the labels of the points themselves, are purely *formal*. Semantic values are of the usual sort: the values of singular terms are things, the values

[3] Grammatical theory, then, can be both about certain abstract things (the grammars) and of empirical, even psychological, significance. Grammars have empirical as well as abstract desriptions; it is the actual and possible connections between the two that belong to grammatical theory in my sense. The inquiry is psychological, at least if developmental psychology is psychology. (See also Higginbotham (1983c).) Of course, one may also worry about the indirectness of a mode of explanation that proceeds through the construct of a grammar, instead of directly from the experience of persons to what they mean by what they say; but this is an independent question.

[4] Higginbotham (1983b), following ideas due originally to McCawley (1968), gives further details. It may be that the theory can be expressed by a narrower conception of the fundamental syntactic objects, as in Lasnik and Kupin (1977). In general, the theory of grammar may distinguish phrase markers only up to certain equivalences, thereby justifying a more restrictive notation than I will use. For one argument to this effect, see Kupin (1978).

of predicative expressions are the various things they denote, and so forth. The primitive predicate v of the theory has five places. It is

meaning $v(x,P,Q,C,f)$ — form of — assign. — context containing

and is read form of the phrase marker

x is a value of the phrase marker P, considered as a sub–phrase marker of the phrase marker Q, in context C, under assignment f.

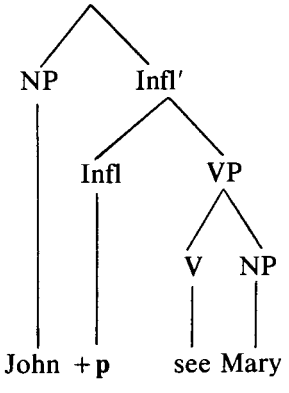
My reasons for the double relativity of values, to phrase markers and to phrase markers that contain them, are illustrated with reference both to extensional examples and to examples of classical referential opacity, in Higginbotham (1984a). *Assignments* are assignments of values to anaphoric elements, as will be seen in section 5. Contexts, or contextual circumstances, are whatever they are, or may be, insofar as they interact systematically with linguistic structure. In this section, whose main purpose is to clarify the framework, I consider only applications for which the relativization of the values of points in P to the parameters Q, C, and f is not needed.

Consider (17):

(17) John saw Mary.

We want to be able to conclude that (17) is well-formed, and that it is true if and only if John saw Mary. The S-Structure phrase marker for (17) is assumed to be (18), where $+p$ denotes the past-tense formative and Infl is the "inflectional" element that expresses the presence or absence of tense in a clausal structure. Infl is taken to be the head of a point labeled Infl′ that immediately dominates Infl and VP:

(18)



The descriptive task of syntactic theory is not confined to showing that (17) is well-formed as inserted within the phrase marker (18); it also includes the task of showing that (18) is unique and that lexical information, together with other grammatical principles, suffices strictly to determine it. Similarly, on the side of the semantics, it must

comprises just a single point, namely

(*see*, +V −N, ⟨1,2,*E*⟩).

The same redundancy of labeling affects all the pairs in (18) consisting of a point with a categorial label immediately dominating a point whose label is a terminal string. For graphic ease, I will continue to give diagrams of phrase markers as in (18); but these are to be interpreted as just indicated. The phrase marker shown in (18) then has seven points (not eleven), of which four are terminal.[5]

Like other predicative expressions, the verb *see*, or more precisely the lexical entry (19), is true of some things and false of others. The *values* of a predicate F, the things x such that $v(x,F)$, are those of which it is true. The values of (19) are at the same time the values of the point p of the phrase marker (18) that bears (19) as its label: they are those ordered triples $\langle a,b,e\rangle$ such that e is an event of a's seeing b. p together with its

[5] Terminal, that is, as far as phrasal syntax is concerned; morphological structure may further proliferate

label is itself a phrase marker. Letting s range over finite sequences of things, the statement (20) gives the values of p:

(20) $\mathbf{v}(s,p) \leftrightarrow (\exists x)(\exists y)(\exists e)(s = \langle x,y,e\rangle \ \&\ \text{see}(x,y,e))$

The thematic roles in positions 1 and 2 of entry (19) are, and must be, assigned to arguments. In VP and S, this happens under the configuration of *government*. For our purposes, the head of a phrase may be taken as governing just its sister constituents.[6]

Consider now the object NP *Mary* of (17). Taking the word *Mary* as a simple NP for the sake of this discussion, its lexical entry would be as in (21):

(21) *Mary*, $-\text{V}\ +\text{N}$

The entry (21) is the label of a sister point q of the point p, and the values of q are given by (22):

(22) $\mathbf{v}(x,q) \leftrightarrow x = \text{Mary}$

The values of the phrase marker P constituting the VP of (18) are given in terms of the values of its parts and their specific mode of organization. Phrase markers are referred to by the labels of their roots, whenever this is possible without ambiguity. With this notation, and understanding that the only values in question are ordered pairs of things, the statement of values for P is (23):

(23) $\mathbf{v}(\langle x,e\rangle, \text{VP}) \leftrightarrow (\exists y)(\mathbf{v}(\langle x,y,e\rangle, \text{V}) \ \&\ \mathbf{v}(y,q))$

Therefore, we have (24):

(24) $\mathbf{v}(\langle x,e\rangle, \text{VP}) \leftrightarrow \text{see}(x,\text{Mary},e)$

The statement (24) is a consequence of general principles, applying to structures VP = V – NP, where NP is a certain argument of V. Similarly, general principles apply to predications S = NP – Infl′. An assertion as in (25) will be the ultimate outcome:

(25) S is true $\leftrightarrow (\exists e)$ see(John,Mary,e)

The assignment of thematic roles in (18) corresponds to the semantic closure of the point S, seen in (25). The position marked by E in (19) ends up bound by an existential quantifier; one way of executing the binding is suggested below. There are several alternatives for tenses, which are tacitly ignored here, since choice among them depends on a far richer array of data than will come under our purview.

The elementary example just discussed should bring out two points about the notion of values used here. First, the semantics is not translational, although, if carried through properly, it will often result in translation. The values of the points in (18) are persons, pairs of persons, events or situations, and truth-values—these are not notations in a

[6] A number of ways of making the notion of government more precise are explored in Chomsky (1981). For a recent discussion, see Saito (1984).

formal system, or representations of any sort. Of course, in assuming that the linguistic level LF is the level for which values are defined, and in particular in assuming that S-Structure does not critically differ from LF for simple cases like (25), one ventures a hypothesis about levels of representation. In some proposals, levels other than LF are targeted for semantic interpretation, either because LF-structures are not final or because a rather different framework was chosen from the beginning. Whatever the choice, semantics in the sense understood here, if it is to explain the data of section 1 and others of a similar nature, will involve a conception of values that is not simply translational.[7]

Second, semantic values are not values-in-a-model for the syntax; so the semantics is not model-theoretic either. It could not be, if what is to be explained are facts involving notions like "___ is true," "___ refers to *a*," "___ means that *p*." These notions do not express relations between syntactic structures and set-theoretic objects *M*.[8] Of course, neither of these points is to be construed as an argument against translational or model-theoretic approaches, or on behalf of a proprietary use of the term *semantics*.

Even if values are not relative to models, they are relative to grammars: the very same phrase marker might mean one thing in one grammar, and something quite different in another. In practice, this situation is certainly realized at the level of words; for instance, there are many speakers of English whose adjective *livid* means the same as *flushed*, and many others for whom it connotes pallor. What affects words affects sentences; thus, these speakers mean different things by *He was livid with rage*. Similarly, speakers of English whose dialects show negative concord will mean by *I never said nothing* that they never said anything, and speakers of other dialects will be constrained to mean that they were always talking.[9]

Taking grammars to contain both syntactic and semantic components, we can give a general picture, in fact a modification of the one suggested by Lewis, of the objects of study. If *S* is a collection of syntactic systems, say a family of sets of phrase markers, we are interested in distinguishing the subcollection S_{human} consisting of those systems *s* in *S* that human beings acquire under normal conditions. Suppose that a *grammar* is

[7] The level of discourse representations in the sense of Kamp (1981), for instance, is a counterpart to LF, since it is with respect to that level that truth and reference are determined, on his view. At another extreme, Barwise and Perry (1983) at least suggest the view that the only level needed is that of expressions themselves (see p. 40 and pp. 133ff.). The approach that individuates linguistic objects as is customary by using structural descriptions (and relations like antecedence) they call "fine-grained," and they propose that there is "no *essential* difference" between this approach and one that recognizes "an added parameter" that "reflects ways of uttering the expression" (p. 135). Since I am not aware of any method for getting at the ways that an expression may be uttered that does not go via the attribution of a grammar to the utterer, I am not sure that more than nomenclature is involved here (perhaps Barwise and Perry would grant this, since they write that "the parameter must in general be a rather abstract feature of the utterance").

[8] See also Davidson (1984, 68). Of course, the semantic notions show various kinds of relativity that reflect the contextuality of natural languages, to speaker, time, or place, and in some accounts to possible worlds (Davidson puts the last in the same category with relativity to models or interpretations, but I do not see that they need to be the same).

[9] Examples apart, the relativization is a matter of principle. The grammars of individual speakers are usually taken as the basic unit in linguistics, and I would follow this practice. However, it does not follow that every aspect of a person's grammar can be determined just through the facts about that person; for reasons given in Burge (1979), the identity of a person's language owes something to its social setting.

a pair (s,r), where s is in S, and r assigns values, or conditions on values, to the phrase markers belonging to s, perhaps along the lines of the predicate v used here. Then, if W is the collection of the (s,r), a successful theory will distinguish the part W_{human} of W that comprises those grammars acquired by people, given appropriate experience. Just as there are syntactic systems s that are not instantiated anywhere, so there are grammars (s,r) with assignments r independently of whether they are, or could be, the grammars of human beings. Concerning these we might wish to say that, had human beings been constructed differently, they would have been the grammars of human beings; and of course some of them, unknown to us, might actually be among the grammars of some other species. In any case, when we say that a name refers to so-and-so, or that a sentence is true under such-and-such conditions, there is a tacit relativization to systems (s,r), whose nature we are trying to discover.[10]

The relation r is a counterpart to Lewis's conception of a language. I allow, however, that the domain of r in (s,r) include syntactic objects that are ungrammatical in the system s.

I have illustrated the projection of values through grammatical trees with respect to one, very simple, example. In the next section I will show others, but of course I omit many applications here. Among these, an account of the *types* of semantic projection is particularly important. Consider the NP *Mary's mother,* with the constituent structure shown in (26):

(26) $[_{NP}[_{NP}$ Mary's$][_{N}$ mother$]]$

Why can (26) not mean that Mary is a mother? The lexical ingredients *Mary* and *mother* are the same in (26) as in the sentence (27):

(27) $[_{S}[_{NP}$ Mary$][_{VP}$ is a mother$]]$

What we ask for in cases like (26) and (27) is the source of the semantic distinction between different combinations of the same words. The specific case of (26) would fall under the condition proposed in Williams (1980), that the relation between N and its "subject" NP (as proposed in Chomsky (1972)) is never that of predicate to subject. Again, the explanation of why (26) cannot mean what (27) means will isolate an ungrammatical structure for (26), namely, the one that assigns predication of *mother* to *Mary*, that would mean what (27) means if it were grammatical.

