

16. SEMANTIC CONSIDERATIONS FOR SOMMERS' LOGIC

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ABSTRACT. During the last twenty-five years Fred Sommers has developed a series of inter-related theories of language structure, ontological structure, logical syntax, and truth. Each theory has naturally contained valuable suggestions concerning semantic issues. But Sommers has not yet offered a specifically semantic theory. I attempt here to fill that gap by sketching a theory of semantics based upon his logical theses. The theory holds that terms, as used in statement making sentences, have both denotation and signification. Terms denote objects and signify properties. Terms, when quantified, refer to some or all of their denotations, and, when qualified, characterize the subjects to which they are predicated as having or lacking the properties they signify. The semantic, syntactic, and ontological theses presented in this theory are contrasted with those found in classical, scholastic, Leibnizian, Fregean, and Quinean theories.

INTRODUCTION

. . . the primacy of first-order logic and its derivatives in contemporary semantic theory is only a matter of historical accident . . . it is worth considering alternative formulations
. . .

R. Jackendoff (1985)

How is it that we understand, "grasp" the meaning of, a statement made in our native natural language? We use "statement" here in the following way. A statement is a sentence used on a particular occasion in order to make a truth-claim. There are, of course, a variety of ways of accounting for statement interpretation. It could be argued that the meaning of any sentence (including those used in statement making) is merely a function of the meaning of the terms included in that sentence. This would be modified then, in light of the use/mention distinction, to: the meaning of any sentence is merely a function of the meanings of the terms used in that sentence. Interpreting a statement on this theory would depend upon deciding about the meanings of certain terms. Such a decision is *semantic*. A theory of statement interpretation as merely semantic decision is, of course, inadequate. As a simple and expedient argument consider the fact that two quite different sentences can use exactly the same terms.

A second way of accounting for our understanding of a statement might be to argue that the formal structure of any sentence must be considered as a factor in interpretation. On this theory the interpretation of any statement would depend both on semantic decisions and on decisions about the structural relations holding among the terms of that statement. These latter decisions are *syntactic*. This second account is likewise inadequate as a theory of statement interpretation since it ignores the fact that different tokens of the same sentence type can be used to make different truth-claims on different occasions.

A third theory, then, would hold that in addition to semantic and syntactic decisions, an interpretation of a statement requires decisions concerning the overall context of use of the sentence. Such decisions are *pragmatic*.

The third kind of theory is generally taken as correct. Linguists, philosophers, cognitive psychologists, and information theorists differ here only about which of the kinds of decisions involved is most important or about the mechanics involved in making such decisions. Among linguistic semanticists there is disagreement, given the importance of semantic decisions, about just what the meaning of a term amounts to. In what follows we will suggest the following kind of theory. First, the initial decisions in statement interpretation are syntactic; semantic decisions follow; and pragmatic decisions conclude the process. Second, the proper semantic theory (accounting for adequate semantic decisions) is generally objectivist in that the meaning of a term is a function of its semantic relations to objects and their properties. It follows from this semantic thesis that there must be an interaction between semantic decisions and decisions about the sorts of objects and properties there are. These decisions are *ontological*. A full account of statements interpretation will be, then, in the sense hinted at above, syntactic, ontological, semantic, and pragmatic. The first part of this essay briefly outlines a theory of syntax for natural language. In the second part sketches a semantic theory, showing how ontological issues are involved. In the third part those ontological issues are more directly discussed. A satisfactory treatment of the pragmatics of statement interpretation requires an understanding of a variety of psychological, social, literary, and other concepts which I do not have. My silence on such issues will, I hope, be an indication of my willingness to sacrifice completeness for judiciousness.

SYNTAX

It is well known that Frege and his immediate followers had little or no confidence in the pursuit of a "logic of natural language". Frege never tired of pointing out the logical inadequacies of natural language. Its ambiguity, its looseness, its tolerance for inconsistency, and so forth, all rendered it a poor medium in which to conduct rational thought. By contrast the language of mathematics was an ideal medium for reasoning. Frege's initial goal was to build a logic which could account for rigorous mathematical proofs. This goal was eventually coupled with the logistic thesis (holding logic to be the foundation of mathematics) to produce what is today *the* standard logic, mathematical logic, in particular the standard first-ordered predicate calculus with identity. Only recently have contemporary logicians begun to examine the possibility of a natural language logic, hoping either to discover one commen-

surate with the standard system, or, more frequently, attempting to legislate the standard system as the *real* logic of natural language. Traditional, pre-Fregean logicians rarely doubted that any viable logic must be a logic of natural language. The lessons of grammar and intuitions of native speakers constituted the essential input for traditional logic theories. These logicians had little doubt that natural language was a proper medium for logical reckoning.

A theory of logical syntax is a basic requirement for any logic. And it is here, with syntax, that Fregeans depart most from traditionalists. Frege looked to mathematical formulae to provide clues to the syntax for his logic. The syntax of functions and arguments seemed to provide the appropriate solution to the initial question for any theory of logical syntax: How is a sentence more than just a string of terms? This question of sentential unity demands an account of how terms "fit together" to form sentences. Frege's solution distinguished between two kinds of terms, saturated and unsaturated. Unsaturated terms (function expressions, predicates) were incomplete. They contained one or more gaps. Since sentences must be complete (saturated) expressions, a predicate, or function, could not by itself constitute a sentence. In order to do that it must be "completed" by having its gaps filled. The gaps in functions could be filled by other functions (the first were then considered secondary functions) or by saturated, gap-free expressions (arguments, viz. names or sentences).¹ Frege's solution to the unity problem, a solution suggested by mathematics, was ingenious. Sentences are not thought of merely as strings of terms but as single complex entities whose parts are inherently suited to "fit" one another. Unity is the result of completing an incomplete expression--of filling all gaps.

The problem of sentential unity was likewise a challenge to traditional logicians. Since it is a basic problem for a theory of logical syntax it must be solved early on in the game. Consequently, we find that the traditional solution was offered by Aristotelians and has been more or less accepted by all traditionalists since. According to this solution what makes a sentence more than just a string of terms is not that some of its terms are incomplete and the rest complete them. Where the Fregean distinguished between two kinds of terms the traditionalist distinguished between terms and nonterms (what the scholastic logicians called "categorematic" and "syncategorematic" expressions). Sentences, on this view, are seen as pairs of terms connected by a (complex) syncategorematic expression. One term is the subject, the other is the predicate, and the job of the syncategorematic expression is to connect, "glue" the terms together to form a sentence. The subject-predicate account, unlike the function-argument account, was the one recommended by traditional grammar.

A viable and powerful system of logic was built on the foundation of the subject-predicate theory of logical syntax--the syllogistic. But it was not powerful enough. There are a variety of kinds of inferences which cannot be accounted for in traditional syllogistic. Inferences involving singular terms, identities, relational expressions, and compound sentences were all beyond the scope of the old logic. Leibniz, a traditional syllogist, had recognized this failure and sought, unsuccessfully, to extend syllogistic into a genuine universal logic by expanding the subject-predicate theory to cover sentences such as singulars, relationals, and compounds (traditionally called "hypotheticals").² The rapid, unimpeded, thorough ascendancy of Frege's logic over syllogistic during

the early days of our century is due in large measure to a theory of syntax which allowed easy and logically perspicuous analyses of all kinds of sentences which syllogists were generally forced to ignore. The present day hegemony of the standard first order calculus notwithstanding, Fred Sommers has recently challenged the new logic by mounting a campaign to carry out what amounts to Leibniz's unfulfilled program.³

There are two alternative but compatible ways of viewing the logical form of a simple natural language sentence, a sentence traditionally called "categorical". One view is "Aristotelian", the other is "Leibnizian". According to the Aristotelian view a categorical consists of two terms connected by a formative (syncategorematic) expression. Aristotle himself tended to favor this account, usually reformulating sentences like 'Every man is rational' and 'Some man is foolish' as 'Rational belongs to every man', and 'Foolish belongs to some man'. On this reading the expression 'belongs to every/some' connects two terms. Notice that while one could distinguish between subject and predicate here there is no need to. Syllogistic demands that any term be fit for either subject or predicate roles. The alternative, Leibnizian, view focuses on the subject/predicate distinction. It takes categoricals to consist of a subject and a predicate. A subject, in turn, is seen as consisting of a term (the subject-term) and a quantifier (a formative, syncategorematic expression); a predicate consists of a term (the predicate-term) and a qualifier, or copula (also a formative).

Sommers' "new syllogistic" is a rich and powerful system of logic, complete with a simple but effective algorithm. From the point of view of theoretical syntax it is often revealing to look at the logical forms of categoricals as Aristotelian. But for most logical purposes a Leibnizian analysis has been preferred by Sommers. In his logic, then, categoricals are analyzed as concatenations of subjects and predicates. These, in turn, are both seen as also syntactically complex, consisting in each case of a term and a formative. Since simple categoricals are the syntactically simplest kinds of sentences in natural language, it follows that there are no sentences which are not syntactically complex to some degree--there are no "atomic" sentences. This contrasts markedly with the modern Fregean view, which sees a favored class of sentences as exhibiting no degree of syntactical complexity. Such atomic sentences (the ones Quine calls "basic combinations") consist of a single function (predicate) and an appropriate number or arguments (names). Now predicates and names are both terms so that a basic combination contains no formative, syncategorematic element. Atomic sentences have zero degree syntactical complexity. Syntactical complexity is then introduced by formatives (viz., secondary functions) resulting in "molecular" sentences. Quantifiers and sentential connectives are the kinds of secondary functions which produce these syntactically complex sentences. The important thing to notice here is that the distinction between predicates and names is not a syntactic distinction (otherwise atomic sentences would have some degree of syntactical complexity). So what sort of distinction is the predicate/name distinction? It is obviously a semantic one. Only general terms are permitted to play the role of names. In the standard symbolism of today predicates and names are symbolized in different script not to indicate a syntactic difference but rather a semantic one. For the general/singular distinction is *prima facie* semantic.⁴

In the new syllogistic there are no atomic sentences. The canonical sentences of natural language consist of categoricals and sentences paraphrasable as categoricals. Any categorical consists of a subject and a predicate; and, since subjects and predicates are syntactically complex expressions, categoricals are always syntactically complex. The obvious question is how are the atomic sentences of Fregean logic analyzed on Sommers' theory in such a way that, contrary to appearances, they turn out to be syntactically complex? A Fregean would take, for example, 'Socrates is wise' as atomic, consisting of a predicate, '. . . is wise' whose gap is filled by a name 'Socrates'. We have seen that this distinction is ultimately semantic, so there is no syntactical work going on here. On Sommers' theory the semantic distinction between singular terms and general terms plays no role in logically formulating sentences. The difference between 'Socrates' and 'is wise' must therefore be construed syntactically. Accordingly, as a first step, 'Socrates' and 'wise' are both seen simply as terms. In 'Socrates is wise', 'wise', has been qualified to render the predicate 'is wise' (qualifier plus predicate-term). Notice that nothing determines a term as a predicate-term prior to its qualification. Any term can be either a subject-term or a predicate-term. Already 'Socrates is wise' has some degree of syntactical complexity on this theory simply because the predicate 'is wise' is syntactically complex, consisting of a term and a formative, the copula 'is'. (On the Fregean theory copulae are nothing more than empty marks, having no logical role whatsoever.) Still 'Socrates is wise' is not categorical and thus is not canonical unless it can be paraphrased with a quantified subject-term. Now scholastic logicians had generally construed singular sentences like this one as implicitly universal. Sommers, on the other hand, following a suggestion first made by Leibniz,⁵ takes singulars to be implicitly particular, containing a suppressed particular quantifier. What makes a singular sentence unique is not that it has no degree of syntactical complexity. Rather, given that its subject-term is known to be singular, it entails, on nonformal grounds, its corresponding universal. This feature, along with the standard subalternation, means, in effect, that for logical reckoning the subject of a singular sentence can be taken as arbitrarily either particular or universal—it has "wild" quantity.⁶ 'Socrates is wise', then, is paraphrased as 'Some Socrates is wise', a genuine categorical.

