What is Logical Form?

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Philosophy, as we use the word, is a fight against the fascination which forms of expression exert upon us.
‘ *Wittgenstein*

I

Bertrand Russell, in the second of his 1914 Lowell lectures, *Our Knowledge of the External World*, asserted famously that ‘every philosophical problem, when it is subjected to the necessary analysis and purification, is found either to be not really philosophical at all, or else to be, in the sense in which we are using the word, logical’ (Russell 1993, p. 42). He went on to characterize that portion of logic that concerned the study of *forms* of propositions, or, as he called them, ‘logical forms’. This portion of logic he called ‘philosophical logic’. Russell asserted that

> ... some kind of knowledge of logical forms, though with most people it is not explicit, is involved in all understanding of discourse. It is the business of philosophical logic to extract this knowledge from its concrete integuments, and to render it explicit and pure. (p. 53)

Perhaps no one still endorses quite this grand a view of the role of logic and the investigation of logical form in philosophy. But *talk* of logical form retains a central role in analytic philosophy. Given its widespread use in philosophy and linguistics, it is rather surprising that the concept of logical form has not received more attention by philosophers than it has.

The concern of this paper is to say something about what talk of logical form comes to, in a tradition that stretches back to (and arguably beyond) Russell’s use of that expression. This will not be exactly Russell’s conception. For we do not endorse Russell’s view that propositions are the bearers of logical form, or that appeal to propositions adds anything to our understanding of what talk of logical form comes to. But we will be concerned to provide an account responsive to the interests expressed by Russell in the above quotations, though one clarified of extraneous elements, and expressed precisely. For this purpose, it is important to note that the concern expressed by Russell in the above passages, as the surrounding text makes clear, is a concern not just with logic conceived narrowly as the study of logical *terms*, but with propositional form more generally, which includes, e.g., such features as those that correspond to the number of argument places in a propositional function, and the categories of objects which propositional functions can take as arguments. This very general concern with form is expressed above in the claim that *all* understanding of discourse involves some knowledge of logical forms. It is logical form in this very general sense, which is connected with an interest in getting clear about the nature of reality through getting clear about the forms of our thoughts or talk about it, with which we will be concerned.[1]

The conception we will champion dispenses with talk of propositions, reified sentence meanings, as a useless excrescence, and treats logical form as a feature of sentences. Consonant with Russell's general interest in the form of propositions, we will treat talk about the logical form of a *sentence* in a language L to be essentially about *semantic* form as revealed in a *compositional meaning theory for L*. We do not, however, treat logical form itself as a sentence, or anything else. On our account, it is a mistake to think that logical forms are *entities*, or to think of logical form as revealed by what symbols occur in a sentence, either in its surface syntax, or in the syntax of its translation into an 'ideal' language. Rather, we will take the relation of *sameness of logical form* as basic. We will give a precise account of the notion of sameness of logical form between any two sentences in any two languages, first for declarative sentences, then for sentences in any sentential mood. Our account is inspired by remarks of Davidson, and we develop the account for declaratives in the context of a Davidsonian truth-theoretic semantics. We develop the account for non-declaratives in terms of a generalization of the notion of an interpretive truth theory, namely, that of an interpretive fulfillment theory.

We will also be concerned to say something about the relation of this characterization of logical form to logic more narrowly conceived, that is, a study of the semantics of logical terms or structures. We will urge that these are distinct, and, to some degree, independent concerns. We will also suggest a criterion (essentially due to Davidson) for picking out logical terms or structures that is particularly salient from the standpoint on logical form we advance, though we make no claim for its being the only way of extending in a principled way the use of the notion beyond where it is currently well-grounded. (This discussion will show, incidentally, that no good basis exists, contrary to what has been relatively recently alleged (Etchemendy 1983; Etchemendy 1988; Etchemendy 1990; Lycan 1989), for denying that a principled distinction between the logical and non-logical *terms* of a language can be drawn.)

The program of our paper is as follows. In section II, we consider the origins of the notion of logical form in reflection on argument form, and criticize two traditional conceptions, one of which remains dominant. In section III, we introduce the notion of logical form we wish to develop, logical form as semantic form, and describe our conception of how to use a truth theory to give a compositional semantic theory for declarative sentences in a language as background for our development of this conception. In section IV, we give a precise characterization of sameness of logical form of sentences applicable across languages in terms of the notion of corresponding proofs of the T-sentences for them in *interpretive truth theories* for the languages. This allows us to clarify what could be meant by the expression '*x* is the logical form of *y*'. In section V, we employ examples from natural language semantics in illustration of the usefulness of the present approach. In section VI, we show how the basic approach can be extended to non-declarative sentences. (This extension is based on some work by one of the authors (Ludwig) which the other (Lepore) has some reservations about, so it is put forward here as a *suggestion* about how this desirable extension might be effected.) In section VII, we discuss the relation of the conception of logical form we advance to the project of identifying logical terms or structures, and contrast it with an alternative conception articulated in terms of an invariance condition traceable back to (Tarski 1986) and (Lindstrom 1966a). Section VIII is a brief summary and conclusion.

II

The origin of interest in logical form lies in the recognition that many intuitively valid natural language arguments can be classified together on the basis of common features, a form which guarantees their validity apart from their different content. We group together arguments which exemplify a pattern, and say that they share a form. Forms of arguments are represented by replacing (certain) of the expressions in their premises and conclusions with schematic letters ' thereby abstracting away from what the arguments are about. This gives rise to a common characterization of the logical form of a sentence, namely, that structure of a sentence that determines from which sentences it can be validly deduced, and which sentences can be validly deduced from it and other premises, where these sentences are in turn characterized in terms of their logical structures.

This loose characterization is far from satisfactory because it leaves unexplicated how 'structure of a sentence' is being used. Logical form cannot be just any schema that results from replacing one or more expressions within a sentence. There are too many, and not every such schema will be taken to reveal logical form. In addition, for sentences with more than one reading, such as [1], we associate more than one logical form, but they will generate the same schemas.

[1] Everyone loves someone.

Similarly, sentences we are intuitively inclined to assign distinct logical forms, such as the pairs [1]-[2], [3]-[4], and [5]-[6], yield the same schemas. Likewise, sentences, as might be urged for the pair [6]-[7], to which we wish to assign the same logical form (in the same or different languages) may yield distinct schemas. Examples can be multiplied endlessly.

[2] John loves Mary.
[3] Dogs bark.
[4] Unicorns exist.
[5] The President is a scoundrel.
[6] The whale is a mammal.
[7] Everything which is a whale is a mammal.

Russell's response, of course, was to bypass sentences and to take logical form to be a property of the *propositions* that sentences express (as above). This renders intelligible talk of similar sentences having distinct logical forms, and of different sentences, in the same or different languages, having the same logical form. Sentences on this view can be said in a derivative sense to have logical form: sentences have the same logical form when they express propositions with the same logical form.

An alternative approach, more usual today, is to identify the logical form of a natural language sentence as the form of a sentence in a specially regimented, 'ideal', perhaps formal, language that translates it (or, in the case of an ambiguous sentence, the logical forms it can have are associated with the sentences that translate the various readings of it).[2] A regimented language must contain no ambiguities and syntactically encode all differences in the logical (or semantical) roles of terms. A common variant of this view, marking out a narrower conception of logical form, is to identify the logical form of the natural language sentence as the form determined by the pattern of logical constants in its regimented translation. Natural language sentences then can be said to share logical form if they translate into sentences the same in form in the regimented language of choice, and to have different logical forms if they translate into sentences different in form. (Cf. Frege in the *Begriffsschrift*, ‘In my formalized language there is nothing that corresponds [to changes in word ordering that do not affect the inferential relations a sentence enters into]; only that part of judgments which affects the possible inferences is taken into consideration’ (Black and Geach 1960, p. 3).)

Neither of these approaches is satisfactory. On the one hand, any grasp we have on talk of the structure of propositions derives from our grasp on sentence structure in a regimented language, which aims to express more clearly than ordinary language, the structure of the proposition. On the other, the trouble with identifying the logical form of a natural language sentence with a sentence structure expressible in a regimented language is that we wish to be able to speak informatively about the logical form of sentences in our regimented language as well. It is no more plausible that it is simply the *pattern* of expressions in the sentence in the regimented language than in natural language. There can be more than one ideal language a natural language can be translated into, whose translations into each other take sentences into sentences with different patterns of expressions. Appeal to the pattern of logical expressions is of no help. First, we have not said when a term (or structure) counts as logical. Second, the pattern alluded to cannot consist of the actual arrangement of the logical terms in the regimented language, for the same reason that appeal to patterns of expressions more generally is futile: there are clearly different regimentations possible which would be said to exhibit the same form but differ in syntax (Polish notation and standard logical notation, for example).

Some philosophers have concluded that all talk about *the* logical form of a sentence is confused. Quine has claimed that the purpose of providing a paraphrase in a regimented language of a sentence, which is treated as its logical form, is ‘to put the sentence into a form that admits most efficiently of logical calculation, or shows its implications and conceptual affinities most perspicuously, obviating fallacy and paradox’ (Quine 1971, p. 452). He argues there will be different ways of doing this, and consequently there can be no demand for *the* logical form of a natural language sentence.[3] Davidson follows Quine in seeing logical form as relative to the logic of one's theory for a language (see 'Reply to Cargile,' in (Davidson 1984b, p. 140)).[4] More recently, (Lycan 1989) and (Etchemendy 1988) have suggested that there can be no principled distinction between logical and non-logical terms, which, if correct, would undercut the possibility of an objective account of logical form by appeal to patterns relating to logical terms. These skeptical reactions are unwarranted, as the sequel will show.