The general form of the theory given in Montague (1974) incorporated as part of its intrinsic apparatus the idea that to a single syntactic category there corresponded only one semantic category. Thus, Montague's theory would have answered our question by observing that, since NP is plainly a category for *terms,* it cannot also be a category for *formulas* (more precisely, the semantic type of NP is restricted to a single point in the

[10] The relativization to grammars, rather than to persons (or persons at times) is the appropriate one for linguistic theory to make, both because we are interested in the grammars that people could have, as well as those that they do have, and because the speech of individual persons shows mixtures of different grammars, given the heterogeneous nature of ordinary experience.

type-theoretic hierarchy). Williams (1983) strongly argues that Montague's thesis cannot be sustained, and if Higginbotham (1984b) is on the right track, there are other cases where syntactic categories crisscross with semantic ones. For further remarks, see section 6 below. I turn now to an elaboration of the methods proposed here for other fundamental cases of semantic combination.

3. Positions of Arguments

In section 2 I discussed the projection of values in phrase markers for simple sentences, as controlled by the thematic grids of lexical items and phrasal structures. The proposal was illustrated with reference to transitive verbs like *see* in English, which meet their arguments in a manner determined by phrasal hierarchy.[11] In this section I will consider other varieties of structures, and the nature of thematic information and its projection, arguing that a certain generalization of the θ-Criterion of Chomsky (1981) will play a significant role in the semantics of complex constructions. I will also introduce a more restricted form of expression for some semantic properties that have seemed to call for higher types, or functionals, in natural languages.[12]

The θ-Criterion has two parts:

θ-*Criterion*

a. Every argument is assigned one and only one thematic role.
b. Every thematic role is assigned to one and only one argument.

Most simply, the θ-Criterion suggests a strict correlation between predicates, which assign thematic roles, and arguments, which bear them. The assignments are understood as the filling of *places* in the predicates, so that the notion of a role's being associated with a place comes on top of the more familiar idea of the sheer *number* of places, or adicity, of a predicate. The statements (a) and (b) then embody two notions, that predicates of any number of places have to meet up appropriately with their arguments, and that the arguments have to be spread among the available thematic roles.

The θ-Criterion is to hold both at LF and at S-Structure. In many cases the distinction between these levels is not significant, and we confine our attention to these in this section.

Recent work on the syntax and semantics of morphological processes, including Fabb (1984) and Roeper (1983), seems to show that thematic information in a stem is visible to the syntax for various purposes. One of these is *control*, as in Rita Manzini's example (28), cited by Roeper,

(28) The boat was sunk [PRO to collect the insurance]

[11] As Richard Larson and Barbara Partee have pointed out to me, the device of projecting thematic grids is a way of incorporating, at least for these examples, a central point of categorial grammars—namely that, semantically, the expression *see Mary* is an intransitive verb, like *walk*.

[12] A *functional* is a function whose argument is itself a function. Chierchia (1983) argues for restrictions on the type-theoretic hierarchies proposed in Montague (1974) and other work.

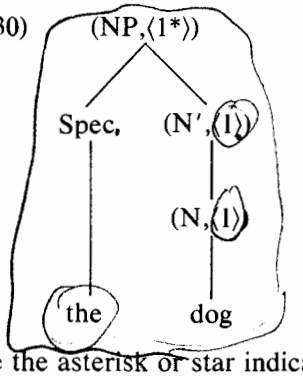
where the subject PRO of the purpose-clause is also the agent alleged to have sunk the boat. The passive form *was sunk*, then, has two thematic positions besides its *E*-position, of which only the one belonging to the derived subject is assigned. The position belonging to the agent is absorbed somehow, but may serve as controller for the subordinate clause. These examples seem to show that part (b) of the θ-Criterion is too simple as it stands.

That thematic roles need not be filled by arguments can be supported also by the properties of nominals that undergo no morphological process. The word *dog*, for instance, a simple noun, has an open place in it (and so denotes each of the various dogs). In many languages, nominals can serve as predicates in main clauses. On these grounds alone, we should expect the word *dog* to have a thematic grid as part of its lexical entry, as in (29):

(29) *dog*, −V +N, ⟨1⟩

But, as noted in section 2, following Williams, head nouns do not take arguments when they form NPs. What happens instead is that the position 1 is accessible to Spec, which acts as a binder of it. There must be some binder, and there cannot be two. We might display the thematic structure of the NP *the dog* as in (30),

(30)



where the asterisk or star indicates that the position open in N′ is not open in NP.

Let the method shown in this example be another way of closing a structure with respect to a θ-role, or as I shall say, *discharging* that θ-role. Then θ-marking is one way of discharging a θ-role; but there is also θ-*binding*, a distinct process. Note that this type of binding must be distinguished from trace-binding. Traces are formatives of the grammar and occupy positions where lexical arguments would go. But a position in a grid is not a formative, being rather part of the entry of the word or phrase whose grid it is. See also Higginbotham (1984b), in connection with certain predicative quantifications in English.

Chomsky (1982) notes that the impossibility of iterating determiners (**every the dog*) may be related to a prohibition against vacuous quantification: in the present terms, one determiner would have to be vacuous, since each is a binder. We can now see this point as an instance of the θ-Criterion, suitably generalized.

Returning now to a point that was left open in the discussion of simple transitive

sentences in section 2, we can conjecture that the position E of the thematic grid of the verb is discharged at the point where VP meets Infl. The interpretation is existential generalization over the E-position, as in Davidson (1966); hence, it is a form of θ-binding. This conjecture is natural on several grounds, one being that it fits very well with the semantics of gerunds, if these in fact lack Infl and, as suggested by Williams (1984), have just the structure [$_{NP}$ NP – (Aux) – VP]. Gerunds are definite descriptions of events or situations, completed by binding into the position E of VP—an open position, since Infl is absent in this case.[13]

The original statement (b) of the θ-Criterion is now replaced by the more general (31):

(31) Every thematic position is discharged.

That a thematic role cannot be assigned to more than one argument becomes a special case of (31). Also, in keeping with the intent of (b), no thematic role can be left dangling. Therefore, for those cases where a role can be discharged only by assigning it to an argument, applications of (b) and (31) will coincide.

Part (a) of the θ-Criterion (Every argument is assigned one and only one thematic role) is also generalizable. One half of it, expressing the *existence* of a role for A if A is an argument, carries over intact, since an argument of X must be assigned a role that is present in the thematic structure of X. The other half, requiring uniqueness, generalizes to (32):

(32) If X discharges a thematic role in Y, then it discharges only one.

There are at least three ways the condition (32) could be violated: by simultaneous θ-marking, by simultaneous binding of two positions, and by θ-marking with respect to one and binding with respect to another. In at least the first two cases, it is arguable on the face of it that something of the sort actually occurs; but investigation of the matter would be too lengthy and inconclusive to be included here.[14]

We can now draw a consequence of some significance from the θ-Criterion as understood here, together with the assumption that θ-marking takes place only under government. Let us say that a constituent such that every role in its associated grid is discharged is *saturated*. Consider a binary structure

[$_X$ A B]

[13] See also the discussions in Davidson (1980).

[14] Dual θ-marking would occur in verbs that were syntactically intransitive but semantically inherently reflexive, candidates being certain verbs of hygiene in English, such as *wash* and *bathe*. See Bouchard (1982) for a discussion of certain inherently reflexive constructions in French. Dual binding might take place in *comparative* constructions, as in (i),

(i) [Fewer cups than saucers] are on the table.

where the complex *fewer. . .than* ends up binding the open positions in both nouns. It is not clear to me whether (32) should be modified in light of these examples.

where A θ-marks B. Then the thematic grid of the head A is projected to X. Suppose that B is unsaturated, so that it contains an unstarred thematic role in this configuration. Then it will be unable to govern a constituent, and therefore unable to discharge that role. This reasoning applies to any argument. So we may assert (33):

(33) Every argument is saturated.

Reserving some possible exceptions, I will note that it is an immediate consequence of (33) that functionals are not to be found in the grammars of languages for which it holds; the arguments of a functional must be unsaturated, and this is just what (33) forbids. Similarly, the "projection rules" of function and argument cannot, on this view, be extended through higher types, as in Montague (1974) or Lewis (1972), among others. I will assume the principle for the duration of this article, mindful that problematic cases, or cases that I have not considered, may force its abandonment.[15]

The notions of θ-marking and θ-binding have their correlatives in standard formalized languages, in the respective forms of structures of functions and arguments, and of quantification. The case is otherwise with *modification,* a unified linguistic phenomenon that does not correspond to any single operation to be found, for example, in quantification theory. Modification of one predicative expression by another can occasionally be taken as expressing *conjunction*: a white wall is a thing that is white (on the outside) and a wall. But this easy treatment is the exception rather than the rule. As everyone knows, a bad violinist is not a thing that is, on the one hand, bad, and, on the other, a violinist. Adjectives like *bad*, the classic *syncategorematic* ones, are the norm.

Nevertheless, I think that we have in the easy routine of conjunction the proper idea of how modification works. The strategy that I will follow can be illustrated with reference to the treatment of certain adverbs suggested in Davidson (1966) (this strategy itself might in turn be motivated by the analogy with adjectives). Davidson was concerned with modifications like the one in (34):

(34) John walked rapidly.

An important question was how to show the obvious truth of conditionals like (35):

(35) If John walked rapidly, then John walked.

The answer that Davidson suggested was to take the adverb *rapidly* as predicated of events, with respect to one or another attribute used for classifying them. Thus, (34) would come out as (36) or, more formally, (37),

(36) There was a walk by John, and it was rapid (for a walk).

(37) $(\exists e)$ walked(John,e) & rapid(e,A)

where A is the attribute indicated by the parenthetical in (36). Since *John walked*, in

[15] Following Rothstein (1983), for whom this principle figures as a premise. The words *saturated* and *unsaturated* are taken from Frege (who admitted functionals).

this formalism, is just (38),

(38) $(\exists e)$ walked(John,e)

the conditional (35) is true, and appropriately obvious. The adverbial modification is interpretable as conjunction when certain unapparent referential places are posited, namely those for e and the attribute A. I propose to apply a similar strategy to adjectival modification.[16]

Adjectives grade things along dimensions that are partly contextually filled in, but also partly controlled by the syntactic environment. When an adjective combines with an N to form a complex N′, as in *tall man, big butterfly,* or *good violinist,* then it is taken as grading with respect to the attribute given in the N. When the adjective is separated syntactically from N, the semantic link is broken also. Thus, in well-known minimal pairs like (39) and (40)

(39) That is a big butterfly.
(40) That butterfly is big.

we judge that (39) is true if the object indicated is big for a butterfly, but that (40) is more open-ended; since even big butterflies are not big creatures, (40) can count as false with respect to an object for which (39) counts as true. Now, interpretations of adjective-noun combinations are not always as constrained as the one in (39): a person who says, "Look at the little butterfly," or, "Here comes a big tank," need not be taken as asserting that the butterfly in question is little even among butterflies, or the tank big even among tanks. Tanks are big things, and butterflies are little things; in these contexts, then, the adjectives might be said to have standard interpretations, and the semantics of the compound to be simple conjunction: the little butterfly is a little thing that is a butterfly, the big tank a big thing that is a tank. Similarly, a rich stockbroker may just be a stockbroker who is a rich person. Since these cases do not raise a distinctive issue of semantic principle, I will not attempt to discriminate them further here.[17]

In strict parallel with Davidson, we can take (39) as shown in (41), and (40) as in (42):

(41) That is a butterfly, and it is big (for a butterfly).
(42) That butterfly is big (for an A).

Let us consider first how to implement this analysis in more detail, only afterward turning to some potential counterexamples.

