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Does possible world semantics turn all propositions into necessary ones?

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Abstract

A number of philosophical and semantic analyses make essential use of the concept of a possible world. Following tradition, we will refer to this family of analyses as ''possible world semantics'' (PWS). The present work argues that there is no interpretation of the term ''world'' that validates even a single one of the doctrines composing PWS. It is argued that, depending on what the word ''world'' is taken to mean, PWS entails either that all modal terms (words like ''necessarily'' and ''possibly'') are infinitely ambiguous or that all true propositions are necessarily true. It is also argued that David Lewis' PWS-based analysis of counterfactuals can succeed only relative to decidedly retrograde conceptions of space and time. Most importantly, it is shown that PWS is false even if it finds a way to neutralize the arguments just described. Given certain truisms about spatiotemporal existence, it is a substantive modal question whether the worlds needed to validate PWS are even possible. (As we will see, there is reason to believe that many of those worlds are in the same category as worlds that comprise light but not electromagnetic radiation.) The modal status of these worlds cannot be non-circularly resolved within a PWS-framework, and must be therefore resolved within some other modal framework, showing that PWS is parasitic on some more fundamental understanding of modality.

Keywords: Possible-world semantics; David Lewis; Necessity; Modality; Modal knowledge; Modal realism; Counterfactuals; Causality

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1. Introduction

A view known as ''possible world semantics'' (PWS) provides the basis for clear and rigorous analyses of many important concepts. PWS is given by three contentions:

(1) A proposition is possibly true exactly if it is true in some world.
(2) A proposition is necessarily true exactly if it is true in every world.[1]
(3) A proposition is the set of worlds where it is true (or, equivalently, it is a function that assigns truth to all and only the worlds in that set).

The most obvious applications of PWS relate to the concepts of possibility, necessity, and meaning. But PWS has proven capable of shedding great light on the nature of counterfactuals, mental content, and even moral obligation.[2]

Despite its virtues, PWS is bedeviled by a number of problems. The main purpose of this paper is to show that PWS is even *more* problematic than has hitherto been realized. In particular, it will be argued that PWS has the unwelcome consequence that all true propositions become necessarily true, and all false propositions become necessarily false. So *George W. Bush is U.S. president in 2006* is in the same modal category as *2 + 2 = 4*, the same being true of *John Kerry is U.S. president in 2006* and *2 + 2 = 5*.

Let us say a word on the basic structure of this paper. In Part I, we will discuss the motivations for PWS, and will delineate some of the applications of that doctrine. In Part II, we will argue that PWS is eviscerated unless the term ''world'' is taken literally. (Our arguments here will include, but will also go beyond, Lewis' (1986) arguments for the same point.) In Part III, we will find that, given the realistic conception of other worlds demanded by PWS, that doctrine has a number of unpalatable consequences, among them the one previously noted. In Part IV, we will examine some of Hintikka's applications of PWS to the analysis of substitution failures and of propositional attitudes. Finally, in Part V, we will examine Lewis' analysis of counterfactuals. Our discussion of PWS will take into account, and find many applications for, some striking insights due to Bealer (1998).

2. Part I. Some of the virtues of PWS

Let us begin with a brief discussion of the merits of PWS. (1) and (2) reduce the problematic notions of possible and necessary truth to that of truth *simpliciter*. (3) reduces the problematic

[1] Some expositions of PWS contain, not (1) and (2), but rather:
(1*) A proposition is possibly true exactly if it is true in some *possible* world.
(2*) A proposition is necessarily true exactly if it is true in every *possible* world.
But, of course, (1*) and (2*) are viciously circular since, in each case, a modal term appears on each side of the biconditional.
(1*) and (2*) are perfectly correct *statements*. It is true – in fact, truistic – that P is possible (necessary) iff P is true in some (every) possible world. But not all true statements are *analyses*. If (1*) and (2*) are to constitute *analyses* of modality, they should be cleansed of vicious circularity (or, if you prefer, of tautological emptiness). This means that the modal terms must be removed from the right side of the biconditional. This is what I have done in the present paper.
Throughout this paper, we will find that many of the contentions associated with PWS are correct and illuminating if taken as *statements* about modality, but unacceptable if taken as *analyses* of it.