A theory of logical syntax which is not grounded on the semantic general/singular distinction is free to admit any term, general or singular, into any logical position, subject or predicate. In particular, this means that singular terms can be qualified and thus be predicate-terms. This is just how so-called "identity statements" are viewed from the perspective of the new syllogistic. Here all copulae are qualifiers (forming predicates from terms). There is no 'is' of identity. 'Tully is Cicero' has the same logical form as 'Tully is Roman' and 'Some philosopher is wise'.⁷

We have seen that the theory of logical syntax embedded in the new syllogistic takes singular sentences and identity statements to be, logically, simply categorical. But the greatest challenge to syllogistic's claim of universality has always been the proper treatment of relational sentences. It is safe to say that none of the many traditional attempts, including Leibniz's, to incorporate relationals into the theory of categoricals was at all successful. Yet Sommers has been able to provide an ingenious yet simple solution to this problem. His important insight is that relational sentences have predicates which are syntactically complex

in exactly the same way that categoricals in general are. Indeed, complex categoricals are complex because they contain some complex term, and every complex term has the logical structure of a categorical sentence. A relational term can be formulated as a subject plus a predicate (this predicate in turn is further analyzable in the case of relations of greater adicity). A sentence like 'Some boy kissed every girl' is analyzed as a subject, 'some boy' and a predicate, 'is a kisser of every girl'. This (complex) predicate is then analyzed as a subject, 'every girl' and a predicate, 'is a kisser'. It is important to keep in mind when using such an analysis that complex terms are *not* categorical sentences; they simply have the logical form of a categorical sentence. Finally, in Sommers' algorithm order among subjects is kept by use of numerical superscripts on relational predicate-terms.

The last kind of sentence requiring incorporation into syllogistic is the compound. A logic of compound sentences is not a Fregean invention. The Stoic logicians favored such a logic over a logic of categoricals. And for centuries afterwards philosophers and logicians worried about the best way to treat conjunctive, hypothetical, and disjunctive sentences. Generally speaking, syllogists attempted to treat compounds as categoricals. Leibniz held that in a true categorical the concept of the predicate is contained in the concept of the subject. He tried to treat compounds as categoricals by claiming that in a hypothetical the concept of the consequence is contained in that of the antecedent.

Une proposition catégorique est vrai quand le prédicat est contenu dans le sujet; une proposition hypothétique est vrai quand le conséquent est contenu dans l'antécédent.⁸

By contrast, contemporary logicians tend to treat compounds as foundational, with categoricals analyzed in terms of compounds and functions on compounds. A sentence like 'Every philosopher is wise' is parsed as 'If anything is a philosopher then it is wise'. Indeed, the accepted view today is that

The logic of propositions . . . is more fundamental than the logic of general terms . . . not in the sense that it includes the second, but rather in the sense that it presupposes the second.⁹

Yet it need not be the case that either categoricals are reduced to compounds or compounds are reduced by categoricals. A third alternative was suggested by Peirce. His suggestion was that though neither compounds nor categoricals are logically reducible to one another, both share a common underlying logical structure.¹⁰ Sommers has taken Peirce's suggestion quite seriously. In the algorithm for his new syllogistic conditionals are seen to have a common logical structure with universals, while conjunctions share their logical structure with particulars.

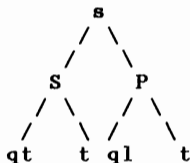
We want now to look at the underlying logical structure common to categoricals, identities, relationals, compounds. But before doing so one important notion must be introduced. One of the most basic and striking differences between syllogistic systems of logic and the standard predicate calculus is this: syllogistic logics recognize two kinds of negation; the standard calculus recognizes but one. On the standard theory today all negation is, logically, sentential. According to both traditional and Sommersian theories both sentences *and terms* can be negated. On this

view 'X is nonA' and 'Not: X is A' are logically distinct. Let 'A' be any term, then 'nonA' will be called its logical *contrary*. Every term has a logical contrary. Most terms have some *nonlogical* contraries. Thus, while 'nonred' is the logical contrary of 'red', 'blue', 'yellow', 'white' etc. are nonlogical contraries of 'red'. The logical contrary of a term is equivalent to the disjunction of all of its nonlogical contraries. Let 'p' be any sentence, then 'Not:p' will be its *contradictory*. Every sentence has a contradictory. Modern logicians have sometimes given part of the credit for the ascendancy of their logic over syllogistic to the elimination of the contrary/contradictory distinction. For the syllogist, of course, this loss was much too high a price to pay.¹¹

The general logical structure of natural language sentences according to Sommers' theory of logical syntax is best seen by constructing phrase structures trees for paradigm sentences. This turns out to be exceptionally easy to do since the phrase structure generation rules for this logic are so simple. In fact there are only four. The first requires that all sentences be logically construed as concatenations of a subject and a predicate. The second parses all subjects as quantified terms. The third parses all predicates as qualified terms. And the fourth takes all terms as either terms *per se* or as sentences. It is the recursiveness of the last rule which guarantees the generation of more complex sentences, such as relationals and compounds. Letting 's' stand for 'sentence', 'S' for 'subject', 'P' for 'predicate', 'qt' for 'quantifier', 'gl' for 'qualifier', and 't' for 'term', we can formulate our four rewrite rules as follows:

- (i) $s \rightarrow SP$
- (ii) $s \rightarrow qt\ t$
- (iii) $P \rightarrow ql\ t$
- (iv) $t \rightarrow t,\ s$

A *general* tree structure, then, would like like this.



Further syntactical complexity is introduced when either the subject-term or predicate-term, or both, is structurally analyzed as itself a sentence (according to rule (iv)).

The important points to keep in mind about the theory of logical syntax hinted at in this section are the following. Every sentence is construed in a binary fashion. Each sentential part itself is construed as a formative plus a term. Every term is possibly complex. All syntactical complexity is sentential. All terms come in logically contrary pairs. All sentences come in contradictory pairs.

SEMANTICS

In the logic of Frege, Russell, and Quine, semantic structure is revealed by syntactic structure. One gets at the meaning of a sentence only by first exposing its hidden logical form. Moreover, this logical form reveals the sentence's meaning by conspicuously exhibiting the truth conditions for that sentence. The idea here is that one understands a sentence only when one is in a position to say under what conditions the sentence would be true/false. In order to appreciate the contrast between our semantic theory and the one usually associated with today's standard logic let us sketch briefly Frege's theory.

In accounting for the syntactical unity of a sentence Frege distinguished, as we saw, between saturated (complete) and unsaturated (incomplete) expressions. Complete expressions are always names (including sentences). Incomplete expressions are functions (predicates). All expressions, when used in sentences, *refer*. Names refer by naming (standing for, designating) objects. Objects are the referents of names. Functions refer to *concepts*. Concepts are not objects. Functions do not name concepts. Naming is a special semantic relation in which names, but not functions, can stand to their referents. In addition to referring, both names and functions have *senses*, which they *express*. The sense of an expression is the way in which it "presents" its referent in a sentence. The sense of an expression is not an idea, which is a subjective, psychological entity. Rather it is an objective, public entity, which anyone who correctly uses the expression must have.

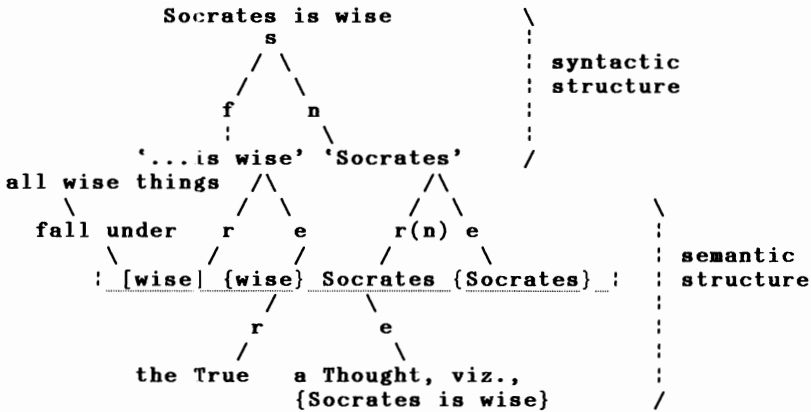
While functions in no way refer to objects, they do have one, indirect, semantic relation to objects. An object which is such that when a given function is completed by its name results in a true sentence is said to "fall under" the concept referred to by that function. Such objects constitute the *extension* of the function.

As we saw, a complete expression is a name. It follows that every sentence is a name. The objects named by sentences (*viz.* sentences used to make statements) are truth-values, the *True* and the *False*. True sentences name the True; false sentences name the False. The sense which a sentence has, in statement making use, is a *Thought*, which, though immaterial, is, like any sense, objective and public rather than subjective and private. To understand a sentence, according to such a theory is to "grasp" the appropriate Thought, which, in turn, will lead either to the True or the False. In a sense, the semantics of entire sentences is prior, in Frege's system, to the semantics of terms (names and functions). For he held that terms have meaning only in the context of a sentence. To understand a name or function, therefore, is to know how it contributes to the sense of the sentence in which it is used.

A Fregean semantics is in many ways epistemological, deriving its inspiration not only from the scholastics semantic theories (e.g., the theory of supposition), but from Kant as well.¹³ In addition to raising many epistemological questions Fregean semantics clearly raises a host of ontological questions. What is the object/concept distinction? What are Thoughts? What is the Truth/False? We offer below an alternative semantic theory, which, while sharing some Fregean features, is on the whole quite different (as one should expect from a theory of semantics

whose syntactical input is so radically different). For later comparison we can summarize Frege's theories of both syntactical and semantic structures by use of the following diagram analyzing a simple "atomic" sentence. In Figure 2 's' stands for 'sentence', 'f' for 'function', 'n' for 'name', 'r' for 'refers to', 'r(n)' for 'names', 'e' for 'expresses' '{x}' for 'the sense of "x"', and '[x]' for 'the concept of what is x'.

FIGURE 2.



