From Worlds to Situations

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In this paper, I argue that it is reasonable and useful for one who has adopted a certain conception of possible-worlds theory to extend that theory until it becomes a version of situation theory.

The conception of possible worlds I have in mind is that developed by Robert Stalnaker (1984). I shall first explain what I take the Stalnakerian conception to be, and then list a number of additions that seem to be in the spirit of this conception, to make it more useful, and to have the cumulative effect of making it into a version of the theory of situations. Basically, possible worlds are seen as a special case of situations, so none of the power of possible-worlds semantics should be lost, while the flexibility of situation semantics will be gained.

In speaking of a version of the theory of situations, I make a distinction between the theory and the most extensive formulation of it to date in Barwise and Perry 1983. There were formulations before this one, and new and improved ones are being developed (Barwise 1985, 1985a, 1985b). The apparatus I develop here of issues, answers, ways, and propositions is in some ways a hybrid, but I think it works well for purposes of comparison with Stalnaker.

I shall not be talking about semantics, per se, but its foundations. Semantical suggestions are made only for the purposes of motivating or illustrating the additions to Stalnaker's theory I suggest. If semantics consists in

studying truth and similar relations between linguistic elements and the world, then it requires some systematic way of classifying language, some systematic way of classifying reality, and some systematic way of matching them up. It is the second issue that concerns us here: finding a way of classifying reality.

Stalnakerian Possible Worlds

In chapter 3 of *Inquiry*, Stalnaker introduces his conception by contrasting it with David Lewis'.[1] Lewis says that it should be uncontroversial that there are ways things could have been other than the way they are. The way things might have been are possible worlds. So far, Stalnaker agrees with Lewis.

But Lewis goes on to take these possible worlds to be alternative concrete realities, just like the actual world in every deep metaphysical respect, except that we are in *it* and not in *them*. "Actual" is really an indexical. Other worlds are as real for their inhabitants as ours is for us. There is no additional status our world has over theirs. (Lewis thinks that no one is in more than one possible world; in the world in which I fall off the stage at this point, it is really not me that falls, but a "counterpart" of me.)

Stalnaker does not share this view of possible worlds. He points out that there is a considerable step from thinking of possible worlds as ways the world might be, to thinking of them as concrete alternatives to it. He does not take that step.

Rather, Stalnaker makes a sharp distinction between what he usually calls the world, something concrete, and possible worlds, including the actual one, which are abstract entities—ways the world might be. I will usually call possible worlds, so conceived, *total ways*, since to me the word "world" has concrete implications. There is one world, which might be of any one of a variety of total ways. I shall call the total way it is the *actual* total way, rather than the actual world.

[1] For Lewis' view, see Lewis 1973. In addition to Stalnaker's criticisms, one should consult Adams 1974.

Stalnaker, like Lewis, takes a proposition to be a function from possible worlds to truth-values. This is why I call his possible worlds *total* ways. Each world provides a truth-value for every proposition, in effect, an answer to every question.

But Stalnaker's worlds are not total in another, more metaphysical sense, in which Lewis' are. Stalnaker considers possible worlds theory as a formal or functional tool—a philosophical apparatus, as he calls it—rather than a metaphysical theory. He does not assume, for example, that there is a single set of all total ways. A set of total ways is an analytical tool, and which set is appropriate depends on the purposes at hand. Since propositions are defined in terms of sets of total ways, the same holds for them. So, in this sense, possible worlds are not total. I shall use "comprehensive" for this notion. So, Stalnaker's possible worlds are total, but not comprehensive.

For example, suppose we are interested in the beliefs of a dog and its master (Stalnaker 1984, 63). They both believe that a bone is buried in the back yard. But the master has the concept of an ersatz bone and the dog does not have this concept. In representing the master's beliefs, we would want to include, among the possibilities his belief might rule in or out, or leave open, the bone in question being ersatz. But we would not want to do this in the case of the dog, or at least might not want to. In the first case, we should take the set of total ways to separate the two cases; in the latter, we should not. Given these different sets of total ways, the propositions believed will differ also, since propositions are functions from sets of total ways to truth-values.

Since I want to recommend some additions to this theory, and an alternative notion of proposition, I need a way of talking about some properties of total ways and propositions that is, so to speak, outside of the theory. For this purpose, I shall use the notions of basic issues and answers.

An n-adic relation R and appropriate objects $a_1, \ldots, a_n$ determine a basic issue, the issue whether the world is such that R holds of $a_1,\ldots, a_n$ or not. A basic issue has an answer; yes or no.

It seems that total ways provide answers to issues. This is not to say that we

should *define* them as functions from issues to answers. That would be contrary to the spirit of Stalnaker's enterprise; total ways are the basic primitives. Even thinking in terms of issues may infect my analysis with an atomism that distorts Stalnaker's view. Still, I think we can productively use this feature of total ways to study them, for at the very least, we will put ourselves in a position to learn how this perspective distorts things. So I shall represent total ways as (total) functions from sets of issues to answers.