[2] I am thinking in particular of Hintikka's paper ''Deontic Logic and Its Philosophical Morals'' (in Hintikka, 1969:184–214).

notion of a proposition to the less problematic notion of a set. (1)–(3) thus reduce the *intensional* to the *extensional*. (See Blackburn, 1984:214).

PWS analyzes other concepts along similar lines. Let P be the proposition *Smith is a tall person*, and let C be the set of worlds where that proposition is true. P is true in world W exactly if W is a member of C. We may thus identify P's being true in W with W's being a member of a certain set. The obscure but pivotal notion of a proposition's being true is elegantly articulated in terms of the transparent notion of membership in a set.[3]

PWS extensionalizes other important notions. According to that doctrine, for a proposition P_1 to entail a proposition P_2 is for the set of worlds identical with the first to be included in the set of worlds identical with the second. The concept of compatibility is also thereby explained, since P_1 is compatible with P_2 exactly if P_1 does not entail the negation of P_2.

Let us turn to another of PWS's great (apparent) triumphs. The concept of a property is as problematic as it is fundamental. Instances of properties are spatio-temporal objects, but properties themselves are outside of space and time. The very notion of a non-spatiotemporal object is one that, almost by definition, lacks empirical respectability and that has consequently been resisted by thinkers of an empiricist turn of mind.[4] At the same time, the notion of a property is not easily dispensed with: statements like ''Smith and Jones have many properties in common'' are often true, and they seem to presuppose the existence not just of property-instances, but of properties themselves.

PWS gives us a way of ameliorating[5] this uncomfortable situation. Let F be a function that assigns truth to an object exactly if that object is tall. Smith is tall exactly if Smith is assigned truth by F. Given this, we might as well identify the property of tallness with F, and the fact of Smith's being tall with his being assigned truth by F. In this way a clear and precise meaning is given to obscure and metaphysically loaded statements like ''Bob and Fred both instantiate the property of tallness.''

The great virtue of PWS is that, if successful, it reduces the intensional to the extensional. Sets take the place of mysterious entities like propositions and properties. Dark relations like necessitation are replaced by perspicuous facts about set-overlap. An important corollary – one that will play a large role in the present paper – is that PWS is threatened to the extent that intensions cannot be eliminated in favor of extensions.

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[3] It is probably not correct to say that this constitutes an *analysis* of the concept of truth. (Here I am drawing on an argument made by Frege, 1956.) Let S be the set of worlds where grass is green, and let w be our world. Even if the proposition *grass is green* is true exactly if w is a member of S, we have not (so one might argue) analyzed the notion of truth in terms of set-membership. After all, the proposition *w is a member of S* is the same as, or at least equivalent with, the proposition:

The proposition w is a member of S *is true*.

So even if the proposition *grass is green* is true exactly if w is a member of S, the right side of the biconditional uses the notion of truth and, consequently, there has been no analysis of that notion. (According to Frege, the concept of truth is involved in any assertion, since to make an assertion is to ascribe truth to a proposition. So, since analyses are obviously given by asserted propositions, there can therefore be no analysis of the concept of truth.)

This is not the place to analyze this argument. (Dummett, 1973 gives an excellent analysis.) But even if it is cogent, it by no means vacates or trivializes what PWS says about the concept of truth. If PWS is right to regard the proposition:

The proposition grass is green *is true*

as equivalent with *w is a member of S*, that equivalence is extremely illuminating, even if it does not provide a way of eliminating the notion of truth in favor of that of set-membership.

[4] Many eminent philosophers are included on that list, among them Hume (2000), Berkeley (1982), Goodman (1977), and Quine (1960).

[5] I say ''ameliorating'', as opposed to ''solving'', because the analysis about to be presented would seem to involve a certain Platonism: mathematical functions are, at least *prima facie*, Platonic objects.

3. Part II. Why PWS must not identify worlds with sets of propositions

Let us begin by making clear one of the commitments of PWS. What is a possible world? Trivially, it is either something concrete, like our world, or it is not. If it is not, then it is a description or representation of some kind. In that case, it is most plausibly seen as a set of propositions or sentences.[6]

In this section, we will consider the consequences for PWS of supposing that worlds are sets of propositions or sentences.[7] In section 4, we will consider the consequences of supposing that worlds are not such things.

