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WHAT IS THE ROLE OF A TRUTH THEORY IN A MEANING THEORY?

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1. Introduction

We are preeminently linguistic beings. An understanding of our linguistic abilities is central to understanding our powers of thought and forms of social organization. One part of the project of understanding our linguistic abilities, the part I will be concerned with in this paper, has to do with the combinatorial structure of natural languages, which enables a finite supply of primitive terms to have infinite expressive powers, in the sense of grounding our ability to mean and understand an infinity of nonsynonymous expressions. We gain an understanding of this feature of natural languages by providing a compositional meaning theory for them: a theory that, from a specification of meanings for a finite vocabulary and a finite set of rules, specifies the meaning of every sentence of the language.

Restricting our attention for the moment to a context insensitive language *L*, we can think of such a theory as aiming to meet the following two conditions. The first is that it prove true meaning theorems of the form (*M*) (henceforth '*M*-theorems'),

(*M*) f means in *L* that *p*,

where what replaces '*p*' translate in the language of the theory (the metalanguage) the sentence in *L* (the object language) denoted by what replaces f. The second is that it do so from axioms in some sense specifying or giving the meanings of primitive expressions in *L*, in a way that exhibits how our understanding of the sentence depends on our understanding of its significant parts and their mode of combination. Such a theory would give us insight into the structure of our practical ability to speak and understand the languages we have mastered,[1] and how their infinite expressive powers rest on a finite base.

My goal in this paper is to say what the relation is between *this* project, or its generalization to languages containing context sensitive elements (henceforth 'context sensitive languages') and so-called *truth-theoretic semantics*. The suggestion that a truth theory, in the style of Tarski,[2] can play a central role in a compositional meaning theory is a familiar one, due to Donald Davidson (Davidson, 1984d). However, it is often not clear from Davidson's work, or from that of his followers, exactly how we are to conceive of the connection. It has sometimes been thought that the truth theory is supposed to *replace* a meaning theory, to provide the most we could provide in the way of a compositional meaning theory. On this view, the truth theory does not serve as a compositional meaning theory, but as a more philosophically and scientifically respectable replacement of it (Stich, 1976).

I do not believe that this was Davidson's intent, though there are certainly things he says that would lead one to believe this, and I think many have been misled. In this paper, I want to explain what I think the connection is, and make much more explicit the role of a truth theory in a compositional meaning theory than Davidson has. I will do this by stating explicitly the form of a theory that entails all instances of (*M*) for a language in a way that makes central use of a truth theory, and which I believe meets at least in spirit the other requirements on an adequate compositional meaning theory. Even if I am mistaken in thinking that this represents Davidson's line of thought (one will not find what I say explicitly in anything he has written), it illustrates one important way of seeing how to exploit the recursive machinery of a truth theory to meet the goal of a compositional meaning theory. And it has some unexpected benefits. It enables us to see how the theory can achieve *its* aims even though the language contains defects that spell trouble for a *truth theory simpliciter*. I have in mind specifically the semantic paradoxes and semantic vagueness, both of which present serious difficulties for truth theories for natural languages.

I will first develop the account for a context insensitive language, where the issues will be clearest. Then I will extend the account to context sensitive languages. Finally, I will show how this helps us out of what have been taken to be some very serious difficulties for the truth-theoretic approach to meaning. In the appendix, I explain why a recursive translation theory cannot achieve the same aims.

2. From Truth to Meaning

Davidson was driven to propose using a truth theory to do duty for a meaning theory by despair of providing a theory that more straightforwardly entailed *M*-theorems. We need not be concerned presently with his arguments against more straightforward attempts to do this. Our question is whether there is some other route to the same result through a truth theory.

The first question to ask is why it would it so much as look as if a truth theory could do duty for a meaning theory? It is obvious that a truth theory is not a meaning theory, and that its theorems (of the form of (*T*) below) do not tell us what sentences in the language for which it is a theory mean.

The key to seeing why we might nonetheless gain insight into meaning through knowledge of a truth theory is by seeing that if we knew enough about the theory we would know something that enabled us to interpret correctly the sentences of the language for which it was a theory. In particular, as Davidson noted, if we knew that a truth theory satisfied Tarski's Convention *T* (Tarski, 1983, pp. 187-8), we would be a long way toward knowing what we needed to know to interpret object language sentences. Convention *T* requires of a formally correct truth definition for a predicate "is true-in-*L*" for a language *L* that it entail for all sentences of the object language a theorem of the form (*T*),

(*T*) f is true-in-*L*[3] iff *p*,

where 'f' is replaced by a structural description of an object language sentence (a description in terms of the mode of combination of its meaningful constituents), and '*p*' is replaced by a translation of f into the metalanguage. Let us call sentences of the form (*T*) that meet this condition T-*sentences*. Suppose we knew a truth theory for a language and we knew it met Convention *T*. If we had then some means of mechanically picking out which of its theorems were the *T*-sentences, we would be in a position to understand any sentence of the object language. Why is this? Consider (1).

(1) 'Gwyn'{' yw eira' is true in Welsh iff snow is white.

Suppose that this is a *T*-sentence for the Welsh sentence 'Gwyn yw eira'. We understand (1). Knowing it is a *T*-sentence tells us that 'snow is white' in English translates 'Gwyn yw eira' in Welsh. Thus, we know (2), which is all we need to know to interpret this sentence in Welsh.

(2) 'Gwyn'{'yw eira' means in Welsh that snow is white,

(I ignore complications having to do with tense.) As Davidson remarked at one point (and so far as I know only at one point), if we know that (1) is a *T*-sentence, what we know guarantees that if we replace 'is true in Welsh iff' with 'means in Welsh that' we will not go wrong (Davidson, 1984c, p. 60). This observation is the key to seeing (i) how to make explicit a compositional meaning theory which relies on the recursive machinery of a truth theory in generating *M*-theorems, and (ii) how to generalize Convention

T to a context sensitive language.

A truth theory is not a meaning theory. Yet, if we knew enough about a truth theory of the right sort, we would be in a position to interpret object language sentences. How can we turn this into an explicit meaning theory? In order to formulate an explicit meaning theory, a theory which will have as consequences all true *M*-theorems (and no false *M*-theorems), we need to make explicit everything that we need to know *about* a truth theory in order to come to be able to interpret sentences of the object language on the basis of understanding their significant parts.

