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# Truth and Meaning

## 0. Introduction

This article is not the first to go by the name "Truth and Meaning". It is preceded by a homonymously titled paper published by Donald Davidson in 1967, a seminal paper on the topic of truth-theoretic semantics for natural languages. It seems appropriate that "Truth and Meaning", (Davidson 1967) should loom large in this article. I will say something about previous work in the area, go on to discuss Davidson (1967) and related papers of his and then discuss some issues arising. I begin with the work of Gottlob Frege.

## 1. Semantics 1879-1965

*Gottlob Frege*

Truth has nearly always been seen as the core notion in the study of meaning and representation. Gottlob Frege produced the most influential work in the area (Frege 1987). Frege's chief interest was in the construction of the Begriffsschrift, an artificial formal language for use in mathematics and science. The key feature of the Begriffsschrift was its logical perfection. Entailment relations among sentences of the Begriffsschrift had to capable of being made completely explicit. It was a language in which one could construct logical proofs. And logic is all about truth, as Frege himself made clear: "The word 'true' indicates the aim of logic as does 'beautiful' that of aesthetics or 'good' that of ethics." (Frege 1956 p. 289).

Fregean semantics is based upon the specification of relations between expressions and entities. At the level of extension, singular terms refer to objects; predicates, connectives and quantifiers refer to functions of various types; and sentences refer to truth values. Frege insists that in the Begriffsschrift every significant expression must have a referent. Expressions that do not, as it were, really have a referent, such as 'the greatest prime number', had to be assigned a referent arbitrarily. And Frege thought

of senses as entities as well: for an expression to be meaningful was for it to relate to a special kind of meaning-entity, a sense.

It is not entirely clear what Frege thought about the prospects of providing formal semantics for natural languages. He certainly thought that natural languages were imperfect representational systems, considered from a logical point of view. Natural languages have expressions with no real referent. And natural languages have further problems not shared by the Begriffsschrift. It was important for Frege that logically well-behaved predicates be completely defined: each one must be either true or false of each object. Predicates of natural languages often fail to meet this requirement. Vague predicates, like ‘bald’ are neither true nor false of borderline instances. And Frege thought that some predicates are only ‘incompletely defined’, which appears to mean that they only apply to objects of certain categories; so, for example, the number three is neither in nor out of the extension of ‘woman’.

However, Frege certainly presents the appearance of someone who thinks that natural languages do have some kind of formal semantics, particularly in his later work. In Frege (1952) and (1956) he sketches semantic accounts of various natural-language constructions, including different types of opaque contexts, subordinate clauses, counterfactuals and indexicals. A somewhat neglected but fascinating paper (Frege 1923) is revealing both in respect of his motivation for thinking of natural languages as subject to formal treatment and in respect of his ideas about the methodology for carrying it out. The article merits some detailed discussion. It begins thus (p. 56):

> It is astonishing what language can do. With a few syllables it can express an incalculable number of thoughts, so that even a thought grasped by a terrestrial being for the very first time can be put into a form of words which will be understood by someone to whom the thought is entirely new. This would be impossible, were we not able to distinguish parts in the thought corresponding to the parts of a sentence, so that the structure of the sentence serves as an image of the structure of the thought. ... If, then, we look upon thoughts as composed of simple parts, and take these in turn, to correspond to the simple parts of sentences, we can understand how a few parts of sentences can go to make up a great multitude of sentences, to which, in turn, there correspond a great multitude of thoughts.

He then goes on to discuss the nature of specific compound thoughts, introducing and talking about various truth-functional compounds. He also devotes some time to the issue of how these compound thoughts are expressed in language, and many of his examples are drawn from natural language. Among the compound thoughts he discusses are ‘hypothetical compounds’. A hypothetical compound is true if and only if either the antecedent is false or the consequent is true. A hypothetical compound thought is thus a material implication, which we now sometimes write "->". Frege says that a hypothetical compound can be expressed by sentences of the form ‘If B, then A’. He immediately anticipates the

objection that ‘this does not square with linguistic usage’ and goes on to offer a complex response, which develops in a fascinating manner (p. 69):

> It must once again be emphasised that science has to be allowed its own terminology, that it cannot always bow to ordinary language. Just here I see the greatest difficulty for philosophy: the instrument it finds available for its work, namely ordinary language, is little suited to the purpose, for its formation was governed by requirements wholly different from those of philosophy. So also logic is first of all obliged to fashion a usable instrument from those already to hand. And for this purpose it initially finds but little in the way of usable instruments available.

The instrument we need for philosophy is a logically perfect language. This language would contain suitable means for expressing complex thoughts, including, for example, hypothetical compounds. Logic looks to ordinary language for its instruments and initially finds but little of use. Notice that he says ‘initially’. He does not say that ‘after a thorough search’ of ordinary language, we find but little of use. He then immediately proceeds with the search via a defence of his interpretation of ‘If B, then A’. He discusses the example ‘If I own a cock which has laid eggs today, then Cologne Cathedral will collapse tomorrow morning’ (p. 70), which he says is true (presumably because the antecedent is false). He anticipates the objection that it is not true, because there is no connection between antecedent and consequent. He says his account is not designed to ‘square with ordinary linguistic usage, which is generally too vague and ambiguous for the purposes of logic’ and immediately goes on:

> Questions of all kinds arise at this point, e.g. the relation of cause and effect, the intention of a speaker who utters a sentence of the form ‘If B, then A’, the grounds on which he holds its content to be true. The speaker may perhaps give hints in regard to such questions arising among his hearers. These hints are amongst the adjuncts which often surround the thought in ordinary language. My task here is to remove the adjuncts and thereby to pick out, as the logical kernel, a compound of two thoughts which I have called a hypothetical compound thought.