3.1. A world of propositions? General notions

3.1.1 Let PWS_E be the doctrine that PWS is correct, with the qualification that worlds are sets of propositions. (The ''E'' stands for *Ersatz*.) As is well known, if we accept PWS_E, then the identification of propositions with sets of worlds collapses into the viciously circular thesis: *a proposition is a set of propositions*.

But PWS_E has deeper problems. To see these, some background is needed. Not every set of propositions corresponds to a (possible) world. For example, no set containing the propositions *2 + 2 = 5* or *Socrates is not self-identical* counts as a world. If a set of propositions qualifies as a possible world (or, at any rate, as a description thereof), let us say that it is ''admissible''; otherwise, it is ''inadmissible.''

What conditions must a set satisfy to be admissible? An obvious (partial) answer is this: a set is admissible only if each of the propositions in it *can* be true, i.e. only if each of those propositions is possibly true.[8] But, of course, given that description of what an admissible set is, PWS_E circularly analyzes the concept of possibility in terms of itself.[9]

3.1.2 But, by itself, the argument just stated by no means warrants the rejection of PWS_E, since the advocate of that doctrine has a powerful counter-argument at his disposal. He can say that *there is* a characterization of the concept *admissible set* – a way of singling out all and

[6] Strictly speaking, there are other options; so it isn't necessary to say that other worlds are *either* concrete entities, like our own, *or* that they are sets of propositions. There are two points to make here. First, many of the arguments that we will direct against the identification of worlds with propositions are readily adapted to deal with the identification of worlds with non-propositional representations. (In most cases, it is fairly obvious what the needed adjustments are.)

Second, Lewis (1986:136–191) has in my view conclusively shown that the remaining options are not feasible. So far as I know, no philosopher has seriously advocated any of these remaining positions.

In any case, if I am wrong about these remaining options being non-starters, the present work can be seen as arguing that *two* of the more plausible conceptions of what a possible world is (they are either maximal states of affairs, like our world, or are sets of propositions) are untenable and that, if PWS is to stand a chance, then one of the remaining options must be the right one. That would not a trivial point.

Later, in connection with our discussion of some of Hintikka's insights into modality, we will discuss the view that possible worlds can be identified with state descriptions or with model sets. We will find, I believe, that these views are ultimately versions of the view that other worlds are sets of propositions.

[7] I will choose to speak of propositions, as opposed to sentences. But obvious adaptations of our arguments accommodate a decision to speak of sentences, as opposed to propositions.

[8] I am assuming that an admissible set contains the conjunction of each of its members. (So even though each of ''x is red all over'' and ''x is green all over'' can be true, the same is not true of their conjunction. Incidentally, quotation marks should be read as quasi-quotes wherever applicable.) A corollary is that if *each* member of an admissible set is a possible proposition, then that set is admissible. So, contrary to first appearances, a set is admissible if and only if *any given one* of its members is possible.

[9] Lewis (1986:150–153) points this out. Also, see Lewis (1986:160–156) and Lewis (1973:85).

only such sets – that doesn't involve any modal terms, and is thus free of any circularity. The best known effort in this direction involves the concept of a *state-description*, where a ''state-description'' is defined as a *maximal consistent set* of propositions.[10] According to this line of thought, P is possible exactly if it belongs to some state description, and necessary if it belongs to all of them.

However, as Lewis (1986:150–153) points out, there is an obvious problem with this proposal. The concept of consistency is a modal concept (P and P* are consistent with each other exactly if they *can* jointly be true). Consequently, PWS_E would seem to be reduced to vicious circularity[11] if it identifies possible truth with truth in some world, and then identifies worlds with state descriptions (i.e. with maximal consistent sets of propositions).

3.1.3 Nonetheless, the point made in the previous paragraph does not, by itself, require that we give up on the idea that modality can be understood in terms of state descriptions. For there is a well-known and plausible way of analyzing the concept of a maximal consistent set of propositions that does *not* presuppose any modal concepts and that, if viable, could therefore be used without vicious circularity in this context. The idea is as follows. S is a maximal consistent set of propositions exactly if S fulfills the following conditions:

(i) For any atomic proposition p, S will contain either *p* or *not-p*.
(ii) For no proposition *p* does S contain both *p* and *not-p*.
(iii) S contains the closure set of its atomic propositions under the operations of conjunction, disjunction, and existential and universal generalization. (So if S contains *p* and S contains *q*, then S contains *p and q*. If S contains p, and S contains either *q* or *not-q*, then S contains *p or q*. If S contains *Fa*, then S contains *for some x, Fx*. And so on.)
(iv) For no object a does S contain *a is not identical with a*.