Pursuing the idea that modification expresses conjunction, consider how thematic grids might be assigned and projected in the N′ of (39), namely (43):

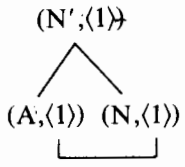
(43) $[_{N'}[_{A}$ big$][_{N}$ butterfly$]]$

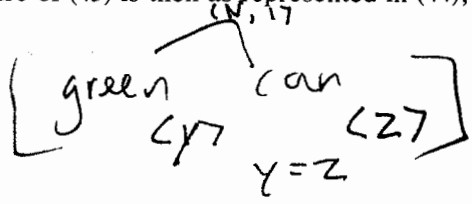
[16] Compare also Wallace (1972). Quine (1984) discusses Davidson's proposal both for itself and as an instance of a more general strategy.

[17] I am indebted here to comments by Saul Kripke.

The word *butterfly* has a single open position, and the adjective must have open positions also, since it occurs as a predicate. The whole N′ has one open position, carried over from the head noun. Therefore, some position in the adjective is *identified* with the nominal position. The thematic structure of (43) is then as represented in (44),

(44)





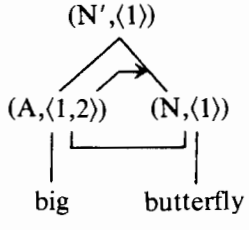
where the connecting line shows identification. On the assumption that the semantics of (44) is given by conjunction, we can compare its structure to that of building up a compound Fx & Gx by conjoining Fx and Gy and then identifying y and x.

To the inventory of θ-marking and θ-binding, we add *θ-identification* as a mode of thematic discharge. If this mode is to satisfy the general conditions of the theory, then θ-identification is constrained to take place under government; and so it does, since the configuration of modification, as in (44), is a configuration of government.

We now extend the proposal to take account of the appearance of attributes in the paraphrases (41) and (42). The attribute is an argument of the adjective, so that the head noun in an ordinary adjective-noun construction serves to discharge two thematic positions, one by identification and the other by θ-marking, by the adjective, of the very noun itself. In the usual case of θ-marking, the reference of the θ-marked expression becomes the value of an open position in the θ-marker; but in the case of modification, I suggest, what is θ-marked, the phrase marker with root N, is itself the value. For this reason, this type of θ-marking will be called *autonymous*.

Consider the thematic structure of (43), and its semantics, under the proposal just sketched. For graphic purposes, I mark with an arrow "→" the discharge of a thematic position through autonymous θ-marking, where the tail of the arrow is at the position of the θ-marker and its head abuts the point marked. (43) is then as shown in (45),

(45)



where what is displayed abbreviates the set of statements (46a–c):

(46) In (43)
- a. the position 1 of N is identified with position 1 of A;
- b. A autonymously θ-marks N, through position 2;
- c. the thematic grid of N is projected to N′.

The following semantics accompanies the syntactic description of (45). For the points A and N we will have (47) and (48), respectively:

(47) $\mathbf{v}(\langle x,y\rangle,\mathrm{A}) \leftrightarrow \mathrm{big}(x,y)$
(48) $\mathbf{v}(x,\mathrm{N}) \leftrightarrow \mathrm{butterfly}(x)$

To go further we must adopt a notation for the attribute expressed in the phrase marker with root N, assuming that this attribute is distinct from the phrase marker itself. Let $\hat{}N$ refer to the attribute. Then, for (43) as a whole, we will have (49):

(49) $\mathbf{v}(x,\mathrm{N}') \leftrightarrow \mathbf{v}(x,\mathrm{N}) \;\&\; \mathbf{v}(\langle x,\hat{}\mathrm{N}\rangle,\mathrm{A})$

The modified constituent is taken up as a conjunction: (49) says that the big butterflies are the things that are butterflies and big for such.

We have now recognized four species of thematic discharge: the nonmodificatory, or *simple*, cases of θ-marking; *autonymous* θ-marking; θ-binding; and θ-identification. All of these are controlled by the configuration of government. In this way, we derive the distinction between (39) and (40), repeated here:

(39) That is a big butterfly.
(40) That butterfly is big.

The attribute chosen in (39) must be that of being a butterfly, since the noun is governed by the adjective; but the choice in (40) is free. I turn now to the application of this apparatus to some widely discussed cases that require a different semantics than the simple examples given so far.

First, consider cases where the adjective cannot be disassociated from the nominal head, as in (50)–(51):

(50) That is an alleged Communist.
(51) *That Communist is alleged.

The fact that alleged Communists need not be Communists already shows that the N′ of (50) is not construed by conjoining the head with the adjective. Apart from this, however, it is obvious that the adjective *alleged* is related to the verb *allege* in a way that should be revealed in the theory of its construction. The verb belongs to a class that includes *know* and *suspect*, in both taking S′ complements and admitting adjectival form. An alleged N is a thing that some agency or other has alleged to be an N; similarly if *known* or *suspected* is substituted for *alleged*. In view of the absorption of agency, we may suppose that position 1 of the thematic grid of *allege* is discharged in the course of affixation (for a hypothesis concerning the mechanism of absorption, see Baker (1983)). Then (suppressing the *E*-position, which is not relevant here) the thematic structure of the adjective is (52):

(52) $[_{\mathrm{A}}[_{\mathrm{V}}\ \text{allege}, \langle 1,2\rangle]\ \text{ed}, \langle 1^*,2\rangle]$

Similarly, the thematic structure of a simple adjective like *batted* would be (53):

(53) $[_A[_V$ bat, $\langle 1,2\rangle]$ ed, $\langle 1^*,2\rangle]$

The semantics is given by existential closure of the bound position: *batted* is true of a thing x such that something y bats x.

When the adjective *batted* combines with a noun, as in *batted ball,* then the method of composition is θ-identification, and the semantics is straightforward: a batted ball is a ball that has been batted. This mode of combination also occurs, with some marginality, with *alleged* and *known*, as in *alleged proposition* (meaning 'proposition alleged by Jones'), *known fact,* and the like. The combination seen in (50), however, is different.

Suppose, again without any claim to generality, that alongside the attributes ^N we also recognize, for each object x, the proposition ^N(x), that the object x is N. The N *Communist*, as it occurs in (50), expresses, for each assignment f to the thematic grid $\langle 1\rangle$ of that word, the proposition that $f(\langle 1\rangle)$ is a Communist. We can then understand the combinations *alleged N* as cases of θ-marking, as in (54):

(54) $\mathbf{v}(x, \mathrm{N}') \leftrightarrow$ alleged (^N(x))

The phrase *alleged Communist* is then, as desired, a predicate true of the things alleged to be Communists. The ungrammaticality of (51) now follows. Since θ-marking takes place only under government, position 2 of *alleged* goes undischarged in (51).

But consider the matter more closely. Both (55) and (56) are well-formed:

(55) Those traits were alleged of Jones.
(56) His Communism was alleged.

So *alleged* can function as an ordinary predicate after all. What is wrong with (51), it turns out, is that it is a category mistake. The word *alleged*, then, behaves like an ordinary adjective, in that it can both θ-mark a nominal head and occur as a predicate.[18]

We have now considered three types of cases of adjectival modification, namely (i) cases of θ-identification, where the combination indicates conjunction, as in *white wall*, (ii) cases in which identification is combined with θ-marking, as in *big butterfly* (here again the semantics involves conjunction), and (iii) cases in which there is θ-marking but no identification, as in *alleged* (or *known*) *Communist*.[19] In concluding this section, let us briefly examine two more types.

[18] Although I do not discuss Siegel's work directly here, I should like to remark that her (1974) paper has been an important source for me on these questions.

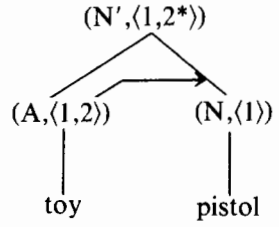
[19] Kamp (1975) calls the adjectives of type (i) *intersective*. He further notes the special properties of the *extensional* adjectives, namely adjectives X for which arguments of the following structure are correct:

(i) That is an $[_{N'}[_A X][_N F]]$;
v is an F iff v is a G; therefore,
That is an $[_{N'}[_A X][_N G]]$

Adjectives of spatial dimension, such as *big,* are presumably extensional. But adjectives of appraisal are not: one could not argue, even if all men were married, that an affectionate man is an affectionate husband (Hide Ishiguro's example). Because of these examples, the attributes indicated by nouns in the examples I attribute

The first is that of the *privative* adjectives, *fake, toy,* and others. A fake or toy pistol not only may, but must, fail to be a pistol. However, it *does* have to be a fake or a toy, and it is this fact that, I believe, gives a clue to the basis of the construction.[20] A thing is assessed as a fake or a toy only relative to an attribute, so that, picking *toy* for an example, we will have a binary thematic grid ⟨1,2⟩ and the projection shown in (57):

(57)



In this case the adjective θ-marks the N itself, as in the case of *alleged Communist*. This N serves simply to indicate the attribute, and the grid that is projected is that of *toy*, not of *pistol*. A toy pistol is a thing that is a toy with respect to the attribute indicated by *pistol*—hence, a toy, in this sense (of course, a thing may also be a toy without being a toy *F*, for any *F*). So the adjective is privative with respect to the head noun, but since, in the semantics, it is as if it were itself the head, this fact does not require changes in the system proposed here.

Structures like (57) are not common and are generally restricted to modifiers that also occur as nouns (e.g. *imitation pistol* but **imitated pistol*). An exception, pointed out to me by David Lewis, is the word *bogus*, an adjective that behaves semantically like the noun *fake*. In projecting the grid of the modifier, we not only violate the usual conditions on projection, but in a way take an unsaturated constituent, namely the N, as an argument; and the open position 1 in its grid is never discharged. A short diagnosis of this situation is that the N in (57) is mentioned, rather than used: it does not, as it occurs in the N′, denote pistols, but only the attribute that it indicates. Hence, the position 1 need not be discharged, any more than it would in a quotation.[21]

Besides the privative adjectives, certain spatio-temporal modifications, as in *former congressman* and *postman where I live*, call for a distinctive semantic treatment. *Former congressman* designates a person whose congressmanhood is former, and *postman where I live* a person whose postal duties are carried out at the place where I live. It is not difficult in these and similar cases to effect the proper paraphrases, and, if we recognized spatial or temporal positions in the thematic grids of the nouns, we could regard the

to θ-marking cannot be reduced to classes. An anonymous reviewer for *Linguistic Inquiry* remarks that, within the attributive category, there is a further distinction between modifications that make reference just to an attribute that a thing has, and those that make reference to the characteristic activity of a thing having that attribute. Roughly, the distinction is between being an A *for* an *F* or *among* the *F*s and being an A *in the capacity of* an *F* or *as* an *F*; for example, between being an affectionate man for a husband and being affectionate as a husband.

[20] I am indebted here to Peter Ludlow.

[21] This type of construction is an example of the need for a relativity of the values of points in phrase markers to the structures they are embedded in, as suggested in Higginbotham (1984a).

whole structure as projected by conjunction of its components; a former congressman, for instance, is an x such that x is a congressman at some time t that is former (before now). An alternative method, due to Larson (1983), would locate the spatio-temporal relativity that these modifications exhibit in the circumstances of utterance of the phrases in question, without building positions into their thematic grids. Whichever method is correct, it seems that no questions of semantic principle arise that would show the need for a fundamental change in the methods adopted here.

This discussion of modification may be compared with the account of Montague (1974), following suggestions due to Hans Kamp. In general, the view was that modifiers, whose syntactic function is to produce complex constituents of the same categorial status as the things they modify, should be interpreted as mapping the interpretation of the modified constituent onto the interpretation of the whole, the latter being an element of the same semantic type as its argument. The variety of interpretive procedures given here then gives way to a uniform semantic rule (see also Lewis (1972)). There is no implication that the objects of which the *modified* noun is true are among those of which the noun is true; for instance, there is no implication that the alleged Communists are Communists. How then does one get the obvious fact that big butterflies are butterflies? The answer was that such facts had to be stated outright, by means of semantic postulates.