Then it seems to me that we can present both sides of Stalnaker's perspective. On the one hand, the relativity to interests corresponds to the different sets of issues that might be relevant to a given analytical task. On the other hand, the total nature of these ways is reflected in the fact that given a set of issues, the worlds or ways for that set of issues are represented by total functions, functions that provide an answer for every issue.[2] So, as I understand Stalnaker, here are the basic points of his view, explained in terms of the notion of an issue and using the term "total way" instead of "possible world":

> There is an important, unique, concrete object, the world.
>
> Relative to a given set of issues, there are a number of ways the world might have been. These are total ways relative to those issues.
>
> The world has a special relation, which I shall call *making actual* to one and only one of the total ways in such a set of alternatives. This is the actual total way, relative to the issues under consideration.
>
> A total way provides an answer to every issue under consideration, that is, provides a total function from issues to answers.
>
> Hence, the world determines an answer for each issue, the answer provided by the total way it makes actual.

Stalnaker singles out two features of his view for special mention. The first is that the propositions lack the structure of sentences. The second is the language-

[2]Note that on this conception there is a kind of proposition that is closely connected to total ways, the proposition that returns truth for only a single total way. Stalnaker calls these basic propositions (56).

independence of propositions. Propositions are not sentences or statements or eternal sentences or abstract entities built up from sentences.

Although I agree with both points, they can help us identify some areas of disagreement. As to the second point, it is worth emphasizing that even if propositions are not intrinsically linguistic, certain parts of language might be made to order to express them.

The first point implies that there could be two statements, which make use of sentences with different structures, but nevertheless express the same proposition. One example of this might be the active and passive; one might well suppose that *Tom kissed Mary* and *Mary was kissed by Tom* express the same proposition. But, in enunciating the principle, Stalnaker has especially in mind the doctrine of the identity of necessarily equivalent propositions. On this doctrine, *George is sleeping* and *George is sleeping and Mary is weeping or Mary is not weeping* express the same proposition as do *7+5=12* and *45/5=9*.

While agreeing with the first point, I reject the doctrine of the identity of necessarily equivalent propositions. The doctrine does not follow from the point, because there are factors other than the sentence used, which can account for the difference between the propositions. In cases of necessary equivalence, unlike the case of the active and passive, the objects the statements are about differ, as well as the structure of the sentence used. Thus there is room for a principled rejection of the doctrine, without individuating propositions linguistically.

I think the doctrine of the identity of necessarily equivalent propositions is an unnecessary weakness of Stalnaker's theory, one not required by the language-independent nature of propositions. It is unnecessary because the theory admits of a straightforward extension, requiring no doctrines except some rather commonsensical ones, that allows us to distinguish among necessarily equivalent propositions without taking propositions to be linguistic.

From Total Ways to Partial Ways

The first addition I want to suggest to possible-worlds theory is to allow partial ways in addition to total ways. A total way provides answers to all of the issues under consideration, while a way of this new sort I am suggesting provides answers to only some of the issues. It is the common part of all the total ways that provide its answers to its questions. So we have ways, some total, others partial.

Each way will provide answers to some of the issues under consideration. The world will make actual any number of ways, but still only one total way.

If we think of total ways as functions from issues to answers, then the existence of the more general class of ways would seem to be pretty uncontroversial. They would just be parts of total ways, in the sense in which one function can be part of another. But as I said, the representation of total ways as functions may be distorting. There may be a reason to be skeptical about the existence of the wider class of ways, given some other conception of the total ways. However, I do not see such a reason, so I shall assume that this is a small unobjectionable addition to the system.

In fact, Stalnaker already recognizes these entities. Consider the set of total ways we use for the master, each of which has the bone being ersatz or not. It looks like the total ways we use for the dog, which do not provide an answer for the issue of whether the bone is ersatz, are just what we want. These entities are total ways, relative to the issues we consider in the dog's case. But it looks like they are just parts of the entities we call total ways in the master's case. That is, it seems that the very entities that are total ways relative to the issues relevant to the dog, are partial, relative to the issues relevant to the master. So, it seems like Stalnaker has recognized all the ways I want. From this perspective, all that I am suggesting is to allow, as an additional analytical tool, a set of ways or alternative possibilities that is the union of sets of ways Stalnaker already recognizes separately as analytical tools.

The second addition, which also seems to be small and unobjectionable,

is a wider class of propositions. Let us call the propositions Stalnaker has defined, those that are functions from total ways to truth-values, Stalnaker-propositions or S-propositions. I want to suggest that we recognize a wider class of propositions: partial functions from ways generally to truth-values, not just total functions and not just from total ways.

Consider again the proposition that George sleeps. The relevant S-proposition is that function that takes us from a total way to truth if the total way provides the answer yes to the issue of whether George is sleeping, and from a total way to falsity if the total way provides the answer no to that issue. Since these ways are total, every one of them will provide one answer or the other to this issue.