III

The account of logical form we advocate generalizes and refines a view Davidson urged in some early papers. A clear statement of this conception occurs in 'On Saying That':

> What should we ask of an adequate account of the logical form of a sentence? Above all, I would say, such an account must lead us to see the semantic character of the sentence ' its truth or falsity ' as owed to how it is composed, by a finite number of applications of some of a finite number of devices that suffice for the language as a whole, out of elements drawn from a finite stock (the vocabulary) that suffices for the language as a whole. To see a sentence in this light is to see it in the light of a theory for its language. A way to provide such a theory is by recursively characterizing a truth predicate, along the lines suggested by Tarski. (Davidson 1968; Davidson 1984c, p. 94)

His suggestion is not precise enough (or, as will emerge, general enough) for our purposes. Not every true Tarski-style truth theory for a language issues in an account of the semantic features of the language, only an *interpretive truth theory*. In order to explain this, we must first explain our conception of how a truth theory for a natural language L may be employed in giving a compositional meaning theory for L.

A compositional meaning theory for L should provide,

(18) from a specification of the meanings of finitely many primitive expressions and rules, a specification of the meaning of an utterance of any of the infinitely many sentences of L.

Confining our attention to declaratives for the moment, a compositional meaning theory for a context *in*sensitive language L, i.e., a language without elements whose semantic contribution depends on context of use, would issue in theorems of the form,

(M) φ in L means that p,

where 'φ' is replaced by a structural description of a sentence of L and 'p' by a metalanguage sentence that translates it.

For context insensitive languages, the connection between a theory meeting Tarski's famous Convention T and a compositional meaning theory meeting (R) is straightforward: a truth theory meets that convention only if it entails every instance of (T),

(T) φ is true in L iff p,

in which a structural description of a sentence of L replaces 'φ', and a synonymous metalanguage sentence replaces 'p'. We shall call such instances of (T) *T-sentences*. The relation between a structural description that replaces 'φ' and a metalanguage sentence that replaces 'p' in a T-sentence is the same as that between suitable substitution pairs in (M). Therefore, every instance of (S) is true when what replaces 'p' translates the sentence denoted by what replaces 'φ'.

(S) If φ is true in L iff p, then φ in L means that p.

Given a T-sentence for a sentence *s*, the appropriate instance of (S) enables us to specify its meaning. One advantage of a truth-theoretic approach (over trying to generate instances of (M) more directly) is its ability to provide recursions needed to generate meaning specifications for object language sentences from a finite base with no more ontological or logical resources than is required for a theory of reference. This turns out to be central also to its role in revealing something that deserves the label 'logical form'.

In natural languages, many (arguably all) sentences lack truth-values independently of use. 'I am tired' is true or false only as used. This requires discarding our simple accounts of the forms of theories of meaning and truth. In modifying a compositional meaning theory to accommodate context sensitivity, and a truth theory that serves as its recursive engine, a theorist must choose between two options. The first retains the basic form of the meaning specification, '*x* means in language *y* that p', and correspondingly retains within the truth theory a two-place predicate relating a truth bearer and a language. This requires conditionalizing on utterances of sentences in specifying truth conditions. The second adds an argument place to each semantic predicate in the theory for every contextual parameter required to fix a context sensitive element's contribution when used. For concreteness, we will suppose that the fundamental contextual parameters are utterer and utterance time.[5] Either approach is acceptable. We adopt the second because it simplifies the form of the theories. This approach yields theorems of the forms (M2) and (T2).

(M2) For any speaker *s*, time *t*, sentence φ of L, φ means$_{[s,t]}$ in L that p.
(T2) For any speaker *s*, time *t*, sentence φ of L, φ is true$_{[s,t]}$ in L iff p.

As a first gloss, we might try to treat 'means$_{[s,t]}$ in L' and 'is true$_{[s,t]}$ in L' as equivalent to 'means as potentially spoken by *s* at *t* in L' and 'is true as potentially spoken by *s* at *t* in L'. However, as (Evans 1985, p. 359-60) points out, we cannot read these as, ⌜if φ were used by *s* at *t* in L, then, as spoken by *s* at *t*, φ would be true iff/mean that⌝, since, aside from worries about how to evaluate counterfactuals, these interpretations would assign sentences such as 'I am silent' false T-theorems. What we need are the readings, ⌜if φ were used by *s* at *t* in L, as things actually stand, φ would be true iff/mean that⌝, or, alternatively, ⌜φ understood as if spoken by *s* at *t* is in L true iff/means that⌝; *mutatis mutandis* for other semantic predicates.

We replace adequacy criterion (R) with (R′):

(R′) A compositional meaning theory for a language L should entail, from a specification of the meanings of primitive expressions of L, all true sentences of form (M2)

The analog of Tarski's Convention T for recursive truth theories for natural languages we shall call *Davidson's Convention T*, given in (D).

(D) An adequate truth theory for a language L must entail every instance of (T2) for which corresponding instances of (M2) are true.

A Tarski-style truth theory for L meeting (D) with axioms that *interpret* primitive expressions of L provides the resources to meet (R′). We will call any such theory an *interpretive truth theory*.

There are two parts of this requirement that deserve further comment. First, we have in mind a Tarski-style theory in the sense of a theory which employs a *satisfaction predicate* relating sequences or functions to expressions of the language and contextual parameters, supplemented by a similarly relativized reference function for assigning referents to singular terms. Second, the requirement that the axioms of the theory *interpret* primitive expressions of L is of great importance in understanding the present approach. We will therefore elaborate on this aspect of the requirement. For an axiom to be interpretive, it must treat the object language term for which it is an axiom as being of the right semantic category. Thus, predicates should receive satisfaction clauses that represent them as predicates, referring terms should receive reference axioms, recursive terms (or structures) should receive recursive axioms. For a context insensitive language, a base axiom interprets an object language expression just in case its satisfaction conditions (or referent) is given using a term in the metalanguage that translates it. Thus, for example, to give an axiom for '*x* is red' in English, taking the metalanguage to be English as well , we would write (ignoring tense and suppressing relativization to language when dealing with English):

for all functions *f*, *f* satisfies '*x* is red' iff *f*('*x*') is red.

This is an interpretive axiom for '*x* is red', for the predicate used to give the satisfaction conditions translates the object language predicate for which satisfaction conditions are given. In contrast,

for all functions *f*, *f* satisfies '*x* is red' iff *f*('*x*') is red and the earth moves,

is not interpretive since 'is red and the earth moves' does not translate 'is red'. A recursive term, such as 'and', will receive a recursive axiom. To be interpretive, the recursive structure used in the metalanguage must translate that of the object language sentence on which the recursion is run. Thus, for 'and' in English, using English as the metalanguage, we would give the following recursive axiom:

for all functions *f*, sentences φ, ψ, *f* satisfies φ⁀'and'⁀ψ iff *f* satisfies φ and *f* satisfies ψ.

In contrast,

for all functions *f*, sentences φ, ψ, *f* satisfies φ⁀'and'⁀ψ iff it is not the case that if *f* satisfies φ, then it is not the case that *f* satisfies ψ,

is not interpretive, because the recursive structure used to give satisfaction conditions does not translate that for which satisfaction conditions are given.[6] These remarks apply directly to context insensitive languages. For context sensitive languages, when we have a verb which is context sensitive, e.g., tensed, we will have a metalanguage verb which has argument places expressing that relativization, which because it is not itself context sensitive, will not be a strict translation of the object language verb. For example, consider the axiom for 'is red' when we take into account tense:

For all functions *f*, *f* satisfies$_{[s,t]}$ '*x* is red' iff red(*f*('*x*'), *t*).

The metalanguage verb 'red(*x, y*)' is not tensed, but rather expresses a relation between an object and a time, the relation the object has to the time iff it is red at that time. What is it for such an axiom to be interpretive? Intuitively, the idea is clear: we want the metalanguage verb to express, relative to appropriate arguments, exactly the relation the object language verb expresses in use. We can make this precise as follows. Consider what we would say a predicate which is tensed *means* relative to use with respect to an object at a time. For example, we would say that a use of ‘is red’ relative to x and t means that red(x, t). Drawing on a generalization of this notion, we will say that an axiom for a predicate, with free variables ‘x_1’, ‘x_2’, ... ‘x_n’, denoted by ‘Z(x_1, x_2, ... x_n)’, which is context sensitive relative to parameters, p_1, p_2, ..., p_m,

For all f, f satisfies$_{[p1,\, p2,\, ...,\, pm]}$ Z(x_1, x_2, ... x_n) iff ζ(f(‘x_1’), ..., f(‘x_n’), p_1, p_2, ..., p_m),

is interpretive just in case the *corresponding relativized meaning statement* is true:

For all f, Z(x_1, x_2, ... x_n) means$_{[f, p1,\, p2,\, ...,\, pm]}$ that ζ(f(‘x_1’), ..., f(‘x_n’), p_1, p_2, ..., p_m).

For a context sensitive singular term, the term must be assigned the right referent relative to the context of use by the rule giving its referent relative to contextual parameters.

With this conception of how a truth theory can serve as a component of a compositional meaning theory (at least for declarative sentences) in place, we can return to the question how such a truth theory helps to give content to the notion of logical form.

IV

An interest in the logical form of a sentence[7] is an interest in those semantic properties it may share with distinct sentences relevant to the conditions under which it is true, and the relations between the conditions under which it and other sentences are true. This interest is motivated by the traditional concern not to be misled by the surface form of sentences into assimilating one sort of claim to another quite different. The conception we are advocating is well-suited to meet this interest, since it identifies logical form with semantic form, insight into which is exactly what a compositional meaning theory provides. This can be made precise in terms of an interpretive truth theory for a language.

