Possible Worlds and Subject Matter: Discussion of Barbara H. Partee "Possible Worlds in Model-Theoretic Semantics: A Linguistic Perspective".

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1 Introduction

Barbara Partee emphasizes two contributions possible-worlds semantics has made to linguistics (1989). First, possible worlds have helped to provide an appropriate structure on the space of meanings. Second, the possible-worlds conception helps relate linguistic meaning to other kinds of informational content.[1] She believes that these contributions are "largely independent of metaphysical issues" (1989, 107).

[1] I have one reservation about how Partee puts the point about the benefits for linguistics of a general account of meaning and information. She says this benefit has not so much to do with linguistics proper, but with the linking of linguistics to other disciplines. But this general conception of meaning and information is needed within linguistics proper, too, in at least two ways. First, the concept of meaning that is used by formal semanticists should connect up with the concepts of meaning used in the rest of linguistics—in the study of meaning change, for example. Second, it seems plausible that the information content that phonological, morphological, and syntactic aspects of an utterance contain about each other should be understood within the same general framework of meaning and information as the content of the utterance as a whole. Thus, a substantive theory of meaning and information should be useful not only for understanding how linguistics connects with other disciplines, but for understanding how the parts of linguistics connect with each other.

I agree that possible worlds have helped to provide a *more* appropriate structure on the space of meanings than that provided by extensional semantics. But I do not think the structure it provides is fully adequate to the needs of a general theory of informational and intentional content. The basic problem is that the notion of a proposition that is suitable for modality is not suitable for all informational and intentional contexts. In this paper, I argue that versions of possible-worlds semantics that limit themselves to the structure of intensions needed for the semantics of modality face serious problems, and that the assumptions at the root of these problems are metaphysical.

The problems I list are instances of what I shall call "the subject-matter problem." These problems are not new. They all are instances of a category of problems that Partee describes as the crucial ones facing possible-worlds semantics (1989, 119). These are cases in which we substitute cointensional statements within an informational or intentional context, but do not preserve truth-value for the embedding statement.

I think the full force of the subject-matter problem has not been appreciated, however, because it has been assimilated to another class of problems in the same category, which are not specific to strong possible-worlds theory. This is the "mode-of-presentation" or "Cicero/Tully" problem. I argue that the subject-matter problem is distinct, and related to the metaphysical principles characteristic of strong possible-worlds theory.

I end by arguing that there is no very strong motivation for the metaphysical assumptions that underlie possible-worlds semantics, and hence every reason to explore alternative frameworks that do not rest on these assumptions and do face the difficulties they bring.

2 Strong Versions of Possible-Worlds Theory

The versions I have in mind share the following assumptions:

(1) Possible worlds are *total* possibilities.

(2) Intensions may be set-theoretically defined as functions from possible worlds to extensions.

(3) Possible worlds and the intensions definable from them provide us all that we need for a theory of informational and intentional content.

David Lewis and Robert Stalnaker are among those who hold strong versions of possible-worlds theory (Lewis 1973; Stalnaker 1984, 1985). But

these two theorists are in radical disagreement as to the metaphysical nature of possible worlds. In the terminology of Robert M. Adams, Lewis is a *possibilist* and Stalnaker is an *actualist* (Adams 1974). Lewis asserts the existence of an infinity of equally real possible worlds, of which our world, the one *we* call "the actual world," has no special status other than our presence. In Lewis' theory, truth is relative to possible worlds in just the way it is relative to times and places and inertial frames. Possible worlds are simply an often unnoticed parameter of all empirical relations. Stalnaker does not believe in these other equally real possible worlds, but he does believe in other ways things might have gone, other ways the one actual world might have been. These ways the world might have been are what *he* calls possible worlds.

Principles (1)–(3) do not, then, really delineate a metaphysical doctrine, but only a metaphysical schema—something that provides a doctrine, once we are told what a possible world is. Even so, it may be the case that the various strong versions have enough in common for there to be common problems for them. I shall argue that this is the case.

Before considering the objections, however, let us say a bit more about what principles (1)–(3) come to.

2.1 Possible worlds are total possibilities

Both actualists and possibilists hold that possible worlds are "total" or "complete," but actualists have a little more flexibility here than do possibilists.