(ii) and (iv) are meant to guarantee S's consistency. (i) and (iii) are meant to guarantee S's maximality (i.e. completeness).

Given these points, a certain analysis of modality is clearly suggested: a proposition is possibly (necessarily) true if it belongs to some (every) state description, and a state description is any set of propositions satisfying (i)–(iv). This analysis of possibility involves no circularity, since consistency is analyzed in non-modal terms.

3.1.4 There are a number of reasons why the analysis just stated cannot be accepted. First of all, that analysis embodies an untenable conception of the nature of consistency.[12] The proposition *x is blue* is not the negation of *x is red*. But surely *x is blue* is not consistent with *x is red*. So a set of propositions satisfying requirements (i)–(iv) might *fail* to be consistent.

We could try to deal with this by saying that *x is red* is really identical (or at least equivalent) with some conjunction like *x is not blue and x is not green and x is not yellow* ... But the problem we are considering would recur. *x is blue* is not consistent with *x is*

[10] See Forbes (1985:75), Lewis (1986:152), and Lewis (1973:85). To my knowledge, the term ''state description'' is first found in Carnap (1947). But the concept was used by Wittgenstein in the *Tractatus*.
[11] or – as Lewis (1986:150–153) points out – would, unpalatably, have to take the concept of possibility as a primitive.
[12] See Lewis (1986:151–153) for a similar, though distinct, argument.

yellow, even though neither is negation of the other. Suppose that we tried to deal with *this* by saying that *x is blue* was identical (or equivalent) with some conjunction of the form *x is not yellow and x is not green* ... In that case, for well known reasons, we would only embark on an infinite regress or be caught in a vicious circle.[13]

Where many other properties are concerned, a similar argument shows that consistency cannot be understood wholly in terms of the absence of a conjunction of the form *Fx and not-Fx*. If *t* and *t** are different times, then the proposition *x's occurrence began at t* is inconsistent with the proposition *x's occurrence began at t**, even though neither proposition is the negation of the other. For analogues of the reasons given in the last paragraph, it would not be possible to represent *x occurred at t* as a conjunction of the form *x's occurrence did not begin at t_1 and x's occurrence did not begin at t_2 and* ....

Suppose that S is a maximal set of propositions (i.e. that, for any given proposition, S contains either that proposition or its negation). For the reasons just stated, given only that S does not contain both p and not-p, for some proposition p, it does not follow that S is consistent. To guarantee that S is consistent, and thus capable of corresponding to some possible world, we would have to add some proviso like the following:

(*) *For any proposition p_1, if S includes p_1, then S does not include any proposition p_2 such that the negation of p_1, or of any consequence of p_1, is a consequence of p_2.*

But (*) is a modal proposition (since a *consequence* of p is a proposition that *must* be true, given that p is true) and thus cannot be used without vicious circularity in this context.

3.1.5 There is another reason why we must reject the analysis of modality described a moment ago. Some states of affairs supervene on others.[14] The fact that your heart is beating supervenes on the fact that various micro-events are occurring. This means that there is no possible world identical with ours in respect of what occurs at the micro-level that does not also include the event of your heart beating. But, of course, the proposition

(1) *such and such sub-atomic events are occurring*

is distinct from the proposition

(2) *so and so's heart is beating*.

Let S be a state description that includes (1). A state description is, by definition, a set of propositions (or sentences) that is complete (maximal) and consistent. In order to be

[13] Wittgenstein (1922) put forth the view that all inconsistency could ultimately be understood in terms of the absence of explicit contradictions, like *John is tall and John is not tall.* But in his post-Tractarian work, especially the *Philosophical Remarks* (Wittgenstein, 1975), he began to question this, citing considerations similar to those cited above. In fact, the argument just given here is virtually identical with one given in that work by Wittgenstein himself. Give many properties F_1, there will be innumerable properties F_2, F_3, and so on, such that *x has* F_1 is inconsistent with, though the not the negation of, each of *x has* F_2, *x has* F_3, and so on. In Kuczynski (2003, 2004) I develop this line of thought, arguing that what we just said is true of *all* properties.