Here is how I understand that. If someone utters ‘If B, then A’, then, when we consider what is going on with respect to ordinary usage, we have to take into account various things. For example we need to consider what thoughts the speaker wants to get across to his audience. Does he, for instance, mean to convey that there is a relation of cause and effect between A and B? The speaker might give hints in respect of these issues. Frege might have in mind such things as that the speaker may take advantage of the conversational context in order to convey the desired message. So the context might, for example, make it clear that the speaker does think that there is causal relation between A and B and wants his audience to know that he thinks this.

But that thought, the one about a causal connection, is an adjunct to "the" thought.

I take "the" thought to be the thought literally expressed by the words uttered. That thought is the logical kernel of what is conveyed in the use of ordinary language. The logical kernel of the ordinary language use of ‘if B, then A’ is thus the hypothetical compound.

So the view is something like the following. Ordinary language is unsuitable for logic because its formation suited it for other things. For example, it is a flexible and efficient instrument for conveying thoughts in conversational contexts. It can rely on such contexts in a way that logic cannot. So initially when we look to ordinary language, we don't find instruments useful for logic. But when look harder, we do find them. We notice, first, that natural language is productive: that we can use old words in new combinations to convey thoughts, even previously unexpressed or unthought thoughts. We infer that natural language must have a compositional semantics, that the meaning of complex expressions must be determined by the meanings of the component expressions and the way they are put together. So we must look for the compositional structure of language, which is not obvious at casual inspection. The way to find it is to strip away the adjuncts accompanying linguistic usage and reveal how combinations of words strictly and literally express thoughts. For example, sentences of the form 'If B, then A' appear not to allow for compositional semantics, since they seem not to be truth functional: the semantic value of a sentence of the form 'If B, then A' appears not to depend on the semantic values of its component parts and their mode of combination. But after careful investigation, we find that actually it is truth functional after all.

It seems then, that Frege thought that natural languages, logically imperfect as they are, are formal at least in parts - and presumably very significant parts, since it is the formal parts of language that allow us to express an incalculable number of thoughts.

Much work in the 20th century developed Frege's ideas. A great deal of that work continued with the assumption that semantics is fundamentally concerned the assignments of entities (objects, sets, functions and truth values) to expressions. So, for example, those who tried to develop a formal account of sense did so by treating senses as functions of various kinds; the sense of a predicate, for example, was often seen as a function from possible worlds to extensions (e.g. Carnap 1947).

*Alfred Tarski*

A notable exception was Alfred Tarski, who described himself as "being a mathematician (as well as a logician, and perhaps a philosopher of a sort)" (1944 p. 369). Tarski's semantics came in the form of truth definitions (or 'T-theories'). A truth definition for a particular language, L, is the definition of a

predicate, say ‘is T’, that is true of all and only the true sentences of L. Tarski was concerned to develop truth definitions that are ‘materially adequate’ and ‘formally correct’. The former requirement means that ‘is T’ must apply to all and only the true sentences of the language, the latter means that the definition must be consistent. Tarski’s famous "Convention T" is a sufficient condition for material adequacy (Tarski 1956 p. 188). To a reasonable approximation, Convention T says that a truth definition will be materially adequate if it entails all instances of the famous (T) schema:

(T) ‘s’ is true iff p

where s would be replaced by an object-language sentence and p by a translation of that sentence in the meta-language.

As Davidson observes (1984 p. xiv), Tarski deploys the notion of meaning, in the guise of translation, in his analysis of truth. The requirement that p translates s is part of what ensures the material adequacy of the truth definition. The way it works is as follows. Suppose that s is true. Since p is a translation of s, it must have the same truth value as s, and so it must be true too. (Assume that there are no indexicals in s). Since (T) is true, [‘s’ is T] and p must have the same truth value. So [‘s’ is T] is also true. So T applies to s. Conversely, if s is false, then p is false. If p is false [‘s’ is T] is false and so T does not apply to s. So T applies to all and only the true sentences of L.

Tarski provided a materially adequate and formally correct truth definition for a specific artificially constructed, formal language, which he called the ‘the language of the calculus of classes’ and I will call ‘LC’ for short. LC is a language for expressing the Boolean algebra of classes, consisting in some elements of first-order logic, variables ranging over classes and an expression for class inclusion. In providing this truth definition, Tarski produced the first proper formal semantic theory for a whole language.

Tarski defined truth in terms of satisfaction. Satisfaction is a relation that holds between expressions and objects or sequences of objects. Roughly speaking, it is the converse of the relation of being true of. For example, an object satisfies the predicate ‘is white’ iff the predicate ‘is white’ is true of the object. Tarskian semantics provides an alternative to the Fregean model whereby every expression has to relate to some entity. Instead of saying that ‘is white’ extends over the set of white things, or that it refers to a function that maps all and only white objects onto The True or whatever, we say (Tarski 1956 p. 190):

(W) For every a, we have a satisfies the sentential function ‘x is white’ if and only if a is white

Compare Davidson’s discussion of the expression ‘the father of’ (1984 p. 18). Davidson considers the proposal that the expression refers to a function that maps people onto their fathers. He points out that the postulated object of reference is not doing any explanatory work. What we need to know is how the expression "the father of" contributes to the semantics of complex expressions in which it features. This can be stated as follows: a complex term consisting of "the father of" prefixed to a term, t, refers to the father of the person to whom t refers. "It is obvious" Davidson remarks "that no entity corresponding to ‘the father of’ is, or needs to be, mentioned in stating this theory."

To give the flavour of a T-theory, I provide a small, semi-formalised sample theory, T*, for a baby language fragment, L* below.

