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Semantic Innocence and Uncompromising Situations

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> Since Frege, philosophers have become hardened to the idea that content sentences in talk about propositional attitudes may strangely refer to such entities as intensions, propositions, sentences, utterances and inscriptions . . . *If we could but recover our pre-Fregean semantic innocence,* I think it would be plainly incredible that the words "the earth moves," uttered after the words "Galileo said that," mean anything different, or refer to anything else, than is their wont when they come in other environments.
>
> Donald Davidson, "On Saying That"[1]

1. SITUATIONS COMPROMISED

The present authors have managed to recover their pre-Fregean semantic innocence by rediscovering an old idea, that statements stand for situations, complexes of objects and properties in the world. The idea is found in various forms in Russell, Wittgenstein, and Austin, and more recently in Gustav Bergmann and other midwestern realists, but it has had little appeal for those whose philosophy of language is guided by the traditional model of formal semantics.

Situations were compromised by Frege's supposition that the reference of a sentence must be a truth value. This approach left no room for situations, and major figures such as Church, Quine, and Davidson have followed Frege in this regard. Carnap tried to take propositions as the designata of sentences in his early *Introduction to Semantics,* and his propositions were something like states of affairs or situations. But Church, in his review of this book, gave a formal proof that this could not work.[2] This argument used ideas from Frege to show that the reference of a sentence must be a truth value, granted principles to which Carnap was committed.

We have developed a model-theoretic conception of semantics which takes situations seriously. We were forced to do this to give an innocent account of the semantics of perception and belief, respectively. Having developed situation semantics, we remembered the old proof that it was impossible. Reexamining Church's argument from this new perspective shows that it conflates two quite different ways of looking at the relation between statements and situations.

In this paper we sketch (quite briefly) enough of our conception of situations and their types to allow us to share our reexamination. A fuller development of situation semantics will appear in due course.

2. TYPES OF SITUATIONS

The basic picture we wish to promote goes like this. The world, at least the common sense world that human language reflects, consists not just of objects and sets of objects, nor of objects, properties, and relations, but of objects having properties and standing in relations to one another. There are parts of the world, clearly recognized (although not precisely individuated) in common sense and human language, that we call situations.

We are certain that situations are part of the world because we see them (as when we see Hoover Tower casting a shadow on Stanford), because we find ourselves in situations (our being late with this paper puts us in an embarrassing one), and because we find we have always believed them (as we have frequently believed that Columbus discovered America). States of affairs are situations, events and episodes are situations in time, scenes are visually perceived situations, changes are sequences of situations, and facts are situations enriched (or polluted) by language.

Situations have properties of two sorts, internal and external. The cat's walking on the piano distressed Henry. Its doing so is what we call an external property of the event. The event consists of a certain cat performing a certain activity on a certain piano; these are its internal properties.

Simple indicative statements classify situations according to their internal properties, by stating that the actual situation is a certain *type* of situation. To represent the internal properties or type of a situation we use partial functions that take sequences of relations and objects as arguments and 1 or 0 as values. The type of situation that distressed Henry is one in which

$$s(\text{on}, \text{the cat}, \text{the piano}) = 1$$

The type of situation s' in which the cat is not walking on the piano but is where he belongs, on the mat, satisfies

$$s'(\text{on}, \text{the cat}, \text{the piano}) = 0$$
$$s'(\text{on}, \text{the cat}, \text{the mat}) = 1.$$

Belief in the world is belief in a largest situation; its type we call the world type.

We take properties and relations seriously; they are neither meanings nor sets of individuals nor sets of sequences of individuals. The domain A of individuals and

the domain R of relations are parallel products of conceptual activity, that of individuation. They are equally abstract but equally the most concrete items we deal with in perception and in language. Individuation provides the articulation of the world necessary for language to get a hold on it.

Actual situations are part of the actual world. The conceptual activity that individuates the world lets us classify the situations according to their types. However, once we have some of the facts, we realize that they might have been otherwise, that there are situation types that are not realized by actual situations. These unrealized situation types are involved in many of our hopes, fears, intentions, and beliefs. Much of our mental life and hence the language we use to describe that mental life involves such unrealized situation types.

3. INTERPRETATION AND EVALUATION

How does language get a hold on the world? It does so at the most rudimentary level by having simple indicative statements describe types of situations, and a sentence's meaning is what suits it for this task. But meaning is a notoriously slippery and complex notion, conflating many distinct aspects of the use of language. Just as the number 100 is the sum of many different columns of smaller numbers, so are there many ways one might try to break down meaning into smaller components. Certain ways of doing this are rather well entrenched in philosophy: Frege's reference versus sense, Carnap's extension versus intension. More recently David Kaplan has advocated a three-level system of character, intension (or content), and extension.[3] Our own attempt also has three levels: *linguistic meaning, interpretation,* and *evaluation.*

About linguistic meaning we shall have little to say here, except by way of examples indicating how it gives rise to interpretation, but must be kept distinct from it. This we have learned from Kaplan's work on indexicality. (It is also an important insight of Austin's, and Austin's work in general is valuable for the situation-oriented philosopher.)[4] Kaplan superimposes his top layer, character, on a possible worlds semantics. Character and intension or content he sees as aspects of Frege's notion of sense. We believe the bottom two layers of this structure are in need of drastic reorganization, and that the top can benefit from awareness of the situations below. Our middle layer is *not* Frege's sense, for our interpretations are complexes of objects and properties, not denizens of a Fregean third realm, and not procedures or functions from possible worlds to extensions that have been used by recent philosophers of language to interpret Frege's senses. Objects and properties are found at Frege's level of reference. But Frege's notion of reference reflects his view that a realm of sense is available to provide needed specificity for embedded statements. We think this is quite misguided; hence our middle level is at best a drastic rewrorking of reference.