In presenting our own semantic theory now it must be kept in mind that the syntactic input is always Sommersian rather than Fregean. We view all sentences (used in making statements) as concatenations of pairs of syntactically complex expressions, each of which consists of a categorematic expression (term or sentence) and a syncategorematic, formative expression. On this theory 'sentence' includes 'expression having the logical structure of a sentence'.

Every term of a natural language has associated with it a variety of semantic entities. From a theoretical point of view each term is first a lexical item. So we will say what semantic associations terms have qua members of the language's lexicon. Then terms are used in sentences. Terms have semantic associations qua sentence components. Finally, any term used in a sentence is either a subject-term (i.e. quantified) or a predicate-term (i.e. qualified). Terms, then, have semantic associations qua subject-term or qua predicate-term. Our semantics is thus three-tiered. Beginning *in medias res*, terms, qua sentence components, terms in use, always come in logically contrary pairs. For example, the term 'red' has 'nonred' as its logical contrary. Other examples are 'married'/'unmarried', 'hopeful'/'hopeless', 'colored'/'colorless' and 'wise'/'nonwise'. Notice that in English there are *negative* prefixes and suffixes ('non', 'un', 'less', etc.). A term without such an explicit mark of term negation is taken to be implicitly positive (though English does have a few signs of positivity for terms, e.g., the 'ful' of 'hopeful', the 'ed' of 'colored', or the 'some' of 'wholesome'). Which of a pair of logically contrary terms is taken to be negative and which positive is quite arbitrary from a semantic point of view. For it happens that for any explicitly negative term, say 'unwise' we can always define a positive term

which is semantically equivalent to it (perhaps 'foolish'). Thus 'wise', 'unfoolish', and 'unwise' are semantically indistinguishable. So are 'unwise', 'foolish', and 'ununfoolish'. We will say, therefore, that every used term is charged (positively or negatively), and that, semantically, the charge on terms is reversible.¹⁴

The fact that terms in use come in oppositely charged pairs permits a considerable economy in specifying the lexicon for a natural language. We could think of terms, *qua* lexical items, as uncharged, ignoring, in effect, whatever charge they have when in use. So rather than making a lexical entry for both 'wise' and 'unwise' we could simply enter 'wise'--uncharged. One problem of course is that terms without explicit charges are taken to be tacitly positive. But we can make use here of the mathematician's device for indicating absolute numerical values (e.g., '/2/' rather than '+2 or -2'). Our lexicon will then contain '/wise/' (read 'absolute "wise"'). Sommers has offered an interesting and potent theory of the semantics of absolute terms, which we will merely summarize here.¹⁵ Associated with each absolute term is a *feature* (also: mode, ontological attribute), which that term *comprehends*. A given feature is shared by all things which happen to satisfy the absolute term comprehending it. Thus, since both apples and lemons satisfy '/red/' (i.e., apples are red, lemons are nonred), apples and lemons have the feature comprehended by '/red/' (let us indicate this feature by '[/red/]'). Apples and lemons have the feature [/red/]. But numbers do not. The number 2, say, is not red--nor is it nonred (as lemons are). It does not have the feature [/red/]. On the other hand, numbers all share the feature [/even/], while no fruits have this feature. All things which share a given feature constitute a *category* with respect to that feature. The members of a given category are said to be spanned by the term which determines the category. [Sommers identifies ontology as the study of categories.)

It is natural to think of comprehension as an intensional relation and spanning as an extensional one. A different pair of intensional and extensional associations is established when a term is used in a sentence. And while the associations an absolute term has with the features and categories are of utmost importance for ontology, it is the semantic associations which a term has in use in a sentence which are of primary interest to the semanticist. Keep in mind that every term in use in a sentence is charged. Thus, '/wise/' and '/red/' may be lexical items, but they are not, normally, used in natural language sentences. What are used are 'wise', and 'unwise', 'red', and 'nonred'. A charged term in use in a sentence *signifies* a *property*. For example, 'red', used in a sentence, signifies the property of redness (let us indicate this property by '[red]'); 'wise' signifies wisdom, [wise]; and 'unwise' signifies foolishness, [unwise]. All the things which share a given property are said to be in the *extension* of the term signifying that property. It is important to notice that nothing requires that all the things which share a property exist. Having a property, being in the extension of a term, has nothing whatsoever to do with existence. My bathrobe has the property [red], and, as I recall, so does the one worn by Holmes. Victor Borge is Danish, has the property [Dane], and so is Hamlet. My landlady is fat, and so is the possible fat man in Quine's doorway. Eagles are winged and so is Pegasus. In spite of the fact that we have divorced having a property from being an existent¹⁶ (if nonexistents did not have properties we would have to resort to Goodman type *ad hoc* solutions to the problem of distinguishing between Hamlet and Pegasus), it is nonetheless

true that in the *ordinary* use of natural language sentences we do usually restrict, somehow, the extensions of our terms. And usually the extension of a term in ordinary use is restricted to existents. How is this done?

Every natural language sentence which is used is used relative to some specifiable *domain* of discourse.¹⁷ Indeed, one of the many pragmatic constraints on ordinary discourse is that the speaker and audience both understand which domain it is with respect to which the speaker's sentence is used. A domain is a totality of things. Any set is a domain. Not all totalities are sets. The actual world is a totality. Unlike a set, the actual world does not completely depend for its identity on its members. The set of children in my house now that my son is gone is a different set from the set of children in my house before he left. Sets are totalities fully specified in terms of their members. The actual world, on the other hand, is not fully specifiable in terms of its constituents. Things come and go from the actual world. The world is changed, constitutively, but not annihilated. I am the same person who sat here last year, in spite of the fact that many of the cells which then constituted me have since ceased to do so. A great deal more can be said about totalities such as the actual world or my body. But what is important to the semanticist is that each used sentence is used relative to some domain, and each such domain is a totality. Any set can be a domain; likewise any organic whole can be a domain. Most importantly, *any* world, actual or otherwise, can be a domain. The world of Greek mythology, the world of *Hamlet*, the possible world in which Nixon was not pardoned, and the world in which all lemons are blue are candidates for domainship. But, as we said, in ordinary discourse our domain is usually the actual world. It is because necessarily all constituents of the actual world are actual, exist, that we ordinarily conflate existence with having a property. Naturally not *all* of our sentences, even in ordinary discourse, are used relative to the actual world. When we say 'Pegasus was tamed by Bellerophon' our domain is the world of Greek mythology. We would be misunderstood by anyone who takes our domain in such a case to be the actual world. When we say 'Any successor of 3 is greater than 2' our domain is the set of natural numbers. When we say 'Any man over twelve feet tall would be scouted by every NBA team' our domain is a possible world (presumably similar to the actual world but having some men over twelve feet tall).

Suppose I give a party. Once all the guests have arrived I might announce 'Everyone is here'. Unless I've invited all persons in the actual world, my sentence would be false relative to the actual world. Clearly my domain is not the actual world but some subset of the persons in the actual world at that time. The term 'one' as used here has as its extension all persons. But the domain restricts that extension. In this case, the domain (*viz.* the set of persons invited to my party) restricts the extension of 'one' quite severely. But even if I had used my sentence relative to the actual world as a domain the extension of 'one' would still be limited. In that case the domain would limit the extension of 'one' to just actual persons, ruling out possible, mythical, imaginary, or fictitious persons. So, while a term used in a sentence has an extension, the extension is limited by the domain relative to which the sentence is used. The members of the subset of a term's extension so limited constitute the *denotation* of the term.¹⁸ Used relative to the actual world the 'one' in my announcement denotes all actual persons. Used relative to my guest list it simply denotes all the invitees. It is impor-

tant to realize that the denotation of a term is not a set but the members of a set. In 'Some logicians are fools', used relative to the actual world, the term 'logicians' denotes all logicians: Aristotle, Ockham, Leibniz, Frege, Russell, Quine, . . . It denotes all constituents of the actual world which have the property [logician]. The set of logicians does not have that property. A term used in a sentence relative to a domain denotes all of the constituents of that domain which have the property signified by it. In other words, a term used in a sentence relative to a domain denotes whatever is in the intersection of the domain and the extension of that term.

We have said that the semanticist is interested in terms *qua* sentence components rather than just *qua* lexical entries. And we have seen the semantic associations which terms have when they are used in sentences. But, given Sommers' theory of logical syntax, any term used in a sentence is either quantified or qualified. Syncategoremata effect the semantic associations of those terms to which they are applied. We can distinguish between those which are extensional and those which are intensional¹⁹ depending upon whether the syncategorematic expression affects the extensional or intensional associations of the term in question. Specifically, an extensional syncategorematic expression modifies the denotations of terms to which it is applied; an intensional syncategorematic expression modifies the significations of terms to which it is applied. Quantifiers are, in this sense, extensional; qualifiers are intensional. We begin with quantified terms.

According to the lights of modern first order predicate logic, the burden of reference rests completely on singular terms (e.g., pronouns for Quine, names for Geach). This is an important restriction for the standard logic since it, the system, accepts, without argument, a syntactic distinction between singular and general terms. General terms cannot carry any referential burden without dire Platonistic consequences. Quantified general terms cannot carry such a burden either, since, for example, an expression like 'no A' can in no way be construed as referential.²⁰

Nonetheless, Sommers has argued that all reference is achieved by the use of particularly or universally quantified terms. A consequence of this is that singular terms, both pronouns and names, are construed as being implicitly quantified when used in subject positions. The admitted semantic distinction between singular and general terms, as we saw earlier, is not reflected in any syntactical distinction in Sommers' logic. The full burden of reference is on quantified terms. Terms denote—quantified terms refer. The referent(s) of a quantified term is determined by the way in which the quantifier modifies the term's denotation. Universal quantifiers place a null restriction on terms to which they are applied. Thus universally quantified terms refer to just what they denote. Particularly quantified terms refer to an undetermined (though perhaps determinable) part (perhaps the whole) of their denotations. An expression such as 'every logician' refers to the entire denotation of 'logician'. If the domain is the actual world, then this is Aristotle, Ockham, Leibniz, Frege, Russell, Quine, An expression such as 'some logician' refers to an undetermined part of the denotation of 'logician', which, given the actual world for a domain, is Aristotle or Ockham or Leibniz or Frege or Russell or Quine or . . . (with inclusive 'or').²¹

The standard system accounts for the reference of terms like 'Socrates' and 'he' by taking them to refer *au fond*. The apparent reference carried by expressions such as 'some man' and 'every logician' is then eliminated by parsing sentences containing them in terms of sentences containing just names and pronouns in referential positions. Sommers' logic requires the opposite maneuver. The reference of names and pronouns is accounted for in terms adequate in the first instance for quantified expressions. As we have seen, Sommers simply takes singular terms to be implicitly quantified when in subject positions. A sentence like 'Socrates is wise', in normal use relative to the actual world, has the logical form 'Some Socrates is wise'. The expression 'some Socrates' refers to a part of the denotation of 'Socrates'. Now 'Socrates', in its normal use, denotes exactly one thing--Socrates. So 'some Socrates' cannot but refer to Socrates. Since the reference of 'some Socrates' exhausts the denotation of 'Socrates', any sentence of the form 'Some Socrates is F' entails a sentence of the form 'Every Socrates is F'. In effect, then, singular terms are indifferently quantified when used as subjects, and in natural language are not given explicit quantity. Again, notice that an inference of 'Every A is B' from 'Some A is B', where 'A' is singular, is not syntactic, formal, but semantic, material. It is licensed only by the extralogical semantic information that 'A' is a singular term.