Let us say that for any n-place relation and sequence of n appropriate objects there is an *issue*, which has one and only one answer (or one per world, at any rate), yes or no. (This is just an apparatus for discussing things; neither the reader nor the scholars discussed will be assumed to be committed to it without warning.) Possible worlds supply answers to issues, somehow or other, depending on the conception of what a possible world is. By saying that possible worlds are total, I mean that each possible world provides an answer to each issue in the relevant universe of issues. I distinguish being total from being comprehensive, which is to provide an answer to every issue, period. Actualists may deny that worlds are comprehensive, while maintaining that they are total. The idea is that for a given analytical project, only some issues may be relevant. Also, there may not be a complete set of issues (Stalnaker 1984). So, each possible world in a "partitioning of the space of possibility" will provide answers to all of the issues that the others in the same partitioning do.

2.2 Intensions may be set-theoretically defined in terms of possible worlds and individuals

This may seem like a truism, for "intension" is now widely used to mean just a function from possible worlds to extensions. But the word "intension," and the view that language was basically intensional, is older than possible-worlds semantics.

Basically, intensions are entities that provide some principle of classification, and that have an identity, independently of the objects so classified. So the intension of a term, which determines whether it describes an object or not, is contrasted with its extension, the set of objects it describes. Properties are intensions, for we can classify objects into those that have them and those that do not. Concepts are intensions, for we can classify objects into those they fit and those they do not. Words are intensions, when we consider them with their meanings intact, for we can classify objects into those they describe or are true of, and those they do not describe or are not true of. The notion of an intension can be found in a wide variety of theories; we might say, for example that the classical debate between nominalists, conceptualists, and realists pertained to which intensions were needed.

The idea that most discourse was "intensional," in the sense that intensions, and not just the actual extensions determined by them, were relevant to truth, is quite old. For example, it is the view of Whitehead and Russell in the introduction to the first edition of *Principia Mathematica* that it is the extensionality of mathematical discourse that requires explanation.

The thought that all intensions are set-theoretical constructions out of possible worlds is thus a substantive thesis. It is one that many philosophers reject who nevertheless find possible worlds good entities to have when thinking about theological, metaphysical, and semantical issues connected with necessity. Adams and Plantinga, for example, fall into this category (Adams 1974, Plantinga 1974). Thus they are not adherents of strong possible-world semantics, in my sense.

2.3 Possible worlds and the intensions definable from them provide us all that we need for a theory of informational and intentional content

Informational and intentional notions are often expressed by constructions that embed statements, as in "Harold said that Mary was crying," "Tom knows that Mary wasn't crying," and "The tree rings indicate that the tree is over one hundred years old." Philosophers commonly suppose that such

statements express *propositions*, and that the propositions expressed by the embedded statements are the objects of belief, assertion, knowledge, etc. From this point of view, providing a satisfactory notion of a proposition is a key test for strong possible-worlds semantics.

Strong possible-worlds theorists take propositions to be the intensions they assign to statements, functions from possible worlds to truth-values. I shall argue that this notion of a proposition is inadequate, and that its inadequacies are related to the metaphysics that leads to strong possible-worlds theory.

3 Two Problems

Functions from possible worlds to truth-values surely provide a more appropriate structure for the space of meanings of statements truth-values by themselves do. By taking propositions to be such functions, and to be the semantic values of statements embedded in modal and intentional contexts, we can explain their nonextensionality.

Still, one might well suspect that such propositions, motivated by the needs of modal contexts, might prove less than completely successful for intentional contexts generally. In particular, the possible-worlds treatment of propositions requires that propositions that are necessarily equivalent are identical, and one might suspect that this notion is too coarse-grained for many purposes. It is natural to suppose that propositions that are true in the same possible worlds have their modal properties in common, so that exchange of logically or necessarily equivalent statements in modal contexts preserve truths. But it is not at all obvious that propositions true in the same possible worlds have *all* properties in common. So it seems that this way of individuating propositions might give us problems, in dealing with nonmodal contexts.

A variety of cases, in which substitution of cointensional statements within an informational or intentional context does not seem to preserve truth-value for the embedding statement appear to justify this worry. Partee identifies such cases as the crucial problem facing possible-worlds semantics (1989, 119).

I maintain that the problems in this category fall into two quite different subcategories. Problems in the first category are not specific to strong possible-worlds theory, while those in the second category are.