The proposition of the more general sort I am now introducing, will be a quite different function. It is that partial function P from ways w to truth-values, such that

> $P(w) = T$ if w provides the answer yes to the issue of whether George is sleeping.
>
> $P(w) = F$ if w provides the answer no for that issue.
>
> $P(w)$ is undefined, if w provides no answer for that issue.

In this more general sense of proposition, propositions that are expressed by statements that are necessarily equivalent do not always turn out to be identical. For example,

> that George sleeps and Mary weeps or Mary does not weep

is that function P' such that

> $P'(w) = T$ if w provides the answer yes to the issue of whether George is sleeping, and provides the answer yes or the answer no to the issue of whether Mary is weeping.
>
> $P'(w) = F$ if w provides the answer no to the issue of whether George is sleeping, and provides the answer yes or the answer no to the issue of whether Mary is weeping.

$P'(w)$ is undefined otherwise.

P and P' are not identical.

To return to the case of the master, the dog, and the bone, we can now, in terms of this wider class of propositions, consider the difference between their beliefs. Suppose the master has the concept of an ersatz bone, but does not have an opinion as to whether the buried bone is ersatz or not. Then we can say that the master believes,

> that the bone is buried and it is ersatz or it is not ersatz

while the dog does not believe this, but only,

> that the bone is buried.

It seems that we might find it useful to be able to make the distinction between these two propositions, within one set of alternative possibilities, in giving semantics for something like:

> The dog believes the bone is buried, while the master believes that and, in addition, that it is ersatz or not ersatz.

Thus, having the more general sort of proposition available, in addition to S-propositions, seems to add structure, and hence flexibility, to our available semantical tools, and at no real cost. Nothing has been lost, for one still has the S-propositions, if they should be needed. S-propositions might be crucial, for example, in thinking about necessity and possibility.

Here is another example of where this flexibility might be useful. Consider the following two courses of action one might contemplate:

> bringing it about that George sleeps
>
> bringing it about that George sleeps and Mary weeps or Mary does not weep.

It seems to me that these are quite different things to consider doing. The decision to do the first, for example, would not require a further decision before

it is carried out, while the second would; once one had decided to bring it about that George sleeps and Mary weeps or she does not, one would have to decide which of the latter two alternatives one was going to try for. Now, one might want to handle the difference in a variety of ways, but I cannot see the harm in having available the tools that allow for a relatively straightforward differentiation, in terms of the difference in the propositions expressed by the embedded sentences. Even if that is the wrong way to handle it, it seems to me that a semantical system that can consider and reject it is better off than one that cannot even consider it.

Finally, we now have a possible explanation for the fact that it might be true that Elwood believes that 2+2=4, but not true that he believes that 367+345=712. The embedded expressions, "2+2=4" and "367+345=712" express different propositions, defined on ways that provide answers to different arithmetical issues, and Elwood can believe one without believing the other.

Now, once again, this explanation might well be wrong. Stalnaker offers another, that the objects of belief and doubt in mathematical inquiry are propositions about the relation between statements and what they say. I do not think I need to criticize Stalnaker's proposal, or defend the one just mentioned, to make my point. An apparatus for semantics should give us the flexibility to consider both explanations. The reasons for taking the objects of mathematical inquiry to be propositions about the relation between statements and what they say should not have to rely on the semantical apparatus leaving out partial ways.[3]

Instead of introducing the general class of ways as entities that are in some sense parts of total ways, we might try introducing them as sets of total ways. The idea would be that we would represent a partial way that is undefined on a subset of the issues at hand as a set of total ways that give different answers to these issues, while agreeing on the issues on which the partial way is defined. Then we could introduce propositions as partial functions from ways, so conceived, to truth-values, where the proposition is undefined on those ways

[3]See Barwise 1985 for a discussion of mathematical conditionals, and the problems raised for the doctrine that there are only two propositions for mathematical statements to express.

all of whose members (which will be total ways) do not provide the same answer to the issues at hand.

One then might ask, would this not be a more acceptable way of introducing ways than the one I have suggested? Might there be reasons for taking ways as sets of total ways rather than as parts of them? Again, if total ways are regarded as functions from issues to answers, the answer to this question seems pretty clearly no, however we conceive of functions. Suppose first that we conceive of functions as sets of pairs of argument and value. Then a part of a function will just be a subset of the original function—a perfectly good entity. There seems to be no particular reason to prefer working with a set of sets of pairs, that all include this subset, and differ with respect to the other pairs they contain, rather than working with the subset itself.

Suppose now that we conceive of functions rather as rules. Consider the rule that says I put a book on shelf 1 if it is about philosophy and on shelf 2 if it is about linguistics. It does not say anything about what to do if it is a recipe book. What reason would there be to take this rule to be a set of more detailed rules, some of which have me putting recipe books on shelf 1, some on shelf 2, some on shelf 3, and so forth? There are many surprises in logic and set theory—at least for me—so I cannot be sure there is no good reason for this, but I admit I cannot see what it would be.