There is much that can be explored at the levels of interpretation and evaluation that seems to be largely insulated from other complexities of linguistic meaning. We do this by following two methodological principles.

Our first principle is that, at the level of interpretation, indicative statements stand for, describe, or *designate* (as we will officially say) types of situations.

Our second principle is a version of compositionality, the claim that the meaning of a statement is a function of the meanings of its parts. Stated so vaguely, it could hardly be false.

Frege used this principle in his theory at both levels: the reference of a complex expression is a function of the references of its parts and similarly for sense. Our second methodological principle is the principle of modest and flexible compositionality: be compositional at the level of interpretation, but be modest in our goals, and not overly rigid. Modestly, bite off as little as possible from "meaning" so as to make the interpretations of a whole functions of the interpretation of its parts. Flexibly, realize that there may be more than one way to make a whole out of parts.

There are deliberate ambiguities in these principles. When we said that statements are to designate situation types, we used the plural to mask a complication. Namely, a single statement does not designate a single situation type, but a set of situation types. For example, "Someone is asleep" does not describe a single situation type, that of some particular individual being asleep; rather, it describes the type of situation in which *someone* is asleep. That is, it will designate the set of types of situations in which someone is asleep.

Similarly "Jackie or Molly has fleas" designates the set of types of situations in which either Jackie or Molly or both have fleas. We shall call a set of situation types a *proposition* so that statements designate propositions.

Another ambiguity in the first principle is that between statement and sentence, and here our first principle begins to interact with our second. The sentence "I am a Nebraskan" has a linguistic meaning that is independent of which English speaker uses it, or when (within bounds of time where the individual words do not take on different meanings or the whole becomes idiomatic). However, it expresses different propositions (types of situations) depending on who says it. Said by the first author, the resulting statement designates a set of unrealized types of situations. As said by the second, the resulting statement is different and contains the actual world type among those it designates.

In our emphasis on statements and types of situations we follow J. L. Austin in his famous paper "Truth." However, Austin tried to have his "descriptive conventions" take one straight from sentences to situation types, a move which conflates two steps that need to be kept separate. (Here Austin failed to implement the insight mentioned above; Kaplan's system does.) The way that utterances of "I am a Nebraskan" give rise to different statements is an important part of linguistic meaning, but one that gets in the way of having sentences designate situation types. Hence our emphasis on statements.[5]

A sentence is a sentence of some language, and part of what the language provides is the linguistic meaning of the sentence. In a particular use, the linguistic meaning provides interpretations of the parts and the whole. The interpretation of the whole is to be the set of situation types designated by the statement. (This is an

oversimplification; as we shall see. The interpretation of the parts underdetermines the interpretation of the whole.) In general, the statement will have one interpretation that is independent of the way things really are in the world: that is, an interpretation determined by the statement, the set A of objects, and the set R of relations, but independent of the structure of the world as it happens to be. This must be the case since we can interpret statements that turn out to be false or that have to do with situations that are inaccessible to us.

Let us now turn to our second methodological principle—modest and flexible compositionality. First, let us look at a trivial application. The interpretation of "Jackie barks" is to be a proposition, the set of situation types *s* in which Jackie barks, i.e.,

$$\{ s \mid s(\text{is barking, Jackie}) = 1 \} .$$

It is also to be a function of the interpretation of the parts of the statement, so "Jackie" must supply the object Jackie and "barks" the property of barking. That is, the simplest choice of interpretations compatible with our principles is to interpret "Jackie" as Jackie and "barks" as the property of barking. At the level of interpretation, then, we find objects as the interpretations of names, variables, and other non-complex terms, properties and relations as the interpretation of simple predicates, and propositions (i.e., sets of situation types) as the interpretation of statements.

There is a tendency in twentieth-century philosophy of language to conflate properties with meanings; this must be avoided. When the first author says "Mollie is this color," pointing to a rug of a certain color, and the second author says "Jackie is this color," pointing to a book, they use exactly the same verb phrase with the same meaning. But if the colors of the rug and the book are different, the predicates stand for quite different properties in the two statements.

To carry the analysis of interpretation one step further, let us find out what the interpretation of a complex predicate, or verb phrase, like "loves Mary" is. At first there is a problem. We interpret "loves" by a two-place relation *l* and "Mary" by Mary, and need to get out of the two some property—the property of loving Mary. Do we need to assume that this is a primitive or can we construct it out of what we have on hand?