3.1 The mode-of-presentation problem

The first kind of problem involves statements that differ only in the proper names used to designate some individual, such as "Tully was a Roman orator" and "Cicero was a Roman orator." Such statements will be cointensional. Given that Tully and Cicero are the same person, the possible worlds in which Tully was a famous orator will be just those in which Cicero was a famous orator. But substitution of one of these statements for the other in reports of belief, knowledge, assertion, and the like does not always preserve truth-value. In certain circumstances, we would be very reluctant to infer from "Smith believes that Cicero was a Roman orator" to "Smith believes that Tully was a Roman orator."

I call this the "mode-of-presentation problem." The change from "Cicero" to "Tully" does not alter whom we are talking about, only how that person is presented. This problem is not specific to possible-worlds theories. Any semantic theory that takes propositions to be nonlinguistic intensions, so that the interchange of two codesignational names determine the same proposition, has the same problem, whether propositions are taken to be states of affairs or worlds, sets or functions, primitive or constructed, partial or total.

A natural reaction to this problem is to suppose that somehow language is relevant to our reluctance to allow substitution in these contexts. After all, language is explicitly involved in assertion, and is intimately associated with the higher cognitive states and activities reported by "believes" and "knows." One might suppose that the objects of these attitudes are not propositions at all, but statements. Or one might suppose that the objects of these attitudes are not propositions, but some "hybrid" entitity. Or, taking the assertion case as one's model, one might suppose that there is an implicit parameter for linguistic entities. One does not simply say that so-and-so, one does so *by* uttering a certain statement in a certain context. Our reluctance to substitute one name for another might be due to the affect on the implicit parameter, rather than on the proposition. (See Barwise and Perry 1983, 262ff.) While no solution along any of these lines has won universal acclaim, the line of attack is plausible enough to make it unreasonable to reject the possible-worlds notion of a proposition because of the mode-of-presentation problem.

The second kind of example presents a problem that is specific to strong possible-worlds semantics, however. I call this the "subject-matter problem."

3.2 The subject-matter problem

We have a fairly coherent and intuitive notion of what things various propositions are about. If you ask me to tell you about Martha, and I say, "The sea is salty," or, "I really like macadamia nuts," you will think I am dotty or run and reread Grice on conversational implicature in hopes of finding some clue as to what I am getting at. The propositions that the sea is salty and that I like macadamia nuts are not about Martha, even though, if they are true, Martha lives in a world in which the sea is salty and in which I like macadamia nuts.

The notion of aboutness may not be as crucial as belief or necessity, but it is quite useful and we have pretty clear intuitions about it. I think the following informally stated conditions could be considered the beginnings of a theory of aboutness:

(a) A simple statement that contains a name for an individual expresses a proposition that is about the individual named. For example, "David is clever" expresses a proposition about David; "Ruth threw Paul over the fence" expresses a proposition about Ruth and Paul.

(b) If P is about a, then *not-*P is about a.

(c) If P is a proposition about a and Q is about b, then P and Q is about a and about b. So "David is clever and Ruth threw Paul over the fence" expresses a proposition that is about Ruth and Paul and David.

(d) If P is about a and Q is about a, then P or Q is about a. So, "David is clever or Ruth threw David over the fence" expresses a proposition that is about David, whether or not it is about Ruth.

(e) If P is about a, and $P = Q$, then Q is about a.

Item (e) is simply an application of the indiscernibility of identicals. But it creates a problem for strong possible-worlds theory. For, given the coarse-grained way in which possible-worlds theory individuates propositions, we get the consequence that every proposition Q is about every object that any proposition P is about.

(1) Assume that P is about a.

(2) *P or not-P* is about a, by (b) and (d)

(3) *Q and (P or not-P)* is about a, by (c)

(4) $Q = Q$ *and* (P *or not-*P), by the possible-worlds theory of propositions

(5) Q is about a, by (e)

Which is to say, strong possible worlds cannot capture the notion of a proposition's being about an object.

The problem can be traced to the mechanism, in strong possible-worlds semantics, of obtaining propositions that focus on any particular matter of fact, such as, say, whether Peter is picking peppers. Each individual possible world provides an answer to every such issue. One focuses on a particular issue, by cancelling out answers to other issues. The proposition that Peter is picking peppers is the set of possible worlds that give an affirmative answer to that issue, and cancel out each other's answers to every other issue. One possible world has Sally selling seashells by the seashore; another one has her selling peaches instead, and so forth. The only thing that they agree about is the target issue, that Peter is picking peppers.