As an extensional functor a quantifier modifies the denotation of a term. Qualifiers are intensional, modifying the significance of terms to which they apply. Any term used in a sentence signifies a property. Signifying a property, like denoting things, is a semantic role for terms used in a sentence, whether the term is used in a subject or a predicate. When used in a subject, i.e., when quantified, the term has the additional semantic role of reference. When used in a predicate, i.e., when qualified, it has the semantic role of *characterization*. The term 'wise' signifies [wise], the property of wisdom. In the statement-making use of the sentence 'Socrates is wise', 'wise' is qualified, yielding the predicate 'is wise'. Here the subject is being characterized as having the property signified by the predicate-term. We will say that qualified terms characterize their subjects as having a given property. In 'Socrates is wise' the subject is characterized as having [wise]. wisdom. In 'Socrates is unwise' the subject is characterized as having [unwise], foolishness.

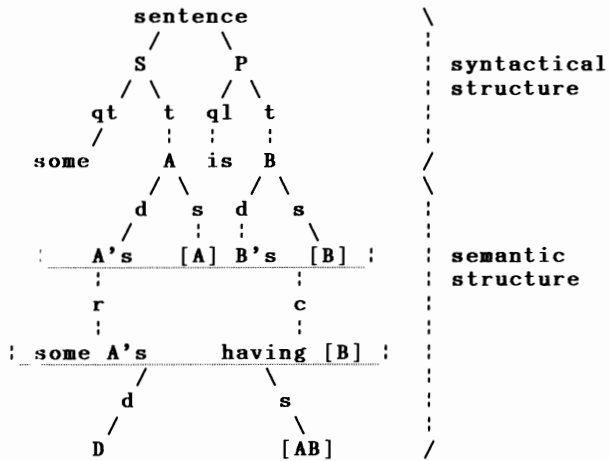
It is important to realize that any term when used in a sentence has both a denotation and a signification. And this is so both for subject-terms and predicate-terms. Yet, when a term plays a subject or predicate role one of those semantic features (signification in the case of subjects, denotation in the case of predicates) is apparently rendered, temporarily, inert. This is the work of the syncategoremata. The application of a quantifier to a term has the effect of semantically modifying that term by 'masking' (in a sense similar to that used by microbiologists when accounting for cell differentiation in terms of certain regulator genes being masked in some selected cell nuclei) its signification. Qualifiers mask the denotations of terms to which they are applied. Consider the sentence 'Every mortal is mortal'. The quantification of the first token of 'mortal' masks the signification of 'mortal', revealing only its denotation. The reference of 'every mortal', then, owes little to the term's signification. The qualification of the second token of 'mortal', masks the denotation of 'mortal', revealing now just its signification. The characterization by 'is mortal' owes nothing to the denotation of 'mortal'.

We said earlier that complex terms share the logical syntax of sentences. Sentences, then, can be viewed as syntactically complex terms. As such they have, when used, both a denotation and a signification. If we say that the signification of a sentence is a property the question naturally arises" What sort of property? The term 'red' could signify [red], but what property does 'Some planet is red' signify? Following a suggestion by Sommers,²² we will say that sentences, when used to make statements, signify properties of the domains relative to which they are so used. Moreover, the kinds of properties they signify are *constitutive*. Consider a stew. We could say of it that it is quite beefy and oniony but not salty. Here we characterize the stew in terms of properties it has (or fails to have) in virtue of what does (or does not) constitute it. A constitutive property of a totality is a property it has by virtue of some thing being (or failing to be) one of its constituents. Beef and onions constitute our stew. It has the constitutive properties of beefiness and onioniness. Salt is not a constituent of our stew, so it has the constitutive property of unsaltiness. Now, to use a sentence in making a statement is to characterize the relevant domain as having a specifiable constitutive property. For example, to use the sentence 'Some planet is red' to make a statement about the actual universe is to characterize the universe as having at least one constituent which is a red planet. Generally, to use 'An A is B' relative to domain D to make a statement is to characterize D as AB-ish, where AB-ish (or [AB]) is the constitutive property of having an A which is a B.

Given that sentences used to make statements signify constitutive properties of their domains, it is natural, then, to take the denotation of any such sentence to be its domain.

Just as the syntactic structure of any sentence can be displayed by use of a phrase structure tree, its semantic structure can be displayed by a semantic tree. A general syntactico-semantic tree for a simple categorical is given in Figure 3. There we let 'd' stand for 'denotes', 's' for 'signifies', 'r' for 'refers to', 'c' for 'characterizes as', 'D' for 'the domain relative to which the sentence is being used', and '[X]' for 'the property signified by "X"'. The syntactical segment of the tree is constructed according to Figure 1 above. Our sample sentence form is 'Some A is B'.

FIGURE 3.



Let us consider now some concrete examples. In each case let the domain be D.

FIGURE 4

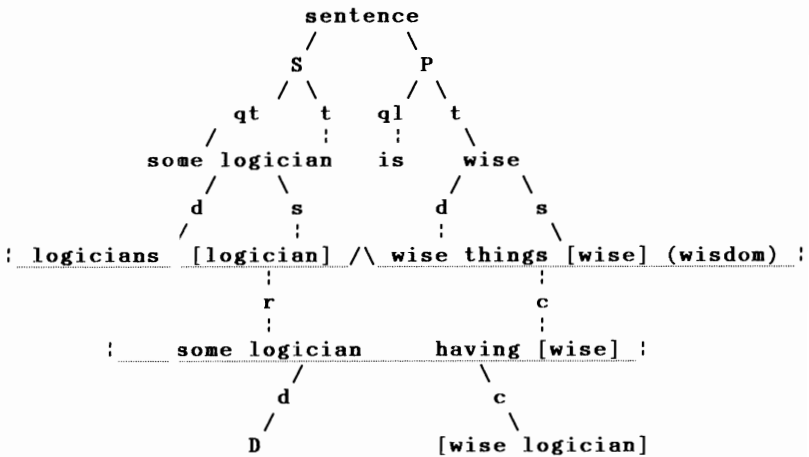
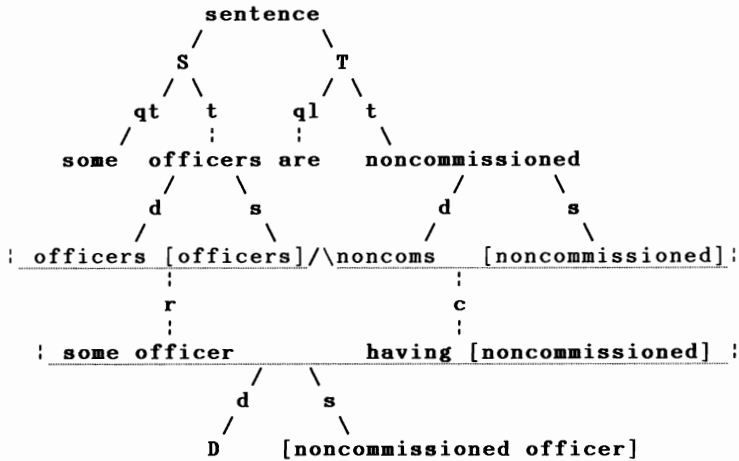
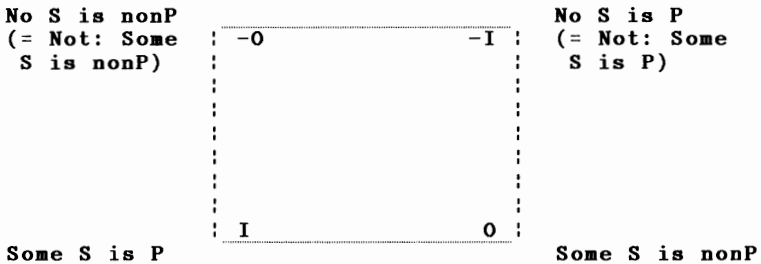


FIGURE 5.



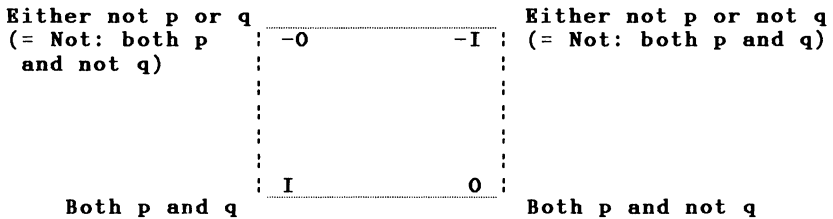
Examples 4 and 5 are, respectively, I and O form categoricals. I and O categoricals and their negations (-I and -O are taken as syntactically "primitive" by Sommers.²³ A schedule of all four primitive forms, arranged on a square of opposition would be a

Primitive Square



The natural assumption is then to equate the -O form with the A form and the -I form with the E form. Nonetheless, Sommers has resisted the temptation to do so. There are sound reasons for claiming that the A and E forms are definable as the negations of the O and I forms only under certain conditions. When one or more of these conditions fails the A and E forms are simply undefined. Moreover, since the syntactic structures of compounds are isomorphic with those of categoricals (Peirce's thesis) there is a similar restriction of them. Thus we could construct a parallel square for compounds.

Compound Square



Here the conditional forms are definable (within specific limits) in terms of the -0 and -I forms. In general, then, we have these definitions.