We want more from a compositional meaning theory than just the *M*-theorems for a language. We want in addition that it should inform us about how the meanings of complexes in the language depend on those of their parts in a way that enables us to understand the complexes on the basis of understanding the primitives and rules for their combination. That is why, even for a language with a finite number sentences, we cannot simply give a list of true *M*-theorems for the language. This is an important requirement, which is sometimes overlooked in discussions of the role of a truth theory in providing a compositional meaning theory (see the appendix for further discussion).

We can divide our task into two parts. First, we must answer the question what constraints a truth theory must meet in order that it have among its theorems all the *T*-sentences for the object language, and that it, in some sense to be specified, exhibit in (at least certain) proofs of the *T*-sentences how understanding of the sentences depends on understanding their parts. Second, we must say what we have to know in addition to that fact about a theory in order to be in a position to state *M*-theorems for each sentence of the object language; in particular, we have to say what we could know that would enable us to pick out the theorems that are the *T*-sentences.

Davidson at first thought that, for a natural language that contains such context sensitive elements as demonstratives and tense, a formally correct truth theory that was simply true would *ipso facto* satisfy (a suitable analog) of Convention *T* (Davidson, 1984d). This hope proved ill founded. From any extensionally adequate truth theory, we can generate another extensionally adequate truth theory that generates theorems giving truth conditions for sentences using nonsynonymous sentences in the metalanguage. This is obvious once we reflect that there can be nonsynonymous but extensionally equivalent satisfaction clauses for object language predicates.[4] The position Davidson subsequently adopted was that the truth theory not be merely true, but be confirmable from the standpoint of a radical interpreter (Davidson, 1984a, p. 139). The hope was that this would put enough additional constraints on the theory to ensure that it would satisfy Convention *T* (or a suitable analog).

I am not concerned currently, however, with the adequacy of these additional constraints. Davidson's aim was to provide constraints on a truth theory which would shed light on the relation between meaning and relatively more primitive concepts, particularly those employed in describing empirical evidence one could have for a truth theory for a speaker or community of speakers (Davidson, 1984a, p. 137). My interest is more limited. I want to say what knowledge we could have about a truth theory for a language that would enable us to use it to interpret speakers *of that language*. It is a separate issue how we could confirm that *a given speaker or speech community spoke that language*. Indeed, the question what knowledge we could have about a truth theory for a language that would enable us to interpret its speakers is conceptually prior to the question how we could confirm such a truth theory for a speaker or group of speakers. For the question of how and whether we could confirm it on the basis of certain evidence depends upon being able to specify independently what counts as success.[5]

What then could we know about a truth theory that would suffice for its meeting Convention *T*? We might simply say that we know that it meets Convention *T*. But this will not guarantee that appropriate proofs of the *T*-sentences exhibit how the meanings of those sentences are understood on the basis of understanding their parts and mode of combination.[6] The solution is to require that the axioms of the theory themselves meet an analog of Convention *T*, which will then suffice to insure that the theory meets Convention *T* and that certain proofs of the *T*-sentences will exhibit how the meanings of those sentences are understood on the basis of their structures.

To see what we require, contrast predicate satisfaction clauses (3) and (4) (given in English).[7]

(3) For all functions *f*, *f* satisfies in Welsh 'triongl yw *x*' iff *f*('*x*') is a triangle.

(4) For all functions *f*, *f* satisfies in Welsh 'triongl yw *x*' iff *f*('*x*') is a trilateral.

In (3) we use a predicate in the metalanguage synonymous with the object language predicate; in (4) we use a predicate coextensive with (indeed, necessarily coextensive with) the object language predicate but not synonymous with it.[8] Either could be used to provide a true truth theory for the language, but only (3) would do if we wanted the theory to have *T*-sentences among its theorems. (3) exemplifies the most straightforward way to give a truth theory for a language which we understand, namely, by using a sentence in the metalanguage which is of the same form as the object language sentence, and which employs a predicate, or recursive term, which is synonymous with the object language expression for which satisfaction conditions are being given.

This then is what we require: that axioms of the truth theory,[9] reference axioms, predicate satisfaction axioms, and recursive axioms, use terms in the metalanguage in giving their reference or satisfaction conditions that *are synonymous with* the object language expressions for which they are used to give satisfaction conditions. More fully, for reference axioms, we require that the correct referents be assigned to referring terms in the object language, and, if there is more to their meaning than that, also that a metalanguage term synonymous with the object language term be used (the metalanguage can be enriched as needed). For example, in 'the referent of 'Caesar' in Welsh is Caesar' we use a term in our metalanguage, 'Caesar', in given the referent of the object language expression 'Caesar', which is synonymous with it (this may only come to their having the same referent, but if more is required the convention requires that it be supplied). For predicate satisfaction clauses, we require a predicate in the metalanguage synonymous with the object language predicate be used in giving the satisfaction conditions, and that the sentence form on the right hand side of the quantified biconditional be the same in logical form as that in the object language. (3) provides an example. For recursive terms, we require that the metalanguage term (or structure) used in the recursion be synonymous with the object language term (or structure) the axiom discharges, and that the sentence form on the right hand side of the embedded biconditional be the same in logical form as the object language sentence for which satisfaction conditions are being given. (This will be qualified when we turn to context sensitive languages.) Thus, for example, for truth functional connectives, we use in the metalanguage a synonymous truth functional connective in giving satisfaction conditions, as in (5).

> (5) For any function *f*, any formulas f, ?, *f* satisfies in Welsh f {' a '{? iff *f* satisfies in Welsh f *and f* satisfies in Welsh ?.[10]

Similarly for other connectives, and for quantifiers. One has only to think here about how we in fact standardly proceed to give an axiomatic truth theory for a language we understand. Let us call this requirement *Convention* S.[11] If we know that a formally correct truth theory meets Convention *S*, then we can be assured that it meets Convention *T*. Let us call a truth theory that meets Convention *S* an *interpretive truth theory*. This is a stronger condition in general than requiring that a truth theory meet Convention *T*.

The simplest proofs (speaking loosely) of *T*-theorems (theorems of the form (*T*)) in an interpretive truth theory produce *T*-sentences in a way that shows how the truth conditions of the sentence are determined from the reference and satisfaction conditions of their parts, using in the metalanguage expressions synonymous with those for which satisfaction conditions are given. This can be fairly said then to *show* how the meaning of the sentence depends on the meanings of its parts. This completes the first part of the task we set above.

If we know that a formally correct truth theory is interpretive, we know it meets Convention *T*, and that there are proofs of *T*-sentences that exhibit how the meanings of sentences depend on the meanings of their parts. To use such a theory for interpreting object language sentences, however, we need to know more than this.