That, at any rate, is the strategy, but it doesn't quite work. Some issues, such as whether 7 and 5 add up to 12, have only one possible answer. And other complex things, such as that Sally is either selling seashells by the seashore or she is not, will be true throughout the set of worlds. Since they are true in all worlds, they cannot be separated one from another; since they filter out no worlds, the conjunction of statements that express them with simple empirical statements are true in the same worlds as those simple empirical statements by themselves.

A natural reaction to this problem is to suppose that the real culprit is not the possible-worlds notion of a proposition, but, as with the mode-of-presentation problem, some implicit linguistic parameter. One might suppose that propositions are really not about anything in and of themselves (just as the possible-worlds theory predicts), but only relative to some statement by which they are expressed, and that when we work out the nature of this relativity to language, the coarse-grained nature of the possible-worlds propositions will be no problem. This approach is exemplified in Stalnaker's treatment of attitudes towards mathematical truths in *Inquiry*.

However, I do not think that this defense works.

We have basically two paradigms of nonextensional, statement-embedding contexts. The first, modal contexts, are insensitive to shifts in mode of presentation and shifts in subject matter. The second, the cognitive attitudes, are sensitive to both. These latter are intimately involved with language, which suggests that the sensitivity may be due to an implicit linguistic parameter, rather than with the coarseness of possible-worlds propositions.

But a great many informational and intentional concepts fit neither of these paradigms. They are insensitive to shifts in mode of presentation, but sensitive to shifts in subject matter. These concepts typically do not have much of anything to do with language, so that the strategy of protecting coarse propositions, by finding an implicit linguistic parameter, is not very promising. I now turn to a number of examples of such concepts.

3.3 More problems

These examples canvass a broader range of states and activities that are usually considered in discussions of intentionality. On the one hand, a number of the examples have to do with *information*, what an inanimate object indicates or shows. On the other, a number have to do with *action*, what an intelligent being does in virtue of the way it moves. The important connection between intentional notions and informational notions has been stressed by Dretske, and that between intentional notions and action is part of the functionalist perspective, whose relevance to semantical issues Stalnaker has stressed. I do not think it has been sufficiently recognized that the logical behavior of informational and pragmatic concepts deviates from both the modal and the cognitive paradigms.

3.3.1 Causation and action

> Caesar brought it about that Tully fell out of bed.
>
> Caesar made Tully fall out of bed.
>
> The collapse of a defective bedpost caused Tully to fall out of bed.

In each case, the substitution of "Cicero" for "Tully" will not have any conceivable effect on the truth-value of the embedded statement or clause. A man made to fall out of bed by any other name is still a man made to fall out of bed. Note here that we are not talking of what a man tried to do or thought he was doing or formed an intention to do, but just what he in fact did. It seems quite odd to suppose, say, that just because Caesar made Tully fall out of bed, he made Tully fall out of bed *and* 7+5=12, or that he made Tully fall out of bed *and* Peter pick or not pick his peck of pickled peppers.

It is true that when a person performs an action the whole world, in some sense, changes. One might then think of modeling the results of an action as the set of worlds that might be actual given that it is done. I think it

is clear, however, that some alternative, more *incremental* notion underlies the way we actually think about the effects of action. We are interested in those things about the world that would not have been as they were, without the action: the issues, on whose answers the action had some effect. That 7+5=12, that Peter did or did not pick his peck of peppers, and much else about the world is unaffected by Caesar's overturning of Cicero's bed.

3.3.2 Perception and memory

Harold saw Mary cry.

Harold remembers Mary crying.

We use a variety of constructions for perception and memory, with interestingly different properties. The statement that Harold saw *that* Mary was crying seems sensitive to exchange of names, as does the statement that he remembers that she was crying. There are many contexts in which we would use these locutions, in which the information Harold sees, or needs to produce, is linguistic in form. In these cases, the exchange of names seems to imply a difference in abilities to interpret or produce information. But the constructions we have used do not seem sensitive in this way. Any inclination to say that Harold saw or remembers "under a description," seem to disappear once we have reminded ourselves that we are speaking of seeing and remembering, not seeing-that and remembering-that.