[14] The argument about to be given borrows an important conceit from an argument given by Lewis (1986:153), but is distinct from Lewis' argument.

complete, S must include (2) and, in order to be consistent, S therefore cannot include the negation of (2). In general, if a state description includes some proposition p, then it must also include every proposition p* describing a state of affairs supervenient on that described by p and it must not include the *negation* of p*. So to guarantee S's consistency and completeness, our description of it must include a statement like:

(**) *For any proposition p, if S contains p, then S contains all the propositions describing the states of affairs that supervene on that described by p, and it does not contain the negation of any such proposition.*

But here we run into a problem. The typical definition of supervenience is this: *E supervenes on E* iff E is the case in any world where E* is the case* (see Kim, 1993). Given that definition of supervenience, use of (**) would be viciously circular in this context, since we are using (**) to say what worlds are.

Another possible way of defining supervenience is this: *E supervenes on E* iff, given E*, it is necessary that E occur.* It is obvious that, given *that* definition of supervenience, use of (**) is viciously circular in this context, since we are using (**) to give an analysis of necessity.

3.1.6 One might respond to this last argument by saying the following (I will put this response in the voice of an imaginary objector):

> I grant that the standard definitions of supervenience involve the concept of a world or, perhaps, the concept of necessity, and thus cannot be non-circularly used in our efforts to identify the sets of propositions needed by PWS_E. But suppose that we found some way of understanding supervenience that *didn't* involve those off-limits concepts. In that case, the argument you just gave would be neutralized.

Lewis (1986:151–153) has made it clear how we must respond to this sort of objection. It can safely be said that many questions relating to supervenience are not going to be solved any time soon. Consider the proposition:

(*) *George is sad at time t.*

Let GS be the state of affairs described by (*). Do we now, or will we any time soon, know exactly which micro-physical, chemical, or biological propositions describe states of affairs on which GS supervenes? Obviously not. So if we accept the objector's position, then the concept of a world becomes purely programmatic, as does the associated analysis of modality, pending our acquiring knowledge of the sort just described. But, as Lewis says, it intuitively seems that we should be able to develop at least some sort of non-programmatic conception of modality without having to know whether GS supervenes on the state of affairs described by (for example):

(**) *sub-atomic mass-energy displacements $E_1 \ldots E_n$ are occurring at t.*

There is one other point to make in response to the objector.[15] Since it is a point that will recur throughout this paper, I will merely outline it now. Suppose that, despite what was just

[15] I don't believe that this point is made by Lewis.

said, we give the objector everything he wants; we concede to him that there is a way of non-circularly using the concept of supervenience in his description of the worlds (i.e. sets of propositions) in terms of which PWS_E analyzes modality. At first, it sounds as though this would help PWS_E. But the opposite is true. So far as the concept of an alternative world is not needed to explicate a modal concept like that of supervenience, the concept of an alternative world is not needed to explicate modality in general. To the extent that modality is not to be understood in terms of the concept of an alternative world, all forms of PWS, including PWS_E, are in error. So PWS_E is threatened to the extent that the advocate of PWS_E could find some way of analyzing supervenience that did not render viciously circular his conception of what a world is. I would now like to clarify and generalize this point.

3.1.7 PWS_E analyzes modality in terms of worlds, and identifies worlds with sets of propositions. As we saw a few pages ago (pp. xxx), PWS_E has great trouble identifying the relevant sets of propositions without circularly using the very notions it is meant to analyze.

But for the sake of argument, suppose that PWS_E found a non-circular way of picking out the right sets of propositions. This would involve finding some *non*-modal characterization of all and only those propositions that are possibly true. (A ''non-modal'' characterization would be one that didn't use any terms like ''necessary'', ''possible'', and the like.)