Every S is P \approx Not: No S is nonP

Every S is nonP \approx No S is P

If p then q \approx Not: both p and not q

If p then not q \approx Not: both p and q

Normally we can take these pairs as equivalent. But it must be remembered that there are certain circumstances in which the universal and conditional forms are undefined.²⁴ We saw earlier that all terms, including sentences, come in charged pairs. We now see that all I had O form sentences are positively charged, while all -0 and -I (including A and E) form sentences are negatively charged.²⁵

The question now arises: How are we to treat negated sentences? A sentence of the form 'Not: some S is P' denies of 'some S' just what 'Some S is P' affirms of 'some S'. Since the sentence 'Some S is P' characterizes what it refers to as *having* [P], the sentence 'Not: some S is P' must characterize some S as *lacking* [P]. An easy way to indicate this kind of negation would be to attach it to the qualifier. The result would be that the (logical) contrary of a sentence would be formed by negating its predicate-term, while the contradictory would be formed by negating its qualifier. Thus, while 'Some S is nonP' is the contrary of 'Some S is P', 'Some S isn't P' would be its contradictory. The sentence 'Some S isn't P' denies 'P' of 'some S'. The denial of any sentence is its contradictory. For example:

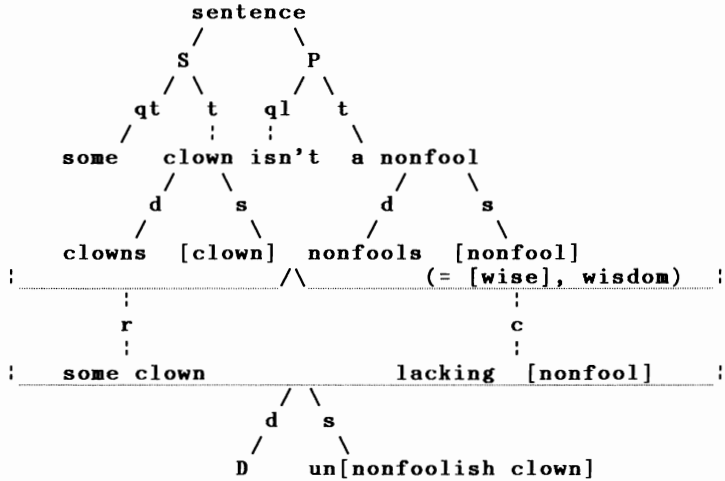
Every man is mortal = Not: some man is immortal

= Some man isn't immortal

Now in ordinary English we usually (recalling our grammar school instruction) allow denial signs and predicate-term negations of cancel one another. Thus we tend to equate 'Some man isn't immortal' with 'Some man is mortal'. Yet, from our logical point of view, we will resist this ill-advised inclination.²⁶

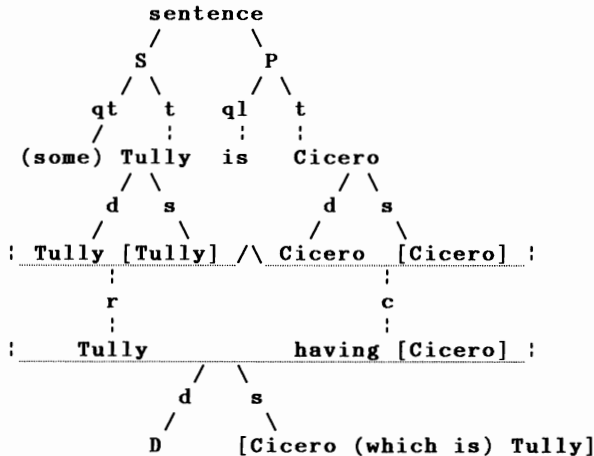
Consider now some further examples.

Figure 6.



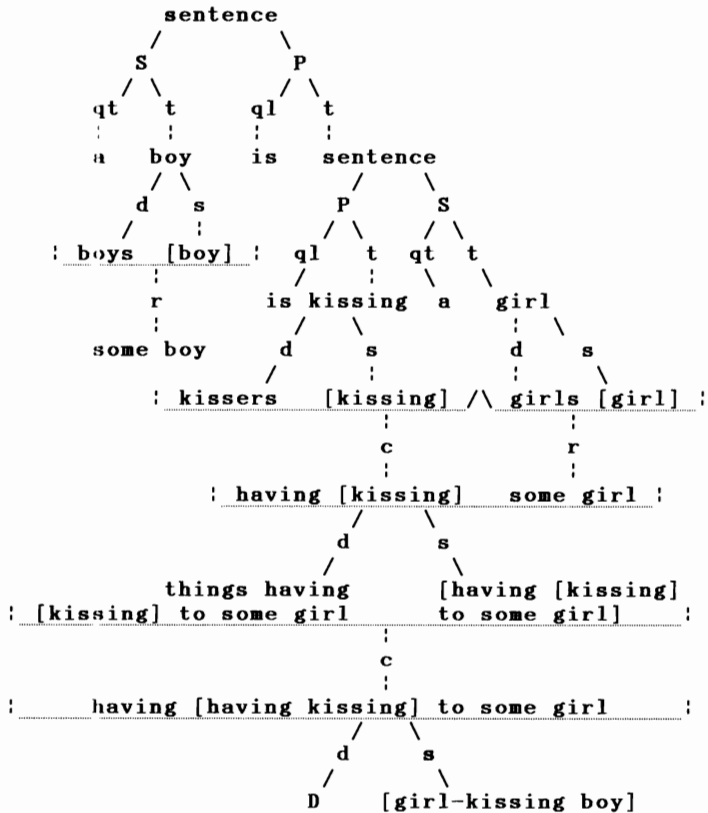
In this example we have, in effect, analyzed a sentence normally equivalent to 'Every clown is a fool'. Notice that just as our stew was unsalty, had the constitutive property of unsaltiness, because it did not contain any salt, our domain D above has the property un[nonfoolish clown] because it does not, if the sentence is true, contain any nonfoolish clowns. Finally note that in the constitutive property signified by the entire sentence 'un' and 'non' do not cancel one another.

Figure 7.



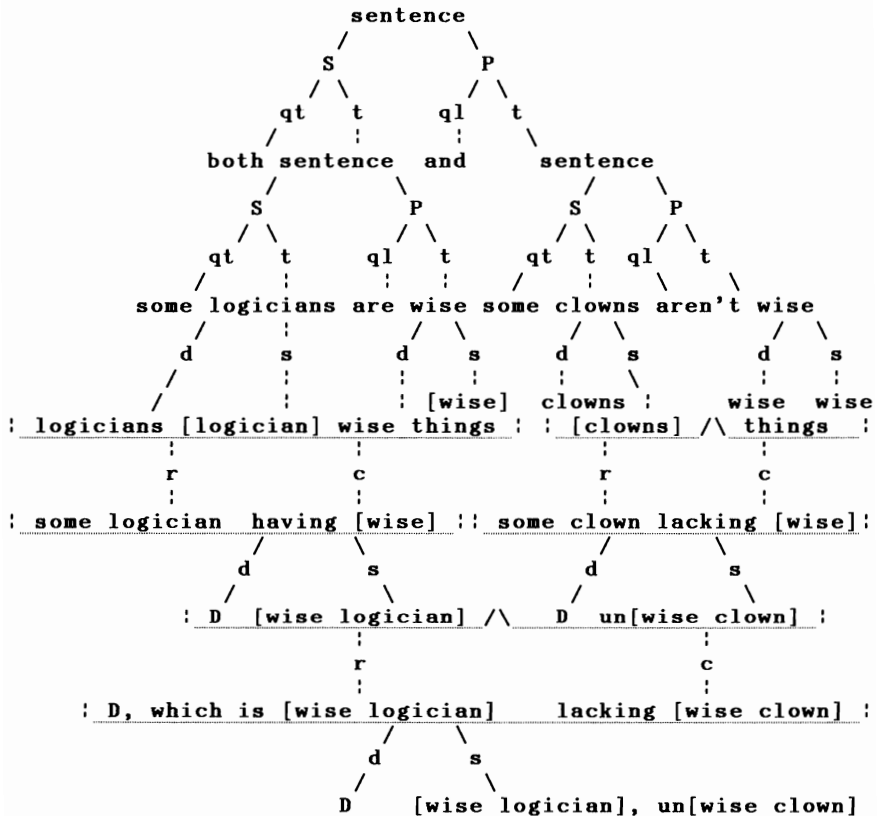
Notice here that [Cicero] is simply the property of being Cicero, a property which, given D as the actual world, Tully, and no one else, has.

Figure 8.



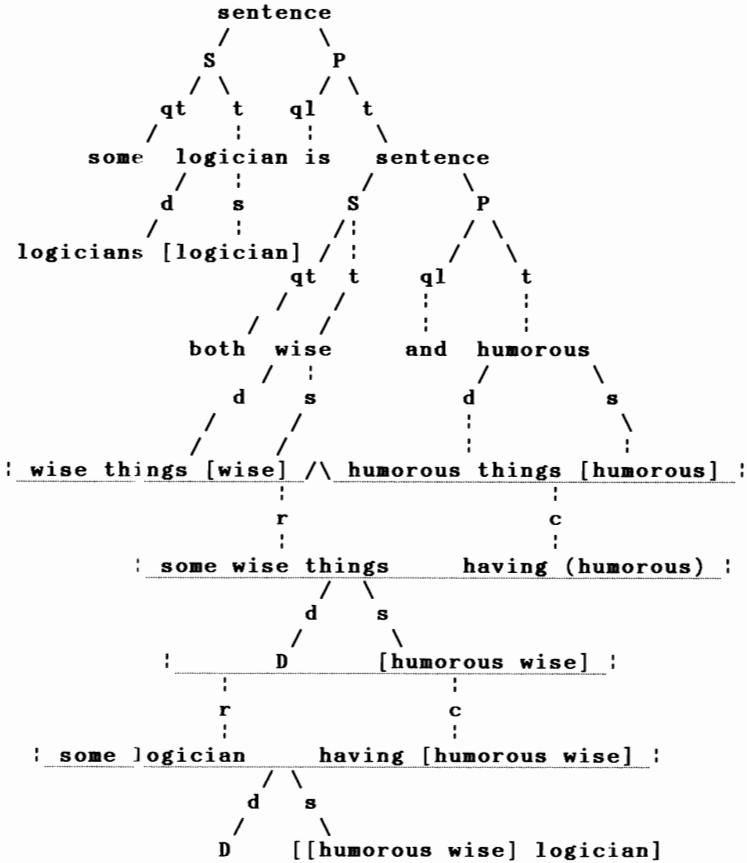
In this example the relational term 'kissing' denotes the field (in the set-theoretic sense) of the relation. We designate the members of this particular field simply as kissers. The entire sentence reads, 'A boy is kissing a girl'.

Figure 9.



Here we have analyzed 'Some logicians are wise but no clowns are'. Notice that, if the sentence is true, the domain has as a constituent at least one wise logician but no wise clown.

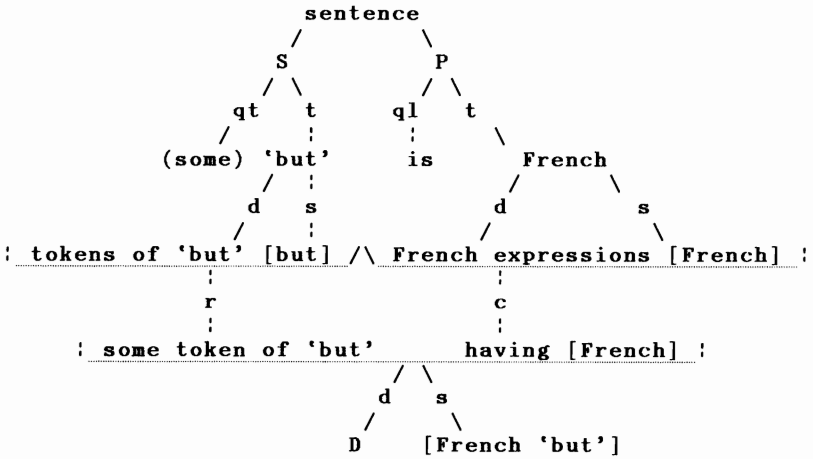
Figure 10.



In this case the entire sentence signifies the constitutive property of being a logician with the property of [humorous wise]. So, given the truth of the sentence, D has as a constituent a wise, humorous logician.