To show how to construct it, we start from our first principle. For any a in A, we want to statement that a loves Mary to be interpreted as the set of situation types *s* in which a loves Mary, s(*l*, a, Mary) = 1. Call this proposition, this set of situation types, p(a). The function from any a in A to p(a) has two important properties: (1) it can be defined solely in terms of the interpretations *l* of "loves" and Mary of "Mary," and (2) from this function and any $a \in A$ we can construct the proposition that a loves Mary, namely, p(a). These are just the properties we require of an interpretation of "loves Mary."

Thus, we define P to be the set of all propositions obtainable from A and R, and we call any function from A into P a *complex property*. They are our analogue of Russell's propositional functions. Any primitive property p can be identified

with a complex property p*—the property of having p—by defining p*(x) to be the proposition that x has p,

$$p^*(x) = \{ s \in S \mid s(p,x) = 1 \}$$

So, in general, the interpretation of a verb phrase is a complex property.

A moment's thought will convince the reader that the conjunction of two statements ϕ and ψ should be interpreted by intersection of their respective interpretations. If we use $[\![\phi]\!]$ to denote the interpretation of ϕ, then $[\![\phi \text{ and } \psi]\!] = [\![\phi]\!] \cap [\![\psi]\!]$. Similarly, $[\![\phi \text{ or } \psi]\!] = [\![\phi]\!] \cup [\![\psi]\!]$. What about negation?

Austin, in "Truth," laments the confusion between falsity and negation, and with this we must agree. In the situation we are aware of here in our study, it is not true that Jackie is barking. Jackie is not present to our senses; she is just not part of this situation. Thus, while the proposition that Jackie is barking does not contain the type of the situation we are aware of, neither does the proposition that Jackie *is not* barking. Knowing Jackie, she probably is barking at home. Thus, the statement that Jackie is not barking is interpreted as the set of types s such that s (is barking, Jackie) = 0, whereas the statement *It is false that Jackie is barking* can be interpreted as $\{ s \mid s(\text{is barking, Jackie}) \neq 1 \}$. Only this last proposition contains the situation we are aware of. Since situation types are partial world types, they never take on more than one value 0 or 1, but being partial, they may take on neither. This does not mean that we have a "three-valued logic." A statement is either true or it is not.

Situation semantics is much more flexible than more traditional approaches in ways that should please the linguist or philosopher of language who has not let traditional logic get too firm a hold on his thought processes. The proposal we are making leads to a rethinking of much of traditional logic. Certain classically simple concepts like negation and material implication are seen as conflations of several notions, brought about by working with only a single situation—the world.

In speaking of flexible compositionality, however, we had in mind another and absolutely central aspect of our theory. Recall that our system has three levels: meaning, interpretation, and evaluation. The idea behind the third category is this. Often by taking a look at the world or at some part of the world (or even at some pertinent situation type that does not fit the world) an expression can be fitted with a "value-laden interpretation"—an interpretation that depends on how the situation type arranges things. This value-laden interpretation is an alternative contribution that the expression can make to the interpretation of the statement of which it forms a part.

Some obvious sorts of evaluation consist in: 1) determining whether a given type of situation is in a given proposition; 2) determining the extension of a property in a given situation; 3) determining the properties an individual has in a given situation. We think that certain traditional semantical categories, such as Frege's *bedeutung* or the more modern notion of extension, are sort of a jumble between interpretation and evaluation, provoked by the central role of evaluation in understanding language. Thus propositions have been taken to be truth values, properties

conflated with extensions, and in Montague's work individuals have almost been identified with sets of properties.

Sensitivity to the differences between value-free and value-laden interpretations of statements is dulled by the logical tradition that ignored situations. For unembedded sentences in simple situations, value-laden and value-free interpretations will not be so different, and in particular their truth values will agree, so long as the salient situation type belongs to a part of the world.

But the distinction is hard to ignore when sentences are embedded in perception and belief contexts. Thus everyone can feel the two readings of

Sally saw a dog with fleas jump in the pool.

or

Sally thinks the dean's secretary is a dean.

One who fails to see the alternative interpretations when the statements are unembedded is forced to find an alternative source for the ambiguity of the embedding statements. The appeal is naturally to scope, and this way of looking at things is so engrained as to be confused with the phenomena itself. We see the ambiguity as simply a matter of the interpretation of the embedded sentence, not a matter of scope.

Applied to definite descriptions, the value-free, value-laden distinction is simply Donnellan's distinction between attributive and referential uses.[6] Russell's theory of definite descriptions focused on their value-free or attributive use, Frege's and Strawson's on their value-laden use. Donnellan saw that these should not be alternative theories, but alternative uses accounted for by a single theory. Donnellan was unsure what sort of ambiguity he was drawing attention to; some philosophers have thought he was simply calling attention to the potential ambiguity, due to scope, when sentences containing definite descriptions were embedded. We think that Donnellan put his finger on a straightforward semantic ambiguity, and that the attributive-referential distinction is one manifestation of a ubiquitous and important phenomenon of value loading.

4. INNOCENT SEMANTICS

One can find two reasons in Frege for giving up innocence. The first is that substitution of co-referential expressions within statements embedded in certain linguistic contexts does not preserve truth of the whole embedding statement. Such contexts are now often called, following Quine, "referentially opaque." Propositional attitudes are widely believed to be referentially opaque. We believe that by and large they are not. In any case, there should be general agreement that *some* are not. One such context is non-epistemic perception:

(1) Sally sees Mollie run.