Finally, introducing ways as sets of total ways would not be equivalent to introducing them as partial. All total ways will agree on issues with only one possible answer, as for example the issue whether seven plus five equals twelve. So all ways introduced the second way will be defined on such issues, since all of their members will agree. But if we introduce ways directly as partial, there is no problem in having ways that do not provide answers to mathematical issues, and the flexibility thus obtained is just what we might want to deal with partial knowledge of mathematical truth.[4]

But as I said, the representation of total ways as functions may be distort-

[4]In the lecture on which this paper was based, I said the two methods for introducing ways were equivalent; the nonequivalence was pointed out to me in a letter from Richard J. Hall and Herbert E. Hendry.

ing. So, it might be that on certain conceptions of total ways, taking ways to be sets of total ways would be less objectionable or more practical or rigorous or precise than taking them to be parts of total ways. So here, again, all I can say is that I do not yet see why this should be so.

So, to sum up the recommended additions so far: we introduce partial ways, providing partial rather than total functions from issues to answers. We introduce a more general class of propositions, as partial functions from ways to truth-values.

Stalnaker on Necessary Equivalence

Stalnaker gives an independent argument for the desirability of identifying the propositions expressed by necessarily equivalent statements (1984, 24). According to this argument, the causal pragmatic account of intentionality that he offers provides a deep philosophical motivation for the identity of necessarily equivalent propositions. In this section, I want to express some reservations about this argument. These are not reservations about the general idea of a causal pragmatic approach to intentionality, but about the step from such an approach to the identity of necessarily equivalent propositions. These may not be definitive counterarguments, but I think they should at least provide some motivation for not ruling out more "fine-grained" objects for the attitudes in the very way we set up our semantical apparatus. It seems that the restriction of the objects of the attitudes to S-propositions, if correct, should come as a (surprising) result of analysis of the attitudes, not a limitation forced upon that analysis by only having S-propositions available in the first place. But I think Stalnaker only provides the second sort of motivation, not the first.

First we must be clear about the sense in which Stalnaker holds the doctrine of identity of necessarily equivalent propositions ("the doctrine," for short). I want to distinguish two senses of the doctrine, one which Stalnaker does hold and one which he does not hold. To make this distinction, we first need to make another one, between propositions that are *true of* the same total ways, and

those that are *the same function* from total ways to truth-values. By saying that a proposition is true of a way, I mean simply that if that is the way the world is, the proposition is true.

Consider two partitionings of the space of possibilities, one a finer-grained version of the other. For example, consider again the ways we partition the space of possibilities for the master and his dog. Now consider the statement that a bone is buried in the back yard. Depending on which partitioning we use, we will take this statement to express two quite different propositions. They will be different, because they are different functions, with different sets of total ways as their domains. Call these P_M and P_D. Now it seems to me that P_M is true of the total ways, in the dog's partitioning, in which a bone is buried. But it is not a function that returns true for these ways, for it is not defined on them, but only on the finer-grained ways emerging from the master's partitioning. And similarly, it seems to me that P_D is true of those ways, in the master's partitioning, in which either kind of bone is buried, although it is not a function that returns true for these ways, since it is not defined on them.

Now let us distinguish two senses of necessary equivalence of propositions P and Q. One is that P and Q are true of the same ways. The other is that P and Q are the same function from ways to truth-values. I think it is clear that Stalnaker means the latter when he advocates the doctrine, for in the former sense, the doctrine is clearly false. Each way of partitioning the space of possibilities will give us its own necessary proposition, the function from all of the ways in the partition to true. These will all be necessarily equivalent in the first sense, but not identical.

The form of Stalnaker's argument is that on the causal pragmatic account of the attitudes, we can expect the attitudes to share features with other, nonattitudinal relations between individuals and propositions, such as *x tends to bring about that P* and *x indicates that P*. Stalnaker claims these relations (and some others cited in developing the causal-pragmatic view) are such that if they hold between x and P, and P is necessarily equivalent to Q, they hold between x and Q. Given the causal pragmatic approach, we can expect the attitudes to behave

the same way. That is, we can expect that the attitudes cannot discriminate between necessarily equivalent propositions, and this provides a motivation for taking such propositions as identical.

Now consider the relation *x tends to bring about P*, where *P* is a proposition. On Stalnaker's definition, this relation holds only if *P* is a logical or causal consequence of *x* being in its equilibrium state.

But why should we define *tends to bring about* in this way? It seems like a poor definition. I tend to bring it about that I have food in my stomach, for this is a causal consequence of my being in my equilibrium state. But do I tend to bring it about that 7+5=12, or that Cicero either did or did not like Caesar? It does not seem to me that I have ever done so. But unless we are convinced that a definition of *tending to bring about* that has these consequences is correct, the causal pragmatic account of the attitudes will not support the doctrine.