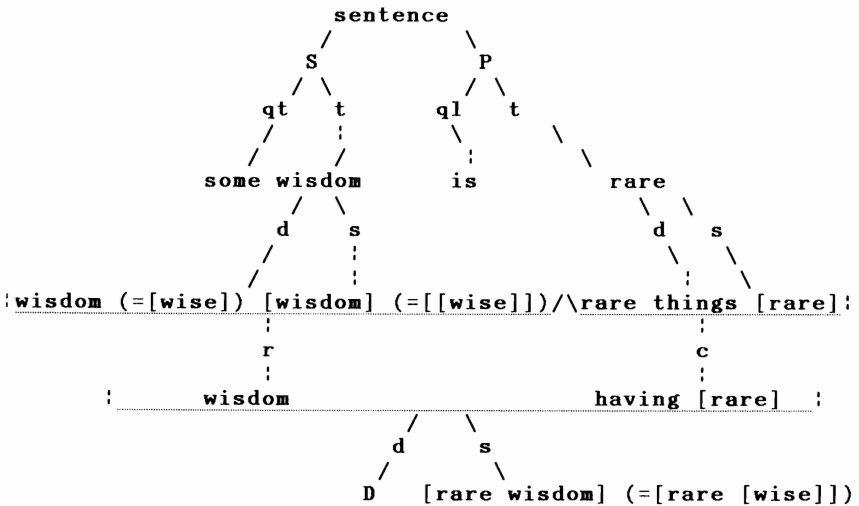
Often, even in ordinary discourse, we make references not only to objects like logicians, clowns, wise things, and such, but to (tokens of) expressions themselves and to properties. Here are some examples.

Figure 11.



Of course, other tokens of 'but' are English.

Figure 12.



In this analysis of the sentence 'That Nixon is free is deplorable' (= 'It is deplorable that Nixon is free'), the expression 'that Nixon is free' does not denote Nixon, nor tokens of the expression 'that Nixon is free'. It does denote the constitutive property [free Nixon]. If our sentence is used to make a true statement then D has as a constituent the deplorable constitutive property of [free Nixon].

By now many a reader will have been bothered by the assumption, and free use, of certain ontological notions with little or no justification. The most obvious question concerns the ontological status of properties, both constitutive and nonconstitutive. And we want to come clean about the notion of truth used here. These, and related topics, will be the concern of the final part of this essay.

ONTOLOGY

As noted earlier, in the sixties Sommers worked out a rich and elaborate theory of ontological structure. According to this theory (the "tree theory") any pair of absolute terms, say /X/ and /Y/, are related to one another in one of two exclusive ways. A categorical sentence with a charged version of one as the subject-term and a charged version of the other as predicate-term will either be sensible (though perhaps false) or nonsense (category mistaken, semantically anomalous). If any such sentence is sensible the two terms are said to be *U-related*. If no such sentence is sensible the two terms are said to be *N-related*. The bulk of Sommers' tree theory consists of two parts. First of all, given that any set of items with fixed relations to one another form a structure, Sommers set out to specify the rules which determine and constrain the structure of terms in natural language. The result was a "language tree". Then, having defined categories as sets of things spanned by a given term, he showed that the structure of categories, the ontological structure, was isomorphic with the language tree. This meant that a variety of ontological features could be gleaned simply by an inspection of the structure of ordinary language. The result was an extremely powerful theoretical tool for philosophical analysis, applicable to a wide range of metaphysical, theological, linguistic, logical, psychological, and epistemological issues.²⁷ While the tree theory might be used to say what *categories* of things there are (as determined by language) and how they are related to one another, it leaves open many other ontological questions. This of course is no criticism of the theory, which was intended to provide only the first, but absolutely crucial, step in the ontological enterprise. Our theory of semantics outlined above has raised some specific ontological questions which are still unanswered.

To begin with simpler things first, our semantics seems to require an ontology of at least objects and nonconstitutive properties. What are these and how are they related? Let us consider some classical approaches to this problem. Suppose I ask why a burning coal is hot. The answer is, naturally, that it contains a bit of fire. But why is the fire hot? Plato's answer was that fire participates in, reflects, resembles, the Form Hot. And Hot is simply hot by its very nature (unlike pieces of coal, bits of fire, dogs or cats, all of which are, if hot, so only because they participate in Hot or contain parts which participate in Hot). Forms have the properties, or natures, they have (Hot is hot, Good is good) by *being* those natures. Other things have those natures only by participation, reflection, or resemblance. Forms are what there are. Forms have

being. All else, particular objects, are mere appearances, unreal. Plato's ontology, then, is bilevel. Ontologically there are only Forms (leaving aside the question of souls). Particulars, individual objects, are ontologically secondary, dependent upon Forms.

Aristotle offered two, possibly compatible, ontological theories. The first, found primarily in *Categories*, divides "things there are" (τῶν ὄντων, as opposed to "things that are said", τῶν λεγομένων) into four groups according to two distinctions.²⁸ Given any subject, there are things that are *said of* it and things that are not. Also, given any subject, there are things that are *in it* and things that are not. Things that are in subjects are not parts of those subjects, according to Aristotle, but are properties which could not exist separated from a subject. Properties which *could* so exist are not only in the subject but said of it as well. What Aristotle had in mind here was a distinction, which he found lacking in Plato, between forms, or universals, and instances of those forms, which are dependent upon some individual. Thus, while heat is said of a burning coal, the-heat-of-this-coal is in the burning coal. Plato's vague notion of participation is abandoned by Aristotle.

A universal like heat is different from a universal like man in that, while both are said of a subject (e.g. Socrates on an August afternoon in the agora), heat depends on the subject in the sense that an instance of heat must be in the subject, while an instance of man is not in any man. Universals, like man, constitute the category of substance. Such universals exist independently of things in any other category. Universals in all other categories exist secondarily, depending for their existence on substances. Substance universals are said of but not in their subjects. Nonsubstance universals are both said of and in their subjects. Finally, there are things which are neither said of nor in any subject. These are individual objects, particulars like Socrates or that dog. So what are said of subjects are universals. What are not said of subjects are particulars. What are not in subjects are substances. What are in subjects are nonsubstances (accidents). Particular substances are "secondary substances", species and genera. Primary substances, particular objects, are ontologically basic (contra Plato) in that every other thing is said of a primary substance or is in a primary substance, or both.

Now what is said of a subject is predicated of it. So there are two kinds of predication, i.e., two kinds of predicates: substantial, essential predicates, and nonsubstantial, accidental predicates. Much of the *Organon* is devoted to formulating a logic of predication in general. But the ontology which Aristotle developed there was eventually seen by him to be in some ways inadequate. In *Physics* he undertook to give a definitive account of change, and it was in so doing that he realized the need to introduce the notion of *matter* as one of the principles, along with form, which accounts for any substance. Aristotle's account of change required something to survive change. In the normal case a substance (particular individual) undergoes "accidental" change, replacing one of its accidental properties by another contrary property, but survives the change as the same substance. Socrates sits, and thereby replaces sitting for standing, but remains Socrates throughout the change. But in some cases substances do not survive change. The tree becomes a table. One substance replaces another. This is not accidental change (substances have no contraries). No single substance has survived the

change. The tree has not given up an accidental property to take on another. It has instead given up its essence, its form, its treeness, what-it-is. This is "substantial", or essential, change. But while we cannot identify any substance which survives such a change, something does survive. What survives substantial change is matter.

In *Metaphysics* (especially Z) the role of substance in the primary sense was finally given to form, the actualizing principle of any particular individual. The two kinds of predications, accidental and essential, are now distinguished not only by their predicates but by their subjects as well. In accidental predication accidents, properties in categories other than substance, are predicated of individual or universal subjects. In essential predication forms are predicated of matter. While Aristotle's first ontological theory emphasized the primary existence of particulars and the secondary existence of species and genera, his second theory emphasized the primary existence of matter and form and the secondary existence of particulars. The debate over these two theories and how they are related continues.

Platonic, Aristotelian, and Neoplatonic ontologies, along with Catholic dogma, all influenced the attempts of scholastic philosophers to formulate an acceptable theory of what there is. The ancients' question of "the one and the many", whether universals or particulars have ontological priority became, in the hands of the schoolmen, more than an ontological question. It became the question of how and what terms mean. It became a semantico-ontological question. In simplest terms, the issue which most clearly divided scholastics here was the status of universals. Either terms mean by suppositing, standing for, things independently of us or they supposit mental entities. If they supposit external things then, while singular terms supposit individual things, particulars, general terms either supposit universals or particulars. Conceptualists held all terms to supposit mental entities. Realists, more strongly influenced by Platonic and Neoplatonic sources perhaps, took general terms to supposit universals. Nominalists, who appear to have developed the most elaborate semantic theories, refused to admit anything like universals or Platonic Forms into their ontologies. A variety of semantic relations were offered for general terms. But in each case such terms were seen as being related to particulars. More influenced by Aristotelian sources, these philosophers tended to distinguish between two kinds of general terms (recalling Aristotle's early distinction between two kinds of predicates. Terms like 'man' and 'horse' here "absolute"; terms like 'white' and 'short' were "connotative" or "appellative". Absolute terms signified particulars in two ways. They "narrowly" signified all the particulars of which they were true, and they "broadly" signified all the particulars of which they were possibly true. Connotative terms had, in addition to these kinds of "primitive" significance, secondary significance. They signified particular instances of a property inhering in the subject to which they were attached. Thus, in 'this coal is hot' the term 'hot' signifies, secondarily, the-heat-in-this-coal. The pay-off of this relatively complex semantic theory was a much simpler, literally Ockhamist, ontology, an ontology admitting only particulars, the kinds of things said in *Categories* to be either in or not in a subject but not said of any subjects.²⁹

Leibniz's metaphysics of God, possible worlds, and monads is well-known. What is not so well-known is his semantico-ontological theory, which evolved from his logical studies. Leibniz's ontology, like Plato's

was bilevel. In the most basic sense, what there are are monads. There are also rocks, rats, and raincoats. But these are only phenomenal objects. They are collections of monads and have no intrinsic unity themselves (since monads have no relations to one another), but appear as units, particulars, to some perceiving monads. Ultimately, then, the terms of natural language sentences get their meanings from standing in certain semantic relations to monads. But these relations are only transparent to God. As finite beings we ground the meanings of our terms on the phenomenal objects to which they are semantically related.