L* Syntax

Singular terms

a

b

Predicates

G

H

Functor

F

Connective

&

Using ‘f’, ‘t’, ‘p’, ‘s’ and ‘c’ (with subscripts where necessary) as typed variables ranging over object-language expressions of the categories functor, singular term, predicate, sentence and connective,

respectively, and '^' for concatenation, we can express rules for forming complex expressions as follows:

(f)(t)(f^t is a singular term)

(p)(t)(p^t is a sentence)

(c)($s_1$^c^$s_2$ is a sentence)

T*

(A1) (x)(x satisfies "a" iff x=Donald Davidson)

(A2) (x)(x satisfies "b" iff x=Alfred Tarski)

(A3) (x)(x satisfies "G" iff x is a mathematician)

(A4) (x) (x satisfies "H" iff x is a philosopher)

Composition axioms

(A5) ($t_1$)($t_2$)(f)(x)(if $t_1$=F^$t_2$ then (x satisfies $t_1$ iff

(Ey)(y satisfies $t_2$ and x is the father of y)))

(A6) (s)(p)(t)(if s=p^t then (s is true iff (Ex)(x satisfies t and x satisfies p)))

(A7) ($s_1$)($s_2$)($s_3$)(if $s_1$=$s_2$^c^$s_3$, then ($s_1$ is true iff $s_1$ is true and $s_3$ is true))

Notice that the L has infinitely many sentences, since the syntactic rules for complex singular terms and sentences are recursive. So we can have "Fa", "FFa", "Ha&Gb", "Ha&Gb&Ha" and so on. This infinite collection of sentences may be very boring. But for all that, T* interprets them all. Here is an edited down derivation of a T-theorem, for "HFa".

(i) "HFa" is true iff (Ex)(x satisfies "Fa" and x satisfies "H") (A6)

(ii) "HFa" is true iff (Ex)(x satisfies "Fa" and x is a philosopher) (A4)

(iii) "HFa" is true iff (Ex)((Ey)(y satisfies "a" and x is the father of y and x is a philosopher) (A5)

(iv) "HFa" is true iff (Ex)((Ey)(y=Donald Davidson and x is the father of y and x is a philosopher) (A1)

(v) "HFa" is true iff the father of Donald Davidson is a philosopher (iv)

There is one important matter in respect of which T* might be held to go against Tarski's grain. For it may be that the truth definition Tarski provides for LC should be considered as model-theoretic, in which case it would differ significantly from T*. The question warrants a digression.

Model theory is a branch of logic that defines notions of validity, consistency etc., in terms of interpretations relative to models. A sentence has a model if there is a possible assignment of objects, relations etc. to its non-logical vocabulary under which it comes out true. With this notion one can define, for example, logical consequence: "A sentence X follows logically from the sentences of the class K if and only if every model of the class K is also a model of the sentence X" (Tarski 1956 p. 417). Tarski argued that model theory provides the best formal account of the intuitive notion of logical consequence. He was also the first theorist to give a rigorous formal treatment of a model theory and explore its general properties.

Now Tarski's definition of truth for LC is completed on p. 195 of Tarski (1956) and neither it nor any of the preceding discussion makes any mention of truth or interpretation relative to a model. Rather, with the exception of variables, every expression of the language has a fixed interpretation and every sentence is true or false, period, not true or false relative to model. However Tarski quickly goes on to introduce the notion of truth relative to a model ('domain'): 'In the investigations ... in the methodology of the deductive sciences ... another concept of relative character plays a much greater part than the absolute concept of truth and includes it as a special case. This is the concept of *correct or true sentence in an individual domain a*.' (Tarski's emphasis) He then goes on explicitly to develop a model theory for LC in which both truth and satisfaction are relativised to models.

According to one interpretation, Tarski would have regarded the preceding definition of absolute truth as really elliptical for a definition of model-relative truth. For, in LC the only non-logical terms are class-theoretic. Evidently, models in which these terms don't have their normal interpretations are of no interest. Therefore a definition of absolute truth and a definition of truth relative to a canonical set of models in which the terms have their normal interpretations, come to the same thing. So there would have been no need for Tarski to make explicit the extra parameter in his descriptions of satisfaction and truth.

I tend to the view, however, that that interpretation gets Tarski backwards. For Tarski, a model was a set of real objects, and absolute truth is the limiting case where a sentence is true relative to the set of all objects. Tarski's primary notion of truth was that of absolute truth. That is why he added this footnote to the initial discussion of relative truth (1956 p. 199):

> The discussion of these relativised notions is not essential for the understanding of the main theme of this work and may be omitted by those readers who are not interested in special studies in the domain of the methodology of the deductive sciences.

Moreover, in his one philosophical paper on truth, Tarski (1944), he discussed his conception of truth at length without saying anything to the effect that really he thinks of it as a relation between sentences and models, with the real world, the world where snow is white, being just one model among others (albeit one of particular interest). In fact he mentions models just once, towards the end of the paper, in saying that his semantic methods are useful in the construction of the important meta-mathematical notion of a model. So it appears that he regarded the business of providing a definition of absolute truth for a language as distinct from the business of giving an account of the logic of that language. Only the second enterprise requires the notion of truth in a model.

Tarski provided examples for natural language, like (W) above and his famous (S), below, merely as an informal aid to understanding the formal semantics.

(S) 'Snow is white' is true iff snow is white.

He had grave doubts that materially adequate, formally correct truth definitions could be given for natural languages. For one thing, he did not think that natural languages have determinate, precise syntactic properties (1944 p. 349). For another, liar sentences appear to pose a huge threat to the formal correctness of any truth definition of a natural language, since they will drive the definition to inconsistency. Thus if (L) is the sentence:

(L) (L) is not a true sentence

We can prove (L')

(L') (L) is a true sentence is true if and only (L) is not a true sentence.