In addition to sentences, the notion of semantic form applies to significant subsentential expressions, complex and primitive. In this way, a notion of logical form associated with semantic form extends to include subsentential expressions, enabling us to talk of the logical form of a lexical item. The logical form of a sentence is determined by the logical forms of its lexical items and how their combination contributes to determining its interpretive truth conditions. The logical form of a lexical item is that semantic feature it shares (at least potentially) with other lexical items that determines how it interacts with other vocabulary items likewise characterized in terms of features shared with other expressions. For example, one-place predicates will interact systematically differently with quantifiers than will two-place predicates. This reveals itself in the base axioms of the truth theory, since all the axioms for one-place predicates will share a common form, and all the axioms for two-place predicates will share a different common form. The semantic type of a primitive term is given by the semantic type of the axiom it receives in the truth theory: its logical form is determined by its semantic type, i.e., sameness and difference of logical form for primitive terms is sameness and difference of semantic type.

There will be a variety of different levels of classification on the basis of semantic features that expressions share in common. Deictic elements can be classified together on the basis of their contributions to interpretive truth conditions being relativized to contextual parameters (speaker and time, if our assumptions are correct). Among deictic elements we may press a further semantic division based on whether contextual parameters alone determine the contribution of a deictic element to the interpretive truth conditions of an utterance of a sentence, or whether additional information is required, such as knowledge of a speaker's demonstrative intentions.

In general, features of the axioms for primitive expressions in the language which capture the way the expression contributes to the truth conditions of sentences can be used to classify them by semantic type. The semantic theory for the language will contain all the information traditionally sought under the heading of logical form, but much more. In that sense this conception of logical form is a generalization as well as development of one strand in the traditional conception.

We said that the logical form of a sentence *s* is determined by the logical forms of the lexical items *s* contains and how they combine to determine the interpretive truth conditions of *s*. This needs to be made more precise. A compositional meaning theory for a language L can be cast as a formal theory. When it is, it must include enough logic to prove from its axioms every T-sentence. Its logic may be so circumscribed that it enables one to prove all *and only* T-sentences, or it may be more powerful. Intuitively, the contribution elements of a sentence *s* make to its interpretive truth conditions (or the contribution of the elements of *s* to the truth conditions of an utterance of *s*) will be revealed by a proof of its T-sentence that draws only upon the content of axioms. We shall call any such proof a *canonical* proof of the T-sentence (following Davidson). If the logic of the theory is so restricted that, for any object language sentence *s*, a T-sentence for *s* can be proved only by drawing solely upon the content of the axioms for terms in *s*, then every proof of a T-sentence will be canonical. If the logic is stronger, the characterization of a canonical proof will involve restrictions on the resources allowed in proofs and perhaps how these resources are deployed. (Of course, if one description of a proof procedure meets the intuitive condition for describing a canonical proof, many will.) Clearly, a canonical proof of a T-sentence for an object language sentence *shows* what its semantic structure is, for it *shows* how the semantic categories to which its constituent terms belong, determined by the type of axiom provided for each, contribute to determining its interpretive truth conditions. We can say that a canonical proof of a T-sentence for a sentence *reveals* its logical form. However, to identity logical form with canonical proof would be a mistake on the order of identifying logical form with a sentence in an ideal language.

A canonical proof is relative to a metalanguage and its accompanying logic, while logical form is not. The canonical proof, together with our understanding of the metalanguage, reveals logical form, i.e., semantic form. The logical form of a sentence *s* is determined by the *semantic category of each primitive in s* and *how these combine* to determine *s*'s interpretive truth conditions and so meaning. Thus, the logical form of *s* is a property of *s* revealed by the structure of the proof and by the axioms for the primitives in *s*. This property is determined once we can characterize when two sentences, in the same or different languages, share logical form. That characterization should not depend on any particular formal theory with respect to which a canonical proof procedure is formulated. We want something which all canonical proofs of T-sentences for a sentence *s* in interpretive truth theories for its language share in common. Intuitively, we want to say that two sentences share logical form when the same canonical proof *can* be given for them, *adjusting* for differences due to *differences in the object language*, and *differences between the axioms employed which are not based on the semantic category to which a term belongs*. For then all the proofs for either will share in common what reveals their semantic structure articulated in terms of the categories of their semantic primitives and how they combine to determine interpretive truth conditions. With this intuitive characterization as a guide, we offer a more precise characterization. First, we define the notion of *corresponding proofs* in [8].

[8] A proof P_1 of a T-sentence for s_1 in T_1 *corresponds* to a proof P_2 for a T-sentence for s_2 in T_2 iff$_{df}$
(a) P_1 and P_2 are sentence sequences identical in length;
(b) at each stage of each proof identical rules are used;
(c) the base axioms employed at each stage are of the same semantic type, and the recursive axioms employed at each stage interpret identically object language terms for which they specify satisfaction conditions (with respect to contributions to truth conditions).

Using [8], we define *sameness of logical form* as a four-place relation among sentences and languages as in [9].

[9] For any sentences s_1, s_2, languages L_1, L_2, s_1 in L_1 has the same logical form as s_2 in L_2 iff$_{df}$
there are interpretive truth theories T_1 for L_1 and T_2 for L_2 such that
(a) they share the same logic;
(b) there is a canonical proof P_1 of the T-sentence for s_1 in T_1;
(c) there is a canonical proof P_2 of the T-sentence for s_2 in T_2, such that:
(d) P_1 *corresponds* to P_2.

[9] requires the contributions of the recursive elements and the way in which they combine with non-recursive elements in each sentence, relative to their languages, to be the same. Note that we have required sameness of interpretation up to contribution to truth conditions in [8](c). This qualification aims to exclude as irrelevant differences in meaning that make no difference to the way in which a recursive term determines how expressions it combines with contribute to fixing the conditions under which the sentence is true. For example, ‘and’ and ‘but’ arguably differ in meaning, but this difference is irrelevant to how each determines the contribution of the sentences they conjoin to the truth of the sentences in which they occur.

The remaining free parameter is sameness of semantic type between base axioms in [8](c). There may be room for different classifications, but in general it looks as if we will wish to classify axioms together on the basis of features neutral with respect to the extensions of predicates, though not with respect to the structure of the extensions (i.e., we will treat the number of argument places as relevant for the purposes of classification). (This captures one feature of the idea that logical form is a topic neutral feature of a sentence.) Reference axioms we can treat as of the same type iff they provide the same rule for determining the referent of the referring expression (proper names are a limiting case in which no rule is employed and the referent is given directly). In general, we wish to identify semantic categories with those such that *that* a new base term falls into the category determines how it fits into the semantic pattern of sentences in the language independently of its extension or referent. (Note that we are not supposing that any terms except predicates and singular terms have extensions or referents.)

On our conception logical forms are not reified. The logical form of a sentence is not another sentence, a structure, or anything else. Talk of logical form is a *façon de parler*, proxy for talk of a complex feature of a sentence *s* of a language L determined by what all canonical proofs of T-sentences for *s* in various interpretive truth theories for L share. The relation *sameness of logical form* is conceptually basic. We want to urge that the expression '*x* is the logical form of *y*' should be retired from serious discussion. The basic expression is '*x* in L is the same in logical form as *y* in L′', where '... in ... is the same in logical form as ... in ...' is explicated as a unit as above. One can derivatively make sense of '*x* in L gives the logical form of *y* in L′'. The practice of 'giving the logical form' of a sentence by exhibiting its paraphrase in a regimented language is a matter of replacing a sentence about whose semantic structure we are unclear with one whose semantic structure is clearer because it is formulated in a language for which the rules attaching to its various constituents and its structure have been clearly laid out. Thus, the relation expressed by '*x* in L gives the logical form of *y* in L′' is true of a 4-tuple <*x*, L, *y*, L′> just in case *x* in L is the same in logical form as *y* in L′, and *x*'s syntax understood relative to L makes perspicuous the semantic structure of *y* in L′. A paraphrase of a natural language sentence in a regimented language may capture the semantic structure of the original more or less well, and it may be that the language does not contain resources needed to yield a sentence with the same logical form as the original. That this occurs when a formal language is chosen as the translation target accounts for our intuition that sometimes indeterminacy about the logical form of a natural language sentence arises when we are forced to try to represent its semantic form in the absence of a worked out semantic theory for the language. It is no wonder the fit is sometimes awkward when we attempt to lay the semantic form of a sentence into the Procrustean bed of familiar logics. We toss and turn, settling on one tentative translation and then another, but none leaves us feeling comfortable.

We have so far ignored awkward facts about natural languages for the purposes of keeping the discussion relatively uncluttered. No formal truth theory can be applied directly to a natural language to reveal logical form because of ambiguity. Structurally ambiguous natural language sentences lack unique logical forms. In these cases, we must first disambiguate the language before we apply a truth theory to it. This makes regimentation, at least whatever is required to remove such ambiguity, necessary for a useful discussion of logical form for natural languages. Additional regimentation, perhaps motivated by considerations about syntactic decomposition, may recommend applying additional transformations before applying a truth theory, but these should not be necessary, as long as some description of the sentence is possible which accommodates all the features required for applying axioms for primitive expressions to generate a T-sentence for it. In an account of the logical form of a sentence, of course, we would want to track syntactic transformations, but, in a sense, its semantic structure would be revealed by a canonical proof of the T-sentence for its spruced up cousin, plus the fact that it means the same.

V

Treating logical form as we have above can help free us from overly simple models of the logical form of natural language sentences.[8] Too often we reach for the tools of elementary logic when trying to understand how natural languages work. The idea that logical form is to be determined by the translation of a sentence into an ideal language encourages this practice. By thinking about how to integrate an expression or construction into a interpretive truth theory, we free ourselves from those constraints, and from misconceptions which may arise from trying fit natural language constructions to a familiar pattern, in a well-understood, artificial language.