Similarly, consider *indication*. The definition is as follows: an object indicates that *P* if and only if, for some state *a* in the relevant set of alternative states of the object, first, the object is in state *a*, and second, the proposition that the environment is in state $f(a)$ entails that *P*. State $f(a)$ is the state the environment will be in if fidelity conditions hold and the object is in state *a*.

On this definition, a tree having 100 rings indicates not only that it is 100 years old, but also that 7+5=12 and that it is 100 years old and 7+5=12. Again, being impressed with indication as a model for, or component of, belief will motivate us to accept the doctrine that necessarily equivalent propositions are identical only to the extent that we think a definition with these consequences is acceptable.

One might respond that although the consequences are not obviously correct, they might be inevitable, and hence have to be accepted. Suppose our basic idea is that relations to propositions are derivative. In all of the cases of "relations to propositions," attitudinal and nonattitudinal, the basic facts are that some state of an object determines a set of ways that the world must be, given that the object is in that state, and certain assumptions hold (causal principles in the case of tending and indicating, something more complex and

counterfactual in the case of the attitudes). Propositions will come in derivatively; the ways that are compatible with the object's being in the state, given the assumptions, will determine a set of propositions, the ones those ways make true. But then propositions that all ways make true will always "come along for the ride." Given the strategy, it seems inevitable that our definitions of tending or indicating will imply that a thing tends or indicates all necessary propositions as well as the conjunctions of those necessary propositions with the contingent propositions that the thing tends to make true or indicates.

But this result is not inevitable, given the distinction between a proposition's being true of a way, and a proposition's returning truth for the way. It might be that the way of partitioning, suitable for the definition of tending or indicating, simply does not provide the materials required, for the definition of all necessary propositions. In fact, it is a consequence of Stalnaker's view that those propositions that are defined on more fine-grained partitions are not definable in terms of less fine-grained partitions. One might still maintain that for each statement of a necessary truth and each partitioning, no matter how coarse, there is a proposition definable in terms of the partition that can be regarded as what the statement expresses. However, I cannot see why, except for the desire to create problems for oneself, one would think that this was so. For example, take a partitioning of possibility into two total ways, relative to the single issue of whether Ronald Reagan dies his hair. I see no reason why the function from these two ways to truth should be a reasonable candidate for the interpretation of, say, "There is no largest prime number." So, it seems to me that the notions that we tend to bring about all necessary propositions, and that tree rings indicate all necessary propositions, are not only unintuitive consequences of the suggested definitions of tending and indicating, but also are avoidable, even if we accept Stalnaker's version of possible-worlds theory and the general approach to the definitions that he takes.

So, in conclusion, I do not see that Stalnaker has provided us with a deep enough reason for identifying objects of the attitudes expressed by necessarily equivalent statements, to motivate building such an identity into the very notion of a proposition provided by our semantical apparatus.

Bivalence

In order to get a grip on the effect of the recommended additions to Stalnaker's system, let us focus on the impact of the addition on the issue of bivalence of propositions.

Recall Stalnaker's approach to truth:

> S is true, iff $S(w*) = T$, where $w*$ is the actual total way;
> otherwise, S is false.

Since each proposition is defined on all total ways, each one will be defined on $w*$, and so each will have at least one truth-value. Since there is only one actual total way, each one will have only one truth-value. So we will have bivalence.

Now let us see what happens when we add partial ways, and the more general class of propositions, to our semantical framework. Recall that a proposition is now a partial function from the set of ways (total and partial) to truth-values. The intuitive idea is that we give the conditions under which propositions are true and false. So we should handle truth and falsity as follows:

> P has truth-value v, iff there is a way w such that w is a way the world is, and $P(w) = v$.

We assume that for any way, the world is that way or it is not, and the world is not both of two incompatible ways, where ways are incompatible if they return different answers for the same issue. These metaphysical assumptions, our conception of a proposition, and the treatment of truth and falsity are not enough to guarantee bivalence. For example, a proposition that was defined on only one way w, returning T, would not have a truth-value if w was not actual. To get bivalence, we need a narrower class of propositions.

Let us say that a way is *basic* if it is defined on a single issue, and that ways are *opposite*, if they provide opposite answers for exactly the same issues. We use $w\sim$ for w's opposite.

Let us define a focused proposition as follows:

> P is focused iff
>
> (1) there is a basic way w such that $P(w) = T$ and $P(w\sim) = F$;
> (Call w and $w\sim$ P's T-Core and F-Core.)
>
> (2) For all w, $P(w) = v$ iff P's v-core is a part of w.

Focused propositions will be bivalent. By (1) and our metaphysical assumptions either the proposition's T-core or F-core will be actual, so it will have at least one truth-value. Suppose a focused proposition has both truth-values. Then there are actual ways w and w' such that $P(w) = T$ and $P(w') = F$ and P's T-core and F-core are parts of w and w', respectively. But then P's T-core and F-core are both actual, which cannot be, since they return opposite answers to the same issues.