*Segue*

Prior to the late 1960s, many theorists shared Tarski's scepticism about the prospects of fruitfully applying the apparatus of formal semantics to natural languages. This is not surprising since natural languages - paradoxes or no - look distinctly casual. Typically, a formal semantic theory specifies semantic properties of atomic expressions of a language, and it contains the means to show how the semantic properties of complex expressions derive from those of their component parts and syntactic structure. Formal semantic theories only apply to languages that have the right kind of syntactic structure: it is best if each complex expression has a unique logical form of a type that allows the theory to get a grip, permitting it to compute the semantic properties of the complex from those of the components and that logical form. The phonological and orthographic perceptible forms of natural language are not logical forms and do not correspond to them one-one. The orthographic form (0) provides a familiar illustration:

(0) Everyone loves someone

The visible form of (0) can associate with either of two logical forms, one for each of the two possible interpretations. Further, (0) doesn't appear to have the right kind of structure for semantics: semantics likes constituent structure, and we can't see whether e.g. [Everyone loves] is a constituent of (0). And further still, semantics typically needs expressions to be categorised, as they are in L*, and the components of (0) don't wear their categories on their sleeves.

*W. V. Quine*

Davidson's tutor, W. V. Quine was famously skeptical about the prospects of any kind of serious semantics for natural languages. His thesis of the 'indeterminacy of translation' was that there is no fact of the matter about when two expressions have the same meaning (e.g. Quine 1960, 1970b). One of the conclusions he drew from this was that there are no such things as meanings, or Fregean senses. Many of his arguments for the indeterminacy of translation involve reflections on the radical interpreter, this being an imaginary field linguist confronted with a previously unknown language, 'Jungle', who takes on the task of translating it into his own, using only evidence from Jungle speakers' behaviour. According to Quine, semantic facts about Jungle are exhausted by facts that would be available to the radical interpreter.

A facet of Quine's methodology that I expect was important for Davidson was the shift of focus of the theory of sense away from the endeavour to say what kinds of things senses are and towards the idea of trying to interpret an object-language sentence by looking for a synonymous sentence of the home

language. Applying the methodology led Quine to the conclusion that there are no such things as senses anyway, so any endeavour to say what kind of objects they are would obviously be doomed to failure. Since there are no synonymous sentences, the endeavour to do semantics by finding synonyms also cannot succeed as stated. But what remains a possibility is that one might find a range of candidate translations that are as good as each other, better than any other candidates, and good enough for their purpose, the purpose of getting along with native speakers. Quine saw such an enterprise as a practical one. For him, since there are no facts of the matter about what a sentence means, there are no facts for a semantic theory to describe and semantic theory cannot be science. Davidson accepted the premise that there would be no unique best translation, but rather a range of equally good ones. And he accepted that there would be no hidden facts of the matter in virtue of which one of a range of equally acceptable translations would be right and the others wrong. But he drew no further skeptical conclusions. Rather his view was: let a thousand flowers bloom. All of the best translations would be right.

Although many theorists of the early and middle years of the 20th century were skeptical about the prospects of formal semantics for natural languages, there were a few exceptions. Davidson (1984 p. 29) cites Yehoshua Bar-Hillel and Evert Beth, both in Schilpp (1963), as examples. I should add that Carnap himself, in his reply to Bar-Hillel (ibid. p. 941), expresses sympathy with Bar-Hillel's appeal for the use of formal methods in the study of natural language. He says that it would be a good idea to use a formal meta-language for the study of natural language and he offers and briefly develops the analogy of studying clouds by comparing them to precise geometrical shapes (ibid. p. 942). I am not sure how to interpret him, exactly, but as far as I can see he does not think of natural languages as approximations to formal languages, nor would he agree with the 'logical kernel' view that Frege expressed in "Compound Thoughts" (see also his replies to Beth and Strawson in that volume).

In another landmark development in the 1950s and 60s, Noam Chomsky developed arguments that natural languages had at least formal syntax, that sentences have imperceptible tree-like constituent structures determining their grammatical properties, Chomsky (1957, 1964), and thereby founded scientific linguistics.

In the mid to late 1960s and early 1970s, a small number philosophers took the view that, in spite of appearances, natural languages really are formal and that they are proper subjects of formal semantic theories. Worthy of particular note for their influence in this regard are Richard Montague and Donald Davidson (papers collected in Davidson (1984) and Thomason ed. (1974)). Both Montague and Davidson offered concrete proposals about the nature of natural language semantics, drawing on earlier work in the formal tradition. Montague developed his formal programme in some depth and detail, developing a model-theoretic semantics whereby expressions are related to entities relative to models.

But he said very little about how to explain the gap between the casual, sometimes sloppy appearance of natural language and its underlying formality. In other words, he did not say in virtue of what a particular formal description was true of a piece of language, nor how one could tell whether it was. Davidson, by contrast, offered lengthy systematic answers to both of those questions.

## 2. Donald Davidson

*How can a natural language be a formal language?*

If natural languages are really formal, then we need to find their logical forms. Davidson's account of logical form goes something like this. We rework Quine's tale of the radical interpret as follows. The radical interpreter's job is to construct a theory of meaning for an object language, L. The interpreter's job is done if he comes up with a theory that systematically yields correct interpretations of what an L-speaker says. An interpretation is correct if it would fit in with a correct overall interpretation of the L-speaker's speech and other behaviour. An overall interpretation is correct if and only if it obeys the principle of charity: it maximises the speaker's rationality by making as much as possible of what he says come out reasonable and true. There will be no unique best theory, by these lights, but a number of equally good ones. But that is not a problem, since we should regard all of them as true, saying the same thing in different ways. Davidson offers the ('rough') analogy of Farenheit and Centrigrade: the actual assignments of numbers to temperatures by the two scales are different, but the pattern of assignments is the same (1984 p. 225). Similarly, theories of meaning capture 'the semantic location' of each sentence in 'the pattern of sentences that comprise the language' (1984 p. 225). By 'the semantic location' of a sentence in the pattern of sentences, Davidson means its logical location: the entailment relations it bears to the other sentences (Davidson, pc).