Yet it would be strange indeed, to reason from the fact that Harold saw Mary cry, to the conclusion that he saw her cry and Peter pick his peppers or not. After all, if Harold saw Mary cry and Peter pick his peppers or not, then he saw Peter pick his peppers or not pick them. And if Harold saw Peter pick his peppers or Peter not pick his peppers, then he saw one or the other. But we cannot conclude, from the fact that Harold saw Mary cry, that he either saw Peter pick his peppers or not pick them. (See Barwise 1981, Barwise and Perry 1983.) Analogous reasoning applies to "remembers."

3.3.3 Information and meaning

These tree rings show that this tree is more than 100 years old.

The height of the mercury in the thermometer indicates that Freddy has a fever.

In the old days, "Ken is starving" meant that Ken was dieting.

"IV+III = VII" means that four plus three equals seven.

The principle that if X shows that P & Q, then X shows that P and X shows that Q, seems pretty plausible. So, given the possible-worlds notion of a proposition, everything shows that R, for any necessary truth R. One might respond, "Why not? It seems pretty harmless to let tree rings show 'the necessary proposition'."

The problem again is that our ordinary devices for dealing with information, and for dealing with devices, like ourselves, that deal with information, are interested in increments. In the typical case we have a system that can vary along a certain dimension or dimensions; in this case, the number of rings the tree has. This systematically depends on, and so carries information about, some other dimension of variation of the system or its environment. Our concept of information, of what is shown, wants to focus on these variations and dependencies. Our ordinary notion of a proposition, what is said or shown or indicated, seems to have built into it a notion of subject matter, of focus on definite objects and issues about them.

This seems most clear in the case of meaning, a notion with which possible-worlds semantics must come to grips, if it is to provide a framework in which the activities of the natural-language semanticist cohere with empirical studies about meaning conducted in other parts of linguistics. We are interested in the increment the truth of a statement makes to the totality of what is true, not that totality. It is not correct that in the old days "Ken is starving" meant that Ken was dieting and 7+5=12.

3.3.4 Necessary truths and conditionals

The principle that there is only one necessary proposition causes havoc with conditionals.

> If this is Stockholm, we are in Sweden.
>
> If Nixon bet on ODD and won when the ball landed on 7, then 7 is an odd number.
>
> If 387 is a prime number, Jack owes Jill $5.

Again, there is no way that exchange of codesignative names could affect the truth-value of these statements. But, at least to untutored intuitions, changing the subject matter makes quite a difference, even if the resulting proposition is necessarily equivalent to the original.

Suppose the first statement is made when a plane lands in Oslo. The antecedent is then false, and necessarily so. But in possible-worlds semantics, there is but one necessarily false proposition, so we should be able to exchange this way of expressing it for any other. But this seems clearly wrong; the statement in question seems true, while, say "If 7+5=13, then we are in Stockholm" does not seem true at all. One might point out that, on most possible-worlds analyses of conditionals, conditionals with necessarily false antecedents are true, so this second conditional would also be true. But this latter doctrine seems just more reason to look for some other notion of a proposition.

The second conditional seems true enough, but if we replace the consequent with, say, "41 is a prime number," the conditional does not strike me as true at all. The third conditional seems like the sort of thing that becomes true when Jill bets Jack that 387 is a prime number. But, given that 387 is not a prime number, so that the antecedent is a necessarily false proposition, the conditional is true on the standard possible-worlds analyses, quite independently of any wager between Jack and Jill, which seems quite implausible.

It can seem odd that things might depend on one necessary truth, but not depend on others. Odd or not, we talk this way all the time. Logicians who teach less mathematically oriented philosophers are always saying things like, "That depends on the fact that addition is associative." This is not confused, although it can be confusing. As Jon Barwise has emphasized, use of conditionals in mathematical pursuits is not an isolated language game, but continuous with their use for other purposes (1985). The notion of propositional content bequeathed to us by strong possible-worlds semantics is simply not flexible enough to cope with such conditionals.

All of the problems I have mentioned are but putative problems; that is, one way or the other of treating them within the framework of strong possible-worlds semantics may, in the end, when all the costs and benefits of the approach are summed, be reasonable. My point is that it is not semantics, or possible worlds, but only the strong view that creates the problems in the first place, so the approach needs to have some benefits to counterbalance the costs.