This is all an illustration of the general theme of the paper. By making the additions to Stalnaker's semantical apparatus I suggest, we do not lose anything. We have a coherent notion of a bivalent proposition, supporting whatever intuitions there are behind classical propositions. But we could also explore, within the semantical apparatus, propositions that are not focused, and the logics to which they give rise.

Types of Nontruth-Functionality

If the classical propositional logic were the issue, of course, we would hardly be motivated to consider Stalnaker's theory, much less the revisions I am suggesting. We could rest content with a semantical apparatus that provided us two truth-values. The need for more fine-grained objects to serve as the interpretations of statements arises with nontruth-functional phenomena, various linguistic contexts O such that

$O(S)$

S and S' have the same truth-value

So, $O(S')$

is not a valid argument. Of course, there are many such linguistic contexts.

I think it is plausible that the propositions provided by possible-worlds semantics are successful in explaining the nontruth-functional nature of the notions of absolute necessity and possibility found in philosophy, theology, and elsewhere. The relevant linguistic contexts discriminate between statements with the same truth-value, but, so far as I know, there is no good reason to take them to discriminate between statements that are necessarily equivalent. S-propositions explain this behavior.

The attitudes, on the other hand, do seem to discriminate between statements that are necessarily equivalent. The revisions of Stalnaker's theory I am recommending, and other versions of situation theory, account for this. However, the attitudes also seem to discriminate between statements that differ only in having different names for the same object. The amendments considered so far do not explain this. As Hall and Hendry say,

> It would seem that the issue of whether Venus is a planet is the same as the issue of whether the morning star is a planet. But if they are the same issue, then it would appear impossible for a way, total or partial, no matter how defined, to give a different answer to whether Venus is a planet than to whether the morning star is a planet ... we will not be able to distinguish these issues, and the corresponding propositions, much as we would like to.

Does this mean that our exploration of partial ways was a waste of time? I think not, for two reasons. The first is the spirit of partiality; there is nothing wrong with a partial solution, which may turn out to be part of a full solution. The second reason is that there is a class of linguistic contexts that do seem to discriminate between necessarily equivalent statements, but do not discriminate between statements differing only in the names used for the same object. One

example are the expressions we use to express causation. Suppose the bed's collapsing made it the case that Cicero lost sleep. It seems that, on the one hand, it does not follow that the bed's falling made it the case that 7+5=12. And, on the other, it surely did make it the case that Tully lost sleep. If Cicero lost sleep because the bed fell, and Tully is Cicero, then Tully lost sleep because the bed fell.

Conditionals are another example, although intuitions are not always as sharp as with causal notions. Suppose we have taken a cheap flight to Boston, with stops in Omaha, Bloomington, and Ithaca. I wake up as the plane lands in Ithaca and say, "If this city is Boston, we have no further to go." It seems that what I have said is true. But if I had said instead, "If this city is Amherst, we have no further to go," you would correct me by reminding me that our goal is Boston and not Amherst. Now there is no possible world in which Ithaca is Boston. And similarly there is no possible world in which Amherst is Boston. So if conditionals were insensitive to change of necessarily equivalent statements, both conditionals should be true or both should be false. Of course, there are many things that could be said about this example, concerning as it does such mysterious things as the relation of identity and Boston. But there seems to be an advantage in being able to at least consider the most straightforward approach, that the change of antecedent statements produced a change of propositions, and hence a change in the truth-value of the conditional.

Given this conjecture, that the most natural application of the benefits of partiality is the realm of causal and conditional notions, it is surprising more time was not spent on them in *Situations and Attitudes*, and less on the attitudes. Barwise is now making amends, however, and since he discusses Stalnaker's views on conditionals in the papers cited earlier, I will not dwell on these issues further.

I believe the problem of substitution of names in attitude reports can be dealt with, in a straightforward way, within situation theory. The strategy is explained in *Situations and Attitudes*, but not in a way that makes it seem very straightforward. However, I have neither the space nor wit to do better here.

The World and its Parts

Stalnaker's version of possible-worlds theory has two main sorts of entity, the world, of which there is only one, and total ways, of which there are many. The first additions I suggested to his theory came from recognizing partial as well as total ways as legitimate entities that ought to be available for semantics. The second set of additions come from recognition of parts of the world as similarly legitimate.

I think it is very natural to suppose that there are parts of the world. For example, what has happened so far seems to be only a part of all that has happened and will happened; I would find it very distressing if this were not so, though not for long. What happens in this room, between midnight yesterday and midnight today, again seems a part of the world, not the whole.

In fact, it seems that all that would ever be needed, in any account of anything, would only be a part of the world. Even if one is very Whiteheadian about how the understanding of anything that happens really involves a great deal else, most of us would put some limits on this.