Another is ordinary belief:

Sally believes that my dog is running.

Some arguments for referential opacity seem to be based on ignoring the difference between value-laden and value-free interpretation. One might argue, for example, that non-epistemic perception is opaque, citing the falsity of

(1)′ Sally sees the dog with the red collar run.

But (1)′ is only false if the description is used attributively; that is, if the type of scene Sally is said to see has the property of having a red collar as a constituent. But so used, the substitution of "the dog with the red collar" for "Mollie" does not preserve interpretation. On the other hand, if the description is value-loaded (using a type of a larger portion of the world than Sally sees to do the loading), (1)′ is true if (1) is, given that Mollie is the dog in question.

Some arguments for referential opacity seem based on a confusion between conversational implicatures and semantic entailments. Thus we think that "Smith believes Cicero was an orator" does not imply, but at most suggests, that Smith would check "Cicero was an orator" true. The suggestion is clearly cancelable: "Smith believes that Cicero was an orator, but only knows to call him 'Tully'."[7]

In any case, it seems clear to us that there are transparent sentence-embedding propositional attitudes. But Frege's second reason for giving up innocence was a set of considerations that convinced him that any such contexts would be equivalent to "It is true that . . ."

In "Sense and Reference" he asks what the reference of an entire declarative sentence should be, when it is "concerned with the reference of its words." He concludes that it is the truth value. A key point in favor of this is that the truth value of an expression remains unchanged when a part of the sentence is replaced by an expression having the same reference. "What else but the truth value could be found," asks Frege, "that belongs quite generally to every sentence if the reference of its components is relevant, and remains unchanged by substitutions of the kind in question?"[8]

An innocent semantics takes the reference of the statement—that aspect of signification that depends on the reference of its parts—to be just that which contributes to the reference of the wholes in which it is embedded. If we take the reference of the sentence to be its truth value, an innocent semantics is hopeless, as Frege sees:

> If now the truth value of a sentence is its reference, then on the one hand all true sentences have the same reference and so, on the other hand, do all false sentences. From this we can see that in the reference of a sentence all that is specific is obliterated.[9]

Given that Mollie is running and Richard lying, this would leave an innocent semantics committed to the equivalence of

(1) Sally sees Mollie run

(2) Sally sees Richard lie

or

(3) Sally believes that Mollie is running

(4) Sally believes that Richard is lying.

A semantics that could not grant these pairs different truth values would be quite hopeless.

The tradition has come to grips with Frege's loss of innocence in two ways: (i) for plausibly opaque propositional attitudes, treat the sentences as embedded and the semantics as guilty; (ii) for undeniably transparent propositional attitudes, treat the embedding of the sentence as illusory, adopting an analysis that removed the seemingly transparent position out of its spot in the embedded sentence. The semantics for that portion of the sentence left embedded will again be non-innocent.

Our approach is to treat the sentence as embedded and the semantics as innocent, and to deny that the problems that Frege and others have seen with this approach amount to much of anything.

For example, we take a statement of the form *X sees S* to embed a statement S, and to be true just in case X sees a scene (a specific kind of situation) that belongs to some type in the interpretation of S. We take *X believes that S*, in its most central and ordinary uses, to say that X has a certain complex relational property built of the objects and properties that are constituents of the proposition that S. In both cases, the parts of the embedded statement have their usual interpretations in the whole. What can be wrong with this innocent approach?

5. THE FREGE-CHURCH SLINGSHOT

Frege's own arguments against innocence do not seem very impressive. To his question, "What else but the truth value could be found, that belongs quite generally to every sentence if the reference of its components is relevant, and remains unchanged by substitutions . . . ?" we answer, "The situations designated." In the situation, all that is specific is not lost.

Again, Frege says that "the reference of a sentence may always be sought, whenever the reference of its components is involved, and this is the case when and only when we are inquiring after the truth value." This seems to imply that we are only interested in the reference of the components of a sentence when we are inquiring about its truth value; but this is not so. If I am told "Smith believes his neighbor is a fool," I might be quite interested in the reference of "his neighbor," without caring at all about the truth of the embedded sentence.

There is, however, a very influential argument, virtually a priori, suggested no doubt by Frege's remarks, laid down explicitly by Church in his review of Carnap, and deployed in various forms with formal rigor and ruthless vigor by Quine, Davidson, and others, which seems to rule out the very possibility of a non-trivial situation semantics. The argument is so small, seldom encompassing more than half a page, and employs such a minimum of ammunition—a theory of descriptions and a popular notion of logical equivalence—that we dub it *the slingshot*. As developed by Church, the conclusion is that all sentences with the same truth value must

designate the same thing. As developed by Quine, we are put in the dilemma of either accepting "extensionality," which means seeing no distinction between (1) and (2) or (3) and (4), or losing our innocence and accepting opacity. Davidson used the slingshot to rule out straighforward innocent semantics, and then applied incredible resources of ingenuity to recover lost innocence in roundabout ways.