An example of the difficulty philosophers have been led into by thinking of translation into a formal language as the proper approach to exhibiting logical form is the traditional treatment of natural language quantifiers in philosophy. Until recently, it was common to translate quantified noun phrases in natural languages like English into a paraphrase suitable for representation in a simple first order logic (the practice is still common). ‘All men are mortal’ goes into ‘For all *x*, if *x* is a man, then *x* is mortal’. ‘The king of France is bald’ goes into ‘There is an *x* such that *x* is King of France and for all *y*, if *y* is king of France then $x = y$, and *x* is bald’. ‘Some men run for office’ goes into ‘There is an *x* such that *x* is a man and *x* runs for office’. *Prima facie*, all these paraphrases are of different forms than the originals, even though necessarily equivalent. That these paraphrases do not capture the semantic form of the originals is shown when we consider quantifiers such as ‘few men’ and ‘most philosophers’, for which the kinds of paraphrases given above fail. While most philosophers are not rich, most *x* are such that if they are philosophers, they are rich ‘ since most things are not philosophers. The solution in a interpretive truth theory is to employ a semantic structure in the metalanguage which functions in the same way as that for the object language sentence (indeed, this is required to meet the condition that the axioms be interpretive). Thus, the satisfaction clause for a restricted quantifier (regimenting the object language sentence to introduce explicit variables) would have the following form (when the metalanguage embeds the object language),

> For any function *f*, speaker *s*, time *t*, *f* satisfies$_{[s,t]}$ ‘[Qx: x is F](x are G)’ iff Q ‘*x* is F’/’*x*’-variants f' of *f* satisfy$_{[s,t]}$ ‘*x* are G’.

We define ‘φ/’*x*’-variant f' of *f*’ in two stages as follows:

Def. For any functions *f*, f', f' is a φ/’*x*’-variant of *f* iff f' is an ‘*x*’-variant of *f* and f' satisfies$_{[s,t]}$ φ.

Def. For any functions *f*, f', f' is a ‘*x*’-variant of *f* iff f' differs from *f* at most in what it assigns to ‘*x*’.

The virtues of this approach to logical form also emerge from its application to the puzzling case of complex demonstratives. Complex demonstratives are the concatenation of a demonstrative with a nominal, as in ‘That man playing the piano is drunk’. What is the logical form of this sentence? Such constructions pull us in different directions. On the one hand, ‘that’ seems clearly to be a context sensitive singular term, and ‘man playing the piano’ appears to be modifying it. This suggests giving ‘That man playing the piano’ a recursive reference clause in the truth theory, and treating the sentence as of subject-predicate form. On the other hand, the nominal in a complex demonstrative appears to play the same role as the nominal in quantified noun phrases. ‘That man playing the piano is drunk’ implies ‘Someone is drunk’, ‘Someone is playing the piano', 'That man is playing something' and 'That man playing something is drunk' (fixing contextual parameters). These implications require the nominal be truth conditionally relevant, and the last in particular requires that we be able to quantify into the nominal, and so relativize it to a universe of discourse, and so relativize to a universe of discourse the contribution of complex demonstratives to truth conditions, which makes no sense if they are singular terms. Such considerations suggest complex demonstratives are quantified noun phrases. Yet'that' is no quantifier word, since there can be vacuous uses of it in both simple and complex demonstratives.

The proper course is to write into the satisfaction conditions for such a sentence the requirements these facts reveal. 'That man playing a piano is drunk' will be true on an occasion of use provided that the object the speaker demonstrates (i.e., *that*) which is a man playing a piano is drunk. That is, 'That man playing a piano is drunk' will have the same logical form as '[The *x*: *x* = that and *x* is playing a piano](*x* is drunk)'. This captures both features of the sentence noted above, the similarities in behavior between the complex demonstrative and quantified noun phrases, and the fact that 'that' functions as a genuine demonstrative. By refusing to look for a translation into a familiar idiom, but first asking how the parts contribute to the truth conditions of the whole, we are led to a novel suggestion for the logical form of complex demonstratives and sentences containing complex demonstratives which reconciles what appeared to be irreconcilable features of the construction. (See (Lepore and Ludwig Typescript).) With complex demonstratives, the concatenation of a demonstrative with a nominal must be treated as introducing a quantifier.[9] This illustrates how grammatical categories such as that of determiner (which subsumes 'this', 'that', 'these', 'those', 'all', 'some', 'the', 'few', 'most', etc.) can provide a poor guide to semantic role.

We find in complex noun phrases an interesting example of how surface grammatical form[10] (we drop the qualifier for brevity) and semantic (or logical) form can come apart. Another example of this sort is provided by the contrast between attributive adjectives such as 'slow' and 'large', and those such as 'red' and 'bald'.[11] 'John is a bald man' and 'John is a large man' share grammatical form. But while the former will be treated by the truth theory as appealing to axioms for simple one-place predicates, 'is bald' and 'is a man', we propose the latter be treated as appealing to a quantifier and a relational predicate ‘is larger than’ as well as to the monadic predicate ‘is a man’. Satisfaction clauses are given for the respective predicates in [10]-[11].[12]

[10] For all functions *f*, *f* satisfies$_{[s,t]}$ ‘*x* is a bald man’ iff *f* satisfies$_{[s,t]}$ ‘*x* is bald’ and *f* satisfies$_{[s,t]}$ ‘*x* is a man’.

[11] For all functions *f*, *f* satisfies$_{[s,t]}$ ‘*x* is a large man’ iff most ‘*y* is a man’/’*y*’-variants *f′* of *f* satisfy$_{[s,t]}$ ‘*x* is larger than *y*’ and *f* satisfies$_{[s,t]}$ ‘*x* is a man’.[13]

Once we consider how to provide recursive satisfaction conditions for our two intuitively different structures, vastly different logical forms are revealed ‘ that is to say, we can see that the kinds of proofs of T-sentences for each and their starting points are different: they will appeal to different kinds of axioms, classified according to semantic type, and hence yield proofs with different structures, exhibiting the components which play a similar grammatical role as playing quite different semantic roles. The concatenation of an attributive adjective such as ‘large’ or ‘slow’ with a noun is revealed to be a kind of restricted quantification.[14] This case helps to make clear the importance for a semantic theory of sorting lexical items into categories on the basis of their semantical roles.[15] The adjectives ‘red’ and ‘large’ look to share grammatical role, but play different semantic roles. No sorting of terms into grammatical categories by tests not sensitive to their semantic roles, such as the traditional test of invariance of judgements of grammaticality under substitution, will provide a grammatical classification of terms that we will have reason to think a certain guide to semantic structure. For the purposes of regimenting sentences for input into a formal semantic theory, it is the semantical roles of the words that should be our guide. Our aim will be to assign different syntactical categories where there are differences in semantic structure.

VI

Non-declarative sentences, such as ‘Open the door’, and ‘What time is it?’, present an especially interesting challenge to any conception of logical form grounded in truth-theoretic semantics, since uses of them are neither true nor false. They have semantic form, and so, on a conception of logical form as semantic form, should have logical form. But how can it make sense to talk about their logical form on the model we have been using up to this point, and to try to characterize it in terms of a truth theory?

A generalization of the truth-theoretic approach may show the way to an answer. To keep the discussion simple, we will concentrate here on imperatives, though we will indicate how the account might make room for interrogatives. Intuitively, uses of imperatives admit of a bivalent evaluation, though they are not truth-valued. Rather, they are complied with or not. To generalize the truth-theoretic approach, we might try introducing a notion of fulfillment conditions which subsumes both compliance conditions for imperatives and truth conditions for declaratives. Since it seems evident that our basic understanding of predicates and referring terms in imperatives should be provided by an interpretive truth theory, we might try to exhibit compliance conditions as recursively specifiable in terms of truth conditions. Imperative sentences would then be obtained from declaratives by a small number of transformations, from which the original declarative is easily recoverable. ‘Open the door’ might be obtained from ‘You will open the door’ by dropping its second person pronoun and modal auxiliary ‘will’. Letting ‘Core(φ)’ represent the declarative core of an imperative sentence, Core(‘Tell me the time’) = ‘You will tell me the time’. The compliance conditions for imperatives will then be exhibited as given in terms of the truth conditions for their declarative cores. Intuitively, an utterance of an imperative is complied with iff the addressee(s) makes it the case that the declarative core of the imperative is true as a result of the intention to comply with the directive issued with the imperative. Introducing a satisfaction predicate relating functions to sentences and formulas in imperative mood, we can exhibit satisfaction conditions for ‘Open the door’ as in [12]:

[12] For any function f, f satisfies$^{I}_{[s,t]}$ ‘Open the door’ iff ref$_{[s,t]}$(‘you’) makes it the case that f satisfies$_{[s,t]}$ Core(‘Open the door’) with the intention of obeying the directive s issues at t.[16]

The satisfaction relation employed on the right hand side of the quantified biconditional is that employed in the truth theory. So, the satisfaction, and so compliance conditions, for imperatives are characterized recursively by the satisfaction conditions of their declarative cores. Note also that the forward looking character of directives issued using imperatives is captured by the fact that the declarative core of an imperative is itself in future tense. A general satisfaction predicate, which we capitalize to distinguish it, can be defined in terms of the satisfaction predicates for imperatives and declaratives. For atomic sentences, we define ‘Satisfies$_{[s,t]}$’ as follows.

For any atomic sentence φ, function f, f Satisfies$_{[s,t]}$ φ iff
if φ is declarative, f satisfies$_{[s,t]}$ φ;

if φ is imperative, f satisfies$^{\mathrm{I}}_{[s,t]}$ φ.