It seems in the spirit of Stalnaker's theory that just as the set of total ways, and hence the propositions, relevant to a given analytical task can vary, so too might that stretch of reality that counts as the world. If so, then the same sort of unification of tools across tasks, which seemed to motivate inclusion of partial ways that are partial relevant to a given task, seems also to motivate the inclusion of stretches of reality than are less than what is taken to be the complete world for a given analytical purpose. We gain flexibility, and lose nothing.

There are two kinds of parts that I think we need to keep in mind. First, and perhaps most naturally, there are the parts that correspond to everything that happens in some continuous spatiotemporal location. Both of the parts I mentioned, everything that has happened up until now and everything that happens in this room in a 24-hour-period, are of this sort.

Second, there are parts of the world that determine the answers to a certain set of issues. Consider the set of people listening to me now in this room, and

the property of being asleep. This set of individuals and this property give us a certain set of issues: whether or not each of these individuals is asleep. Then we have a somewhat different notion of a part of the world: that part of the world that determines the answers to this set of issues. This part of the world will not be everything that happens in a continuous spatiotemporal location.

I will call parts of the first kind chunks of the world and parts of the second kind aspects of the world. Aspects of the world are more closely connected to ways than are chunks, and one might wonder whether we need aspects at all in addition to ways. I think we do need them. That is, we should distinguish between that aspect of the world that makes it the case that a certain way is actual, and that way itself. The way would exist, even if it were not actual. It would be there, an unactualized possibility. On a Stalnakerian conception, these unactualized possibilities seem no more objectionable than other uninstantiated properties. But the aspect or aspects of the world that make the way actual would not be there if the world were not the way it is in these respects.

Earlier, we recognized a relation, *making actual*, between the world and total ways. Then we extended that relation to partial ways. While the world makes only one total way actual, it makes many partial ways actual. Now I suggest a further extension, allowing that parts of the world make partial ways actual.

Let us assume, as an example, that George Washington had false teeth. Now it seems to me as clear as anything can be that this issue was settled by a part of the world that occurred before the twentieth century. The world is a certain way, being such that George Washington had false teeth, because a certain part of it, say, the world up until 1850 (to be cautious) was this way.

Suppose some obscure piece of reasoning of Bradley's or Frege's yet to be understood will eventually show us that no issue is settled except by the whole of the world. Still, this seems like a very significant fact, one we want to be in a position to state. So it seems a good idea to recognize parts of the world, and the relation of *making actual* between them and ways, even if no part of the world ever has made or ever will make a way actual by itself.

Let us call all parts of the world *situations*. For a given analytical purpose,

we may suppose that some situation is large enough to include everything relevant to the tasks at hand; it is the world. Its parts are the rest of our situations, and represent the second addition I am suggesting to Stalnaker's theory.

Now what will recognition of these situations add to our theory that might be useful for semantics? Before answering this, let us make an important distinction between persistent and nonpersistent properties of parts and wholes, and consider the general point of recognizing parts when we already have the wholes.

There are properties that the parts and the whole can share. For example, I have a weight, and so does my right arm. Note, however, that my weight will not be that of my right arm. I weigh about 190 pounds. I do not know how much my right arm weighs, but if I caught a fish the size of my right arm I would expect it to weigh at least four or five pounds. So let us suppose that my right arm weighs five pounds. Now from this it follows that I have an arm that weighs five pounds, and that I weigh at least five pounds, but it does not follow that I weigh (exactly) five pounds.

The property of weighing (exactly) five pounds is not persistent along the relation of physical part to whole. Some properties, though, are persistent, such as weighing at least five pounds.

The ways we have so far are all persistent properties of situations. If a situation settles a number of issues in a certain way, then every larger situation of which it is a part will settle those issues in the same way. Now, if all properties of situations were like this, there might be little point in recognizing situations in addition to the world. It is nonpersistent properties that make parts of interest. My dining room table, for example, has a leg that in an extreme emergency could be used as a baseball bat. It has a certain weight and size and shape, and heft. The table of which it is a part does not have that size, weight, shape and heft, and would not make a good baseball bat. When the emergency comes, I will be better off for having recognized the part as well as the whole, because by doing so, I was able to recognize one of its important nonpersistent properties.

It seems clear that situations have many nonpersistent properties, as well

as the persistent ones. The property of not settling an issue one way or the other, for example, is clearly not persistent, for the issue will be settled by some larger situation. Also, insofar as we interact with situations, or they interact with other objects, or with each other, they will have nonpersistent properties. For example, I now see a certain situation, with various people doing various things—nodding, yawning, looking at their watches, and the like—but I do not see every situation of which this situation is a part. So being seen by me is a nonpersistent property of situations.

Here is another example. If a situation makes it the case that George Washington had false teeth, then any larger situation of which it is a part must also settle that issue in that way. But suppose a situation has only one person in it that has false teeth. Consider the situation in George Washington's bedroom at Mount Vernon. On certain assumptions about Martha's teeth, this situation has only one person in it having false teeth. But other situations of which it is a part, such as the world as a whole, do not have this property.