First, we need to know some mechanical way of identifying the *T*-sentences among the theorems of the theory. If we allow the theory a rich enough logic, we will be able to prove *T*-theorems that are not *T*-sentences.[12] What we need is to define a predicate that, relative to a formal interpretive truth theory, applies to all and only *T*-sentences, and whose extension can be determined mechanically, at least in the sense that for any sentence we are given of the language, we can mechanically determine for it a *T*-theorem which falls in the extension of the predicate.[13] Intuitively, given an interpretive truth theory, proofs that draw solely on the content of the axioms in proving T-theorems will yield *T*-sentences. Let us call such theorems *canonical* T-*theorems*. This is not itself a syntactic notion. But for a given theory with its logic, we can characterize a syntactical notion that aims to be coextensive with this intuitive notion. We do this by characterizing a canonical theorem as a *T*-theorem that is the last sentence of a proof meeting certain constraints that ensure that only the content of the axioms is drawn on in proving it. This can be accomplished by restricting the rules we can appeal to in proofs and what we can apply them to. Proofs that satisfy the constraints we can call *canonical proofs.* A set of rules for constructing a canonical proof for a given object language sentence we can call a *canonical proof procedure* (in this following Davidson). A canonical proof procedure, for an interpretive truth theory, has a *T*-sentence as its conclusion; given how it is constructed, it reveals in its structure also the semantic structure of the object language sentence.

There can be no general syntactical characterization of these notions simply because there are many different logical systems we could employ in the theory. For any given theory and logic, it would straightforward, if somewhat tedious, to write out what restrictions were required. Once we had a characterization of the restrictions required in some logical system, we could in fact weaken the system so that it consisted of only the moves so allowed. In this case every *T*-theorem of the theory would also be a *T*-sentence. What then do we need to know about an interpretive truth theory in order to pick out its canonical theorems? We can put it this way: we need to know a canonical proof procedure for the theory or that its logic permits only canonical *T*-theorems. (In the appendix a simple example is given in the course of the discussion of recursive translation theories.)

Second, we also need to know what the theory says, for we might know that a truth theory *in* Italian *for* Welsh meets Convention *S* without being in a position to interpret Welsh, because we don't know Italian. Moreover, we don't just need to know what the theory expresses, we need to know that the theory for which we know a canonical proof procedure says what the theory expresses. That is to say, we need to know enough to be able to understand the theory. Otherwise, our knowledge of how to pick out *T*-theorems that are *T*-sentences is not connected with our knowledge of what the theory expresses in a way that allows us to interpret object language sentences. Our semantic and syntactical knowledge must be matched.[14]

This completes the second part of our task. What remains is to state all of this explicitly, that is, to write out the propositions that we must know in order to use a truth theory to interpret object language sentences. If we identify the meaning theory with the body of knowledge that is required in order to interpret object language sentences on the basis of knowledge of the meanings of their parts, then the result will be the meaning theory itself, as distinct from the truth theory we exploit in formulating it. And this will also make explicit, then, the relation between the truth theory and the compositional meaning theory.

Let us suppose then we have an interpretive truth theory T for a language L, in a metalanguage M, with axioms A1..., A2 ..., ..., and a specification of a canonical proof procedure CP for T. In addition to the usual vocabulary required in a truth theory for a given object language, we will require M to contain a predicate, μ which is a translation of '*x* means in L that'. A *meaning theory*, *M*, for L, can then be stated in the following form:

1. T in M is an interpretive truth theory for L.

2. The axioms of T are A1 ..., A2 ..., ...

3. A1 means in M that ...; A2 means in M that ...; ...; μ means in M *x means in L that* ....[15]

4. CP is a canonical proof procedure for T.

5. For any sentence *t*, any language *L*, any interpretive truth theory *T* for *L*, if *t* is the last line of

a canonical proof in *T*, then the corresponding *M*-sentence is true in M.

The *M*-sentence corresponding to a canonical theorem *t* in an interpretive truth theory is the result of replacing the translation in M of 'is true in L iff' in *t* with the translation of 'means in L that'.

Suppose we knew 1-5 for some suitable theory. 1, 2 and 4 suffice for us to be able to identify the *T*-sentences of the theory and to know that we have identified the *T*-sentences. 3 ensures that we will understand them. 5 states the knowledge we have which enables us to infer from the *T*-sentences to the truth of corresponding meaning theorems. Semantic descent allows us to infer the theorems themselves. The instantiation of 5 to T is something we could deduce from 1-4 given the meanings of 'is an interpretive truth theory' and 'is a canonical proof procedure for', so in a sense it is redundant, but it helps to make explicit how the connection is made between *T*-sentences and true *M*-theorems. The canonical proof of a *T*-sentence in T exhibits (for someone who understands the language of the theory) how the meaning of the object language sentence depends on the meanings of its parts. Thus, someone who knows *M* knows how to interpret any sentence in L on the basis of knowledge sufficient to understand each of the primitive terms of L and rules for their combination.[16]

Notice that *M* contains statements about the truth theory T, and its axioms, but it does not include the axioms of T. Indeed, it is clear that *M* and T need not be in the same language. Thus, surprisingly, we have been lead to the conclusion that the truth theory itself is not *part of* the meaning theory.[17] This turns out, as we will see below, to be a virtue when we come to some worries about the coherence of defining truth for many natural language sentences. Before we come to that, however, I want to sketch how this approach extends naturally to context sensitive languages.

3. Extension to Context Sensitive Languages

The extension to context sensitive languages requires two things. First, we need to explain the appropriate form of the analog of *T*-sentences and *M*-sentences for context sensitive sentences. I will continue to call these *T*-sentences and *M*-sentences for convenience. Second, we need to say what it is for a truth theory that issues in such *T*-sentences to be interpretive. Once we have done this, we simply reinterpret 1-5 above according to the notions appropriate for a context sensitive language; all the morals will carry over straightforwardly.

There is more than one way to adapt a Tarski-style truth theory to a context sensitive language. One approach is to shift from a predicate of sentences to a predicate of utterances, and this has many advantages. It makes clear that in a context sensitive language, the primary unit of semantic evaluation is the speech act using a sentence. However, it also entails certain technical complexities which I wish to avoid. I will therefore adopt the alternative of introducing a truth predicate with additional argument places for contextual parameters that are relevant to the determination of the semantic contribution of context sensitive elements of the language. For present purposes, I will suppose we can get by with just two: speaker and time (place can be reduced to the speaker's location; the contribution of demonstratives can, at a first pass, be secured relative to the speaker's demonstrative intentions).[18] The predicate I introduce is '*x* is true in *L* taken as if spoken by *s* at *t*'.[19] That is, in asking whether a certain sentence is true, relative to a speaker and a time, we ask relative to the interpretation it would have, fixing the language, if its context sensitive elements were assigned semantic values in accordance with rules in the language, given the speaker and time as input. We make the parallel modification in the case of '*x* means in *L* that', to get '*x* taken as if spoken by *s* at *t* means in *L* that'. I abbreviate these as '*x* is true$_{[s,\, t]}$ in *L*' and '*x* means$_{[s,\, t]}$ in *L* that', respectively.