For molecular sentences, ‘Satisfies$_{[s,t]}$’ will be defined recursively in the usual way, with the caveat that for mixed mood sentences the recursion selects the satisfaction relation appropriate for the mood of the component sentences. Satisfaction of open sentences in the imperative mood or in mixed moods is a straightforward generalization of the above. (A similar approach can be employed with respect to interrogatives. See (Ludwig 1997) for a fuller working out of this approach, and its extension to interrogatives, which present additional complexities.) The connection between a fulfillment theory for natural languages and a compositional meaning theory is given by a generalization of our earlier characterization. For an imperative (under which category we included molecular sentences which mixed imperatives and declaratives), we wish a compositional meaning theory to entail all true instances of schema (I),

(1) For all speakers s, times t, φ commands$_{[s,t]}$ that p,

where φ is replaced by a structural description of an object language sentence. For an interrogative (under which we include mixed interrogative and declarative mood molecular sentences), we wish a compositional meaning theory to entail all true instances of the schema (Q),

(Q) For all speakers s, times t, φ requests$_{[s,t]}$ that p,

where φ is replaced by a structural description of an object language sentence. The condition on an interpretive fulfillment condition theory for a language L is that

if ⌜φ is fulfilled$_{[s,t]}$ in L iff p⌝ is canonically provable from it,
then if φ is assertoric, then φ means$_{[s,t]}$ in L that p;
if φ is imperative, then φ commands$_{[s,t]}$ in L that p;
if φ is interrogative, then φ requests$_{[s,t]}$ in L that p.

This put us in a position to extend the notion of logical form to non-declaratives, and to generalize the notion of logical form as semantic form. Letting ‘F-sentence’ stand for an interpretive sentence of the form ⌜φ is fulfilled$_{[s,t]}$ in L iff p⌝, we generalize the earlier characterization:

For sentences s_1, s_2, languages L_1, L_2, s_1 in L_1 has the same logical form as s_2 in L_2
iff there is an interpretive fulfillment condition theory F_1 for L_1 and an interpretive fulfillment condition theory F_2 for L_2 such that
(a) F_1 and F_2 share the same logic;

(b) there is a canonical proof P_1 of the F-sentence for s_1 in F_1;
(c) there is a canonical proof P_2 of the F-sentence for s_2 in F_2, such that:
(d) P_1 corresponds to P_2.

The notion of a corresponding proof similarly generalizes. Likewise, the notions of logical consequence, truth, etc., can be generalized in a straightforward way to include non-declaratives.

VII

The above sections present our basic approach to explicating logical form. It will be useful, however, to consider the relation of this characterization to the notion of a logical constant, or a slight generalization of this notion, the topic of this section.

Logical constants are a subset of primitive terms of a language thought to be especially useful for identifying classes of arguments the same in form. The notion of a logical constant, however, conceived of as subsuming only terms, is too narrow to do the work needed for regimenting valid natural language arguments. The inference from [13] to [14] is intuitively valid in virtue of form.

[13] Brutus is an honorable man.
[14] Brutus is a man.

[13], however, has no logical constant. The term ‘honorable’ functions semantically to contribute a predicate to the sentence, as is shown by the fact that [13] also implies in virtue of its form ‘Brutus is honorable’ (that is, ‘A is an F G ⊃ A is F’ is a valid schema). The effect of modifying ‘man’ with ‘honorable’ is to add to the truth conditions the requirement that Brutus be honorable as well as a man. It is not the use of ‘honorable’ that signals this, but rather that it is an adjective modifying the noun from which the predicate ‘is a man’ is formed. Thus, we need to identify here the structure,

noun phrase + ‘is a’ + adjective + nominal,

as itself semantically significant to the semantic compositional structure of the sentence. Intuitively, modifying the nominal with an adjective does the same semantic work as adding a conjunct to the sentence ‘ in the case of [13], of adding ‘and Brutus is honorable’. These are different ways of ‘encoding’ the same semantic information. To recognize this is to recognize that we need to talk not just about logical terms, but logical structures. A logical structure will in general be characterized in terms of a pattern of types of terms in a grammatical expression. What are traditionally thought of as logical constants may or may not appear in the pattern of terms. When they do, they count as part of the pattern that constitutes the logical structure. Indeed, the idea that an argument is valid in virtue of its logical terms is a mistake. It is rather patterns which include the constants which render an argument valid. Logical constants are useful because they help form patterns which provide information about how to understand the contribution of component expressions in which they occur to a sentence's truth conditions. To express this notion of a logical structure, we will press into service the term 'logical syntax'.[17]

The aim of identifying logical syntax is to identify *syntactical* constants in sentences which help regiment natural language arguments into classes with shared forms that account for their validity. There will be in the nature of the case a variety of different levels of abstraction at which we can identify forms which help to regiment natural language arguments. We would like to find a way of isolating out for special consideration a class of structures salient from the point of view of a semantic theory for the language, and which seem to have something specially to do intuitively with the structures the sentences of the language.

The notion of logical form we have articulated is neutral about what structures count as logical. Any of the competing criteria in the literature could simply be adjoined to our account. This points up an important fact about the relation between talk about logical form, if we are correct in holding that our explication tracks use of the term back to interests expressed by Russell in the quotation at the beginning of this paper, and talk about logical syntax and the related notions of logical consequence and truth. The identification of *logical* syntax is not itself either central to or sufficient for understanding what talk of logical form comes to. Rather, it has been thought to be central because many of the kinds of terms identified as logical constants have been particularly important for understanding the semantic structure of sentences in which they appear. But identifying a particular class of terms as logical, for the purposes of identifying a class of logically valid sentences or argument forms, is not necessary to understand the semantic structure of such sentences. The interpretive truth theory contains all the information necessary whether or not we go on to select out a particular class of terms (or structures) for attention for more specialized interests. And, of course, the notion of the semantic structure of a sentence applies to sentences in which no logical constants as traditionally conceived appear.

Despite this independence, there are differences among primitives terms (and primitive terms and structures which carry important semantic information) which are particularly salient from the standpoint of an interpretive truth theory, namely, that between terms which can receive base clauses and *terms or structures which require a recursive treatment*. It is natural to seize on this difference and to urge that 'the logical constants may be identified as those iterative features of the language that require a recursive clause in the characterization of truth or satisfaction' ((Davidson 1984a, p. 71)).[18] We must generalize this a bit in the light of our discussion above. We will suggest that the recursive syntactical structures of the language be treated as its logical syntax. The recursive syntax of sentences gives them structure beyond that already expressed in the number of argument places in primitive predicates. It is natural to think of arguments made valid in virtue of the presence of recursive syntax in the premises and conclusion as valid in virtue of their *structure*. This gives one clear sense to the idea that in identifying the logical *terms* we identify those terms that we do not replace with schematic letters in identifying the structures or forms of sentences relevant to determining what other sentences similarly identified in terms of their structures they bear deductive relations to. The proposal rounds up many of the usual suspects, the so-called truth-functional connectives, and the quantifiers, as well as other iterative syntactical patterns that do similar work. As we have seen, truth-functionality is not always achieved lexically, as in 'Brutus is an honorable man'. Likewise, quantification need not be signaled by an explicit quantifier word, as in 'Whales are mammals'. Verb inflection for tense, too, is arguably best thought of as a quantificational device (Lepore and Ludwig 2002).

We have indicated that both terms and structures may be treated recursively. One cannot identify a recursive term or structure by a syntactic test of iterability. We may concatenate 'Time is short and' with any sentence, and concatenate it with the result, and so on indefinitely. This does not mean that 'Time is short and' is a logical constant or a recursive structure. For we need a recursive clause for the concatenation of a sentence with 'and' with another sentence. The rule attaches to that structure, not to particular instances of it. Similarly, though 'honorable' may be added any number of times before 'man' in 'Brutus is an honorable man', we do not suppose 'honorable' is a logical constant or itself receives a recursive clause. Again, the rule attaches to a pattern exemplified by the sentence, not to the particular terms instantiating that pattern.

These terms and structures by and large are intuitively topic neutral, as expected, since, with few exceptions, they determine only how the primitive predicates of the language contribute to the truth conditions of complex sentences. Exceptions in natural languages are primitive restricted quantifiers, such as ‘someone’ and ‘anytime’. Artificial examples may be constructed as well. It seems appropriate to divide recursive terms into the logical and what we can call the *purely logical*. In the case of ‘Someone is in hiding’, the satisfaction clause would be:

> For all *f*, *f* satisfies$_{[s,t]}$ ‘Someone is in hiding’ iff some ‘*x* is a person’/’*x*’-variant *f* ′ of *f* satisfies$_{[s,t]}$ ‘*x* is in hiding’.

Alternatively:

> For all *f*, *f* satisfies$_{[s,t]}$ ‘Someone is in hiding’ iff some ‘*x*’-variant *f* ′ of *f* such that *f* ′(‘*x*’) is a person satisfies$_{[s,t]}$ ‘*x* is in hiding’.

These suggest the following condition on a purely logical term or structure: a term or structure is purely logical iff its satisfaction clause does not (a) introduce terms requiring appeal to base clauses other than those required for the terms to which the logical term is applied, or (b) introduce non-logical metalanguage terms not introduced by base clauses for the terms to which the logical term is applied.[19] If (a) or (b) is violated, the extra non-logical material is contributed by the logical term or structure itself.