Church gives a form of the slingshot in the opening sections of his *Introduction to Mathematical Logic*, to motivate taking truth values as the key notion in developing logic. This version of the argument is especially interesting because, being for a reader who does not already know logic, Church cannot fall back on an appeal to any accepted notion of logical equivalence. This makes it eminently suited for reexamination, to see just where it goes wrong. Church considers these sentences:

(5) Sir Walter Scott is the author of *Waverly*.

(6) Sir Walter Scott is the man who wrote the twenty-nine *Waverly* novels altogether.

(7) The number, such that Sir Walter Scott is the man that wrote that many *Waverly* novels altogether, is twenty-nine.

(8) The number of counties in Utah is twenty-nine.

Church argues that as we go from each sentence to the next, what the sentences denote is the same. But the first and last seem to have nothing of importance in common except their truth value; he says, "Elaboration of examples of this kind leads us quickly to the conclusion, as at least plausible, that all true sentences have the same denotation."[10]

Sentence (6) results from (5) by replacement of one description by another, where both descriptions describe the same person, Scott. Sentence (8) results from (7) by a similar move, with the descriptions describing the same number, twenty-nine. The step from (6) to (7), however, is of a different sort. Church says that (6), though perhaps not synonymous with (7), "is at least so nearly so as to ensure having the same denotation."[11]

The argument is like an ambiguous figure or an Escher drawing. If you are aware of situations, you have to keep shifting perspective to let the argument trick you. From one perspective the first and last steps are fine but the middle step is all wrong. From a second perspective the middle step is reasonably good but the first and last steps are completely unfounded.

Intuitively, situations are complexes of objects and relations (under which we shall from now on subsume properties). Given this conception, the role of the parts of the sentence is to identify objects and relations out of which the complex is constructed. Let us hold this in mind, and go through the steps of the argument from both perspectives.

To get from (5) to (6), we need to suppose that the great difference between "the author of *Waverly*" and "the man who wrote the twenty-nine *Waverly* novels altogether" makes absolutely no difference to the situations described by the two

sentences, that is, that the contribution these two descriptions make to the situation is just to identify Scott. Thus, the first perspective is the one where all four definite descriptions are interpreted by the objects they happen to describe, Scott in two cases, the number twenty-nine in the other two.

But from this perspective, the step from (6) to (7) does not work at all. Recall we are attempting to show that all four sentences must designate the same situations. But from our current perspective, (6) designates a situation whose only constituent object is Scott, whereas, (7) designates one whose only constituent object is the number twenty-nine.

Now let us focus on the step from (6) to (7). If we attempt to see these sentences as designating the same situation, then it must be that of Scott's having written exactly twenty-nine *Waverly* novels altogether. To see them as designating this situation, however, we must pay close attention to the properties involved in the definite descriptions. This is not unreasonable. If you take situations seriously, it is quite natural to distinguish two ways in which descriptions might contribute to the sentence. The need is for the materials to build a situation, a complex of objects and properties, and why should the description not contribute the individual described or the properties involved in the description of the situation?

Thus, the second perspective, which is suggested anyway if we take situations seriously, is the one where "the author of *Waverly*" is not interpreted simply as Scott, but contributes the complex of objects and properties it mentions to the situations the sentence describes. But this perspective is absolutely fatal to the step from (5) to (6) or from (7) to (8). The descriptions of Scott, and those of twenty-nine even more so, contribute radically different objects and properties to the overall situation. Sentence (7) designates twenty-nine's being the number of *Waverly* novels Scott wrote, but sentence (8) designates twenty-nine's being the number of counties in Utah: distinct situations if ever there were distinct situations.

So we see that from the first perspective, the one Frege would have us take, where in the reference of the description all that is specific is obliterated, the first and last steps of the argument are fine but the middle is wrong. From the second perspective, more in line with Russell's theory of descriptions, the middle step comes off better but the first and the last steps are wrong. Under neither reading are we compelled to accept the argument.

The connection between the slingshot and Russell's theory of descriptions was, in effect, commented on by Gödel in his essay "Russell's Mathematical Logic," for he used a sort of reverse slingshot to motivate Russell's theory:

> But different true sentences may indicate different true things. Therefore, this view about sentences makes it necessary either to drop the above mentioned principle (of compositionality) . . . or to deny that a descriptive phrase denotes the object described. Russell did the latter by taking the viewpoint that a descriptive phrase denotes nothing at all but only has meaning in context, . . .[12]

Gödel goes on to say that he cannot help feeling that the puzzling conclusion

of the slingshot "has only been evaded by Russell's theory of descriptions and that there is something behind it which is not yet completely understood."[13]

We believe that "something" was gotten at by Donnellan, with the referential and attributive distinction, and that this version of the slingshot, and every version of it, simply turns on shifts from value-free to value-laden interpretations. We value load the definite descriptions for the first step, take them as value-free for the next, and then load them again to finish the argument.