The form of *T*-sentences and *M*-sentences, then, for context sensitive languages, will be (*TCS*) and (*MCS*):

(*TCS*) For all times *t*, all speakers *s*, f is true$_{[s,\, t]}$ in *L* iff *p*.

(*MCS*) For all times *t*, all speakers *s*, f means$_{[s,\, t]}$ in *L* that *p*.

The next question is how to say what it is for a truth theory for a context sensitive language to be interpretive. Convention *T* no longer applies, since in (*TCS*) when f is a context sensitive sentence we will have bound variables in '*p*', and so it would be inappropriate to require that f be translated by '*p*'. For example, consider (6), intuitively the *T*-sentence for 'Rydw i yn darllen', Welsh for 'I am reading'.

(6) For any time *t*, speaker *s*, 'Rydw i yn darllen' is true$_{[s,\, t]}$ in Welsh iff *s* is reading at *t*.[20]

If a speaker S of Welsh utters 'Rydw i yn darllen' at a time t, instantiating (6) to him yields a specification of its truth conditions that expresses the proposition expressed by the sentence interpreted relative to the occasion of utterance, namely, that S is reading at t. And that is just what we want. Clearly we *don't* want to say that 'Rydw i yn darllen' means the same as '*s* is reading at *t*', with its free variables. We see what we want: but how can we express the requirement in general terms?

Here is the clue. Convention *T* can be *restated* in the following way.[21]

An adequate truth theory for a context sensitive language *L* must be formally correct and entail for all sentences of the object language a theorem of the form (*T*), where 'f' is replaced by a structural description of an object language sentence,

(*T*) f is true in *L* iff *p*,

such that the result of replacing 'is true in *L* iff' with 'means in *L* that' yields a true sentence in the metalanguage.[22]

This is equivalent to the original because we can replace 'is true in *L* iff' with 'means in *L* that' *salva veritate* if, and only if, the sentence that replaces '*p*' translates that denoted by f. This is, of course, precisely the fact that allows us to move from *T*-sentences to *M*-sentences. (*TCS*) and (*MCS*) are our analogs for (*T*) and (*M*) for a context sensitive language. To generalize Convention *T* to a context sensitive language, *we need merely generalize our reformulated statement of it.* For notice that in (6) we can replace 'is true$_{[s, t]}$ in Welsh' with 'means$_{[s, t]}$ in Welsh' to yield a true sentence. And that is precisely what it is for the truth conditions assigned relative to a speaker and time to express the proposition a use of the sentence would express in the language relative to the speaker and time. Thus, our modified Convention *T*, which I'll call Convention *TCS*, can be stated as follows:

An adequate truth theory for a context sensitive language *L* must be formally correct and entail for all sentences of the object language a theorem of the form (*T*), where 'f' is replaced by a structural description of an object language sentence,

(*T*) f is true$_{[s, t]}$ in *L* iff *p*,

such that the result of replacing 'is true$_{[s, t]}$ in *L* iff' with 'means$_{[s, t]}$ in *L* that' yields a true sentence in the metalanguage.

To complete our characterization of an interpretive truth theory, we now need merely to modify Convention *S* in a similar way. For recursive terms, which are not context sensitive, no modification is needed. For context sensitive referring terms, we require simply that the reference clause provide the correct referent (if any) relative to a use of the referring term. For context sensitive predicates, we employ a variant of the device we used for sentences. 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 speaker *s*, and time *t*,

For all *f*, *f* satisfies$_{[s,\ t]}$ Z(x_1, x_2, ... x_n) iff ?(*f*('x_1'), ..., *f*('x_n'), *s*, *t*),

meets Convention *S* just in case the corresponding relativized meaning statement is true in the metalanguage:[23]

For all *f*, Z(x_1, x_2, ... x_n) means$_{[f,\ s,\ t]}$ that ?(*f*('x_1'), ..., *f*('x_n'), *s*, *t*).

Here we introduce a meaning relation that holds between a formula, speaker, time, and function, if the formula interpreted relative to the assignments made by the function to its free variables and taken as if uttered by *s* at *t* means what the sentence in the complement clause means (taking the '$f(x_i)$' to be directly referring terms). The revised convention is Convention *SCS*. A truth theory that meets Convention *SCS* is interpretive; clearly it will meet Convention *TCS* if it meets Convention *SCS*.

This completes the extension of the results of the previous section to context sensitive languages.

4. <u>Application to Semantic Defects</u>

Explicitly formulating a meaning theory that makes use of a truth theory has some important benefits. This becomes apparent when we consider certain kinds of objections to truth-theoretic semantics that are based on the assumption that in order for a truth theory to aid in the work of giving a compositional meaning theory, the theory must minimally be true and consistent. On this assumption, certain semantic defects in natural languages that make formulating a true truth theory for them problematic threaten to restrict or undermine altogether the possibility of a truth-theoretic semantics for them.

The most obvious difficulty is the possibility of formulating semantic paradoxes in natural languages. Consider the sentence labeled (*L*).

(*L*) The sentence labeled (*L*) in "What Is the Role of a Truth Theory in a Meaning Theory?" is false.

Empirical investigation shows this sentence to say of itself that it is false; if true, then, it is false, and if false, then true, so it is true iff false, which is a contradiction. This will follow from any truth theory that meets Convention *T* (*TCS*) for the language together with the relevant empirical facts. No consistent truth theory can be given for the whole language then. This looks at the least to put some limitations on the use of truth-theoretic semantics in application to natural languages (see (Chihara, 1976), for example).

An even more serious problem is raised by the fact that many, even most, natural language predicates are vague. In my view, no vague sentence is either true or false, since vague predicates fail a presupposition of our semantic vocabulary, namely, that they are semantically complete and have extensions.[24] But problems arise even if one simply accepts that vagueness engenders truth-value gaps. It looks as if one's truth theory itself then will inherit the gaps because one is forced to use metalanguage predicates synonymous with object language predicates in giving truth conditions to meet Convention *T* (or *TCS*).