So for Davidson, the logical forms of a natural language, L are an abstraction from L speakers' behaviours. A sentence's logical form is a form that would allow a theory of meaning to apply to it. This means that a theory of logical form then has two constraints to meet. One is that it must assign forms that allow the theory of meaning to provide an interpretation of each L sentence. And the second is that it must assign forms that account for logical relations among L sentences. Davidson also thought, at least at certain times, that logical forms would be Chomskyan deep structures (1984 p. xv). Under that assumption, there would be third source of constraint on the theory of form: it would need to account for expressions' grammatical properties as well.

*Truth theories and the philosophical program*

What sort of theory would serve the interpreter's purpose? Davidson defines a theory of meaning for L as a theory which, if it were explicitly known, would allow the knower, in principle, to interpret all the sentences of L. Davidson saw that a T-theory has some of the properties that a theory of meaning ought to have. A T-theory is a finite formal theory with axioms specifying semantic properties of atomic expressions from which follow theorems specifying semantic properties of complex expressions. Moreover, T-theorems pair object-language sentences with meta-language sentences that could be used to specify their meanings.

But T-theories appear to lack one crucial property that a theory of meaning ought to have. They do not actually say what any object-language expression means. To make the point vivid consider (1) (a) and (b):

(1) a. 'Les elephants ont des oreilles' is true iff elephants have ears

b. 'Les elephants ont des oreilles' is true iff pigs have curly tails

Let us call a theory that provides a correct characterisation of 'true' a 'truth theory' and one that also meets Tarski's translation constraint, a 'T-theory'. We can suppose that (1) (a) and (b) are theorems of different truth theories, the first of which, is interpretive, hence T-theoretic, and the second of which is not. We can suppose further that both theories are true and provide correct characterisations of 'true'. If the only information about the object-language to which you had access was the information in the truth theories, then you would not be able to tell that (1a) is interpretive and (1b) is not. Thus even if a T-theory has the property of interpretivity it does not itself say that it has that property.

A T-theory is not a theory of meaning. Moreover the information provided by a T-theory falls far short of what the interpreter requires. For what he would need to know to distinguish the interpretive from uninterpretive truth theories are such things as that: 'Les elephants on des oreilles' means that elephants have ears. But that is just the sort of information that a theory of meaning is supposed to provide. Let us

call this "the information problem".

In spite of the information problem, Davidson claimed, a T-theory can in some interesting sense ‘do duty for’ a theory of meaning. His idea was to redescribe what it takes for a truth theory to be interpretive in a way that doesn’t implicate linguistic semantic notions. In this way, he could get a philosophical account of meaning, something that might very roughly be expressed along the lines of: s means that p iff a truth theory with property X entails that s is true iff p.

The X that Davidson settled on in the mid-seventies, had, I believe two conditions. The truth theory had to be lawlike and maximally simple. The lawlikeness requirement was intended to rule out cases like (1b). It is a little difficult to see what kind of law Davidson has in mind. But it does seem right that (1a) is less accidentally true than (1b). For example, (1a) supports counterfactuals and (1b) does not: ‘les elephants ont des oreilles’ would be true even if pigs lacked curly tails, but would be false if elephants lacked ears.

The simplicity requirement was meant to rule out cases like (2):

(2) ‘La neige est blanche’ is true iff snow is white and [either snow is black or snow is not black]

So Davidson’s claim might be informally expressed as (D):

(D) A sentence s of a language L means that p iff a theorem of a maximally simple, lawlike truth theory for L says that s is true iff p.

So what the interpreter would need to know is that his truth theory is lawlike and maximally simple.

It seems to me that the simplicity requirement is in fact redundant for reasons to do with the notion of the interpretivity of a truth theory. Let me explain.

A proper exposition of a T-theory involves a specification of a logic, or a set of ‘production rules’ (Larson and Segal 1995 p. 35) with which to conduct the derivations. Now, if the theory comes with a standard logic, such as first-order predicate calculus with identity, then it will be overproductive. That is, it will be able to prove lots of uninterpretive T-theorems such as (2). So we must either construct T-theories that do not yield uninterpretive theorems or find some means of picking out only the interpretive theorems.

Taking the former approach, one might develop a theory that uses only very limited logical apparatus. It is possible in that manner to rule out the derivation of many uninterpretive theorems. But is very difficult or impossible to rule them all out by this means because, typically, one has to prove uninterpretive theorems on the way to proving interpretive ones: observe the first three lines of the little partial derivation above. Taking the latter approach involves specifying specific procedures for the derivation of theorems, often called ‘canonical derivations’, which are guaranteed to produce only interpretive theorems. A mixed approach is also possible, whereby one would specify a limited logical apparatus - just enough to prove the desired theorems and no more - and specify a canonical proof procedure as well.

Which approach one prefers will depend on one’s conception of the aims of semantic theory. For example, if you think the theory ought to account for logical relations among L sentences, then you will need more than the few rules that are required to prove T-theorems. If you don’t, but think rather that the main aim of the theory is to get the right theorems, then you might prefer to stick to the limited logic. (For discussion see Larson and Segal 1995 p 34-37 and Fara 1997).

In any event, the point here is that the locus of a T-theory’s interpretivity is only the canonically derived T-theorems. And those will not include examples like (2), the proof of which uses procedures that are not required for proving the desired sort of theorems and therefore would not be used in a canonical proof.

So where Davidson might have claimed (D), I would propose that he might equally have claimed (D’):

(D’) A sentence s of a language L means that p iff a canonical theorem of a lawlike truth theory for L says that s is true iff p.