Church speaks of the intimate relation between (6) and (7) but, as he is introducing logical ideas at this point, does not exploit the fact that they are logically equivalent in the traditional sense: true in just the same models. From one perspective they are both identity statements (*Scott is Scott, twenty-nine is twenty-nine,* respectively). From the other they are contingent, but nevertheless true in just the same models. For the philosopher who has learned the traditional notion of logical equivalence, it is easy to be impressed by this. It might seem that logically equivalent statements must stand for the same thing; they must, after all, be equivalent in their *logical* powers or they would not be called that. But this line of thought would use the idea that all true sentences stand for the same thing as a premise for an argument where it is also the conclusion. If sentences designate truth values, then, of course, sentences that have the same truth value under all assignments to the non-logical constants will be equivalent in what they designate. But if statements designate something else, they might be equivalent in truth value in virtue of logical structure, while being non-equivalent in what they designate. On our theory, "logical equivalence" is a misnomer for the relation between statements true in the same models; such statements need not have the same subject matter, in the sense of objects and properties designated by their parts, at all. As soon as such "logically equivalent" statements differing in subject matter are embedded in other statements, the differences in their logical powers become evident. The standard notion of logical equivalence plays an important role in the uses of the slingshot to which we now turn.

6. QUINE AND THE SLINGSHOT

Quine uses various forms of the slingshot throughout his writings. One of the most explicit of these uses comes in his discussion of what he calls the extensionality principle: statements occur within other statements either truth functionally or opaquely, which forces one to give up semantic innocence.[14] When we suppose that (1) and (3) might be true, and (2) and (4) false, but still maintain that the parts of the embedded sentences make their usual contributions to the wholes, we are violating the extensionality principle.

Quine does not say that such violation is impossible, only that it is "not easy". Suppose S and S′ are true and that F is a referentially transparent sentence-embedding context. Quine wants to argue that if F(S) is true, so is F(S′), and conversely. First note that

(A) $\{x \mid S\& x = \phi\} = \{x \mid S'\& x = \phi\} = \{\phi\}$

(B) S is logically equivalent to $[\{\phi\} = \{x \mid S\& x = \phi\}]$
S′ is logically equivalent to $[\{\phi\} = \{x \mid S'\& x = \phi\}]$

From F(S) we obtain $F([\{\phi\} = \{x \mid S\& x = \phi\}])$ by substitution of logical equivalents, then we obtain $F([\{\phi\} = \{x \mid S'\& x = \phi\}])$ by (A) and the referential transparency of F, and then F(S′) by another substitution of logical equivalents. If S and S′ are both false, trade ϕ for $\{\phi\}$. Thus, if F is referentially transparent, it will treat sentences that just happen to have the same truth values alike.

Quine finds in this argument "compelling" grounds for the principle of extensionality, a principle he was to come to advocate for the whole of science.[15] And yet he quite explicitly observes that for it to work we must suppose not only that the embedding context is transparent but that logical equivalents are interchangeable in it. The argument simply takes us from the premise that transparent contexts do not discriminate among "logically equivalent" statements to the conclusion that they do not discriminate among statements that happen to be equivalent in truth value.

All the versions of the slingshot turn on the fact that logically equivalent statements can differ in subject matter, i.e., in what individuals and relations their parts designate.

Let us call a context that is transparent and in which logical equivalents are interchangeable *unconcerned* (about subject matter). Those that are transparent but in which logical equivalents are not interchangeable we shall call *concerned.* There seem to be a number of clearly concerned contexts. The most compelling is perception:

(9) Fred sees Betty enter.

(10) Fred sees Betty enter and (Sally smoke or Sally not smoke).

The statements embedded in (9) and (10) are logically equivalent. "Fred sees" seems clearly a transparent context. And yet we cannot go from (9) to (10). If we did, we should have to admit that Fred either saw Sally smoke or saw Sally not smoke, even though, as we may suppose, Fred has never laid eyes on Sally. The admission would be forced by the principles:

If Fred sees P and Q, then Fred sees Q

If Fred sees P or Q, then Fred sees P or Fred sees Q.

One could of course deny one of these principles to save the principle of extensionality, or one could deny that perception statements such as (9) and (10) are transparent. But we see no motive for either move. Quine seems to convey the attitude that unconcerned contexts are in the natural order of things, but, to be fair, does not say that there are no concerned contexts. His argument has to do with his statement operator "nec," and he carefully stipulates that logical equivalents are interchangeable within it without change of truth value. Other writers are not always so careful.

7. DAVIDSON AND THE SLINGSHOT

The term "slingshot" was originally suggested to us by Donald Davidson's use of this compact piece of philosophical artillery in his wars against some of the giants of our industry. It is an essential part of his criticisms of Reichenbach on events and of Austin on truth, for example. The biggest giant Davidson takes on is Frege, however, for Davidson has consistently resisted the idea that statements embedded in propositional attitudes retain specificity by referring to Fregean senses. For this resistance, and for his recognition of situations, particularly in the analysis of action statements, he should be applauded. Unfortunately, Davidson was blocked from the most straightforward implementation of these insights by his devotion to the slingshot, a weapon constructed of Frege's own materials. To vary the pun, although Davidson resisted original *sinn*, he succumbed to original *bedeutung*.