I remarked above that the view that I would suggest would exemplify one side of a trade-off between a certain generality, purchased in Montague's and Lewis's account by the admission of higher types and functionals, and the positing of a certain internal structure, with truth-functional modes of composition. A simplification that comes from the view suggested here is the absence of semantic postulates. In Montague's theory, all modifications were alike, and so postulates were needed. On the view suggested here, they are distinguished in that some involve θ-marking and identification, others only θ-marking, with further differentiation in the varieties, as we have seen. Each mode of combination, however, has its characteristic semantics, from which there follow the facts that the semantic postulates were used for.

4. Binding and Obviation

We have seen that attachment of values to points in phrase markers, in ways that are controlled in part by formal relations such as antecedence or predication, enables us to infer semantic facts about these phrase markers and to take anaphoric relations into account in simple cases. In section 1 I considered certain cases where anaphoric relations are not possible (in English), remarking that the data (namely, that these sentences cannot mean certain things in English) rely crucially for their explanation on the application of the semantics to formally ungrammatical structures. I will now apply this form of explanation to the most basic cases of what I will call the *Disjoint Reference Condition*, following Lasnik (1976). The condition applies between the pronoun and the name in

sentences like (58):

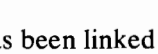
(58) He saw John.

Although there is general agreement about which sentences the Disjoint Reference Condition applies to, there is less than unanimity about what its application determines about their meaning.[22] There are, roughly speaking, two major types of interpretation. The weaker interpretation, represented in Evans (1980), holds that the condition, as applied between two positions *A* and *B*, merely prevents either one from depending on the other for its interpretation; in the case of (58), it prevents *John* from being the antecedent of *he*. The stronger interpretation of Lasnik (1976; 1982) holds that the condition forces *A* and *B* to be "different" in some sense, or in a relation of *obviation*, to use the traditional term. If the positions *A* and *B* are obviative, then neither is dependent on the other; so the stronger interpretation implies the weaker. However, nondependence does not imply obviation. Clarifying the notion of obviation then becomes an important task.

Let us assume that at least (59) must be explained in semantic theory:

(59) *He saw John* cannot mean that John saw himself.

Following the strategy of sections 1 and 2, we should look for a structure Σ, such that Σ means that John saw himself, (58) is the sequence of words given in Σ, and Σ is ungrammatical. This structure is (60):

(60) [[He][saw John]]


Since *he* has been linked to *John*, its value is whatever the value of this antecedent is—that is, John. Therefore:

(61) (60) is true if and only if saw(John,John).

However, (60) is ungrammatical, since the pronominal *he* has its antecedent in its own c-command domain.

One might try putting the facts about (58) in terms of "purported" or "intended" coreference—roughly, as the requirement that a person who says (58) purports or intends that the reference of *he* is not the reference of *John*, or at least does not purport or intend that they are the same. But this thesis is not factually correct in any sense in which its own purport is clear, and even if it were it would not serve as an explanation. It is easy enough to construct cases in which the speaker asserts a sentence S, containing two positions *A* and *B* between which the Disjoint Reference Condition holds, such that the speaker believes, and intends the hearer to believe, that they have the same reference.

[22] See the discussions in Evans (1980), Higginbotham (1980a,b), Engdahl (1981), Lasnik (1982), Reinhart (1983), and Hornstein (1984), among others.

(62), embedded in the argument (63), is a sentence of this kind:

(62) *He* put on *John*'s coat.
(63) He put on John's coat; but only John would do that; so he is John.

(I owe this type of example to Nancy Browman, from her comments on a lecture at New York University, 1979.) In what sense do *he* and *John* not have the same "intended" reference? Moreover, even supposing that the speaker of (62), as embedded in (63), intends thereby that he or she does not purport the reference of *he* and *John* to be the same, it cannot be that the intentional state explains this aspect of the meaning of (62). That would be getting things backwards. It must be because of the meaning of (63) that the hearer will ascribe the intentional state to the speaker. Thus, an account in terms of associated intentions merely restates the problem.

If (62) cannot be uttered with the intention that *he* should be anaphoric to *John*, that is not because of any failure of the speaker's powers of intention, but because the structure that would realize this meaning is ungrammatical. Now, the weak interpretation of the Disjoint Reference Condition, which states that it amounts just to the prohibition of antecedence, satisfies the requirement that the intentions of speakers be explained by linguistic meaning, and also allows the case (63) freely. The datum is (64):

(64) *He put on John's coat* cannot mean that John is a thing x such that x put on x's coat.

This datum follows from the prohibition of antecedence between *he* and *John* and is not violated as (62) is used in (63). Indeed, the whole point of the argument (63) was to demonstrate that the reference of *he* indeed *is* the reference of *John*; it would defeat the purpose of that argument if its first premise meant that John put on his own coat.

We have been examining the weak interpretation of the Disjoint Reference Condition, using the notation suggested in Higginbotham (1983a). This account of binding incorporated a kind of *transitivity condition* (after Jackendoff (1972)), in order to prevent the linking shown in (65):

(65) John said [$_S$ he saw him]

The antecedent *John* of both pronouns in (65) is outside the tensed S containing them; however, the sentence cannot mean that John said that he, John, saw himself. The transitivity condition was to rule out (65) by requiring that if X and Y shared an antecedent, and one c-commanded the other, then one was the antecedent of the other. (65) is then ungrammatical, since the pronouns share the antecedent *John*, but are not themselves linked.

However, some examples seem to show that the transitivity condition should be given up, at least if the advantages of the linking account over coindexing are to be

retained. After enumerating these, I will show how the introduction of conditions on obviation will both account for some data that are recalcitrant for the weak interpretation of the Disjoint Reference Condition and remove the need for a transitivity condition.

Consider (66):

(66) They strike each other as [*t* intelligent]

The reciprocal phrase must be linked to its c-commanding antecedent *they*; the trace *t* must also be linked to *they*. But the reciprocal phrase c-commands the trace, as is shown by (67):

(67) *It strikes *her* that [*Mary* is intelligent]

The same data appear in other "raising" constructions. (67) and the like therefore stand as counterexamples to the transitivity condition.

A major advantage of linking over coindexing is that, in revealing information about antecedents that the indicial notation suppresses, linking also expresses information about interpretation that coindexing says nothing about. The following illustrations are due to Finer (1984a) (see also Montalbetti (1984) for examples from Spanish involving conditions on pronouns as variables). The sentence in (68), where the subject pronoun *they* refers, say, to John and Mary, exhibits a three-way ambiguity:

(68) They told each other they had better leave.

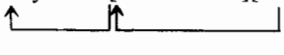
The interpretations are (a) each told the other, "I had better leave," (b) each told the other, "We had better leave," (c) each told the other, "You had better leave." The ambiguity disappears in the control structure (69):

(69) They told each other to leave.

The only interpretation of (69) is (c).

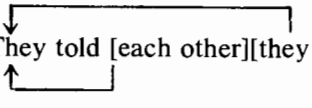
In (69), a case of object control, the only links possible are as shown in (70):

(70) They told [each other][PRO to leave]



This linking is also possible in (68), with *they* for PRO, and leads to the same interpretation. But in (68) the embedded pronominal is not controlled, so that the linking shown in (71) is also available:

(71) They told [each other][they had better leave]



This structure displays an ambiguity that is familiar from examples like (72):

(72) They said [they would leave]

That is, each said something about himself, or something about the two of them. In either case, the value for the embedded pronominal refers back to the value assigned to the subject, not to the reciprocal.[23]

The sketch of an analysis of the distinction between (68) and (69) is very attractive; but it requires abandoning the transitivity condition, since that condition is violated in (71). Further evidence comes from the behavior of the subject-control verb *promise*:

(73) They promised each other [(that) they would succeed]
(74) They promised each other [PRO to succeed]

(74) is unambiguous: each promised the other, "I will succeed." However, with some degree of marginality, (73) can be interpreted as meaning that each promised the other, "You will succeed;" at least, this interpretation seems to be as acceptable as the sentence (75):

(75) Mary promised John that he would succeed.

Suppose we give up the transitivity condition, revising the binding conditions (A)–(C) of Chomsky (1981). In the notation of linking, these conditions may be stated as follows:

(A) An anaphor is locally linked.
(B) A pronominal is not locally linked.
(C) An R-expression is not linked.

Or, in the revised version:

(A*) An anaphor is locally linked (= (A)).
(B*) A pronominal is locally obviative.
(C*) An R-expression is obviative.

The relevant notions of locality are perhaps different for different languages, and perhaps also different in (A*) and (B*) for a given language. That the antecedents of anaphors c-command them we take to be a general principle that need not be stated in the condition (A*). Furthermore, as Lasnik (1982) observes, it appears to be a general condition on the interpretation of anaphors that whatever they are linked to *exhausts* their meaning. This fact, together with the condition that elements are interpreted in one and only one way (the condition (R) of Higginbotham (1983a)), suffices to imply that no anaphor can be linked to more than one element. Like anaphoric linking, obviativity universally applies only with respect to c-commanding potential antecedents; hence, (B*) requires obviativity from each local c-commander, and (C*) obviativity from each c-commander. The condition (C*) covers the case of *incomplete descriptions* (sometimes misleadingly

[23] In Higginbotham (1981) I observed distinctions like that between (68) and (69), within an assumed format of coindexing; choice of values was then stipulated as part of interpretation, instead of proceeding from the syntactic structures. Other examples given in that article will also serve to illustrate the points made here.

confined to those with epithetic status), as in the contrast between (76) and (77):

(76) When *John* came in, *the man* looked tired.
(77) **John* thought *the man* was tired.

Completion of this type of account of binding now requires, above all, two sorts of investigations. First, since binding now makes reference both to antecedence and to obviation, we must consider the principles of their interaction. Second, the semantic nature of obviation must be made manifest, insofar as it applies context-independently.

Let us consider more closely how the semantics for pronouns, PRO, and reciprocals will apply to give the proper results for the cases discussed so far. Suppose that pronominal X is linked to antecedent Y in the phrase marker Σ. Then, for a language that distinguishes only singular and plural, the most basic case is the following:[24]

(78) Include some values of Y among the values of X.

If Y is singular, then it has only one value, and so that thing becomes a value of X—the only value, if X is also singular. If X and Y are both plural, the commonest case seems to be that in which every value of Y is a value of X. Thus, in (79)

(79) John and Mary told Bill and Susan they should leave.

the interpretation where *they* refers to John and Mary is surely more salient than, say, one where it refers to John and Susan. Finally, suppose that Y is plural and X is singular. Then (78) alone will fail to secure a definite interpretation for X. Some individual elements of the value of Y must be salient, however; we cannot have (80):

(80) They [waving at a crowd] think he is a nice fellow[25]

Since (78) is the strongest statement that can be made in general about the transference of values from antecedent to pronominal, the relation of antecedence ceases to be universally transitive. The failure of transitivity, however, is located in a particular place, namely the case of singular pronominals (not anaphors) with plural antecedents. I turn now to some elementary considerations on the interpretation of reciprocals and pronouns.

Suppose that R is a reciprocal expression linked to an antecedent Y, where Y is a *plural term,* like *they,* denoting various objects $a, b, \ldots$, all of them among its values.

[24] I do not consider the "corporate plural" of British English, or other cases where the formal morphology does not match the number of the interpretation.