However, once we recognize that the meaning theory itself, which exploits a truth theory, does not embed a truth theory, then we see that *the truth theory need not be true* in order for it to serve its function. For it serves its function by meeting Convention *S* (*SCS*). That is what guarantees that it has as its canonical theorems *T*-sentences. And that is what allows us to infer corresponding *M*-sentences, which are the output of the meaning theory. We do not need to assert the truth theory in order to use its recursive machinery to (a) reveal compositional semantic structure and (b) generate true *M*-theorems.

Take the semantic paradoxes. Even (*L*) will have its *T*-sentence. Ignoring context sensitive elements, an adequate truth theory would yield (*TL*) as the canonical theorem for (*L*).

> (*TL*) 'The sentence labeled (*L*) in "What Is the Role of a Truth Theory in a Meaning Theory?" is false' is true in English iff the sentence labeled (*L*) in "What Is the Role of a Truth Theory in a Meaning Theory?" is false.

(*TL*) is problematic. But we do not have to assert it as part of the meaning theory. The meaning theory will generate (*ML*).

> (*ML*) 'The sentence labeled (*L*) in "What Is the Role of a Truth Theory in a Meaning Theory?" is false' means in English that the sentence labeled (*L*) in "What Is the Role of a Truth Theory in a Meaning Theory?" is false.

(*ML*) is *true*, just as (7) is.

> (7) '2 + 2 = 5' means that 2 + 2 = 5.

Thus, the meaning theory bypasses the difficulties that afflict the truth theory!

The same is true when we turn to semantic vagueness. Again, even if the truth theory uses vague predicates, the meaning theory need not, since it does not include the truth theory, as opposed to statements about the truth theory. Consider (ignoring tense) the *T*-sentence for a sentence about a borderline case for 'bald'.

(*TB*) 'Barring Pate is bald' is true in English iff Barring Pate is bald.

Everyone except epistemicists will agree that (*TB*) is neither true nor false. The truth theory that generates it is therefore defective. Many of its axioms dealing with vague predicates will likewise be neither true nor false. However, the meaning theory is not committed to asserting (TB) (or the axioms that lead to it), but rather (*MB*).

(*MB*) 'Barring Pate is bald' means that *Barring Pate is bald*.

The trouble with vague terms arises when they have to contribute their *extensional* properties to the truth conditions of sentences in which they are used. While 'bald' is in some sense used in (*MB*) in the complement (we do not understand (*MB*) unless we understand the complement), it is clear that it does not contribute its extensional properties to the truth conditions of (*MB*). Thus, even if (*TB*) is without a truth-value, (*MB*) comes out true.[25]

The point is general. No semantic defect that undercuts the possibility of giving a true truth theory for a language need thereby undermine its use in a compositional meaning theory, since such a theory need not assert the content of the truth theory itself.

5. Conclusion

In conclusion, I have aimed to do three things in this paper. The first was to make explicit the connection, or at least one sensible connection, between a recursive truth theory for a non-context sensitive language and the project of giving a compositional meaning theory for it. The second was to show how to extend this result to context sensitive languages. The third was to show that, once we are clear about the connection between the truth theory and meaning theory, a number of what have been thought to be serious difficulties for truth-theoretic semantics for natural languages turn out to be impotent, because commitment to the truth of the meaning theory does not entail commitment to that of the truth theory.

APPENDIX

In this appendix, I address the claim that insofar as a truth theory enables us to provide something like a meaning theory for a language, it can in principle be dispensed with in favor of a translation theory.[26] This claim is based on the assumption that the only purpose of the truth theory in the meaning theory is to provide us with a way of matching object language sentences with metalanguage sentences that translate them. This assumption is mistaken. It fails to pay attention to the desiderata on a *compositional* meaning theory, which it is our aim to provide by appeal to the mechanism of a truth theory. A compositional meaning theory must exhibit both how our understanding of complex expressions depends on our understanding of their parts and their mode of composition, and how we determined the meaning of a sentence relative to a context of utterance. A translation theory does neither of these. A compositional meaning theory employing a truth theory as sketched above does both.

Consider context sensitivity first. For a natural language, a meaning theory should exhibit how we determine the meaning of a sentence as uttered on a particular occasion. If we consider the form of a truth theory of the sort introduced in section 3 above, it is clear that its function is not at all to provide us with a way of matching sentences with sentences that translate them, but rather to provide context relativized truth conditions, which then enable us to specify context relativized statements of what they mean. A translation theory does not issue in any statements about what a sentence means as used by a speaker at a time. A translation theory takes 'Rydw i yn darllen' in Welsh blandly into 'I am reading' in English, with no hint that its truth may vary from context to context, or that what it means in the mouth of one speaker is different from what it means in the mouth of another. If we understand one of the languages, we can understand an utterance of a sentence from the other, at least as a whole; but we still have no *theory* that reveals anything about their context sensitivity. We might as well say we understand natural languages and be done with it. A translation theory then obviously does not do the same job as a truth theory in the case of a context sensitive language, for its job is *not* just to match sentences of the object language with translating sentences of the metalanguage.

Let us turn to our second concern. Even a recursive translation theory fails to meet the central desideratum on a compositional meaning, namely, that it exhibit how our understanding of complex expressions depends on our understanding of their parts and mode of combination. To see this, consider a translation theory for a simple context insensitive language *L*. The vocabulary and symbols of *L* consist of the following expressions:

'*a*', '*R*', '*F*', '&', '~', '(', ')'

The first we call a singular term, the second two we call predicates, the fourth and fifth the conjunction and negation signs, respectively, and the right and left parentheses we call grouping elements. The sentences of *L* are given by the following rules.

If a is a singular term and f a predicate, then a{f and f {a are sentences.

If ? is a sentence, then '~'{? is a sentence.

If f and ? are sentences, then '('{f {' & '{?{')' is a sentence.

(The point of allowing concatenation of a singular term with a predicate in either order will become clear in the sequel, where it will be used to highlight a limitation of the recursive translation theory.) Let 'Tr(*x*, *y*)' be short for '*x* in *L* is translated by *y* in *L**'. We will allow that *L** has formation rules homologous to those for *L*. We let '*s*' together with subscripts range over sentences of *L*, and '*P*' range over predicates of *L*, and '*n*' over singular terms in *L*. We give the translation theory as 1-8.