To see how the slingshot corrupts Davidson, let us briefly look at his criticisms of Reichenbach. In *Elements of Symbolic Logic* Reichenbach developed a formal symbolic logic in which he quantified over situations, events, and facts. For Reichenbach the terms "fact" and "event" were synonymous, and events "have the physical existence of things, and not the fictitious existence of situations." [16] Thus his events and facts are analogous to our situations, his situations to our situation types.

Reichenbach sees a close relation between statements like (11) and (12):

(11) Scott wrote Waverly

(12) The event of Scott writing Waverly took place.

He refers to such statements as alternative ways of "splitting" a situation: "thing splitting" and "event splitting." The close relation is that a certain situation "corresponds" to (11) which is referred to by the description in (12). Reichenbach does not think that there is any singular term, manifest or hidden, in (11) that refers to the situation; only the statement as a whole has this relation to it; the transformation from (11) to (12) is "holistic."

Davidson finds much of value in Reichenbach's theory.[17] He acknowledges and emphasizes the importance of recognizing situations in resolving a number of problems about the logic of action statements. But he has to reject the leading component of Reichenbach's idea: he does not think (11) can correspond to the situation referred to by the description in (12) unless (11) also contains a (hidden) argument place for events. At this point, we think, Davidson purchases philosophical insight at the cost of syntactic plausibility.

The villain here is the slingshot. It convinces Davidson that Reichenbach's proposal is "radically defective," in leading inevitably to the conclusion that there is only one big event. The deployment of the slingshot depends on the principle,

> If S and S′ are logically equivalent, then, for every event e, e consists in the fact that S if and only if e consists in the fact that S′.

This is just the assumption that "e consists in the fact that" provides an unconcerned context. Here Davidson is being less cautious than Quine was, perhaps more

awed by the phrase "logical equivalence." There is no reason at all to suppose this operator would be unconcerned, as should now be pretty clear. The natural development of the idea of a statement corresponding to an event or class of events will have that event or class of events determined by the objects and properties the parts of the statement designate. And logically equivalent statements can have parts that designate very different sets of objects and relations. Reichenbach would have no reason to accept the principle.

Logical equivalence as an unargued-for criterion for statement codesignation plays a key role in another important paper of Davidson's. In "Truth and Meaning" he considers the possibility of a semantical system something like ours.[18] Our level of interpretation is an aspect of meaning that is assigned to statements in a (modest and flexible) way as a function of the interpretations of the parts. Such a system, Davidson argues, must conclude that all true sentences have the same meaning, and so, too, all of the false ones. This version of the slingshot takes up very little room:

> But now suppose that 'R' and 'S' abbreviate any two sentences alike in truth value. Then the following four sentences have the same reference:
>
> (1) R
>
> (2) $\hat{x}(x = x.R) = \hat{x}(x = x)$
>
> (3) $\hat{x}(x = x.S) = \hat{x}(x = x)$
>
> (4) S
>
> For (1) and (2) are logically equivalent, as are (3) and (4), whereas (3) differs from (2) only in containing the singular term '$\hat{x}(x = x.S)$' where (2) contains '$\hat{x}(x = x.R)$' and these refer to the same thing if S and R are alike in truth value.[19]

This difficulty for such a theory of meaning looms when we make two assumptions Davidson describes as reasonable:

> . . . that logically equivalent singular terms have the same reference; and that a singular term does not change its reference if a contained singular term is replaced by another with the same reference.[20]

Davidson notes that the argument is essentially Frege's, cites Church, and says that "the argument does not depend on any particular identification of the entities to which sentences are supposed to refer."

Although we do not speak this way, in assigning interpretations to whole statements, we might be said to be treating them as singular terms. Let us look at Davidson's two principles, then, from the perspective of someone who treats statements as singular terms referring to situations. The first principle would be totally unacceptable, for it is really simply the rejection of this very idea. This is not surprising, since it was the rejection of the whole idea by Frege that led to the use of "logical equivalence" that the statement of the principle exploits. In spite of what Davidson says, it is hard to imagine any among those who have decided that statements designate at all who would accept this principle, except those who had

decided they designate truth values. The second principle is ambiguous, depending on whether complex singular terms are given a value-free or value-laden interpretation. Taken the first way, and assuming the first principle, the first step in the argument works but not the second. Taken the second way, the first step fails.

8. FINAL REMARKS

In many contexts embedded statements seem to contribute something more specific than their truth values to the embedding statement. Frege's choice of the truth value as that which belongs to the statement in virtue of the references of its parts precluded taking this appearance at face value. His approach was to look to another aspect of meaning for the specificity provided by the embedded statement. Others who are skeptical of meaning beyond reference, like Quine, have been led to doubt the very intelligibility of such statement-embedding contexts. A third approach is to recognize that statements do contribute something to the larger wholes in which they are found, something that turns on the designations of their parts, but to deny that when this occurs they are truly embedded. Quine takes this attitude too at times, and Davidson's article from which our opening quotation was taken adopts a radical version of this approach. Perhaps a combination of the first and third attitudes is something like philosophical orthodoxy. Frege's approach is taken toward certain cases ("de dicto"): the statement is embedded, but what it provides does not turn on the reference of its parts. The third attitude is taken toward other cases ("de re"): the parts of the contained statement do provide their designations to the whole, but the statements are not really embedded, they only seem to be at the level of superficial syntax.