[25] The restoration of indices, so as to allow multiples like $\{i_1, \ldots, i_n\}$, would not advance the discussion. We would then lose the account of the distinctions, for instance, between (68) and (69), or those in Montalbetti (1984). The question would also arise how these new indices were to be interpreted. The interpretation could not be that the number n gives the intended number of the referent; for it must be possible to wave at a crowd without knowing how many people one is waving at.

The simplest interpretation of reciprocity is summed up in (81):

(81) For each a such that $\mathbf{v}(a, Y)$, the values of R are those b such that $\mathbf{v}(b, Y)$ and $b \neq a$.

On this interpretation, sentences like (82)

(82) They saw each other.

will be true if each value of *they* saw each of the others.[26]

If P is a plural pronoun with plural antecedent Y, then the values of P are inherited from those of Y. However, there are distinct, salient ways in which this inheritance can take place, as indicated, for instance, by sentences like (72) (repeated here):

(72) They said they would leave

The interpretive principle (83)

(83) For each a such that $\mathbf{v}(a, Y)$, $\mathbf{v}(a, P)$.

gives only the interpretation where each of them says, "We will leave." The other, *distributed* interpretation arises by a different mechanism. Whatever the mechanism is, I conjecture that it is also responsible for sentences like (84),

(84) They are cups and saucers.

in the sense in which this sentence is true when the objects in question are divided exhaustively between cups and saucers, and none of them is both a cup and a saucer. But since cases like (84) involve a more extended discussion, I will not pursue this question here.[27]

The rules for inheritance of values provide an account of the difference between (85) and (86), which represent the possible linkings in the sentence (68):

(85) They told [each other][they had better leave]

(86) They told [each other][they had better leave]

In the light of these comments on inheritance of values through antecedence, I return to a discussion of obviativity.

As remarked above, if two positions X and Y are obviative, then neither can serve

[26] More formally, predications $S = NP_{plural} - VP$ will be true only if NP_{plural} has at least two values and, that condition satisfied, if (but not only if) each value a of NP_{plural} is a value of VP. The value of a VP containing anaphoric elements such as *each other* is relative to an assignment f. For any f, the predicate *saw each other* is true of each a such that a is in f(*each other*), and *saw*(a,b) for each b in f(*each other*) different from a. Because the pronoun is the antecedent of the reciprocal, f(*each other*) must in S be the reference of *they*. This combination of conditions on VP and S then interprets (82).

[27] Schein (1984) discusses related cases.

as antecedent of the other. The general notion of obviativity must, however, be stronger than this. A rough description of what is involved might be (87):

(87) If *X* and *Y* are obviative, then they cannot be determined by the structure in which they occur to share a value.

This statement is relatively informal, but I think that it is none the worse for that. (87) will, first of all, do the work that was required of the transitivity condition, now abandoned. In (65) (repeated here)

(65) John said [$_S$ he saw him]

he and *him*-are obviative, by (B*). Nevertheless, they must share a value, namely John, and (87) implies that the structure is ungrammatical.

Lasnik (1982) has pressed the question of examples like (88), as pronounced with ordinary stress on the verb:

(88) *We like me.

(These were first extensively discussed in Postal (1971).) (88) falls under obviativity in the formulation (87), though not under an interpretation that merely prevents antecedence; and, as Lasnik has remarked, the binding condition (B) in Chomsky (1981) fails here as well. It has been noticed that (88) is much more acceptable with contrastive stress on the pronoun *me*, especially if accompanied by ostension, as in (89):

(89) We like *me* [speaker points at self].

Evans (1980) and Roberts (1984) contain other examples of the same type.

What do these exceptions show? The speaker of (89) uses the pronoun *me* as if it were a demonstrative, its interpretation supplied through ostension rather than through its ordinary linguistic meaning. This observation is enough, I think, to remove (89) as a counterexample to (87). At the same time, it is apparent that a full working-out of the import of obviativity would require a comprehensive picture of language use.

As we have been using the term *obviative,* the statement (90) implies (91), but not conversely:

(90) In *John saw him, John* is obviative from *him.*
(91) *John saw him* cannot mean that John saw himself.

Reinhart (1983) argues, however, that the stronger judgment of obviativity (90) might be derived from pragmatic considerations. Briefly, she suggests that the speaker of *John saw him,* in using that form rather than the available form *John saw himself*, invites the hearer to suppose, on the assumption that avoiding or minimizing ambiguity is the norm of speech, that different persons are intended by *John* and *him.* The existence of a

contrasting potential utterance, which the speaker did not say, is responsible for our intuitions about these examples, hence for (90).

Arguments of this form have been given by others, as Reinhart notes. Reinhart extends the idea to cases like (92),

(92) *He* thought that I saw *John*.

where the speaker has avoided the bound-anaphora option shown in (93)

(93) John thought that I saw him.

and therefore, it is argued, will be assumed by the hearer to intend obviativity. Although Reinhart's expression of the thesis involves some notions that I find obscure, such as that of "using a syntactic structure" (Reinhart (1983, 76)), I think that it is clear enough how examples will go.

The most evident difficulty for Reinhart's proposal is that obviativity is found even where there is no contrasting utterance that the speaker could be said to have avoided. Cases of this kind include Lasnik's (88) as well as (94):

(94) John and Mary saw him.

Since *John and Mary saw himself*, like *We saw myself*, is ungrammatical, the judgment that the value of *him* is obviative from that of *John* cannot be accounted for on the pragmatic basis suggested. Similarly, there is no bound-anaphora option in (95) that has the interpretation that John and Mary told him, John, that she, Mary, should leave:

(95) They told John that Mary should leave.

A second point, observed in Huang (1982), is that the account predicts that pronominals and reflexives should be in complementary distribution (see Reinhart (1983, 73)); however, this is not the case even in English, as in (96):

(96) They expect [pictures of them(selves)] to be on sale.

Examples in languages like Icelandic also illustrate this point. Both sentences in (97) are grammatical in Icelandic and can mean that John wishes Mary would visit him, John:

(97) John wishes that Mary would visit him(self).

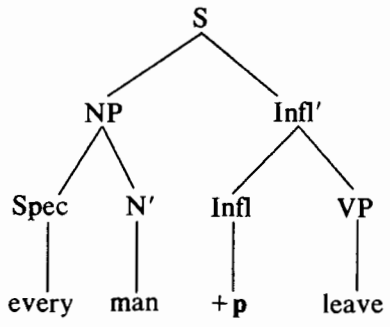
Reinhart notes (p. 71) that her grammatical analysis faces problems in that reflexive forms and pronouns (her "R-pronouns" and "non-R-pronouns") are sometimes possible in the same contexts. The pragmatic analysis faces similar problems. For these reasons, it seems to me that there is no alternative to regarding the phenomenon of obviativity in terms of formal grammar.[28]

[28] Given the existence of "switch-reference" languages, discussed in Finer (1984b), which show overt obviative marking, there is no prospect of avoiding this notion in linguistic theory generally. Besides the

5. Generality

Consider explicit quantification, as in the S-Structure representation (98), underlying *Every man left*:

(98)



The grammatical relation of the subject NP to Infl′ is just as it would be in simple sentences, such as *John left*. The values of Infl′ are the various things that left, so that *John left* is true if the value of *John*, namely John, is one of those things. But the quantificational sentence (98) has a different *kind* of truth-condition from that of the simple sentence. In (98) the Infl′ is not predicated of some thing called "every man"; rather, (98) says that every single man is among the values of Infl′. Therefore, if the interpretation of structures S = NP – Infl′ is to be predicational in character, then expressions of generality cannot be in their S-Structure positions at LF.

May (1977) has shown that adjunction of quantificational NPs, under the assumptions of trace theory, is a natural way, within a framework of the type assumed here, of representing generality at the level of LF. In the case of (98) his proposed rule of

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examples cited, the free alternation between *her* and *her own* in (i), as well as the occurrence of reciprocals in genitive position, is already sufficient, in my opinion, to show that there is no complementary distribution between pronominals and anaphors in English:

(i) Mary tied her (own) shoelaces.

The usual arguments against this view, including one due to David Dowty, cited in Reinhart (1983, footnote 15), point to emphatic uses such as (ii), where *her own* has no sentential antecedent:

(ii) That's her own book.

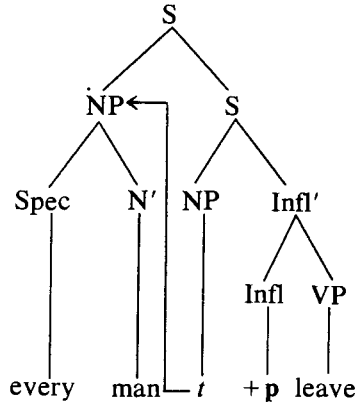
This observation, employed as evidence against the anaphoric status of *X's own* in English, leaves it quite up in the air why, for instance, (iii) is unambiguous, the sole possible antecedent being the c-commanding NP *Mary's mother*, or why (iv), but not (v), is acceptable without emphatic stress:

(iii) Mary's mother tied her own shoelaces.
(iv) Tie your own shoelaces!
(v) Tie his own shoelaces!

In any case, the evidence from (ii) has little force, since it shows only that the distribution of *X's own*, as used emphatically, is different from that of *X-self*.

Quantifier Raising (QR) would produce (99):

(99)



The trace t has the adjoined quantifier for its antecedent, as shown by the arrow. With respect to the lower S, t behaves like a free variable, so that values of that S are sensitive to assignments of values to t. The basic semantic predicate **v** reflects this sensitivity. If Q is the phrase marker whose root is the lower S of (99), then the value of Q is truth for those assignments f such that $f(t)$ left, and falsehood for all others.

The semantics for (99) and similar structures is completed by an appropriate clause for the quantification in the higher S. It is then possible to derive the statement (100) as expressing conditions under which (99) is true:

(100) (99) is true $\leftrightarrow$ [every x: man (x)][$\exists e$] leave(x,e)[29]

In (100) the binding relations between the quantifier *every man* and the subject of the lower clause, and between the binding phrase *every* and the open position in the noun, are not represented abstractly, by means of relations between phrasal points, but rather by the typographical shapes of certain lexical items, the *variables*. In this respect, the right-hand side of (100) does not entirely match in form the structure of (99); it is not *homophonic*, in the sense of Quine (1968). However, if "variable" is understood in the precise sense of the variables of quantification theory, there may be no variables in the most basic parts of natural languages. Variables x, y are a typographical expedient, whose end is disambiguation within the limitations of customary writing and printing practice. The expedient itself leads to certain nuisances, for instance in the elaborations that are

[29] More formally, one considers structures as in (i):

(i) S_0 = [[$_{NP}$ every N'] S_1]

Let the notation '$g \sim_t f$' signify that $g(x) = f(x)$ if $x = t$. Then

(ii) $\mathbf{v}(T,S_0,f) \leftrightarrow$ [every g:$g \sim_t f$ & $\mathbf{v}(g(t),N',g)$] $\mathbf{v}(T,S_1,g)$

The values assigned to the words in (99), and some set-theoretic steps, lead then to (100). As noted in Higginbotham (1984a), other quantifiers are to be treated as *every* is above, including those not expressible by the means available in quantification theory; for example, the clause for *most* would be just like (ii), except for a lexical substitution.

way: (102) is true provided there is a man such that he went into every store, and (103) when every store is such that some man or other went into it. Of more significance than this separation of truth-conditions, however, is the point that a theory with QR implies that (101) is not one sentence, but two; it is homonymous between (102) and (103), distinct grammatical structures that happen to sound alike.

The rationale just given for QR involves three distinct assumptions. The first is that S = NP – Infl′ sentences are interpreted in a uniform way; the second is that the most elementary cases, such as *John left*, are predicational; and the third is that in (98) and

[illegible] assumptions while denying the third form a lengthy chapter of the history of logic. Therefore, for any account that incorporates the first assumption (at least for all cases in which the subject is not pleonastic) the question turns on the second assumption alone.