1. Tr('*a*', 'a').

2. Tr('*R*', '?').

3. Tr('*F*', '?').

4. Tr('&', 'v').

5. Tr('~', '5').

6. For any *n*, *P*, Tr(*n*{*P*, Tr(*n*){ Tr(*P*)) and Tr(*P*{*n*, Tr(*P*){Tr(*n*)).

7. For any s_1, s_2, Tr('('{s_1{' & '{s_2 {')', '('{Tr(s_1){' v '{Tr(s_2){')')

8. For any *s*, Tr('~'{*s*, '5'{Tr(*s*))

1-5 provide translation axioms for primitive expressions term by term. 6-8 provide a recursive procedure for producing translations of complex expressions built from them. So far so good.

The claim we want to examine is whether this theory can serve the ends of a compositional meaning theory. If it can, then it should exhibit how understanding of complex expressions in the language depends on understanding of the primitive expressions and their modes of combination. As stated, of course, it does not say anything that tells us what the primitive expressions of either language mean. So it must obviously be supplemented. Since we are interested in whether it tells us what complex expressions mean on the basis of understanding their primitive components and their mode of combination, we should add axioms that state the meaning of primitive terms in *L**, and we will say, for concreteness, that 'a' means *Alfred*, '?' means *is round*, '?' means *is red*, '5' means *not*, and 'v' means *and*.

Yet, even once we have done this, we are *not* in a position to interpret complex expressions in the language. For we have not yet been told anything about how the meanings of the simples contribute to those of the complexes in which they appear, that is to say, the contribution of the mode of combination remains opaque, so far as the information we have been provided with goes. For we cannot assume anything about this on the basis of knowing just one word translations for the primitive expressions of the language, even if we are tempted, in the case above, by analogies with familiar artificial languages. An easy way to see this is to notice that it is compatible with the form of the theory given above that concatenation of a *singular term* in L^* with a *predicate* is to be understood as equivalent in English to concatenation of a singular term together with the predicate negation, while the concatenation of a *predicate* with a *singular term* (the reverse order) is understood as simple predication. It is also compatible with the information we have available that these two forms are simple variants of one another and that both represent simple predication, or that both represent application of predicate negation. The translation theory given above doesn't exhibit which way L^* works, even if we know the meanings of its primitive terms. Similar remarks apply to axioms 7 and 8. Knowledge of the translation theory and knowledge of the meanings of the primitive expressions does not automatically give us knowledge of the meanings of complex expressions (i.e., it doesn't put us in a position to understand them, and it doesn't exhibit how an understanding of the complexes would rest on understanding the primitives and their mode of combination). Of course, if we already understood L^*, then we could translate L. But this shows that the theory itself is impotent to give us knowledge of how the meanings of the simple expressions in it contribute to determining the meanings of the complexes in which they can appear. Thus it does not do the same job as a compositional meaning theory that appeals to a truth theory in the manner sketched above. Even translation into a language we understand leaves unarticulated what the truth theory makes plain, how what the parts of complex expressions mean contribute, together with their mode of combination, to determining what we mean in using them. Translation theories then, even recursive translation theories, cannot replace truth theories in the project of providing a compositional meaning theory for a language.[27]

We can contrast the ineffectual translation theory with a simple truth theory for the language *L*, which can be used in the fashion indicated above to provide a compositional meaning theory, and work through a sample proof. The truth theory is given by A1-A5.

A1. '*a*'{'*R*' is true in *L* iff ref('*a*') is round.

A2. '*R*'{'*a*' is true in *L* iff ref('*a*') is not round.

A3. '*a*'{'*F*' is true in *L* iff ref('*a*') is red.

A4. '*F*'{'*a*' is true in *L* iff ref('*a*') is not red.

A5. For any sentence s_1, s_2, '('{s_1 {' & '{ s_2{')' is true in *L* iff (s_1 is true in *L* and s_2 is true in *L*).

A6. For any sentence *s*, '~'{*s* is true in *L* iff it is not the case that *s* is true in *L*.

A7. Ref('*a*') = Alfred.

(Here, of course, the puzzle that the translation theory left us with is removed immediately; it is enough to know just that the theory is true, though we will stipulate also that it is interpretive.) A *canonical theorem* is a sentence of the form '*s* is true in *L* iff *p*' in which '*s*' is replaced by a structural description of a sentence of *L* and '*p*' is replaced by a metalanguage sentence containing no semantic terms and which is the last line of a proof which employs only the following rules in application to Axioms A1-A7 and the results of such applications:

R1. *Universal Quantifier Instantiation (UQI)*: For any sentence f, variable *v*, singular term ß: Inst(f, *v*, ß) may be inferred from UQuant(f, *v*).

R2. *Replacement (RPL)*: For any sentences f, ?, *S*(f): *S*(?) may be inferred from Eq(f , ?) and *S*(f).

R3. *Substitution (SUB)*: For any singular terms a, ß, sentence *S*(a): *S*(ß) may be inferred from *S*(a) and Ident(a, ß).

'UQuant(f, *v*)' means 'the universal quantification of f with respect to *v*'. 'Inst(f, *v*, ß)' means 'the result of replacing all instances of the free variable *v* in f with the singular term ß'. Note that we count structural descriptions of object language terms, and terms of the form 'ref(*x*)', as singular terms for the purposes of this rule of inference. 'Eq(f, ?)' means 'the biconditional linking f with ? (in that order)'. '*S*(*x*)' stands for a sentence containing the grammatical unit *x*, which may be a word, phrase, or sentence. 'Ident(a, ß)' means 'the identity sentence linking a with ß (in that order)'.

Sample proof:

1. '('{'*a*'{'*F*'{' & '{'*a*'{'*R*'{')' is true in *L* iff ('*a*'{'*F*' is true in *L* and '*a*'{'*R*' is true in *L*). {from A5 by two applications of *UQI*}

2. '*a*'{'*F*' is true in *L* iff ref('*a*') is red. {from A3 by *UQI*}

3. '*a*'{'*R*' is true in *L* iff ref('*a*') is round. {from A1 by *UQI*}

4. '*a*'{'*F*' is true in *L* iff Alfred is red. {from 2 and A7 by *SUB*}

5. '*a*'{'*R*' is true in *L* iff Alfred is round. {from 3 and A7 by *SUB*}

6. '('{'*a*'{'*F*'{' & '{'*a*'{'*R*'{')' is true in *L* iff (Alfred is red and Alfred is round). {from 1, 4, 5, by two applications of *RPL*}

Suppose we know the canonical proof procedure, the axioms of the theory, and what they mean, and that they meet Convention *S*. Then we know the theory is interpretive. Given this we know the every instance of the following schema is true:

If (*s* is true in *L* iff *p*), then (*s* means in *L* that *p*), when the antecedent is instantiated to a canonical theorem. Thus, we can introduce a inference rule, which I will call *MR*:

> *MR*: '*s* means in *L* that *p*' may be inferred from the corresponding canonical theorem of *T*, '*s* is true in *L* iff *p*'.