This conception of logical syntax does omit, however, terms often included, such as the identity sign. On this conception, the identity sign is treated as having the logical form of a two-place relational predicate, and, consequently, is not singled out for special attention. Likewise, the second-order relation ‘is an element of’, and such relational terms as ‘is a subset of’, ‘is the union of’, will not be counted as logical on this conception; and so on.[20] These sorts of terms would be counted on a conception introduced independently by (Tarski 1986) and (Lindstrom 1966b), and motivated by the idea that the “logical notions” or terms have greatest generality (see (Sher 1996) for a recent exposition of this line, though with differences from the way we develop it below). This is connected with the idea we have already invoked that logical syntax is topic neutral. But it is spelled out in a way that yields different results.

The basic idea is that terms express more general notions the more stable their extensions under transformations of the universe, and those terms that express the most general notions will be those whose extensions are invariant under all permutations of the universe, i.e., under all one-one mappings of the universe of discourse onto itself. For this to be applicable to all terms, of course, will require us to think of all terms as having extensions, and of truth conditions of sentences as being given in terms of their extensions. Thus, this approach is most natural on a Fregean conception of semantics on which sentential connectives like ‘and’ and ‘or’ are thought of as functions, and the quantifiers as second-order functions. It is not difficult to see the upshot of this approach. Terms associated with sets invariant under all permutations of the universe will be counted as logical terms.[21] Thus, e.g., proper names will not be logical terms because their referents (which we will treat as their extension) will not always be mapped onto themselves. Likewise, most n-place first-order relational terms will not be logical terms. Some will, however, for example, those one-place predicates whose extensions are the universal set (‘exists’ or ‘is an object’) and the empty set (‘is nonexistent’, ‘is non-self-identical’), and those two-place predicates whose extensions are the set of ordered pairs consisting of an object and itself, and the set of ordered pairs of objects and some distinct object (‘is identical with’ and ‘is nonidentical with’). There will be similar terms for any number of argument places. Likewise, there will be second-order relations (which take extensions of first-order relations as arguments) that will count as logical. If the universal quantifier has as its extension the set of the universal set, and the existential quantifier all subsets of the universal set except the empty set, these will count also as logical terms. ‘Everything is F’ will be true just in case ext(‘F’) $\in$ ext(‘everything’). Binary quantifiers can be treated as appropriate sets of ordered pairs of sets. ‘All’, for example, can be assigned as its extension the set of all ordered pairs of sets such that the first is a subset of the second. ‘All A are B’ will be true provided that <ext(‘A’),ext(‘B’)> $\in$ ext(‘All’). The result of systematically extending this idea is that all the so-called cardinality quantifiers will count as logical terms, as well as the standard set-theoretic relations. With contortions, truth-functional connectives can be treated as logical terms as well.[22] The approach could be extended straightforwardly to our broader notion of logical syntax.

We don’t think there is an answer to the question which of these conceptions of logical syntax (or any of the others in the literature) is correct. Each is a projection for our intuitive starting point in thinking about argument form and what sorts of constant structures we can identify to help us classify together arguments which are valid (or invalid) in virtue of those structures. Against the invariance conception, it might be said that it counts some terms as logical which don't seem helpful in this regard, such as, e.g., 'is an object' and 'is nonexistent', and 'is nonidentical with'. Likewise, it might be said that if our aim is to identify intuitively topic neutral syntax, the set-theoretic relations should not count as logical terms. Likewise, one may object that in order to count many terms as logical on this approach we must resort to a representation of the semantics of expressions which seems both gratuitous and misguided. On the other hand, there is no point to denying that classifying terms together as logical in this way may for some purposes be useful. We are inclined to say then that there is no substantive, as opposed to terminological, issue here. It may well be that in the place of the term 'logical syntax' what we need is a number of different terms with overlapping extensions.[23] This fact in itself could not be a reason to conclude no objective division is possible. Rather, it signifies that *many* objective divisions of 'logical' from 'non-logical' terms are possible, answering to different interests.

VIII

In this paper, we have shown how to capture and generalize a notion of logical form used in the tradition in philosophy stretching back (at least) to Russell's enormously influential discussion of logical form in the first few decades of this century. To this end, we employed the notion of an interpretive truth theory for a natural language. The notion of logical form on this account is shown to be basically the notion of semantic form as it relates to the truth conditions of sentences. The basic notion is *not* the logical form of a sentence, but rather sameness of logical form as between sentences interpreted relative to languages. Derivatively, we can make sense of the notion of 'giving the logical form' of a sentence in terms of offering a translation in a language which marks more explicitly in syntax the semantic features of the original and for which we have a better worked out semantics. There is, however, strictly speaking, no such *thing* as the logical form of any sentence. We have characterized the notion of sameness of logical form in terms of T-sentences for sentences with corresponding proofs in interpretive truth theories for their languages. The proofs encode the semantic structure of the sentence, abstracting away from differences in base axioms irrelevant to understanding how they combine with other kinds of expressions, and from differences in recursive axioms that make no difference to truth conditions. Sameness of logical form of primitive terms is sameness of semantic type, characterized in terms of the way in which the terms systematically interact with other kinds of terms. The notion of logical form can be extended to non-declaratives, by way of a generalization of the truth-theoretic approach to giving a semantic theory for declaratives. The notion of sameness of logical form has been characterized independently of the notion of a logical constant or more broadly of logical syntax. The notion of logical form, i.e., semantic form, is more general. The interest in identifying logical syntax lies in its utility for classing together natural language arguments in terms of interesting broadly structural features they share which provide a common explanation for their validity. There is little reason to believe, so far as we can see, that the interest dictates a unique choice. However, we have urged a criterion for logical syntax particularly salient from the point of view of an interpretive truth theory, namely, logical syntax is that syntax which must be treated recursively in an interpretive truth theory. This provides one good reason for thinking of logical syntax as especially concerned with revealing the validity of arguments in virtue of the structures of the contained sentences, as well as respecting the requirement that logical syntax be topic neutral.[24]

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Notes

1. Russell expressed these views in numerous places. For example, in 'On Scientific Method in Philosophy,' the Herbert Spencer lecture at Oxford in 1914, he says, "Philosophy, if what has been said is correct, becomes indistinguishable from logic as that word has now come to be used' (Russell 1959, pp. 84-85). He distinguishes within logic two portions ('not very sharply distinguished' (*loc. cit.*)), one dealing with 'those general statements which can be made concerning everything without mentioning any one thing or predicate or relation'roughly the topic neutral conception of logic'and one dealing with 'the analysis and enumeration of logical forms, i.e., with the kinds of propositions that may occur, with the various types of facts, and the classification of the constituents of facts' (*loc. cit.*). 'In this way,' Russell says, 'logic provides an inventory of possibilities, a repertory of abstractly tenable hypotheses' (*loc. cit.*). It is clear as well that Wittgenstein's concern with logical form in the *Tractatus Logico-Philosophicus*, a concern that grew out of his work with Russell from 1911 to the outbreak of the First World War, was a general concern for the form of representations, and in the case of natural languages, with the logical forms of expressions generally, not a concern more narrowly with a restricted set of terms to be called 'logical'. See, *e.g.*, 3.32-3.325, *Tractatus*, though it is clear throughout that Wittgenstein uses the notion of logical form very broadly for the form of a representation, including the forms of elementary propositions. These conceptions of the primary task of philosophy and the correlative role of the notion of logical form in articulating it have, needless to say, had an enormous, though somewhat inchoate, influence on the philosophical tradition in English speaking countries. Wittgenstein's greatest immediate influence was on the members of the Vienna Circle. Some sense of the impression created, and the importance attached to the general notion of logical form Wittgenstein worked with, can be gleaned from Moritz Schlick's 'The Turning Point in Philosophy' (the lead article in the first volume of *Erkenntnis* (Schlick 1959)). The influence of the Vienna Circle and its sympathizers in turn has had a central role in shaping contemporary philosophy. Of course, this broad notion of logical form did not arise first with Russell, but stretches back into the tradition. For example, it is clear that Kant's conception of the logical form of a judgment is in the same spirit as Russell's, a concern with very general common features of judgments which yield a basic taxonomy of their kinds, abstracting from their particular matter. And a concern with logical form in broadly Russell's sense, if not under that description, as Russell himself has said, is clearly something philosophers from ancient times have been concerned with in thinking about how our forms of speech and thought relate us to reality.

2. This can almost be called the official view. It has made its way into the *Cambridge Dictionary of Philosophy* as the canonical account: logical form is 'the form of a proposition in a logically perfect language, determined by the grammatical form of the ideal sentence expressing that proposition (or statement, in one use of the latter term).' (Note that this *mixes up* the two conceptions distinguished in the text.) The author goes on to characterize sameness of logical form as sameness of grammatical form in an ideal language, but in a way that resists characterization across languages of sameness of grammatical form or, hence, logical form.

3. Quine also uses this argument to urge that the grammarian's deep structure need not be identified with what is usually taken by logicians to be logical form. He gives as an instance of two ways of regimenting the same sentences, for purposes of keeping track of their implication relations, a language which eliminates proper names in favor of predicates by treating the name ‘a’ as equivalent to ‘*x*=a’, and introducing a predicate letter for it, and then regimenting ‘Fa’ as ‘(∃*x*)(F*x*.*x*=a)’, and a language which retains individual constants.

4. It is with some irony that we report this, since our own approach, which shows how to explicate the notion of sameness of logical form without relativizing to the logic of any particular theory, is, as we've said, based on the suggestion of Davidson's quoted below at the beginning of section III.

5. Though we will not argue for it here, we believe these are the only contextual parameters we need in order to devise an adequate semantics for tense. Throughout quantifiers over times will range over time intervals, and ‘is a time’ will be true of time intervals. We will include as a limiting case of a time interval a temporal instant.

6. By way of another contrast, consider the approach to conjunction represented in PC′ in [Larson, 1995; pp. 111-112]. We need consider only the axioms for ‘and’, ‘or’, and sentences formed using them.