Montague (1970) observed that uniformity of interpretation of basic sentential structures may be maintained, by the device of assimilating names to expressions of generality.

[30] As the letters of written English represent an accommodation to the phonological structure of the spoken language, so the variables of quantification theory represent an accommodation to LF. The customary notation of "coindexing" should, on this view, be understood as a mere manner of speaking. It represents the importation back into linguistic description of a mode of expression that was created for the formalized languages. At the same time, the notation is clearly not "variable-free," in the sense of combinatory logic, for example. Besides myself, Cooper (1983) and Barwise and Perry (1983) carry out a semantic description that depicts anaphoric connections by a family of relations.

The basic idea is that a simple subject like *John* will have for its value, not John himself, but a function that assigns to the interpretation of the VP the value truth if that VP is true of John, and falsehood otherwise. Elementary sentences then are not predicational in the classic sense, and proper names of people then become functionals, since their arguments are functions. Naturally, Montague's suggestion depends on the thesis, which he in fact defended on philosophical grounds, that natural languages are, or are to be translated into, higher-order languages.

The theoretical considerations of section 3 make Montague's device in principle unavailable to us: since VP is unsaturated, it cannot be an argument of the subject NP.[31] We are led, then, to something like the classical, Fregean view that the forms of quantificational sentences are structurally distinct from those of simple sentences. The assumption common to Montague's approach and the approach taken here is that clausal structures admit a uniform interpretive procedure.

Besides the above abstract considerations, there are a number of linguistic points that support the thesis that LF assigns scope to expressions of generality along the lines of QR. Some of these points turn on the unification of conditions on well-formedness or on interpretation that can be made to follow from the assimilation of cases of overt syntactic movement, on the one hand, and the hypothetical movement into LF, on the other.[32] Further, starting with Chomsky (1976), and pursued in different ways in Higginbotham (1980a; 1983a), Hornstein (1984), and others, LF-movement has been suggested as a mechanism for accounting for the "crossover" conditions on anaphora, or, as in Hornstein's account, for distinctions among quantifiers.[33]

The strongest theory of the relation between syntactic structure and semantic interpretation is that interpretive principles are universal— that is, that human languages cannot differ in the ways that semantic principles apply to syntactic objects with their specific formal properties. The universality of LF-representations should be seen as a working hypothesis that is advanced about the child's contribution to knowledge of meaning. The differences between languages that do not flow from sheer lexical idiosyncrasy are then to be seen as differences in the nature of formal grammatical conditions, not semantic rules.

[31] Similarly, if the denotation of NP is a functional, it cannot be an argument of VP. Consequently, if the relation of NP to VP is that of function to argument, VP must be regarded after all as saturated. David Lewis has pointed out to me that this last route may be more thoroughly "Montogovian" than the one that Montague himself took.

[32] For a survey of many of these, together with further arguments and suggestions for the exact shape of LF, see May (1985) and the references cited there, among them especially Huang (1982).

[33] It is sometimes thought that QR and other rules of scope assignment are semantic in character, rather than rules of formal syntax. This misinterpretation surfaces in Rooth (1984, 392), where it is conjectured that the reasons for scope assignment in Higginbotham (1983a) are "interpretive." In the passage that Rooth cites, however, I refer only to conditions on well-formedness. Rooth also supposes that it was intended that all *and only* operators are subject to scope assignment, a strengthening of the view I advanced that is neither stated nor implied in the material he quotes. Rooth argues very cogently for scope assignment to simple arguments (names), on the basis of the distribution of interpretations for words like *only* and *even*; the argument is not unlike that of Reinhart (1983) on sloppy identity. That names may occur in nonargument positions at LF is therefore a feasible view.

This point of view may be put in terms familiar from Chomsky (1
of language variation, or *parameters* in this terminology, should hav
the child can find evidence in the linguistic environment that sett
which formal structures are admissible, expressed in terms of the
rameters. To speak and understand the language, the child must kn
including both the meanings of words and the principles of interpr
structures. Obviously, words must be learned. Suppose that we co
learning is all that is required to distinguish one language from anot
ciples of interpretation of structures cannot differ from language to
parameters of meaning are confined to the meanings of words.

If our conjecture is correct, then there are no language-particul
tation, apart from the lexicon. In this case, questions of scope, b
language and across languages, will be answered in just the way the
earlier sections were answered; in particular, scopal ambiguity wil
nonambiguity will have a syntactic explanation. The method of L
well-supported way of formulating a theory with these properties.
lustrations of the method at work, afterwards turning briefly to an a
to Cooper (1983).

A point that seems to have exerted some influence on the d
properties of expressions is the observation that straightforward c
biguity is not very widespread in English. Studies of other languages
For instance, Huang (1982) reports that in Chinese S-Structure c-co
scope: it is not possible for *A* to c-command *B* at S-Structure, and
having wider scope than *A*. English then emerges as a marked ca
missive. Even in English, there is a strong inclination to give subjec
objects, as in the minimal pair (104)–(105), from Chomsky (1957):

(104) Everyone in this room speaks at least two languages.

(105) At least two languages are spoken by everyone in this r

It might therefore be thought that to posit distinct grammatical stru
of disambiguation of quantifiers is a marginal gain for theory.

This line of reasoning, I think, would stand the question of am
Seen right side up, the question is not what *allows* ambiguity of scc
prevents it from occurring everywhere. For example, a word-for-wo
in Chinese is completely unambiguous, having only the interpretat
This consequence of course follows from Huang's syntactic para
LF-representation of the Chinese equivalent of (101) as in (103), and

Other conditions that prevent scopal ambiguities are of a synt
instance, as discussed in Rodman (1976), relative clauses are island
The sentence (106)

(106) There is a man whom every woman loves.

cannot mean that every woman is such that there is a man whom she loves. There is an LF-representation of (106) that does mean this, namely (107), and in virtue of syntactic conditions discussed in May (1977), it is ungrammatical, perhaps universally:

(107) [[every woman][there is a man whom t loves t']]

Rodman's own method for deriving the nonambiguity of (106) was to introduce a syntactic rule that prevented the generation of the appropriate analysis tree in a Montague grammar. This method differs in the letter, but not in spirit, from that suggested here.

Cooper (1983) presents an interesting alternative picture. On his view, scopal islands and ambiguity are both to be explained by means of rules that associate the right types of interpretations with already given well-formed expressions. Concerning examples like (101), he writes (p. 3):

> There is no reason from a syntactic point of view to give [sentences with multiple generality] more than one syntactic structure. . . . However, it is normally assumed that [they] are semantically ambiguous, depending on which of the quantifiers has wider scope. We will explore the possibility that the semantics can be made to work in an interesting way without introducing an unmotivated syntactic rule, i.e., without creating a syntactic ambiguity corresponding to the semantic ambiguity.

The method that Cooper employs for sentences with multiple generality implies the data about these sentences by assigning to their (unambiguous) structural descriptions distinct courses of computation of their values. A given structural description is associated with an interpretation (an intension) and a pushdown store (the latter possibly empty). The items placed in the store are not phrases of the language, but their interpretations; presumably it is in this sense that the theory does not "create a syntactic ambiguity."

However, if cointensive items in the pushdown store are theoretically indistinguishable, then a question arises about the adequacy of the theory. Suppose that there are quantificational expressions, or other expressions that are assigned scope, that are cointensive, but differ in their scopal properties. The theory will then, wrongly, fail to distinguish them. If the natural diagnosis of the distinction between *anything* and *everything* is correct, for example, then in the pair (108)–(109)

(108) Some people can do anything.
(109) Some people can do everything.

we should say that the difference between them is just that the scope-bearing elements in (108) are interpreted uniquely with the universal *any* between the subject and the modal, whereas in (109) this is not the case. So if *anything* and *everything* are cointensive, then the account will wrongly assign to (108) an interpretation belonging only to (109), or will fail to assign to (109) an interpretation that it has. Similar examples are given in

Lasnik (1972) and in Kroch (1974). The following pair, of a type due to Lasnik, is representative:

(110) John didn't solve a problem.
(111) John didn't solve some problem.

(110) is ambiguous, but (111) is not: we cannot have the scopal order *not . . . some*. Both Lasnik and Kroch explain the distinction in terms of a lexical condition, observing that the ambiguity of (110) is correlated with the grammaticality of (112), and the non-ambiguity of (111) with the ungrammaticality of (113):

(112) Not a problem was solved.
(113) *Not some problem was solved.

On the view taken here (though not in Kroch (1974)), the condition is a filter at LF, ruling out for (111) the structure (114):

(114) [[not][[some problem][John solved *t*]]]

But the phrases *some problem* and *a problem*, as they occur, say, in (115),

(115) John solved $\left\{\begin{matrix}\text{a} \\ \text{some}\end{matrix}\right\}$ problem.

seem to be cointensive, each representing existential quantification over problems. Since the information that was used is lost as they are stored, it seems that Cooper's account will produce the wrong results either for (110) or for (111).

It would take us too far afield to speculate here about whether Cooper's view can be maintained in the face of these examples. However, the considerations behind them are, I submit, perfectly general: if there are cointensive items with distinct scopal properties, then either the stores must be augmented with *syntactic* features, in which case there will indeed be syntactic ambiguities in sentences with multiple generality, or else the theory will not be adequate.

In this section, I have not attempted to add to the already considerable arguments in the literature in favor of LF-movement of quantificational expressions, including *wh*-expressions; I do hope, however, to have clarified somewhat the status of the proposal. If Cooper's account cannot ultimately be sustained, then it is not clear to me that there are at present any alternatives that do not end up repeating the contents of the LF-movement theory in other terminology. I hope to discuss this matter elsewhere.

6. Notional and Formal Categories

In the semantics briefly sketched here, the central data about the meanings of sentences have been simple and unexceptionable. But a number of questions of a metaphysical character make themselves felt in applications. The questions that I mean are not those aroused by fictions or by other pretenses of reference that may arise from time to time in speech or thought. Rather, they are manifested in the appearance of prima facie

dubious objects, of a sort that, as Chomsky (1981) has emphasized, can be marked at least negatively by their nonappearance in the "fragments" of natural language that are given in most of the literature on formal semantics.

In some cases, I think, the apparently dubious objects turn out not to be dubious except insofar as they are not material, or ordinary. But other cases require further consideration. Although I cannot consider more than a few types here, I will argue, for those examples that I do consider, that what those of the second class may show, in their various ways, is a kind of interaction between syntactic and semantic categories, whose study is potentially of great importance for semantics.

The categories that I call semantic are, in other terms, *notional,* classifying words, phrases, or sentences according to what they express, rather than according to their means of expressing it. Syntactic categories are *formal*, taking into account only part of speech or other grammatical features. The members of these categories overlap to a great extent. In formalized languages, they are either in one-to-one correspondence or at least observe Montague's condition that to a given syntactic category there corresponds only one semantic category. As I have said, even that condition seems to be too strong for natural languages. Nevertheless, that we do not have great difficulties in relating our native speech to the formalized idiom shows the extent of coincidence between the formal and the notional.

The notional categories that have been used here are of only three types, namely terms, predicate-expressions (including sentences), and variable-binding operators. The formal categories have been those of X′-theory, namely N, V, A, and P and their various projections, together with Infl and Spec. Inasmuch as elements of the formal categories may be notionally distinct, the grammar does not obey Montague's condition.