4 Towards Intensional Tolerance

The source of these problems is the basic thesis of strong possible-worlds semantics, that all intensions are to be built up from total possible worlds.

If we drop this thesis, we could take propositions to be more "fine-grained" entities. There are a number of ways of doing this available to the tolerant intensionalist. Here is a simple one, designed to keep as close as possible to the possible-worlds idea of taking propositions to be sets of possibilities.

We start by taking relations and objects as primitives, rather than possible worlds. From these we can build up "issues"; the answers can be 0 and 1 or any suitable set-theoretic entities. We can introduce worlds as further primitive entities, associating with each a total function from issues (whatever universe of issues is relevant to our linguistic or philosophical project). Call this the world's "issue profile." Then we can focus on simple facts by subtraction rather than addition. That is, augment the total functions from issues to answers with partial functions, which only provide answers for some of the issues. The limiting case would be a function defined only on a single issue, say, whether Peter was picking peppers. We introduce entities, perhaps "partial worlds" or "partial ways," with these partial functions from issues to answers as their profiles. Then, we take propositions to be functions from the worlds *plus* these new partial entities to truth-values.[2]

[2]Partee claims that Stalnaker shows in the ms. of "Possible Worlds and Situations" that "there is no obstacle in principle to identifying a situation with the set of all possible worlds that have that situation as a part" (1989, 104). This argument did not make the final version of the paper, and I do not have the ms., so I am not sure exactly what was shown. The difficulties in question stem from the basic strategy of modeling something partial with a set of totalities. Some of them were spelled out in Barwise and Perry 1980.

Where an issue consists of the relation R and the sequence of objects $a_1, \ldots, a_n$, I shall say that the members of the sequence are constituents of the issue. The constituents of a (partial or total) world w are the constituents of the issues on which the associated function is defined. A proposition is about those objects that are constituents of every (partial or total) world that is a member of the proposition.

So, the proposition expressed by "Peter is picking peppers" will consist of all (partial or total) worlds that provide the affirmative answer to this issue, including the limiting case, the one defined only on this issue. The proposition that Peter is picking peppers will be about Peter, but not about anyone else.

This suggestion fits with the intuitive principles about aboutness that we noted above. A conjunction will be about the objects the conjuncts are about, since the proposition expressed by the conjunction will be the intersection of those expressed by the conjuncts. But a disjunction may not be about the objects the disjuncts are about, since the ways in the union of two propositions may not all be defined on issues with the constituents the original propositions were about.

The more fine-grained notion of a proposition we have just considered does nothing directly to solve the problems connected with the mode-of-presentation problem. But it does solve the problem of subject matter, in that it blocks the inferences that depended on the strong possible-worlds treatment of propositions. We need not infer that Caesar made it the case that Peter was or was not picking peppers, simply because he played a trick on Tully, or the tree rings indicate all of the truths of logic and mathematics, simply because they indicate the age of the tree. Conditionals can be taken to express relationships between partial worlds, and not simply total worlds. (See Barwise 1985.) It is, then a partial solution in two senses, to some putative problems for possible-worlds semantics. I am not claiming, of course, that the apparatus just sketched is one that will meet all of our needs. My point is simply to suggest how limiting the strong possibilist possible-worlds position is. *The problems that derive from the identity of necessarily equivalent propositions are not inevitable or based on any principle of technique or methodology; they are simply the results of a metaphysical commitment to reduce all intensions to functions on the domain of total possible worlds.*

5 Motivations for Strong Possible-Worlds Semantics

So what motivation is there for strong possible-worlds semantics?

Here, again, there seems to be a large difference between the possibilist and the actualist.