An alternative is to question Frege's original decision. Here we think the slingshot has had a real and unfortunate influence. Perhaps its most important use was the first, Church's in his review of Carnap's *Introduction to Semantics.* Church used principles internal to Carnap's system to show that it must have truth values as the designations of sentences, rather than the situation-like propositions Carnap had intended. Church's argument turned on the principle that "L-equivalent" sentences have the same designation and on the assumption that substitution of two quite different singular terms designating the null class preserved the designation of the sentence in which they occur ('Λ' and '$(\lambda x)(x = x \ \& \sim \ldots)$', where '$\ldots$' is some true but not L-true sentence). His argument seems decisive against Carnap's system as it stands. One possible response would have been to rethink Carnap's principles about designation and his conception of propositions, to see if the slingshot could be avoided. But both Church and Carnap went in another direction and assumed that what is specific is not to be found in the reference of the sentence. Awesomely formal deployments of the slingshot seem to put this beyond question. One can see the whole development of possible worlds semantics, and much else in the philosophy of language of the past thirty years, as an outgrowth of this response to Church's deployment of the slingshot against Carnap.

We like to view situation semantics and possible worlds semantics as two lines

meeting in a single point, that point being where there is only one world and one situation. We believe a more workable semantics for natural language can be developed along the line we are proposing and that many of the valuable insights of the possible worlds approach can be incorporated into it. It may turn out, however, that the semantic facts will not fit such a narrow-minded view, and that we will have to look at the complex plane determined by the two lines. If so, we leave it to the reader to decide which line is the real axis and which is the imaginary.

Notes

1. Donald Davidson, "On Saying That," reprinted in *The Logic of Grammar,* ed. Donald Davidson and Gilbert Harman (Encino, Calif., 1975), p. 152. Originally published in *Synthese* 19 (1968-69). Our italics.

2. Rudolf Carnap, *Introduction to Semantics* (Cambridge, 1942); Alonzo Church, "Carnap's *Introduction to Semantics,*" *Philosophical Review* 52 (1943):298-305.

3. David Kaplan, "Dthat" and "On the Logic of Demonstratives," in *Contemporary Perspectives in the Philosophy of Language,* ed. Peter A. French, Theodore E. Uehling, Jr., and Howard K. Wettstein (Minneapolis, 1979), pp. 383-412.

4. J. L. Austin, *Philosophical Papers* (Oxford, 1961). See particularly "Truth" and "Unfair to Facts."

5. We try to use "sentence" and "statement" properly, except when discussing the views of others where it seems inappropriate.

6. Keith Donnellan, "Reference and Definite Descriptions," *Philosophical Review* 75 (1966):281-304; "Putting Humpty Dumpty Together Again," *Philosophical Review* 77 (1968): 203-15. Ruth Marcus remarks in passing in "Modalities and Intensional Languages," *Synthese* 14 (1962), that descriptions can function as proper names, i.e., "purely referentially"; she takes their normal use to be more like the attributive; see page 283.

7. See J. O. Urmson, "Criteria of Intentionality," in *Logic and Philosophy for Linguists* ed. J. M. E. Moravcsik (The Hague, 1974) pp. 226-37. See also Jon Barwise, "Scenes and Other Situations," unpublished paper, Stanford University, and John Perry. "Belief and Acceptance," *Midwest Studies in Philosophy* 5 (1980):533-42 and "The Problem of the Essential Indexical," *Noûs* 13 (1979):3-21.

8. Gottlob Frege, "On Sense and Reference," in *Translations from the Philosophical Writings of Gottlob Frege,* ed. and trans. Peter Geach and Max Black (Oxford, 1960) p. 64.

9. *Ibid.,* 65.

10. Alonzo Church, *Introduction to Mathematical Logic* (Princeton, 1956), p. 25.

11. *Ibid.*

12. Kurt Gödel, "Russell's Mathematical Logic," reprinted in *Philosophy of Mathematics,* ed. Paul Benacerraf and Hilary Putnam (Englewood Cliffs, N.Y., 1966) pp. 214-15.

13. *Ibid.*

14. W. V. Quine, "Three Grades of Modal Involvement," in *Ways of Paradox,* revised and enlarged edition (Cambridge, 1976) pp. 163-64.

15. W. V. Quine, "The Scope and Language of Science," in *Ways of Paradox,* p. 242.

16. Hans Reichenbach, *Elements of Symbolic Logic* (New York, 1966), p. 272. Relevant sections are reprinted in *The Logic of Grammar,* ed. Davidson and Harman.

17. Donald Davidson, The Logical Form of Action Sentences," in *The Logic of Grammar,* pp. 235-46. This essay was originally published in *The Logic of Decision and Action,* ed. Nicholas Rescher (Pittsburgh, 1967).

18. Donald Davidson, "Truth and Meaning," in *Philosophical Logic,* ed. J. W. Davis et al. (Dordrecht, 1969) pp. 1-20. This essay was originally published in *Synthese* 17 (1967).

19. *Ibid.,* p. 3.

20. *Ibid.,* pp. 2-3.