(i) Val(<z, z′>, ‘and’) iff z = t and z′ = t
(ii) Val(<z, z′>, ‘or’) iff z = t or z′ = t
(iii) For any S, ConjP, Val(t, [$_{s}$S ConjP]) iff for some z, Val(z, S) and Val(z, ConjP)
(iv) For any Conj, S, Val(z, [$_{conjP}$ Conj S]) iff for some z′, Val(<z, z′>, Conj) and Val(z′, S)
(v) For all conjunctions α, Val(<z, z′>, [$_{conj}$ α]) iff Val(<z, z′>,α)
(vi) For any elementary sentence ζ, Val(t, [$_{s}$ ζ]) iff Val(t, ζ)

‘Val(x, y)’ is read as ‘x is a value of y’. ‘[$_{s}$S ConjP]’ structurally describes a sentence formed from a sentence S and a conjunction (‘and’ or ‘or’) concatenated with a sentence P, the latter treated as a unit for purposes of decomposition. This is a device like the use of parentheses to disambiguate the order of evaluation of parts of complex sentences. Likewise ‘[$_{conjP}$ Conj S]’ is a structural description of a conjunction concatenated with a sentence S. It should be obvious that this is not, in our usage, an interpretive truth theory (or a fragment thereof), for a number of reasons. First, as we have said, we have in mind a Tarski-style theory in the sense of theory which uses a satisfaction predicate to relate sequences or functions to expressions of the language (and a reference function for singular referring terms). On our conception of an interpretive truth theory, no entities are assigned to any expressions in the language except referring terms; no terms (excepting singular terms) are said to have ‘values’ in the sense intended by Larson and Segal. The axioms above therefore fail to be axioms in an interpretive truth theory in our sense because they are not axioms in a Tarski-style theory in our sense. This point applies not just to PC′, but to all of the theories Larson and Segal discuss. (The motives which prompt Larson and Segal to introduce ‘semantic values’ for all expressions of natural languages are not shared by us, and are not part of any project of giving compositional semantics for natural languages which concerns us.) This is not unconnected with another way in which the above theory fails to be interpretive in our sense. The appeal to the assignments of ordered pairs as values to conjunctions allows the formulation of axioms (iii) and (iv) above as part of the recursion to generate T-sentences. The result of this, however, has a quantified sentence (or quantified open sentence) representing the recursive structure of an object language sentence that is not quantified. An interpretive axiom for a sentence with a recursive structure must not introduce recursive structures not present in the target sentence. But, of course, the introduction of this quantifier is directly connected with the decision to assign entities to sentential connectives, which represents the most fundamental departure from the style of theory with which we are concerned. These points are relevant to the semantic categories of axioms in an interpretive truth theory which are relevant for our characterization of sameness of logical form through the notion of corresponding proofs, explained in section IV. Questions about the relation of our approach to that of Larson and Segal, which prompted this note, were raised by Peter Ludlow in his comment on an earlier version of this paper presented at a symposium on logical form at the 1998 Central Division Meetings of the American Philosophical Association.

7. We restrict our attention for the time being to declarative sentences.

8. ‘Language disguises thought. So much so, that from the outward form of the clothing it is impossible to infer the form of the thought beneath it, because the outward form of the clothing is not designed to reveal the form of the body, but for entirely different purposes.’ (*Tractatus Logico-Philosophicus*, 4.002)

9. It turns out that there is considerable leeway in which quantifier we use in our paraphrase: ‘some’, ‘the’, and ‘all’ would work equally well, since the predicate restriction requires the variable to take on a value identical to the referent of the demonstrative as used by the speaker on that occasion. Here, perhaps, is a case where we can say there is indeterminacy of logical form: each captures as well as any other the semantic behavior of complex demonstratives. This is generated by forcing the object language structure to be interpreted in a language which requires one or another of these quantifier words to be used. It would be possible, however, to introduce into the metalanguage a structure which mimics exactly that of the object language, for example: for all f, f satisfies$_{[s,t]}$ ‘[That x: x is F](x is G)’ iff f' such that f' is a ‘Fx and x = that’/’x’-variant of f is such that f' satisfies$_{[s,t]}$ ‘x is G’.

10. We use ‘surface grammatical form’ advisedly, since one can characterize grammatical form so that the form of a sentence is exhibited only in a notation in which every semantical feature of the sentence is syntactically represented. This would not be, however, something to be read off from the words and their order in the sentence we write down or speak, and so characterizing grammatical form makes any current grammatical categories we use, like that of ‘determiner’, hostage to a correct semantic theory. It is perhaps worth noting, to avoid any misunderstandings, that when we use ‘sentence’ we mean the string of symbols we write out or the sequence of symbols we utter in speech, not a string of symbols which represents its analyzed structure.

11. The treatment given below for attributives such as ‘slow’ and ‘large’ doesn’t extend to all adjectives which do not interact purely extensionally with the nouns they modify. These form a semantically heterogeneous class since there is not a single mode of interaction. The treatment given here works well for attributive adjectives which have a related non-evaluative comparative, as ‘slow’ and ‘large’ do in ‘slower’ and ‘larger’. The same treatment does not work, for example, for ‘good’, since to be a good knife or a good actor is not merely to be better than most knives or actors. Even a bad actor could be first among a very bad lot. In the case of evaluative attributives, it looks as if what is selected in the interaction for comparison is something like an ideal of the type modified. Likewise, other attributives can interact in distinct ways with nouns they modify. For example, adjectives which are formed from nouns for substances, such as ‘iron’, ‘brass’, or ‘wooden’, interact non-extensionally with some (though not all) nouns. While a brass railing is both brass and railing, a brass monkey is not both brass and a monkey, but monkey-shaped brass. This only helps to reinforce the point that surface grammatical form is a poor guide to semantic form.

12. A general treatment will require a device for introducing variables not already present in a predicate. We elide this in [11] in the interests keeping the presentation relatively perspicuous. A generalization is: For all functions *f* *f* satisfies$_{[s,t]}$ ‘*x* is a F G’ iff most fresh(‘x is a F G’)$^\frown$’ is a man’/fresh(‘x is a F G’)-variants f' of *f* satisfy$_{[\mathrm{s,t}]}$ ‘*x* is larger than ‘$^\frown$fresh(‘x is a F G’) and *f* satisfies$_{[s,t]}$ ‘*x* is a man’. The function fresh(φ) yields as value the first variable in some standard ordering not in φ.

13. A caveat: often ambiguities will need to be resolved before an appropriate satisfaction clause can be assigned. ‘Jean Paul is a subtle French philosopher’ can be read either as ‘Jean Paul is a subtle philosopher and Jean Paul is a French philosopher’ or as ‘Jean Paul is a subtle (French philosopher)’. Similarly, ‘Paul Bunyan is a large quick man’ may be read as conjunctive, or ‘large’ may be read as modifying ‘quick man’. Once ambiguities are resolved, the recursive clause provided in the text will yield the right satisfaction conditions.

14. Gareth Evans (1975) tries to provide a satisfaction clause for attributive adjectives which makes no appeal to explicit quantifiers. Adapting it to our notation, his proposal for ‘*x* is a large man’ would be:

> For any function *f*, *f* satisfies$_{[s,t]}$ ⌈*x* is a large man⌉ iff *f*(‘*x*’) is an large satisfier$_{[s,t]}$ of ‘*x* is a man’.

(Two different satisfaction relations are introduced on this account.) The attempt fails, however, because Evans’s clauses are not recursive, but adjectival phrases can be of arbitrary complexity. Given that attributive adjectives can interact, as in ‘x is a large slow man’, so that we cannot represent this as ‘x is a large man’ and ‘x is a slow man’, on at least one of its readings, we must introduce a new axiom for each additional iteration. Since there is no end to the iterations, there will be no end to the axioms required, which would represent the language as unlearnable.

15. The point is not novel. In ‘The average man is no better than he ought to be’ we do not suppose ‘average’ is contributing a predicate with a variable bound by the definite article, or that

in ‘I had a quick cup of coffee’ the adjective ‘quick’ contributes a predicate or a comparative with places bound by a restricted quantifier whose restricting predicate is ‘x is a cup’. In the first, ‘average’ modifies the sentence, and in the second ‘quick’ modifies the verb, despite their displacement. These cases may well count as idioms, however. Clearly the case involving attributive adjectives is not. Adjectives such as ‘fake’ and ‘phony’ present interesting cases. Such adjectives create an intensional context, which suggests they should receive a treatment as a part of a general account of opaque contexts. Such an account is presented in (Ludwig & Ray, 1998). But it would take us too far afield to show how to apply that account to the present case.

16. A full treatment will introduce some additional complications, though none that affect the approach outlined here. Thus, for example, since more than one directive can be issued at a time, even using the same words (directed at different audiences), satisfaction and truth conditions ultimately need to be relativized to speech acts.

17. It should be clear that here syntax is not thought of as a purely orthographical feature of an expression, but includes information about the semantic category of terms or places in a sentence structure.

18. See ‘Truth and Meaning,’ p. 33, ‘In Defense of Convention T,’ p. 71, ‘On Saying That,’ p. 94 in (Davidson 1984). (Interestingly, Dummett gives a similar, if somewhat less precise, criterion in (Dummett 1973), and includes, in a footnote, an anticipation of the generality conception we discuss below, in discussing the logical status of the identity sign, which is otherwise excluded.) The requirement that a term must receive a recursive clause to be a logical constant is important in this characterization, and rules out what would otherwise be counterexamples. Adjective modifiers can be given a recursive clause *if* we ignore the use of connectives in adjectives and focus only on extensional adjectives that don’t interact with other adjectives, as in the following example.