The notation in which we have written out the semantics for the examples treated here has been a notation that itself belongs to an outgrowth of our language. It differs somewhat in syntactic form (as in the use of variables) from the structure of the grammars that it is about, but it is not essentially unfamiliar. Metaphysical questions then are transferred to questions about that notation, and particularly about the interpretation of the quantifiers. In the classical setting, these are *objectual.* Nevertheless, other interpretations of expressions of generality are possible; for example, Parsons (1971) has given some reasons why we might regard certain quantifications as substitutional in character.

Plenty of pieces of our language, then, raise metaphysical questions that semantic theory simply transcribes in its own vocabulary. If we ask, for example, whether it is possible to interpret apparent reference to objects of some kind as a mere manner of speaking, the articulation of semantic theory does not have to wait in abeyance on the answer; on the contrary, it may be that the theory, by putting the question in more explicit form, is instrumental in resolving it.

Neither the question of quantifier interpretation, nor that of possible reinterpretation, puts obstacles in the path of semantic investigation. The worrisome cases that will be discussed here are of neither type. In analyzing a few prominent examples, I hope to indicate a method that could be applied to others.

One point of interest to which Chomsky (1981) draws attention is the intuitively different status of NPs like (116) and (117):

(116) the flaw in the argument
(117) the coat in the closet

He expresses the difference in terms of the presence or absence of commitment on the part of the user of the expression to an object referred to by the NP (p. 324):

> If I say "the flaw in the argument is obvious, but it escaped John's attention," I am not committed to the absurd view that among the things in the world are flaws, one of them in the argument in question. Nevertheless, the NP *the flaw in the argument* behaves in all relevant respects in the manner of the truly referential expression *the coat in the closet*. . . .

Now, what is absurd about the view that there are flaws in arguments? Suppose a particular argument *A* is flawed. Then there is at least one flaw in it. A flawed *F*, in general, is an *F* that, judged by the standards of appraisal that apply to *F*s, is not all that an *F* should be. Thus, *flawed*, like *real*, is a *trouser-word* in the sense of Austin (1962). Still, if an argument is flawed, then it possesses a feature in virtue of which it is not all that an argument should be: an unsupported step, perhaps. This feature is a flaw in the argument—*the* flaw, if there are no others.

Chomsky emphasizes that NPs like (116) have the usual properties of nominals: one can ask *how many* flaws there were in the argument, form statements of identity, and so forth. What room, then, is there for skepticism? Nevertheless, there is an important difference between (116) and (117). It reveals itself in the statement quoted above, in the clause (118):

(118) ". . . among the things in the world are flaws, one of them in the argument in question."

Certainly, (118) is a bit of a joke. Why is this? I think that the reasons are not metaphysical, but syntactic, stemming from the separation in (118) of the noun *flaw* from mention of the kind of thing that is said to be flawed. The description *flawed F* is like *bad F*, since a flawed *F* may be a perfect *G*. The noun *flaw*, since it is not interpretable except with reference to a kind of thing and its norms of appraisal, might be expected not to stand on its own. Compare (118) to (119):

(119) Among the things in the world are bad ones (bad things), some of which are violinists.

(119) seems to be odd in the same way as (118). In particular, one would not assert the existence of bad violinists by using (119).

These examples may be considered in light of the discussion of modification in section 3. It was supposed there that the control of thematic discharge by the configuration of government, and in particular the restriction of autonymous θ-marking to this configuration, is what accounts for the semantic distinction between *That is a big butterfly* and *That butterfly is big*. The same hypothesis will account for a distinction between

He is a bad violinist and *He is bad, and a violinist*, or between *That is a flaw in the argument* and *That is a flaw, and it is in the argument*. Another point is relevant, however. Terms of appraisal strongly necessitate an attribute, since, intuitively speaking, their interpretation is heterogeneous with respect to the attributive choice, in contrast to the case, say, of *big*, which varies along fewer dimensions. Hence, (118) is odd, since no attribute is available with respect to which the status of anything as a flaw can be determined. In contexts where the attribute is provided for, the noun can stand alone, as in (120):

(120) The flaw (in your discussion) is in your exposition, not in your argument.

The case we have discussed resolves a worry that may be initially seen as metaphysical in favor of syntactic and semantic analysis. A type distinct from this in structure, but answerable, I believe, by the same general method, is exemplified by (121), discussed in Hornstein (1984):

(121) That his$_i$ income is falling bothers $[\left\{\begin{array}{c}\text{the}\\ \text{*every}\end{array}\right\}$ average man$]_i$

As the usual conditions would predict, in this configuration the pronoun can be anaphoric to the definite description, but not to the quantifier: (121) is a "weak crossover" violation in the sense of Wasow (1972). Exactly the same facts obtain where *average man* is replaced by *tall man* or *man I saw yesterday*. There is a certain *autonomy* to the conditions on anaphora, insofar as they care only for whether the specifier of NP is a determiner like *the* or a quantifier like *every*, and are indifferent to the nature of the noun following. Hornstein expresses his conclusions from this example in metaphysical terms: the distinction between the expressions in (121) is indifferent to *existence*, since "no one wishes to claim that there are objects that are average men in any meaningful sense."[34] I will argue that, although Hornstein's point that anaphora are syntactically autonomous is correct and important, the metaphysical conclusions that he draws are not warranted.

First of all, there certainly is a sense in which there are average men. Suppose that

[34] Hornstein (1984, 58). Although I am not persuaded by Hornstein's skepticism about semantics, I hope that it is clear that the present work is congenial to his view that there is no level of "semantic representation" between syntax and context-dependent full interpretation. The conditions on meaning that are given by the predicate v represent *what* the native speaker knows (in fact, what is known universally without teaching, as a part of Universal Grammar), but, except insofar as they take into account the structure of syntax and the lexicon and are organized in explicit and deductive form, they do not represent *how* the speaker may represent that knowledge to himself. Indeed, the notion of a "semantic representation" may mislead, since such a representation would be a syntactic object.

Despite his skepticism, much of Hornstein's work seems to me to presuppose semantics, in the sense in which this term is commonly used. For instance, in considering examples such as (i),

(i) *John$_i$ is his$_i$ cook.

he writes (p. 93), "in [(i)] the indicated interpretation is disallowed." Elsewhere, he makes it clear that the index *i* is part of the syntax of (i). So the coindexing—the fact that there are subscripts *i* in two places in (i)—indicates something about its interpretation. How does it do this? A theory of this matter would be a semantic theory.

we were going to test the truth of (122):

(122) [The average man]$_i$ is worried that his$_i$ income is falling

We interview a number of men, taking care that we do not count those that are not average on whatever scale is in question: say, net worth. Suppose that by mistake we interview the millionaire Smith, and upon discovering that he has no worries about his falling income, count the result as evidence against (122). Someone who knew about Smith might correct us by saying, "You shouldn't count Smith. He's not an average man, but a millionaire."

In the last scenario, the interpretation of *average* was contextual; but that feature raises no metaphysical questions. The more interesting point, and the one that Hornstein presumably had in mind, is that it is only one of the scenarios we can associate with testing the truth of (122); for we might take it in such a way that it is true, not if men who are average are worried about their falling incomes, but only if, *on the average,* men are worried about their falling incomes. In the latter case, Smith counts, millionaire or no. The interpretation of *average* is then analogous to that seen in (123):

(123) The average temperature here is 78 degrees.

Its meaning is effectively *adverbial*, although it remains formally an adjective. The oddity of (124) supports this diagnosis:

(124) ?The temperature which is average here is 78 degrees.

Again, the word *average* is not unique in showing an adverbial interpretation. Sentences like (125)

(125) Only the exceptional man saves his money.

are ambiguous between (a) only people who are exceptional on some scale of character, such as thriftiness, save their money, and (b) it is only exceptionally the case that one saves one's money. In neither case do we find anything metaphysically suspicious: in both interpretations, the only objects are people.[35]

For a third example, I turn to certain *nominalizations,* noted in Chomsky (1981, 344):

(126) [$_{NP}$ John's lack of [talent]]
(127) [$_{NP}$ John's lack of [interest in mathematics]]

These NPs as wholes, and their internal arguments *talent* and *interest in mathematics,* have abstract values. Depending on context and syntactic configuration, they can pattern with count or with mass nominals (nouns like *truth* have the same property). In a sentence like (128)

(128) John lacks [much interest in mathematics]

[35] I am indebted here to discussion with Isabelle Haïk. Haïk (1983) discusses a number of important examples of related types.

it is as if interest in mathematics is a stuff, which John can have more or less of. The stuff plausibly supervenes upon the psychology of persons or other agents: it is because John is little interested in mathematics that he lacks much interest in it. So abstract stuffs are at least a candidate for a reductive program. Semantic theory, at least in its first articulation, need not worry about this; on the other hand, since it seems plausible that the abstract stuffs are supervenient, it may be of interest to carry through the program in part as a reconstruction of the commonsense feel for things.

The nominals (126) and (127), and many other derived forms, have the property that their use implies truth of the sentence corresponding to the nominal. Consider (129):

(129) Mary persuaded me of [John's lack of talent]

(I owe this observation to Steven Abney, to whom I am indebted also for discussion.) What I am persuaded of does not have to be true; but if (129) is true, then John really does lack talent. The reason for this cannot, therefore, be in the verb *persuade*, which is nonfactive both when its object is sentential and when it is an ordinary NP, as in (130)–(131):

(130) Mary persuaded me [that John lacks talent]
(131) Mary persuaded me of [something (false)]

Similar contrasts between *that*-clauses and nominals are seen in (132)–(133):

(132) Mary anticipates [that John lacks interest in mathematics]
(133) Mary anticipates [John's lack of interest in mathematics]

This property of the abstract nominals seems to follow from the type of analysis suggested in Higginbotham (1983d) for a different type of case, namely the "naked-infinitive" complements to verbs of perception and causation. Taking full advantage of the *E*-position, the sentence (134) may be rendered as shown in (135):

(134) John lacks talent
(135) $(\exists e)$ lack(John,talent,e)

The nominal (126) is then interpreted as the restricted quantification (136),

(136) $[\exists e$: lack(John,talent,e)]

and the sentence (129) as (137):

(137) $[\exists e$: lack(John,talent,e)] Mary persuaded me of e

If this is correct, then objects of persuasion, anticipation, and the like, include something like situations or facts.[36]

Is there an ontology of facts, or ontological commitment to facts? As given in Quine

[36] The naked-infinitive complements to perception verbs show referential transparency, as originally noticed by Jon Barwise; but the nominals under discussion here perhaps do not. The full account of these constructions will therefore be more complex than what is given here.

(1953), the notions of ontology, and of ontological commitment, are relative to the adoption of a *form of language,* or "canonical notation," with respect to which they are defined. Ontology, on this view, is the ontology of a theory T in a language L of the appropriate form. Thus, our question about (129) will depend on how (137) is understood relative to the canonical notation. If the account of the factivity of (129) is correct, then that is certainly *some* evidence that we talk about facts or situations, although it does not say more than is needed for the semantic theory about what the nature of these things might be. Similarly, when in section 3 it was suggested that the θ-marking of nominal heads in cases of ordinary modification, such as *big butterfly,* represents the filling of a thematic position in the adjective with an attribute, that is evidence that we in some way talk about attributes in these constructions; but a metaphysical investigation would take much more into account, and would ask more closely what these things are, if anything, that are attributes. What the semantic theory, supposing it is correct, says about these constructions is surely not *irrelevant* to metaphysical questions; but it is not the whole story about them either.