Leibniz saw the issue of meaning as primarily a question of truth-value determination for categorical sentences. The truth or falsity of a sentence depended, according to this view, on how the objects designated by the subject and predicate of a sentence were related. He offered two different ways of interpreting sentences. On the extensional interpretation the subject and predicate each designate sets of particulars, phenomenal objects. The sentence is true just in case the set designated by the subject is included in the set designated by the predicate. On the intensional interpretation, which Leibniz usually favored, terms designate concepts (representations of phenomenal objects in conscious monads). A sentence is true whenever the concept of the predicate is contained in the concept of the subject. Given Leibniz's general metaphysics, the inclusion of one set of particulars in another, or the containment of one concept in another, must be grounded on the intrinsic, natural properties of monads. And so it must be necessary. God can see this, so that from his point of view all truths are necessary. Our limitations bar us from seeing most truths as more than contingent.³⁰

Aside from certain artificial constraints placed on Leibniz's semantico-ontological theory by his metaphysics (as well as by his theory of logical syntax), in assessing it it is important to note that it rests in part on the assumption that both of the terms of a sentence must contribute to the interpretation of the sentence in the same way. This caused difficulties for both the extensional and intensional theories. Consider the sentence 'Every unicorn is green'. Since 'unicorn' designates the empty set, in the actual world, and since the empty set is included in every set, it follows that on the extensional interpretation this sentence is true of the actual world, contrary to our ordinary common sense expectations. But the intensional view fares no better. Consider the sentence 'Some swan is green'. Given Leibniz's account of particular affirmations, where such sentences are true when something consistent with the subject can be "added" to it, the sentence is also, counterintuitively, true. This is so since we could consistently add to 'some swan' the term 'green' to get 'Some green swan is green'. Now the concept of green is contained in the concept of green swan, so the sentence is true (not in the actual world, but in some possible world).

Let us end these historical sketches by looking briefly at the ontology which seems to be required by the semantics of today's standard first order calculus. Recalling Frege's semantics, outlined earlier, we can see that he was committed to an ontology rich in things other than just individual objects. It is a Platonistic ontology, countenancing concepts and senses (both of which are taken as objective, public things), the True and the False, and propositions. One of the important advantages claimed by modern logicians for their formalized language is that, unlike natural language, its syntax reveals its semantics. To see the logical form of a sentence is to know how to interpret it. While logicians from

Frege to the present have generally retained this view, epistemological and ontological fashions have shifted radically since Frege's day. In particular, late Nineteenth Century German Kantianism and Platonism are hardly favored in late Twentieth Century Anglo-American circles. The shift from Frege's semantico-ontological theory has progressed through Carnap, Church, Lewis, Goodman, and Quine to a generally empiricist and radically nominalist theory today.

Since the 1930's Quine has persistently pointed to the ontologically nominalist underpinnings of the standard first order predicate calculus.³¹ In spite of challenges to his nominalism, many by adherents to the standard logic program, some version of nominalism now seems most consonant with that program. The syntax of canonically formed sentences satisfies his Ockhamist demands, according to Quine. Reparsing according to the rules of standard first order syntax renders sentences which, as we have seen, are either atomic or functions of atomic sentences, molecular sentences. In either case the only semantic relation available in interpreting a sentence is the relation of reference to individuals. And the only expressions which can stand in this relation are bound variables, the logical counterparts of natural language pronouns. The job of bound variables is reference—pure and simple. Reference, for Quine, is the paradigm of an ontologically innocent, transparent semantic relation. Its only ontological demand is the existence of particular objects, referents. Other semantic relations are intensional, demanding intensional entities. Aside from economy and utility, Quine's main argument for an ontology of objects, *sans* intensional objects, is that we can formulate criteria for identifying and reidentifying concrete objects but not intensional objects. The vacuum left by rejecting meanings, possibilities, senses, propositions, essences, abstracta, etc. can be filled by classes (of concrete objects). In summary then, Quine's ontology (i.e., the ontology one is committed to whenever he or she speaks in an ontologically transparent manner) consists of particular concrete objects and classes thereof. To ask any more about the nature of objects, what there is, is to begin to tread on dangerous ground. For the only answer to such a question is Locke's characterization of substance: I know not what. Quine's objects are nothing more than bare particulars³² Admittedly, Quine's is not the only, or even last, word on the proper ontology for the first order calculus. Yet most alternatives are but variations or expansions on his basic theme. Clothing bare particulars by the use of sortal or restricted quantifiers³³ and achieving some degree of intensional freedom by the use of possible world semantics, nonbivalence, presupposition, and so forth are examples of this.

Our own semantic theory has led us to an ontology of at least objects and their properties, where properties themselves can be taken as objects. Objects and properties constitute the counter-domain of two semantic relations, denotation and signification, respectively. Terms constitute the domains (in the set theoretic sense) of these two relations. Objects are denoted by terms (as used in sentences). They are also referred to by quantified terms. In our theory, unlike Quine's, the burden of reference is on quantified terms rather than just pronouns. Our theory takes 'Some A is B' to refer to some A (not some *thing*). The importance difference here is that A's, unlike things, are *propertied* (clothed) since 'A' denotes just those things which have the property it signifies. The objects of our ontology, then, are propertied particulars. This insight is essentially Aristotelian. Every primary substance is the subject of some secondary substance.³⁴

Properties are signified by terms (as used in sentences). They are also what qualified terms characterize the referents of their subjects with. Properties are not classes of objects. Like Fregean concepts, properties are public and objective. But they are abstract, intensional, objects. Like Platonic Forms, they are ontologically independent, with properties of their own. Thus the sentence 'Moral perfection is more valuable than gold' refers to moral perfection (the property of being morally perfect, [morally perfect]) and characterizes it as having the property of being more valuable than gold. And this can be so even when our domain consists of no morally perfect particulars (e.g., the actual world).

While Plato and Aristotle differed about whether particulars or universals are more basic, on our theory objects and properties are on an ontological par with one another.

Our semantico-ontological theory has an important advantage over both those theories which interpret sentences completely in terms of intensions (e.g., Leibniz's favored theory) and those which do so completely in terms of extensions (e.g., modern nominalists like Quine and Goodman). Both theories assume that in any categorical sentence both terms must contribute to the interpretation of the sentence in the same way. Recall our two sentences 'Every unicorn is green' and 'Some swan is green'. Nominalists get into trouble over the first³⁵ while intensionalists get into trouble over the second. Our theory is a "mixed" one. The semantic contributions made by subjects and predicates in the interpretation of categorical sentences are different. The contribution of the subject is extensional; the contribution of the predicate is intensional. The problem of fully extensional or fully intensional interpretations are avoided. 'Every unicorn is green' is not interpreted as saying that the set of unicorns is included in the set of green things. 'Some swan is green' is not interpreted as saying that the concept or property of green is included in the concept or property of swan (green or otherwise). On our theory both sentences can be interpreted as straight forwardly false simply by taking into consideration the domains relative to which these sentences would normally be used to make statements. For the first sentence the appropriate domain is the world of mythology. Here 'unicorn' admittedly does not refer to anything in the actual world, but it does denote something in the mythological world--something which happens not to be green. If the domain were the actual world then the sentence would simply be undefined. Leibniz thought the second sentence must be true since it is true in some possible world (i.e., we could consistently qualify 'swan' to render the sentence true). For him, the absolute truth-value of any statement is the one known by God. And God knows all possibilities. This, in effect, means that God's only domain is that of all possibilities. But we need take neither God's view nor Leibniz's. For us, there are any number of domains to choose from in interpreting any sentence used to make a statement. In some possible world some swan is green; in the actual world no swan is green.

We have seen that our semantics commits us to an ontology of both the denotata and significata of terms in use. But some of those terms are themselves sentences. So we are committed as well to an ontology of the denotata and significata of sentences. Sentences denote domains. Domains, then, are objects. As objects domains have properties--not only constitutive but nonconstitutive as well. Thus, as a domain the

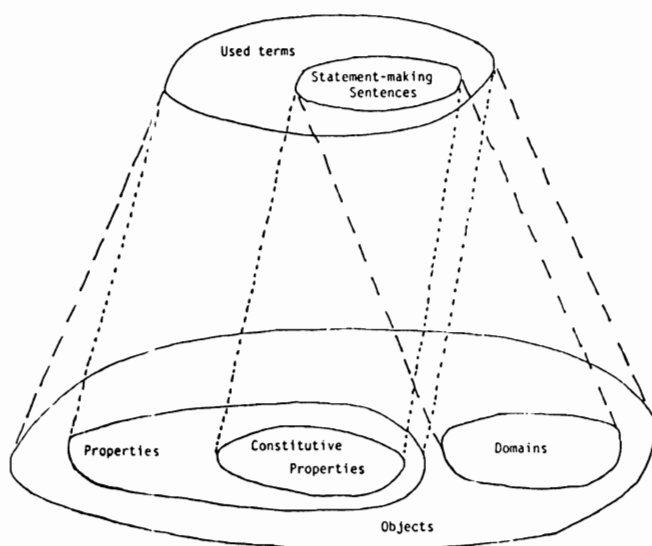
actual world is multi-membered, interesting, inclusive of the domain consisting of North American baseball teams, and included in the domain consisting of all possibilia.³⁵

Seen as terms, sentences denote and signify. What a sentence signifies is a constitutive property. Constitutive properties are properties of domains. To say that a given domain has a specified constitutive property is just to say that it contains a specified object. The notions of domains and constitutive property are tied together, as we had seen. And both are tied to a third notion, a notion which we have used in several places above but about which we have been fairly silent. The notion is truth.³⁷ Correspondence theories of truth are burdened with the task of accounting for the things to which true sentences correspond. These are usually propositions, states of affairs, situations, or facts--the kinds of things whose ontological status is notoriously hard to pin down. Strawson's attack on correspondence theories on just such grounds has been effective.³⁸ But it has often left the impression that no version of the theory is ontologically viable. Our theory is a correspondence one, which nonetheless avoids Strawson's criticism by avoiding the temptation to include propositions, states, facts, and the like in its ontology.

Aristotle distinguished between statement-making sentences, in which there is truth or falsity, from sentences in which there is neither truth nor falsity (e.g., prayers, petitions, questions, commands).³⁹ And so will we. A sentence has a truth-value only when it is used to make a statement. To use a sentence to make a statement is to do two things in one act: to utter an appropriate sentence and, *eo ipso*, to make a truth-claim. It is relatively easy to decide whether or not a speaker has uttered an appropriate sentence. Whether he or she has made a truth-claim thereby is a matter of discerning his or her intentions. And this depends upon recognizing a wide variety of contextual, conversational, social, and other clues. To make a truth-claim is to claim implicitly that the sentence being used is true. So to make a statement is to use a sentence and in so doing implicitly claim that the sentence is true. But what is it to claim, implicitly, that a sentence is true? First of all, it is not to make a second statement about the sentence. To see what it is remember that every sentence in use is used relative to a specifiable domain. The sentence itself denotes that domain, and it also signifies some determinate constitutive property. To claim that a sentence is true is simply to characterize that domain as having that property. Suppose, relative to the actual world, I use 'Some men are bald' to make a statement. My implicit claim is that the actual world contains at least one bald man. Whether my claim is sound, i.e., whether I make a true statement depends upon whether there are any bald men in the actual world. Suppose, again relative to the actual world, I say 'Some horses are winged' in order to make a statement. What I say is true just in case there are any winged horses in the actual world. Since there are no winged horses in the actual world (how we know this is another--epistemological--issue) my sentence is false. The actual world is characterized by not having any winged horse as a constituent. Notice that this account in no way depends upon anything like states or facts. What I say is not true or false by virtue of there being anything like states or facts anywhere, but simply by virtue of there being bald men or winged horses in the actual world. Had you wished to determine the truth-value of my 'Some men are bald' you would not have inspected the world for any states (e.g., the state of affairs in which some men are bald) or

facts (e.g., the fact that some men are bald). You would have simply, and naturally, inspected the world for bald men. Had I said 'Some horses are winged' relative to the world of Greek mythology I would have made a true statement since there are indeed constituents of that domain which are winged horses. To summarize then, a sentence used to make a statement is true just in case the domain it denotes is characterized by the constitutive property it signifies. On such a theory the objective correlates of true sentences (what true sentences "correspond to") are constitutive properties. It is a correspondence theory without propositions, states, facts, and the like.