## 3. Cognitivism versus instrumentalism

Davidson adopts an instrumentalist stance towards reference and other semantic notions. Reference and satisfaction are the interpreter’s tools and nothing more. And the interpreter’s job is to discover charitable interpretations and nothing more. Here is a characteristic quote: "The crucial point on which I am with Quine might be put: all the evidence for or against a theory of truth (interpretation, translation) comes in the form of facts about what events or situations in the world cause or would cause speakers to assent to

or dissent from each sentence in the speakers repertoire" (Davidson 1984 230). Later, in Fara (1997) Davidson clarified the stricture on evidence. He said that he allowed that other sorts of evidence might be helpful in the discovery of semantic facts. But other kinds of evidence could never be used to adjudicate between truth theories that are equally good at providing charitable interpretations. He said that evidence in the form of facts about what events or situations in the world cause or would cause speakers to assent to or dissent from sentences in the speaker's repertoire is sufficient for deciding the correctness of a theory of meaning. Language, he said, is a social phenomenon and evidence about what someone's words means must be socially available. The alternative is that each would just be speaking their own language and there would be no assurance that anyone else could understand it. He said that, on his view, what people mean is determined by the public circumstances in which they speak.

To me, it seems wrong to claim that evidence of a certain, circumscribed sort is always sufficient to adjudicate between rival theories of a given range of phenomena. Such claims would be out of place if we were considering theories of planetary motion or optics or any other natural phenomenon. Semantic phenomena are perfectly real natural phenomena as well. Given this, we cannot know what kinds of evidence will help us discover them by telling us which of two or more rival theories is right. As Chomsky has pointed out, making a priori stipulations about the range of evidence available to theories of language amounts to an unmotivated methodological dualism. The study of language and mind generally should meet the same standards as scientific study of other phenomena.

Psycholinguistics, the branch of cognitive psychology founded by Chomsky, is consistent with a different and, in my view, more attractive picture than Davidson's. In this picture, what I mean by an expression is determined by certain cognitive states of mine that are associated with it. These states are not determined by my speech dispositions. Rather they are part of the mechanism that explains these dispositions. I will sketch out this alternative and then argue that it does not suffer from any problems about how one person can know what another means.

In the Chomskyan picture, language is not really a social phenomenon. The rules of language are in people's heads, or, more precisely, represented in the minds of individual speakers. We may not be conscious of these representations. But they are there anyway. The representations enter into the explanation of various syntactic, semantic and phonological data all of which concern human cognition and action: how speech sounds are perceived and produced, judgements people make about what sentences do and don't mean, whether certain strings of words seem deviant and so on.

For example, consider (3):

(3) a. The tourists wanted to lick them

b. The zookeeper asked the tour leader which lion the tourists wanted to lick them

In (3a) ‘them’ cannot refer back to the tourists, but must have its interpretation fixed by something else in the context. The same string of words as (3a) occurs in (3b). But in that case ‘them’ can be interpreted as referring back to tourists (although it doesn’t have to be). A possible explanation for this goes roughly as follows (from Chomsky 1986 pps 164-184). Suppose that the logical forms of the sentences are as partially depicted in (4):

(4) a. $[\text{The tourists}]_j$ wanted to lick $\text{them}_k$

b. The zookeeper asked the tour leader which lion $[\text{the tourists}]_k$ wanted PRO to lick them $_k$

PRO is a hidden element, present in the logical form but not pronounced or written, that works rather like a pronoun meaning *one*. The subscripts are also hidden but real elements of the logical form and they determine the relations of co-reference: co-indexed terms must co-refer. There are rules that govern the possibilities of co-indexing and these do not allow the co-indexing of expressions that have too little linguistic material of a specifiable sort between them. In (a) there is too little between ‘the tourists’ and ‘them’ for co-indexing to be permitted. But in (b), the presence of PRO permits the possibility of co-indexing and hence co-reference.

Suppose, for the sake of argument, that that explanation is along the right lines. If we did not know the relevant rules, then we would have no reason not to interpret ‘them’ in (a) as referring back to the tourists. If we want to explain our judgments in terms of linguistic rules, then we have to suppose that the rules are guiding those judgements. And the easiest way to make sense of that is to suppose that we know them, if not consciously, then unconsciously, or that they are represented in what Chomsky calls our ‘language faculty’, i.e., the cognitive systems that underlie our linguistic capacity.

With that picture in place, we can offer a different account of semantic theory from Davidson’s. Logical

forms are not abstracted from speech behaviour but rather are the structures that our language faculties represent complex expressions as possessing. Semantic rules are a subset of the rules represented by our language faculties. And if we suppose that the rules we represent constitute a compositional semantic theory, then we can explain our remarkable capacity to understand new sentences. We can explain how 'with a few syllables' [we] 'can express an incalculable number of thoughts, so that even a thought grasped by a terrestrial being for the very first time can be put into a form of words which will be understood by someone to whom the thought is entirely new' (compare the first quote from Frege 1923, above).

With the development of Chomskyan linguistics and the rise of cognitivism in the latter part of the 20th century, a number of theorists adopted Davidson's insight that a T-theory (or some elaboration of one) was the right sort of theory for semantics, but deployed the insight within a more cognitivist perspective. The next section sketches the specific approach adopted by Larson and Segal (1995).

*Semantics from a cognitivist perspective*

If we want to explain semantic competence in terms of knowledge of a T-theory, the information problem resurfaces. Since a T-theory does not say what any expression means, knowing a mere T-theory would not appear to suffice for semantic competence.

From the cognitivist perspective, the information problem can be solved by exploiting Chomsky's distinction between competence and performance, the distinction between having a body of knowledge (competence) and having the means to deploy the knowledge in relation to specific tasks.