> For all functions f, speakers *s*, times *t*, and nouns φ, f satisfies$_{[s,t]}$ ⌜*x* is a red φ⌝ iff *f* satisfies$_{[s,t]}$ ⌜*x* is a φ⌝ and f(‘*x*’) is red.

However, clearly this is unnecessary. The only feature of such constructions which require recursive treatment is the concatenation of an adjective with a noun. The contribution of the adjective can, and in fact should, be cashed out in terms of the axiom for the corresponding predicate, as in the following.

> For all functions f, speakers *s*, times *t*, and noun φ, *f* satisfies$_{[s,t]}$ ⌜*x* is a red φ⌝ iff *f* satisfies$_{[s,t]}$ ⌜*x* is a φ⌝ and *f* satisfies$_{[s,t]}$ ‘*x* is red’.

We note also that the approach represented by the first clause requires an axiom for each adjective in addition to axioms for their occurrences in predicates formed using the copula, though it seems clear that our understanding of the use of adjectives is of a piece with our understanding of the predicates formed from them. We show in note 12, incidentally, that a similar recursive treatment of attributive adjectives such as ‘large’ and ‘slow’ is not viable.

19. Modal operators may be counterexamples as well if they must receive recursive clauses, for their contributions to determining the truth conditions of sentences in which they occur are not

intuitively independent of features of objects picked out by the predicates in sentences to which they apply. The exclusion criterion just given would not exclude modal operators, so they would have to be excluded independently. If they are (implausibly) treated as quantifiers over possible worlds, then, as lexically primitive restricted quantifiers, the exclusion rule given in the text would exclude them as well.

20. An alternative proposal by (Peacocke 1976), which also draws on the resources of a Tarski-style truth theory, employs an epistemic criterion. Peacocke's proposal is that a term α is logical iff, with respect to a truth theory for a language containing α, from knowledge of (a) which sequences (or functions) satisfy formulas θ_1, θ_2, ...θ_n to which α can be applied and (b) knowledge of the satisfaction clause for α, one can infer *a priori* which sequences (or functions) satisfy $\alpha(\theta_1, \theta_2,...\theta_n)$. The main idea behind his proposal is that it identifies *as* logical those terms knowledge of whose contributions to satisfaction conditions requires no knowledge of the properties of, or relations into which, objects enter. This is a way of trying to cash out the idea that the logical terms are topic neutral. (We can extend the proposal to terms that apply not just to formulas but to variables and singular terms: α is a logical term just in case, with respect to a truth theory for a language containing α, from knowledge of (a) which sequences (or functions) satisfy formulas θ_1, θ_2, ... θ_n and which objects sequences assign to terms τ_1, τ_2, ..., τ_m to which α can be applied and (b) knowledge of the satisfaction clause for α, one can infer *a priori* which sequences (or functions) satisfy $\alpha(\theta_1, \theta_2, ...\theta_n, \tau_1, \tau_2, ..., \tau_m)$, or if it is a singular term, what object each sequence (or function) assigns to it.)

What terms count as logical constants on this view depends on what knowledge we suppose we have about the sequences (or functions) that satisfy formulas or apply to terms. For example, knowing that sequences σ_1, σ_2, satisfy '*x* is F' is not in itself sufficient to know that every sequence satisfies '*x* is F', even if these are all the sequences, unless we also know that they are all the sequences, which is an additional bit of knowledge. Likewise, application of the criterion to numerical quantifiers and terms like the identity sign depends on whether we are supposed to know facts about the numbers of sequences that satisfy a formula and facts about the identity and diversity of objects in sequences.

The same idea may be approached non-epistemically by appeal to entailment relations as follows: α is a logical term iff, with respect to a truth theory for a language containing α, which sequences (or functions) satisfy formulas θ_1, θ_2, ...θ_n and which objects sequences assign to terms τ_1, τ_2, ..., τ_m to which α can be applied and the proposition expressed by the satisfaction clause for α entail which sequences (or functions) satisfy $\alpha(\theta_1, \theta_2, ... \theta_n, \tau_1, \tau_2, ..., \tau_m)$, or if it is a singular term, what object each sequence (or function) assigns to it. Here too what terms are counted as logical will depend on what propositions about the sequences (or functions) that satisfy a formula we are including. For the universal quantifier to be a logical constant, we have to include propositions about all '*x*'-variants of a given function or sequence.

Both these ways of spelling out the idea suffer from a obvious difficulty noted by (McCarthy 1981), namely, there are *a priori* inferences (entailments) not obviously grounded in the meanings of what have been traditionally taken to be logical constants. To see the difficulty, consider an arbitrary formula Ω, and a operator on it Σ, with satisfaction conditions as given in,

For any function f, f satisfies $\Sigma^\frown\Omega$ iff f satisfies Ω or A, where ‘A’ is replaced by any *a priori* truth, e.g., ‘1 < 2’. Peacock’s criterion will count Σ as a logical constant, though intuitively it is not. Similarly, as McCarthy points out, if *de re* knowledge of which objects sequences or functions assign to terms includes whether they are numbers, many function signs denoting functions that take numbers as arguments, such as ‘the successor of ___’, or ‘... + ___’ will be treated as logical constants, though intuitively these are not topic neutral terms. Peacocke intends to exclude from consideration number-theoretic terms, but this seems *ad hoc*, and in any case other *a priori* truths will do as well. An interesting example McCarthy mentions is the concatenation sign, ‘...⌒___’. Knowledge of what objects sequences assign to terms which can appear in the argument places for this functor and knowledge of the satisfaction clause for it suffices for knowledge of which objects sequences assign to the expression formed from those terms and the concatenation sign. Few will wish to treat ‘⌒’ as a logical term, however. The feature that Peacocke identifies seems at best a necessary condition on a term’s being a logical term, but not a sufficient one.

McCarthy’s own suggestion is a version of the invariance approach which we discuss in the text. McCarthy’s proposal identifies a narrower class of terms than the invariance approach we consider below, and, in particular, fails to count cardinality quantifiers as logical terms. We will not discuss it further here. But it helps to illustrate the variety of notions of logical constants one can identity, and to suggest, as we will urge, that there is a family of related notions, to a greater or lesser extent topic neutral, which can be classified on the basis of a number of overlapping features, and that there is little point to insisting that one is the objectively correct way of extending the practice of using the term ‘logical constant’ beyond the territory in which it is currently well-grounded.

21. We will be assuming that there are an infinite number of objects, e.g., all the real numbers, as well as spatio-temporal objects, so that concerns about the size of the universe need not affect this criterion.

22. We need to assign the logical constants extensions invariant under all permutations of the universe. Frege treated them as functions from truth-values to truth-values. If we associate The True with the universal set and The False with the empty set, the invariance criterion will classify the usual truth functional connectives as logical terms. Rather than force fit truth-functional connectives to this criterion, (Sher 1996) gives a separate criterion for them. This admits, however, that no one notion of generality applies to every term we deem as logical.

23. Once we have a characterization of logical syntax, we can define in the usual way the notions of logical truth, logical consequence, and logical equivalence, with adjustments to accommodate for natural language sentences not being true or false independently of context. To do so, we relativize the notions to sets of contextual parameters. A sentence true under all interpretations of its nonlogical terms for a given set of values for contextual parameters C is a logical truth relative to C; a sentence φ is a logical consequence of a set of sentences $\{\psi_1, \psi_2 \ldots \psi_n\}$ relative to a given set of contextual parameters C iff there is no interpretation of nonlogical terms under which every sentence of $\{\psi_1, \psi_2 \ldots \psi_n\}$ is true relative to C and φ is false relative to C; sentences φ and ψ are logically equivalent relative to contextual parameters C iff each is a logical consequence of

the other relative to C. (Stronger notions can be defined by universally quantifying over contextual parameters, though complications emerge for demonstratives.) Essentially, this picks out those consequences as logical (relative to contextual parameters) which are due to the meanings of the syntactical features of the language identified as logical.

We can also identify a notion of pragmatic consequence and necessity. φ is a pragmatic consequence of ψ iff φ is true in all contexts in which ψ is true; φ is pragmatically necessary if true in all contexts. 'I am here now', e.g., is pragmatically necessary (well, almost'for one can use 'here' to designate a place one is not, e.g., by pointing to a map). But it is best to keep these notions distinct from those of logical consequence and necessity.

(Evans 1976) has suggested distinguishing a notion of structural consequence from logical consequence. However, his proposal would identify structural consequences with a subset of what we are already committed to treating as logical consequences, on the basis of a feature of them which does not seem to mark them out as an interestingly distinct class. Evans treats logical consequences as hinging on the presence of logical *terms* in a sentence. Structural consequences hinge not on logical terms but on patterns in the construction of sentences. Thus, we recognize the validity of the argument from (i) to (ii) by recognizing forms (iii) and (iv):

(i) Brutus is an honorable man.
(ii) Brutus is honorable.
(iii) noun phrase + 'is a' + adjective + noun
(iv) noun phrase + 'is a' + noun

Understanding the semantic contribution of the adjective in a sentence of the first form is sufficient to know that the corresponding sentence of the second form is true if the first is. We have already, though, subsumed the sort of structure exhibited in (iii) under the heading 'logical'. It counts as logical because it, not the terms which instantiate it, receives a recursive treatment (the terms all get their own base clauses, or terms they are derived from do). Evans does not treat the entailment from (i) to (ii) as logical. But from our perspective, this is misguided. From the point of view of an interpretive truth theory, the difference between 'Brutus is an honorable man' and 'Brutus is honorable and Brutus is a man' is merely what syntactic features of a sentence are subserving a certain semantic role. Rather than distinguish a new notion of consequence, as Evans does, it is more reasonable to extend the notion of logicality from terms to structures.

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