The rest of the story goes as follows:

> 1N. 6 is a canonical theorem of *T*. {Inspection of the proof and definition of 'canonical theorem'}
>
> 2N. '('**{**'*a*'**{**'*F*'**{**' & '**{**'*a*'**{**'*R*'**{**')' means in *L* that (Alfred is red and Alfred is round) {6, 1N, by *MR*}.

The role the truth theory plays is not just to get us to 1N. Its most important role lies in *how* it gets us to 1N. It does so by a method which exhibits how the meaning of the complex sentences of the object language depends on the meanings of its parts, that is, is shows how to understand the complexes on the basis of understanding the parts. It does not state this of course. But someone who understands the theory and knows it meets Convention *S* can see how it works. The mistake of thinking a truth theory does no more than a recursive translation theory rests on thinking that our only aim is to match object language sentences with metalanguage sentences that translate them. But that misses the main point, and interest, of a compositional meaning theory.[28]

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NOTES

1. It is not part of this claim that the ability is instantiated by propositional knowledge of the theory, only that its structure mirror the structure of the complex set of interlocking dispositions required of someone competent in speaking and understanding the language.

2. I have in mind here recursive axiomatic truth "definitions" which use roughly the sorts of devices Tarski introduced in (Tarski, 1983). See note 9 for some further remarks on the relevant class of theories.

3. Tarski was concerned to define a predicate (actually, membership in a set) that applied to the object language only. The shift to using a truth theory in pursuit of a meaning theory will free us from this constraint, and we can regard the predicate as expressing truth in a language, where the place of '*L*' is a genuine argument place. We then cease to regard the truth theory as defining a truth predicate and regard it instead as a theory about the language, which may be right or wrong. When we regard it as a theory about a language described as the language of a given speech community or speaker, it is an empirical theory.

4. See: (Foster, 1976); (Loar, 1976); (Evans & Mc Dowell, 1976), introduction; (Davidson, 1984b); (Wallace, 1978, p. 51). More recent discussions include (Soames, 1989, 1992), (Higginbotham, 1992), and (Richard, 1992).

5. This calls into question the intelligibility of Davidson's apparent answer to the question what constraints a truth theory would have to meet to be useable as a central component of an interpretation theory. For requiring that a radical interpreter confirm it leaves his goal under specified. It cannot be merely to confirm a true truth theory, since we *know* that is not enough. What about a truth theory does a radical interpreter have to confirm then? It cannot be *that he has confirmed it*, since this *leaves open* what it is about it that he must confirm.

6. We can illustrate the problem with a very simple truth theory for a language without quantifiers. Suppose we have as axioms A1-A4 (we could add more for a richer language without affecting the point to be made), where 'is *T*' is our truth predicate for the language, and suppose we have as our logic a suitable complete natural deduction system (I omit formal characterization of the syntax of the object and metalanguages). We suppose further that 'Caesar thrice refused the crown and Caesar was ambitious' in the object language means what that sentence does in English (ignoring, again, tense).

> A1. Ref('Caesar') = Caesar.
> A2. For any name a, a{' thrice refused the crown' is *T* iff ref(a) thrice refused the crown and for every *x*, *x* = *x*.
> A3. For any name a, a{' was ambitious' is *T* iff ref(a) was ambitious and it is not the case that any thing is both ambitious and not ambitious.
> A4. For any f,?, '('{f{' and '{?{')' is *T* iff f is *T* and ? is *T*.

A1-A4 together will be adequate to prove the *T*-sentence, (*T*), since we can prove (1), and then (*T*), since 'for every *x*, *x* = *x*' and 'it is not the case that any thing is both ambitious and not ambitious' are logical truths (counting the identity sign as a logical constant).

> (1) '('{'Caesar'{' thrice refused the crown'{' and '{'Caesar'{' was ambitious'{')' is *T* iff Caesar thrice refused the crown and for every *x*, *x* = *x* and Caesar was ambitious and it is not the case that any thing is both ambitious and not ambitious.

(T) '(' { 'Caesar' { ' thrice refused the crown' { ' and ' { 'Caesar' { ' was ambitious' { ')' is T iff Caesar thrice refused the crown and Caesar was ambitious.

Yet is it evident that we have not gone from axioms that show the structure and meaning of the object language sentence to the *T*-sentence, and so we have not revealed the compositional structure of the object language sentence in the proof.

7. Rather than sequences, I use functions from variables to objects as satisfiers. Tarski's sequences can be represented using sets of ordered pairs of positive integers and objects, the integers representing the order of the objects in the sequence. To associate an object with a variable in an open formula, Tarski associated variables in a predetermined order with the integers representing the order of objects in a sequence. This simply represents then an assignment of objects to the variables, and we can dispense with the sequences, which can be seen to play merely a heuristic role in Tarski's discussion.

8. This shows, incidentally, that not even knowing that the theory is analytically true suffices to know that it is interpretive.

9. The class of theories we apply the convention to must be circumscribed so as to exclude introduction of extraneous materials that might cause difficulties. Thus, we require that theory be minimal in a certain sense: we want only axioms needed for giving satisfaction conditions for object language expressions and nothing not needed for this purpose, and we want the axioms which give satisfaction conditions not to include anything in them which is not necessary for giving satisfaction conditions for object language expressions or sentence forms. Thus, e.g., we would want one axiom for each primitive expression of the object language, and every satisfaction axiom should be a quantified biconditional; in addition to such axioms we would need only axioms for our theory of functions and reference axioms, which themselves would have a standard form ('the referent of a = *x*'). Thus, e.g.,

((for all functions f, f satisfies in Welsh 'triongl yw *x*' iff f('*x*') is a triangle) and 2 + 2 = 4),

would not be an axiom of a truth theory of the form under consideration here. This could be spelled out more precisely, but it should be clear enough for present purposes what form of theory is intended.

10. There are some additional complications in Welsh I overlook here. 'ac' is the form required when what follows begins with a vowel. Strictly speaking, then, there should be a restriction on ? in (5) to sentences or formulas that do not require the 'ac' form.

11. Convention *S* can be made more precise, of course, relative to a precise specification of the forms of axioms employed in a theory for a given kind of language.