Although possibilism is often characterized as some sort of extreme realism, there is a pretty clear sense in which the possibilist is not, or need not be, a realist at all. According to Lewis, for example, possible worlds are not properties or relations or universals or abstract entities of any kind. So possible worlds are not intensions. Traditional intensions, or replacements for them, are built out of possible worlds and other nonintensions. These "new" intensions are all just sets of various sorts. As far as I can see, there is nothing in the ontology of Lewis' theory that someone like Quine should object to, except the possible worlds. Each of them is a desert; it just turns out that there are more deserts than one counted on. From the perspective of someone who likes desert landscapes, but is not put off by needing a lot of them, strong possible-worlds semantics is perfectly natural. The problem of change of subject matter is difficult to avoid, because the only intensions he can fairly avail himself of are those built up out of possible worlds. But these difficulties might be a fair price to pay for a theory that can be at once so scrupulous about abstract entities and generous in providing interpretations for intensional constructions. It all depends on how one feels about alternative concrete realities, about living in a possibluum of equally intrinsically real worlds as well as a continuum of equally real locations.[3]

For the possibilist, then, possible worlds are not intensions at all, but concrete objects. For an actualist, possible worlds are intensions of a special kind, sort of like properties of the entire universe. There is clear motivation for recognizing this new sort of intension, for they deal well with necessity and possibility. But what is the motivation for an actualist to adopt strong possible-worlds semantics, forsaking all intensions but these?

A possible reason is that one believes that possible worlds are in some metaphysical sense the fundamental intensions. Stalnaker disavows this reason. He points out that taking possible worlds as primitive and other intensions as derivative, in one's formal semantics, does not preclude thinking that possible worlds are definable or analyzable in terms of other sorts of entities, and that the possible worlds needed for various analytical enterprises

[3] I would feel better about rejecting this out of hand, if I understood better how equally real I think the past and future are, and why.

might be analyzable in various ways. (See Stalnaker 1985.)

A reason Stalnaker does give is that, by working in a framework basically the same as that of the possibilist, technical points can be debated without getting enmeshed in philosophical issues. This point is not compelling. Lewis and Stalnaker agree that conditionals describe an abstract relation between total worlds. One can hardly compare their theories in a system that has no total worlds, but there seems to be no motivation for excluding partial worlds.

Stalnaker's most important reason, which he has advanced and defended in a number of places, has to do with intentionality and the nature of informational content:

> The picture is this: to have the capacity to represent, an organism must be capable of being in each of a set of alternative states ... which will, under ideal conditions, reflect corresponding states of the environment ... the state of the environment tends to cause the organism to be in its state .... Now we can ask, what must informational content be if this is what it is for an organism to be in states that have informational content? What is essential to contentful states is that they distinguish, in some way or other, between alternative possible states of the world ... what any representer must do—what it is to represent—is to locate the world in a space of alternative possible states of the world. It is appropriate to begin with possibilities because that is the level of abstraction that captures what is essential to representation (1986).

This argument seems to beg the question. If we use total possible worlds to model environmental states, then this picture will lead us to use total possible worlds to model intentional states. But if we use some partial technique for the former, we may also do so for the latter.

Consider a simple case. The waiter brings it about that there is a milk shake in front of me. I see that there is a milk shake in front of me, believe that there is, and drink the milk shake. We can represent what the waiter brings about as the set of total possible worlds, whose issue-profiles disagree about everything except necessary truths and the relative position of me and the milk shake. Or we can represent it by the set of partial worlds, whose issue profiles have the milk shake in front of me. Whichever we choose to model the state of my environment, we can use to model my intentional states. Choosing sets of total worlds, the route of strong possible-worlds semantics, will enmesh us in the putative problems listed above. Choosing

to use partial objects, will mean that our theory of informational content cannot simply rely on the structures bequeathed to it by the semantics of modal logic. The picture sketched by Stalnaker does not provide an argument for the first choice over the second.[4]

Postscript

Essay 8 was my contribution to a session on Barbara Partee's "Possible Worlds in Model-Theoretic Semantics: A Linguistic Perspective," which was held at the Nobel Symposium on Possible Worlds in Humanities, Arts and Sciences, in Stockholm in 1988 (1989). In her "Speaker's Reply," Partee took issue on two counts (1989a).

First, she claimed that strong possible-worlds semantics can capture a semantic notion of aboutness, which she calls pw-aboutness:

> An empirical proposition can be said to be *about* a particular individual (or property, etc.) if the truth of that proposition varies systematically with the properties of that individual (or property, etc.) .... Let the worlds in which proposition p is true be p's T-set and those in which p is false be p's F-set. Then a proposition p is pw-about Jones if there is some systematic difference between the properties Jones has in the worlds in p's T-set and the properties Jones has in the worlds in p's F-set. This will be the case for the proposition expressed by the sentence "Jones is bald" but not for the proposition expressed by "Smith is bald"; Jones's properties in various worlds will presumably not have any systematic correlation with whether those worlds are in the T-set for "Smith is bald" (1989a, 153).