I have considered from the literature three cases of constructions that raise questions about the interaction of formal categories (specifically the category NP) with notional ones, and for each I have attempted an explanation of the judgments cited. The examples were each representative of an unbounded class, so that the explanations had a theoretical character; because of this, I think that further investigation is called for, in English and in other languages. A final example, of what I will call the *semiproductive idioms,* will conclude this discussion.[37]

Consider first the NP *Bill's sake,* say as it appears in (138):

(138) I did it [for [Bill's sake]]

Everyone will agree that this NP does not refer to a thing. The evidence that this is so is that the construction is *syntactically defective*: we cannot have **every sake (of Bill)*, or even *the sake* in isolation. The predicate *for Bill's sake* applies to actions intended to benefit Bill; but it does not do this by being for a thing that is Bill's sake. Therefore, the semantics must not assign any value to this NP, though it will to the PP of which it is the grammatical object. The semantics is not compositional, and the construction is an idiom, whose properties are given directly in the lexicon.[38]

Syntactic defectiveness is the mark of an idiom; but defectiveness comes in varieties and degrees. In a case like (139),

(139) I took a look at it.

where we are tempted to view the construction *took a look at* as a verb with approxi-

[37] In the following I am particularly indebted to Noam Chomsky.

[38] The NP *X's sake* is also defective, in that it is not a local governing category for pronominals:

(i) John saw *Mary* for *her* sake.
(ii) **John* saw Mary for *his* sake.

The PP *for X's sake* behaves in this syntactic respect like the purpose-clause *PRO to benefit X.*

mately the meaning of 'scrutinized', we can see, by varying the construction, that we are in the presence of a process that is linguistically productive, up to a point:

(140) I took a chance on it/offense at his remarks/etc.
(141) I took a long, careful look at it.
(142) The look I took at it was long enough for my purposes.

In (142), in particular, the phrase *take a look* is broken up, with a definite NP subject. However, the construction is not fully productive:

(143) *Go take the look at it.
(144) *Which looks did I take at it?
(145) *A look would be hard to take at it.

Thus, the NP *a look* in (139) behaves in some ways like an argument and in others like a mere fragment of an idiom; and similarly for the phrases *a chance* and *offense* in (140). In this sense, the idiom is semiproductive. These types of examples raise important and rarely considered questions, both about the range of permitted syntactic forms and about the construction of interpretations. Insofar as they are so widespread and the facts about them are clearly known to native speakers, they call, not for abstraction from questions of meaning, but for the elaboration of theory.

7. Conclusions

I have argued that semantic theory, conceived as a section of the general project of understanding the nature of human language and the basis for its acquisition, is expressible as a formal system that uses principles connecting form and meaning to deduce, in the first instance, counterparts to ordinary statements about meaning, known to native speakers. It appears that both the nature of the theoretical problem and the kinds of answers that are at present well-supported lead to the conclusion that the basic principles of interpretation of categories or expressions, and of linguistic relations between them, are fixed universally and apply at the level of LF. However, languages differ according to syntactic principles, and these differences are responsible for the differences in interpretation that are observed between expressions in one language and their word-for-word renditions in another. The systems of antecedence and disjoint reference, the properties of the θ-Criterion, generalized to include all cases of thematic discharge, and the representation of generality all support this thesis. Finally, although it is not to be expected that categories of form and categories of meaning will match up in any tidy way, the enormous extent of their interpenetration and the systematic nature of their divergences conspire to suggest that we shall not go wrong in regarding the problems of linguistic theory from both points of view.

References

Austin, J. L. (1962) *Sense and Sensibilia*, Oxford University Press, Oxford.
Baker, M. (1983) "'Assume GF' and the Order of Morphemes," in I. Haïk and D. Massam, eds., *MIT Working Papers in Linguistics* 5, 53–101.

Evans, G. (1980) "Pronouns," *Linguistic Inquiry* 11, 337–362.
Fabb, N. (1984) *Syntactic Affixation,* Doctoral dissertation, MIT, Cambridge, Massachusetts.
Finer, D. (1984a) "Linking and Illicit Movement," ms., University of Wisconsin, Madison.
Finer, D. (1984b) *The Formal Grammar of Switch-Reference,* Doctoral dissertation, University of Massachusetts, Amherst.
Haïk, I. (1983) "Syncategorematic Adjectives," ms., MIT, Cambridge, Massachusetts.
Higginbotham, J. (1980a) "Pronouns and Bound Variables," *Linguistic Inquiry* 11, 679–708.
Higginbotham, J. (1980b) "Anaphora and GB: Some Preliminary Remarks," in J. Jensen, ed., *Proceedings of the Tenth Annual Meeting of NELS (Cahiers linguistiques d'Ottawa 9.4)*, Department of Linguistics, University of Ottawa, Ontario, 223–236.
Higginbotham, J. (1981) "Reciprocal Interpretation," *Journal of Linguistic Research* 1, 97–117.
Higginbotham, J. (1983a) "Logical Form, Binding, and Nominals," *Linguistic Inquiry* 14, 395–420.
Higginbotham, J. (1983b) "A Note on Phrase Markers," *Revue Québecoise de Linguistique* 13, 147–166.
Higginbotham, J. (1983c) "Is Grammar Psychological?" in L. Cauman et al., eds., *How Many Questions? Essays in Honor of Sidney Morgenbesser,* Hackett Publishing Co., Indianapolis, 170–179.
Higginbotham, J. (1983d) "The Logic of Perceptual Reports: An Extensional Alternative to Situation Semantics," *The Journal of Philosophy* 80, 100–127.
Higginbotham, J. (1984a) "Linguistic Theory and Davidson's Program in Semantics," ms., MIT, Cambridge, Massachusetts.
Higginbotham, J. (1984b) "Indefiniteness and Predication," ms., MIT, Cambridge, Massachusetts.

Hornstein, N. (1984) *Logic as Grammar,* Bradford Books, MIT Press, Cambridge, Massachusetts.
Huang, C.-T. J. (1982) *Logical Form in Chinese and the Theory of Grammar,* Doctoral dissertation, MIT, Cambridge, Massachusetts.
Jackendoff, R. (1972) *Semantic Interpretation in Generative Grammar,* MIT Press, Cambridge, Massachusetts.
Kamp, J. A. W. (1975) "Two Theories about Adjectives," in E. L. Keenan, ed., *Formal Semantics for Natural Language,* Cambridge University Press, Cambridge, 123–155.
Kamp, J. A. W. (1981) "A Theory of Truth and Semantic Representation," in J. Groenendijk et al., eds., *Formal Methods in the Study of Language,* Mathematical Centre, Amsterdam.
Kroch, A. (1974) *The Semantics of Scope in English,* Doctoral dissertation, MIT, Cambridge, Massachusetts.
Kupin, J. (1978) "A Motivated Alternative to Phrase Markers," *Linguistic Inquiry* 9, 303–308.
Larson, R. (1983) *Restrictive Modification: Relative Clauses and Adverbs*, ms., University of Pennsylvania, Philadelphia.
Lasnik, H. (1972) *Analyses of Negation in English,* Doctoral dissertation, MIT, Cambridge, Massachusetts.
Lasnik, H. (1976) "Remarks on Coreference," *Linguistic Analysis* 2, 1–22.
Lasnik, H. (1982) "On Two Recent Treatments of Disjoint Reference," *Journal of Linguistic Research* 1, 48–58.
Lasnik, H. and J. Kupin (1977) "A Restrictive Theory of Transformational Grammar," *Theoretical Linguistics* 4, 173–196.
Lewis, D. (1972) "General Semantics," in D. Davidson and G. Harman, eds., *Semantics of Natural Language,* Reidel, Dordrecht, 169–218.
Lewis, D. (1975) "Languages and Language," in K. Gunderson, ed., *Language, Mind, and Knowledge,* University of Minnesota Press, Minneapolis.
McCawley, J. (1968) "On the Base Component of a Transformational Grammar," *Foundations of Language* 4, 243–269.
May, R. (1977) *The Grammar of Quantification,* Doctoral dissertation, MIT, Cambridge, Massachusetts.
May, R. (1985) *Logical Form: Its Structure and Derivation,* MIT Press, Cambridge, Massachusetts.
Montague, R. (1970) "The Proper Treatment of Quantification in Ordinary English," in R. Montague (1974), 247–270.
Montague, R. (1974) *Formal Philosophy,* ed. by R. H. Thomason, Yale University Press, New Haven, Connecticut.
Montalbetti, M. (1984) *After Binding: On the Interpretation of Pronouns,* Doctoral dissertation, MIT, Cambridge, Massachusetts.
Parsons, C. (1971) "A Plea for Substitutional Quantification," *The Journal of Philosophy* 68, 231–237.
Postal, P. (1971) *Cross-Over Phenomena,* Holt, Rinehart and Winston, New York.
Quine, W. V. (1953) "On What There Is," in *From a Logical Point of View*, Harper and Row, New York, 1–19.
Quine, W. V. (1968) "Ontological Relativity," in *Ontological Relativity and Other Essays,* Columbia University Press, New York, 26–68.
Quine, W. V. (1972) "Methodological Reflections on Current Linguistic Theory," in D. Davidson and G. Harman, eds., *Semantics of Natural Language,* Reidel, Dordrecht, 442–454.
Quine, W. V. (1984) "Events and Reification," paper delivered at the Conference on the Philosophy of Donald Davidson, Rutgers University, New Brunswick, New Jersey.
Reinhart, T. (1983) "Coreference and Bound Anaphora: A Restatement of the Anaphora Questions," *Linguistics and Philosophy* 6, 47–88.

Roberts, C. (1984) "Anaphora, Coreference, and the Binding Theory," ms., University of Massachusetts, Amherst.
Rodman, R. (1976) "Scope Phenomena, 'Movement Transformations,' and Relative Clauses," in B. Partee, ed., *Montague Grammar,* Academic Press, New York, 166–176.
Roeper, T. (1983) "Implicit Thematic Roles in the Lexicon and Syntax," ms., University of Massachusetts, Amherst.
Rooth, M. (1984) "How to Get 'even' with Domain Selection," in C. Jones and P. Sells, eds., *Proceedings of the Fourteenth Annual Meeting of NELS,* Graduate Linguistic Student Association, University of Massachusetts, Amherst, 377–401.
Rothstein, S. (1983) *The Syntactic Forms of Predication,* Doctoral dissertation, MIT, Cambridge, Massachusetts.
Saito, M. (1984) "On the Definitions of C-Command and Government," in C. Jones and P. Sells, eds., *Proceedings of the Fourteenth Annual Meeting of NELS,* Graduate Linguistic Student Association, University of Massachusetts, Amherst, 402–417.
Schein, B. (1984) "Reference to Events and Quantification," ms., MIT, Cambridge, Massachusetts.
Siegel, M. (1974) "Capturing the Russian Adjective," in B. Partee, ed., *Montague Grammar,* Academic Press, New York, 293–309.
Stowell, T. (1981) *Origins of Phrase Structure,* Doctoral dissertation, MIT, Cambridge, Massachusetts.
Thráinsson, H. (1979) *On Complementation in Icelandic,* Doctoral dissertation, Harvard University, Cambridge, Massachusetts.
Wallace, J. (1972) "Positive, Comparative, Superlative," *The Journal of Philosophy* 69, 773–782.
Wasow, T. (1972) *Anaphoric Relations in English,* Doctoral dissertation, MIT, Cambridge, Massachusetts.
Williams, E. (1980) "Predication," *Linguistic Inquiry* 11, 203–238.
Williams, E. (1983) "Semantic vs. Syntactic Categories," *Linguistics and Philosophy* 6, 423–446.
Williams, E. (1984) "*There*-Insertion," *Linguistic Inquiry* 15, 131–153.
Yang, D.-W. (1982) "The Extended Binding Theory of Anaphors," ms., Seoul National University, Seoul, Korea.

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