To illustrate the distinction between competence and performance, Chomsky invited us consider a case of temporary aphasia. In such cases, a subject temporarily loses some or all of their capacity to speak and understand. The capacities then return. Since the subject does not have to relearn the language, it is very natural to suppose that they retained their linguistic knowledge, but merely could not access it. If we suppose that during the aphasic period they lacked the knowledge, it would be very difficult to explain how they suddenly regained it.

As a second illustration, please consider (5) and (6):

(5) The philosopher the linguist the psychologist agreed with argued with abstained.

(6) The cat hunted in the attic sneezed.

When initially confronted with such examples, most speakers judge them to be garbled or meaningless. However, they are perfectly grammatical and meaningful. To understand (5), note that the philosopher abstained - it was the philosopher with whom the linguist argued - and that the psychologist agreed with the linguist. To understand (6), parse it on the model of "the cat infested with fleas sneezed". The idea is that normal English speakers unconsciously know syntactic and semantic rules that generate legitimate structures and meanings for (5) and (6), but are unable to apply this knowledge to these particular cases.

What bridge the gap between competence and performance are "performance systems": cognitive systems that have access to the internally represented syntactic and semantic theories and apply the information to particular linguistic tasks such as speech and understanding. These systems get tangled up when confronted with examples like (5) and (6). And it is these systems that are impaired in temporary aphasias.

Not a great deal is known about performance systems. It is fairly clear that they must include at least a parser - something that accesses the axioms of the syntactic and semantic theories and applies them to build up representations of the structure and meaning of complex expressions.

There are presumably other performance systems too. For example, there may be one that identifies the referents of indexicals, and combines such information with information about the semantics of sentence types to derive the truth conditions of utterances of context-sensitive sentences. There may also be one or more performance systems concerned with pragmatics, involved in inferring speaker meaning from literal meaning and context.

Larson and Segal (1995 pps 37-42) apply the distinction to the information problem roughly as follows. They suggest that performance systems have access to an internally represented T-theory and use this theory to produce representations of meanings of words and sentences. They do this because they use the T-theory precisely on the assumption that it is interpretive. To put it crudely, they use the p on the right hand side of a T-theorem to interpret the s on the left.

The proposal might appear to be some sort of confidence trick. After all, there is a considerable difference between the information provided by a T-theory and the information that a given T-theory is interpretive. By what right do these performance systems merely get to assume that their local T-theory is interpretive, given that establishing the interpretivity of a candidate T-theory is such a big task?

But the question is: interpretive of which language? The contents of a subject’s internalised T-theory simply determine how they will understand language. For example, when they encounter a linguistic sign, a written or spoken sentence, for instance, then the performance systems will automatically provide

an interpretation for it, based on the contents of their T-theory. If a canonical theorem of the T-theory has it that ‘les elephants ont des oreilles’ is true iff elephants have ears, then the subject will automatically take ‘les elephants ont des oreilles’ to mean that elephants have ears.

One speaker will understand another, then, if the contents of their internalised theories are the same in respect of the words and sentences that they use in their communications. That we often can understand one another is not a mystery. Rather, it is to be expected, given the overall design of human linguistic systems. If adult semantic competence consists in knowledge of a T-theory, then acquiring semantic competence is acquiring a good T-theory, one that will allow you to understand others in your environment. Hence it is the business of language-acquisition mechanisms to ensure that what gets encoded in the language faculty is a T-theory that is interpretive for ambient bits of language. So, for example, when a French child learns "rouge", she learns that "rouge" applies to any object x iff x is red. She doesn’t learn that "rouge" applies to x iff x is the colour of raspberries, nor that "rouge" applies to x iff [x is red & [either snow is black or snow is not black]].

So that is how a mere T-theory can do duty for a theory of meaning: the T-theory is unconsciously known by a speaker, linguistic performance systems within the speaker have access to the theory and use it to interpret linguistic forms.

On Larson and Segal’s account, we get (M1) and (M2) in place of Davidson’s (D):

(M1) A sentence S means that p for individual I iff it is a canonical theorem of I’s internalised T-theory that S is true iff p.

(M2) What an expression E means for I is given by the canonical clause for E in I’s internalised T-theory.

In this picture, the fundamental notion of meaning is idiolectic and in no metaphysically essential way social or publicly accessible. Davidson (and others whom I have encountered) worry that this makes communication a mystery. Davidson’s own view, as explained above, is that what a person means by their words must in principle be determined by publicly observable facts. The worry is that if it were not, then other speakers could never really know what she meant.

But the worry is misplaced. Consider first the actual epistemic situation of real speakers. If someone utters something in a language you understand, then you will automatically hear it as having a certain meaning. The same applies to written words. Try not to understand "all philosophers are idiots" as saying that all philosophers are idiots. You understand the sentence as you do because performance systems that have access to your internalised semantic theory automatically provide you with interpretations of linguistic signs that you encounter. Whether the interpretation they provide is correct depends on whether the speaker’s idiolect coincides with the hearer’s (or reader’s). In normal cases, the hearer will have no reason for doubts and will accept the automatically provided interpretation of the words. In special cases she may not: she may have reason to believe that the speaker is speaking a different language and that the

similarity of signs is merely coincidental.

Now let us suppose that there is an element of doubt: the speaker appears to have said, e.g., that all philosophers are idiots. But maybe he is speaking a different language from the hearer's. That is a genuine epistemic issue. But it makes no interesting difference to the epistemological situation of whether meanings are constituted by publicly observable facts about behaviour or by internal representations of rules. Note first that the typical hearer has not in fact observed the relevant observable facts - the linguistic behavioural history of the speaker - any more than they have observed the hearer's internal representations. So in either case the speaker must, if they want to find out what the speaker meant, do some research.