Unless I am mistaken, the presumption made in the last sentence is one a strong possible-worlds semanticist should not make. There are actually a number of properties, of the strong possible-worlds variety, that Jones has in all and only the worlds in which Smith is bald. Consider the function f:

$f(w) = \{\text{Jones, Smith}\}$ if Smith is bald in w
$f(w) = \emptyset$ otherwise

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f is a function from worlds to extensions, hence a property on the strong possible-worlds account. $f(w)$ contains Jones in all and only those worlds in which Smith is bald, so Jones' having this property in a world varies systematically with whether the world is in the T-set for "Smith is bald." We might express this property as "being such that Smith is bald and one is Smith or one is Jones."

It seems that the properties that Partee must have been thinking of, in the quoted sentence, are not functions from worlds to extensions, but good old-fashioned properties. Being bald is such a property, but being such that Smith is bald and one is Smith or one is Jones is not. Given this old-fashioned kind of property, Partee's concept of pw-aboutness is fine. But Partee's semantic concept of pw-aboutness does not belong to strong versions of possible-worlds semantics.

The second point on which Partee takes issue is whether there really is a "relatively clear and robust pretheoretic notion of aboutness that a semantic theory *should* enable us to capture." I always get a little nervous when philosophers claim it is our concepts that are at fault, and not their theories, when their theories cannot take account of the concepts. But in this instance, the main point Partee makes seems to be correct. This point is that we do not have very clear intuitions on the cases on which her notion of pw-aboutness and my notion of aboutness differ. "Jones is bald" is about Jones (by my principle (a)), and pw-about Jones, since it is empirical and its truth varies systematically with the properties of Jones. "Jones is Jones" is also about Jones by principle (a), but it is not pw-about Jones. Do we really have clear pretheoretic intuitions about this necessary truth being about Jones? I agree with Partee that we do not.

I do not have very clear pretheoretic intuitions the other way either, though. The idea that the proposition that Jones is Jones is about Jones in some semantic sense in which it is not about Smith does not seem incoherent, even if it is not a blue-ribbon intuition. It would be nice if our semantics could give us two concepts, so we could compare them. So we might consider whether pw-aboutness could be strengthened so as to apply to necessary and impossible propositions by dropping Partee's requirement that the propositions in question be empirical. But this seems hopeless. In possible-worlds semantics we have only one necessary proposition (the set of all worlds) and one impossible one (the empty set). So if the proposition that Jones is Jones is about Jones, so is the proposition that Smith is Smith.

This may not be all there is to say, though. Stalnaker has made an important distinction between taking worlds to be total and taking them to be comprehensive. I think this is a good distinction, and Partee agrees.

As she puts it, "total possible worlds may be totally specified alternatives within some very small domain of possibilities, such as the distinct possible outcomes of a sequence of three coin-flippings" (1989a, 153). But I think this distinction means that there is not just one necessarily true proposition, and one impossible one.

Given the distinction, it does not seem quite right to talk about the set of all possible worlds except relative to a range of possibilities under discussion. In Partee's coin-flipping example there are eight possible worlds. The universal set of worlds, relative to this range of possibilities, includes these eight. This will yield us 256 propositions, one of which is the necessary proposition for this range of possibilities.

Obviously none of these 256 propositions can reasonably be taken to be the proposition that Jones is bald. Can we then reasonably take the one of them that contains all eight worlds to be the proposition that Jones is Jones? If not, then there seems to be room in possible-worlds semantics for more than one necessary proposition, without resorting to syntactically inspired internal structure.

In any case, the intuitions Partee had about pw-aboutness suffice to make the main point of my paper. This is the intuition that Smith and his properties have something to do with which worlds get into the T-set of "Smith is bald," while Jones and his properties do not. The concept of property that honors Partee's intuition will not be that of a function from possible worlds to extensions. Only metaphysics, not methodology, prevents us from countenancing such properties and propositions. It still seems to me that for a possible-worlds semanticist with no metaphysical commitment to limiting intensions to functions on possible worlds, the problem of necessary equivalent propositions is simply a fly bottle that did not have to be flown into. The solution is to fly out, not to argue that, all things considered, maybe it is not such a bad bottle to be in.