We have now seen that our theory of truth can be formulated in such a way that our ontology of objects and properties need not be augmented with states or facts or such things. Quine has often claimed that ontological commitment is made explicit through our use of those natural language idioms which correspond to the bound individual variables of the first order calculus. Our claim is that we are ontologically committed to objects and their properties by the used terms (quantified and qualified, simple and complex) of our natural language sentences when used to make statements. The projection diagram below illustrates and summarizes the ontology demanded by our semantic theory (dash lines indicate projection by denotation, dot lines indicate projection by signification).



But, where Quine has identified ontological with existential commitment, we do not. From his point of view the speaker must be extremely cautious in his or her talk about winged horses, possible horses, intended horses, imagined horses, etc., lest he or she inadvertently undertake an existential commitment to such things. This means that we not let such things be the values of our bound variable, or their natural language analogues. But that, in turn, means not referring to them. Nonetheless, in ordinary discourse we often have occasion to make such references. And we do so, quite successfully usually, without thereby making any unwanted existential commitments. We can do this because we all normally share tacit recognition of the domains relative to which our sentences are used. We have an ontological commitment to any object or property denoted or signified by the terms of our used sentences. And, since sentences are always used relative to specifiable domains, our ontological commitments are domain-relative as well. In using 'Some horses are winged' relative to the world of Greek mythology I commit myself to an ontology of, *inter alia*, winged horses. Yet I do not thereby commit myself, in any way, to the existence of winged horses. For existential commitment is made only by the use of terms in sentences used relative to the actual world. When my domain is the actual world the terms I use impose on me not only ontological commitments but existential commitments as well. Since in ordinary discourse our understood domain is usually the actual world, our ontological commitments are usually existential. It follows from our theory that vacuous sentences (those whose referring expressions--quantified terms--fail to refer) are vacuous not because any referents fail to exist (except for the actual world domain) but because the purported referents fail to belong to the relevant domain. To be is to belong to the relevant domain. To exist is to belong to the actual world.

Concluding Remarks

Contemporary semantic theories, in particular those favored by logicians, are decidedly extensional and nominalistic. Their syntax draws a radical distinction between two kinds of terms, singular and general. Their ontology admits only (concrete) objects. Consequently, their semantics, which accounts for the relations which must be recognized between linguistic expressions and ontological entities in order to properly interpret statement making sentences, must account for two kinds of semantic relations: the name relation between singular terms and objects and the predicate (is true of) relation between general terms and objects. Such theories answer the question: Why is Socrates wise? By claiming that 'wise' is true of him. And why is 'wise' true of Socrates? Because (and here Tarski's Convention T is seen as an important element of modern semantics) Socrates is wise.

Much of modern nominalism is not so much a positive response to genuine philosophical questions, but a negative reaction to the Platonism of Frege and the early Russell. Where the nominalist opts for a simple ontology, which he pays for with a relatively complex semantics, the Platonist opts for a simple semantics, paid for by a relatively complex ontology. The Platonist's ontology admits both objects and properties (universals, Forms). But the Platonist's semantics require only one kind of semantic relation. Linguistic expressions simply refer; some refer to objects, others refer to properties. So the answer, on this kind of the-

ory, to why Socrates is wise is quite simple: Because Socrates has the property of wisdom.

We have rejected the nominalist's policy of ontological parsimony at all costs. We have been willing to admit a modestly expanded ontology. But we have also rejected an apparent Platonistic policy of semantic simplicity at all costs. In fact, our theory sees both of these extreme views as overly simplistic (though in different ways). The nominalist's account of what there is, the ontology, is too simple. The Platonist's account of how expressions have meaning, the semantics, is too simple. The source of each of these errors just may be syntactic. Modern nominalists and Platonists alike have failed to distinguish clearly between terms, on the one hand, and subjects and predicates, quantified and qualified terms, on the other. On our syntactic theory the asymmetry between subjects and predicates is completely syntactic, fully accounted for in terms of the difference between two kinds of syncategorematic, formative expressions. For the nominalist these differences rest on the singular/general distinction. And what is worse, the singular/general distinction rests on the reference/is-true-of distinction, which, in turn rests on it. For the Platonist the subject/predicate asymmetry rests on the object/property distinction. In formulating our own theory we have chosen to build a theory of syntax *before* either a semantic or an ontological theory. Granted no one can gainsay the intimate connections which must hold among matters of syntax, semantics, and ontology, the fact remains that thus far theories which allow these kind of factors to become prematurely entwined with one another have proved to be inadequate for accounts of natural language. For the most part issues of syntax have not even been raised since the hegemony of the first order calculus in logic has blinded us to any conceivable alternative. Nonetheless, by posing a theory of syntax such as ours (*viz.* Sommers'), the burden of accounting for subject/predicate asymmetry (which is really just the question of sentential unity in another guise) is taken from the shoulders of semantics and ontology. Our syntax has helped guide us to the referential/characterization and object/property distinctions. The hope is that the kinds of relative complexity such a theory accepts, ones avoided by the popular alternatives, are justified by the power and fertility of results.

The theory sketched here clearly does not answer all the semantic questions raised by Sommers' logic. We have ignored virtually all pragmatic issues, and there is much to say yet about modality, synonymy, propositional attitudes, and a host of other relevant topics, both semantic and ontological. But the challenge of rectifying those errors and approaching those further topics from the new perspective offered by Sommers' logical work is both refreshing and exhilarating.

END NOTES

- ¹ See especially "On Concept and Object" in Geach and Black, 1970.
- ² See Castañeda, 1976, and Englebretsen, 1982a.
- ³ Sommers' "new syllogistic" is developed for the most part in Sommers, 1967, 1969, 1970, 1976, and 1982. See also: Englebretsen, 1979, 1981a, 1985, and forthcoming a; Friedman, 1980; Strawson, 1982' and Van Ben- them, 1983.
- ⁴ For more on this see: chapter one of Sommers, 1982; Wald, 1979, and Englebretsen, 1982b, 1984a, and forthcoming b.
- ⁵ In a paper on "Some Logical Difficulties" written sometime after 1690. See Parkinson, 1966, especially 115.
- ⁶ For more on this notion see, in addition to the works cited in notes 3 and 4, Noah, 1973; Slater, 1979; Englebretsen, 1980, 1983 and forthcoming c. Sommers' treatment of singulars as implicitly particular reminds one of Montague's treatment of names as having the same categorial analysis as quantified terms, viz. $s/(s/n)$. See Montague, "The Proper Treatment of Quantification in Ordinary English", reprinted in Hintikka, Moravcsik, and Suppes, 1973.
- ⁷ In addition to the works already cited see Englebretsen, 1981b, 1981c, 1982c, 1984b, and forthcoming d.
- ⁸ Quoted in Castañeda, 1976, 484.
- ⁹ Kneale and Kneale, 1962.
- ¹⁰ A discussion of Peirce's thesis is found in Dipert, 1981.
- ¹¹ An extensive, but often overly polemical, view of this contrast is found in Englebretsen, 1981d.
- ¹² For a fuller discussion of the phrase structure grammar for Sommers' logic see Englebretsen, 1984c.
- ¹³ For an extended account of the epistemological element in Frege's logic see Sluga, 1980.
- ¹⁴ Cf. DeMorgan, 1966, 2f. See as well G. Englebretsen, "Logical Polarity", in Englebretsen, forthcoming a.
- ¹⁵ See Sommers, 1959, 1963, 1965, 1971, and chapter thirteen of 1982.
- ¹⁶ Cf. The penetrating remarks by Martin, 1979, 293.
- ¹⁷ This particular notion of *domain* is due to Sommers. See Sommers, "Truth and Existence" in Englebretsen, forthcoming a, and Sommers, 1983.
- ¹⁸ Cf. Venn, 1889, 179-80.

- ¹⁹ See Gupta, 1980.
- ²⁰ This is a favorite Geachian argument. See, for example, chapter one of Geach, 1962, and sections 1.5 and 3.8 of Geach, 1972.
- ²¹ This denotation/reference distinction sheds light on the scholastic doctrine of distribution. A term is distributed in a sentence if and only if that sentence entails a sentence in which that term refers to its entire denotation.
- ²² See Sommers' "Truth and Existence" in Englebretsen, forthcoming a.
- ²³ See especially chapters thirteen and fourteen of Sommers, 1982.
- ²⁴ In addition to chapter fourteen of Sommers, 1982, see the discussion of this topic in Englebretsen, 1984d and e.
- ²⁵ There is one important disparity between the charges on terms and those on sentences. It does not affect our thesis here, but see Englebretsen's "Logical Polarity" in Englebretsen, forthcoming a.
- ²⁶ This would be easier to do in Latin, for example, where the predicate-term negation/predicate denial distinction is easily marked by position. Thus: *Socrate est non animal* \neq *Socrate non est animal*.
- ²⁷ The literature concerning the tree theory has become quite extensive. But, in addition to the works by Sommers cited in note 15, see Englebretsen, 1971.
- ²⁸ la20-1b10.
- ²⁹ It is interesting to note that the scholastic Conceptualist-Realist-Nominalist debate is still alive and well in our century, particularly among linguists (with prodding now and then from logicians and cognitive psychologists). Nominalism, inherited by Quine from Bloomfield, Katz's realism, and Chomsky's conceptualism are today's counterparts. See the valuable collection of essays illustrating these division in Katz, 1985.
- ³⁰ Leibniz's semantico-ontological theses are scattered throughout his logical and metaphysical work. See Parkinson, 1966, and *Monadology* in Schrecker and Schrecker, 1965.
- ³¹ The most widely known of these attempts are Quine, 1960, and "On What There Is", reprinted in Quine, 1953.
- ³² Quine may have qualms about bare particulars but he has made this comparison himself. See "The Variable and Its Place in Reference", in Van Straaten, 1989, 165, and "Grammar, Truth and Logic", in Kanger and Ohman, 1981, 25.
- ³³ Gupta, 1980.
- ³⁴ The point is discussed in detail in Durrant, 1973.
- ³⁵ For the classic attempt to avoid these difficulties see Goodman's "On Likeness of Meaning", revised and reprinted in Linsky, 1952.

³⁶ The idea that domains are structured by mutual inclusion relations can serve as a basis for a new modal logic. Interesting and important as it is, I leave this topic for another day.

³⁷ The discussion of truth to follow relies heavily on a theory presented by Sommers in Sommers, 1983.

³⁸ See Strawson's "Truth", reprinted in Pitcher, 1964.

³⁹ 16b33-17a7.

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