12. Take any *T*-sentence, say (1) in the text, and any logical truth, ?. From these we can prove (1N).

(1N) 'Gwyn' { 'yw' { 'eira' is true in Welsh iff snow is white and ?.

See (Soames, 1992, p. 28) and (Foster, 1976) for the objection. It must be said that Davidson was aware of the need, and invoked the idea of a canonical proof procedure to meet it, without, however explaining exactly how we were to think of it. Perhaps he thought it was too obvious to be worth remark.

13. I include the qualification because there are reasons to think that the grammar of English is not finitely

recursively specifiable. The reason I have in mind is that the quotation name of any symbol is a symbol of English, whether the symbol itself is or not, and it is doubtful that there is any way to recursively enumerate every possible symbol, since it is plausible that there are an infinite number of primitive symbols.

14. This meets the criticisms leveled by (Loar, 1976) and (Foster, 1976).

15. I am assuming that knowledge of what is stated here will suffice for understanding M; if not, we will just add as much as we need to 3 to state knowledge sufficient to understand the language of the truth theory. This violates none of our constraints, since obviously understanding the language of the truth theory does not by itself suffice for understanding the object language.

16. The account given here can be extended to a generalization of the truth-theoretic approach to handle imperatives and interrogatives that are not assigned truth conditions but rather compliance conditions. See (Ludwig, 1997) for an outline of the approach.

17. Thus, it is not surprising that this proposal avoids objections to truth-theoretic semantics that presuppose that the truth theory itself is the meaning theory. Critics looking at the truth theory and wondering where the meaning theory was were looking in the wrong place.

18. I do not claim here that speaker and time determine by themselves the referents of demonstratives. The suggestion is that we can describe the referent of a demonstrative in terms of speaker and time; roughly, it is the object demonstrated by the speaker at the time using the demonstrative. In fact, there is one additional complexity in the case of demonstratives: we must make reference also to the speech act in which a demonstrative is used. This is necessary to accommodate the possibility of someone using a single token of a demonstrative ambiguously in two speech acts, directed, e.g., at different audiences at the same time, with different demonstrative intentions with respect to the different audiences ('Bring me that'). With this in mind, we can give the following reference clause for simple demonstratives:

For all speakers *s*, times *t*, speech acts *u*, and objects *x*,
if s demonstrates x at t using 'that' in u,
then $\text{ref}_{[s,t,u]}(\text{'that'}) = x$.

Here '$\text{ref}_{[s,t,u]}(\text{'that'}) = x$' is read 'the referent of 'that' as used by *s* at *t* in *u*'. The relativization to speech acts will require that our semantic predicates likewise be relativized to speech acts, but this additional relativization will not affect any of the points made in the text. The fact that we must conditionalize on a speaker's demonstrating something in the reference axioms for demonstratives means that we cannot discharge the reference axioms in proofs of *T*-sentences for object language sentences which contain demonstratives until we apply them to speakers using the object language sentence, so as to allow the antecedent to be satisfied by some object. See (Lepore and Ludwig 2000, appendix) for further discussion.

19. For a discussion of why we cannot read it as '*x* would be true if it were spoken by *s* at *t*', see (Evans, 1985, pp. 359-60).

20. Strictly, we should interpret '*s* is ... at *t*' as a primitive metalanguage verb relating a speaker to a time. See (Lepore & Ludwig, 2001) for an explanation.

21. Recall from note 3 that we have shifted to thinking of truth as a primitive in our theories, and so treat it as relating sentences to languages.

22. This requires that the metalanguage contain the meaning predicate as well as the truth predicate. Of course, the exact form of the convention will vary depending on the metalanguage.

23. Again, we require the metalanguage to have such a predicate.

24. See (Ludwig & Ray, 2000).

25. See (Ludwig & Ray, 1998) for a sententialist account of such contexts that makes good on the claim that terms in that-clauses and similar contexts do not contribute their extensional properties to determining the truth conditions of containing sentences.

26. See (Harman, 1974) and (Soames, 1992). Soames claims, e.g., that "the role of truth theories in specifying the knowledge that is supposed to be sufficient for understanding sentences is essentially heuristic, and in principle, dispensable" (p. 27), for "all that is needed for the derivation is that we be provided with sentences of the form, '*S* ' is *F* iff *p*, where the sentence replacing '*p*' is guaranteed to be a translation of the sentence replacing '*S*'" (*ibid*.). He goes on to say that "beyond this, it is not important how these sentences are produced, what they say, or even whether they are true" (*ibid*.). Yet, as will be shown, it is important how these sentences are produced if we wish to accomplish the aim of a compositional meaning theory, even though, if the main thesis of this paper is correct, there is truth in the claim that it does not matter whether or not they are true, within certain limits. In fairness to Soames, it should be said that he is not taking the proponent of the utility of a truth theory in the theory of meaning to be aiming for more than is required to put someone in a position to interpret each sentence of another language.

27. It has been suggested to me that one could mimic in a translation theory the features of a truth theory that enable it to exhibit the meaning of, e.g., connectives in the language. Take conjunction as an example. Instead of 7, one could propose 7N.

> 7N. For any s_1, s_2, of *L*, for any s_3, s_4 of *L**, Tr('('{s_1{' & '{s_2{')', '('{Tr(s_3){' v '{Tr(s_4){')') iff Tr(s_1, $_3$) and Tr(s_2, s_4).

The suggestion is that this shows that '&' and 'v' mean 'and' in the same way that a recursive axiom for conjunction in a truth theory shows that the object language term means 'and' (see axiom A5 below). But this is illusory. 7N will be true iff '&' translates 'v' and the concatenation of a sentence of *L* with '&' and another sentence in *L* translates the concatenation of the translation of the first with 'v' with the translation of the second into *L**. Nothing else matters, and in particular it doesn't matter what '&' and 'v' mean: they could mean 'and', 'or', 'iff', 'only if', 'because', and so on, as long as they are sentential connectives. To learn more we must be told two things: what '&' or 'v' mean, and what the significance of their pattern of combination is in these sentences: it is the latter in particular that a translation theory will never give us any information about. It is also worth noting that the strategy suggested backfires when we turn to some other connectives, such as negation. For in the case of negation, the axiom mimicking the negation axiom for the truth theory would be 5N.

> 5N. For all s_1 of *L*, s_2 of *L**, Tr('~'{s_1, '5'{s_2) iff it is not the case that Tr(s_1, s_2).

An embarrassing result, to be sure. The parallel axiom for disjunction yields a similarly odd result.

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