These nonpersistent properties of situations can seem sort of puzzling. They must be reflected somehow in the way the world is. The persistent properties of situations end up being ways the world is. Are the nonpersistent ones in danger of being left out?

They are not left out, because by recognizing situations, we generate a whole new set of issues. Some situation s must settle the issue of whether I see a given situation s' or not. That it settles this issue in the way it does will be a persistent property of s. So the nonpersistent property of s', being seen by me, is reflected in the persistent property of s, of settling the issue of whether I see s' positively, and hence in a property of the world. (The reader can see that the issues generated in this way can quickly make things quite complicated. In Barwise and Perry 1983, we represented real situations, within the formal theory, with what we called abstract situations. But abstract situations were also used to represent the real uniformities across situations that I am here calling ways. This led to some difficulties, and a failure to realize the importance of the new issues that are generated by taking situations to be objects. This is one of the main

reasons we are working on yet new versions of the theory of situations, much to the frustration of some who have worked hard to understand the versions already put forward.)

It seems reasonable, then, that if there is a world, it has parts. And if it has parts, these parts have nonpersistent as well as persistent properties. And if this is so, it would seem wise to have these entities, and their nonpersistent properties, available for semantical analysis.

Barwise and I think that many of the topics that have been puzzling in the history of semantics revolve around situations and their nonpersistent properties. In fact, we think that the problem highlighted in the previous section, of contexts that are sensitive to substitution of names for the same object, is such a topic, but as I said, I will not try to explain our approach in this paper. (See Barwise and Perry 1983, part IV.) But I will mention a couple of other examples.

Consider a statement like "The man in the red coat is asleep." A straightforward Russellian analysis seems to make this a claim that implies there is one and only one person in the whole world that has a red coat, but this is not usually what is intended. Another approach is to suppose that we are not trying to describe the world, but just a part of it: a situation in which there is only one man with a red coat, and he is sleeping. This property of the situation is not persistent.

Here is another example. Suppose that after my talk the program committee, Barwise, Feferman, and Israel, say to me, "Everyone was asleep during your talk." Of course, they do not mean that everyone in the whole world was asleep. Nor do they even mean that everyone in the room was asleep, because they do not think I was asleep. Rather, there is a certain set of issues in question: whether each member of the intended audience was asleep or not. These logicians are describing that part of the world that settles the answers to those issues. Their statement is about that part of the world. The semantics of "Everyone was asleep" should provide for this; that is, it should identify a property of situations, of everyone in them being asleep. And it should allow

that a statement can be about a part of the world, a situation, rather than the whole of the world, and can be true if it describes that part of the world correctly.

There are, of course, other ways of dealing with these examples. We might suppose that the context supplies some extra descriptive material, which, together with that which is explicitly articulated, yields a persistent property of situations, a way the world might be. I am inclined to think that the strategy of requiring the context to supply a situation to be described will be more workable. But for present purposes, I only want to claim that we want our semantical tools to be rich enough to consider this treatment as well as others.

So, my final suggestion for an addition to Stalnaker's possible-worlds theory is a class of propositions that are true only relative to situations. These propositions will be functions from pairs of nonpersistent properties and situations to truth-values. We might call the propositions nonpersistent too, since the fact that such a proposition is true relative to a given situation, will not insure that it is true relative to other situations of which that situation is a part.

So I have argued that certain additions to Stalnakerian possible-worlds theory, which do not strike me as contrary to the spirit of the theory in any obvious way, will provide us with a richer and more flexible foundation for semantics. By recognizing parts of possible worlds (considered, as Stalnaker does, as ways or properties of the world, and not alternative realities), we make available structured propositions, whose conditions of identity are more fine-grained than those provided by Stalnaker's theory unamended. By recognizing parts of the world, we are able to recognize discourse that attempts to characterize those parts directly, and the world as a whole only indirectly.

Let me end on a modest note. Stalnaker emphasizes that he does intend his possible-worlds theory to be a metaphysical theory, but a semantical apparatus. But what then is the underlying metaphysics, implied by our ability to partition possibility in different ways for different purposes? I believe that situation theory, considered as a metaphysical theory, provides Stalnaker with all he needs for possible-worlds theory, considered as a semantical tool: a world and total

ways, and the relevant S-propositions, *given a fixed set of issues*. And it will also support Stalnaker's skepticism about there being a set of total ways apart from any fixed set of issues. That is, my final conjecture is that situation theory is the right metaphysics for one who wants Stalnakerian possible-worlds theory as a foundation for semantics—even for one who wants it unsullied by situations, in spite of all my good advice.[5]

[5]This is an expanded version of a paper prepared for a symposium at the 1985 CSLI Summer School/ASL Meeting. Certain examples reflect the fact that the paper was originally prepared to be read to an audience. The thoughts recorded here reflect many conversations over a period of years with Jon Barwise on the topics of situation theory and possible worlds, as well as participation in a seminar on *Inquiry* with John Etchemendy, Bob Moore, David Israel, Ned Block, and others.