In Davidson's picture, they would need to explore behavioural dispositions. One might expect that the hearer could do this reasonably successfully and, up to reasonable inductive confidence, come to know the relevant dispositional facts. So for example, he might check that the speaker applies 'philosopher' to certain specific philosophers, assents to 'these days philosophers often work at universities' and so on. But the hearer could never get 100% conclusive evidence about the relevant dispositions, because the disposition has infinitely logically possible manifestations which might in principle undermine the hypothesis that best fits the finite data. Gruelike examples come to mind.

In Larson and Segal's picture the research project would be to find out the content of the relevant internalised rules. The ordinary hearer presumably would not endeavour to discover the rules represented in the speaker's language faculty. However they might reasonably be expected to do something similar: to investigate whether the idea that the speaker associates with 'philosopher' is the idea of a philosopher, where an idea is taken to be part of what causes behaviour. If it is, and if the speaker has the relevant further beliefs, then he will be disposed to apply 'philosopher' to certain specific philosophers, to assent to 'these days philosophers often work at universities' and so on. In this case, the process is one of confirming a theory about unobservables using observable evidence. And the hearer could come to know that the hypothesis was correct. Of course that sort of knowledge falls short of absolute certainty. But that is the same in the Davidsonian scenario.

The same applies if the hearer becomes a cognitive semantic theorist and endeavours to test the hypothesis is the speaker has a representation in his language faulty which states that (x)(satisfies 'philosopher' iff x is a philosopher). If that is the case, then the speaker will be disposed, if his performance mechanisms are functioning properly and if he has the relevant further beliefs, to apply 'philosopher' to certain specific philosophers, to assent to 'these days philosophers often work at universities' and so on. This is again a process of theory confirmation of a sort that can yield knowledge, in the ordinary, undemanding sense of 'knowledge'.

## 4. Context and the limits of formality

Before concluding, I want briefly to consider one objection to formal truth-theoretic approaches to natural language semantics. According to Tarski, recall, a language is formal if the sense of every expression is unambiguously determined by its form. I noted that one reason that natural languages don't appear to be formal is due to ambiguity. The standard move for a formal semanticist is to deal with structural ambiguity, such as that exhibited by (0) above, by claiming that (0) is just the surface form of two different sentences with two different logical forms. Analogously what appear to be ambiguous words like 'book' are held to be surface forms of distinct words: '$book_1$', a verb meaning to make a reservation; '$book_2$', a noun referring to a form of written work.

But for a wide range of cases, such moves do not appear particularly plausible. Here is a nice example, borrowed from Charles Travis (p.c.). A watermelon is green on the outside and red on the inside. Now consider two utterances of (7) in two different contexts:

(7) That is a red one

In both contexts, the same melon, m, is being picked out by the demonstrative. In the first context, a greengrocer is helping a customer find one of those melons that is red inside. The utterance is true. In the second context, an artist is looking for a melon with a green outside and his colour-blind and ignorant friend, mistaken about m's exterior colouring, utters (7). In that case, the utterance is false. The utterances have different truth-conditions even though they are utterances of what appears to be a single expression. Moreover the whole notion of satisfaction now becomes problematic. Does m satisfy 'red' or not?

One could try to deploy the normal methods. As just mentioned, one ploy would be to claim that 'red' is ambiguous, in one sense meaning *red on the outside* and in another, *red on the inside*. But few would believe that. And the problem generalizes beyond that solution. Blue ink in a bottle can look black. One can imagine contexts in which 'black' is truly applied to the ink and others in which it is not. It's not just a matter of insides and outsides.

Another standard ploy that one might try in this case would be to appeal to the distinction between semantics and pragmatics, as Frege did in his defence of the truth-functional account of 'If B, then A'. One could claim that, strictly and literally speaking, (7) is true even as uttered in the artist's studio. What (7) means is something like: *That one is red in some way or other*. And that is true, since m is red on the inside. When the artist's friend utters (7), however, he conveys an adjunct thought to the effect that m is red in a contextually relevant way, which would be: red on the outside. We think the utterance is false because we focus on the adjunct thought, rather than the thought strictly and literally expressed.

This proposal leads to some counterintuitive consequences, since it makes it very easy for something to be red. Suppose, for example, that there is a species of brown mushroom with two similar-looking subspecies. One sub-species has characteristic tiny red dots on the underside of its cap and the other has

corresponding yellow ones. As a result, people classify them as ‘red’ and ‘yellow’. Suppose that the artist is assembling a scene for a still life that he wants to paint. I offer to go home and fetch a mushroom that I think will fit in nicely. It is one of the brown ones with tiny red dots. The artist asks me what colour it is and I say ‘It is red’. On the suggested account, my utterance is strictly and literally true. But that does not really seem right. When I bring the mushroom, the artist might well exclaim: ‘It is brown, not red’. Suppose I then show him the red dots and say ‘Look, it is red’. The pragmatic proposal would predict that the artist might well respond with something like: ‘Oh, I see. It is red, strictly speaking. It is just not red in the way you had led me to expect’. But that is not the sort of response one would expect.

Maybe, in spite of such consequences, the pragmatic proposal could be defended. But I am tentatively inclined to doubt that and to accept Travis’s account of the examples. In that case, we must recognize that our language faculties allow us to be the final arbiters of how linguistic expressions ought to apply to the world. Whether a mushroom or a watermelon is properly called ‘red’ does not depend only on the meaning of the term ‘red’ and the colour of the object. It is up to the participants in the conversation (just the speaker, in my view) to determine what manner of being red is to decide the matter.

None of that precludes expressions from making stable semantic contributions across different contexts. Obviously ‘red’ means *red* both in the greengrocer’s shop and the artist’s studio. Semantic theory, therefore, has to be modified to take account of the interaction of context and context-independent semantic properties of words in determining conditions of satisfaction and truth. I don’t think, however, that this requires any major departure from standard truth-theoretic methods. It just means predicates work rather like indexicals, with extensions varying across contexts.

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