At first, the discovery of such a characterization would seem to help PWS_E. But in actuality, it would *destroy* the need for any form of PWS, including PWS_E. An analysis of modality is to supposed to say (among other things) what it is for a proposition to be possibly true. That statement must be non-circular: the *explanandum* cannot be an ingredient of the *explanans*. It follows that an analysis of modality says what *non*-modal predicate is satisfied by all and only those propositions (or sentences) that are possibly true. (So it gives us a non-modal characterization of the notion of possibility.) A characterization of the kind we've been discussing would give us exactly that information and would amount to nothing less than an analysis of modality. So supposing we found some non-circular way of identifying the sets of propositions that count as possible worlds, we would *ipso facto* have an analysis of modality, and would therefore cease to have any need for any form of PWS, including PWS_E. To sum up, if it is avoid circularly presupposing the very notions it is supposed to analyze, PWS_E must produce some non-modal characterization of all and only those sets that are admissible, i.e. of those sets that contain only those propositions that could be true[16]; but, given such a characterization, it is unclear why there would continue to be any need to understand the notion of possibility (or, therefore, of necessity) in terms of the notion of an alternative world.

An illustration may be appropriate. Let S be arbitrary set of propositions satisfying requirements (i)–(iv). Of course, we saw a few pages ago that inconsistent propositions may belong to S (e.g. propositions of the form *so and so's heart is not beating and* $e_1 \ldots e_n$ *are occurring*, where $e_1 \ldots e_n$ are the events on which the beating of so and so's heart supervenes). But in this context, solely for the purposes of argument and illustration, let us suppose that a proposition P is possible P just in case P belongs to a set like S, i.e. a set satisfying (i)–(iv). Given that this is so, it seems that we no longer have any need to

[16] Importantly, the characterization in question wouldn't use the concept of a *world* since, by hypothesis, possession of such a characterization would be a pre-requisite to saying what worlds, in the relevant sense, are.

understand modality in terms of other worlds, since we now have an analysis of modality that doesn't involve the concept of a world, namely: a proposition is possibly true exactly if it belongs to a set satisfying (i)–(iv). Of course, we may *refer* to such a set as a ''world'', but that would just be an abbreviated way of saying that it is a set of propositions meeting requirements (i)–(iv).

This brings us to another point. Solely for reasons of argument and illustration, let us continue to suppose (falsely) that a proposition P is possible exactly if it belongs to a set satisfying requirements (i)–(iv); and let us continue to suppose that S is such a set. Given these suppositions, S *would* describe a possible world, and each proposition P in S would therefore be true in some possible world. But this would be a mere *consequence* or *symptom* of the fact that P is necessary. There is no denying that a proposition P is possibly true just in case there is some possible world where P is true. This is a truism, and any analysis of modality must be *consistent* with it, regardless of whether of that analysis itself employs the concept of a possible or alternative world. So given only that, relative to the suppositions in question, S describes a possible world, it doesn't follow that the concept of a possible or alternative world has any place *within* a proper analysis of modality.[17] What follows is merely the platitude that any tenable analysis of modality must be *consistent* with the truism that P is possibly true iff P is true in some possible world.

The upshot of these points is that, if we found some non-circular way of stating which sets of propositions qualify as ''worlds'', then we would *ipso facto* no longer need to analyze modality in terms of the concept of a world.

3.2. Hintikka and the role of state descriptions in modal analysis

Here we must discuss one of Jaakko Hintikka's many contributions to the study of modality. Four notions are central to Hintikka's analysis of modality, namely: *state description, model set, model system*, and *satisfiability.*

We have already defined the term ''state description'', making it easy to define the terms corresponding to the remaining three notions (see Hintikka, 1969:24–26, 57–59). A formula[18] F is *satisfiable* iff there is some sentence s such that, first, s is what results when the variables in F are replaced with constants and such that, second, the proposition expressed by s is part of a state description. So the formula *x is tall* is satisfiable, whereas *x is round and square* is not. (The asterixes are meant to be quasi-quotes, and they will continue to be used in this way for the

[17] Another illustration may clarify my meaning. Suppose that, as some have suggested (e.g. Lewis, 1986:113 and Kuczynski, 2005a), a proposition P is possibly true exactly if P has internal, structural properties $s_1 \ldots s_n$. In that case, the fact that P* (an arbitrary proposition) has $s_1 \ldots s_n$ will necessarily be *reflected* in the fact that P* is true in some possible world. But P*'s being possible will *consist in* its having $s_1 \ldots s_n$, not in its being true in some possible world. The statement *P is possibly true exactly if P is true in some possible world* is a good (negative) touchstone for the truth of an analysis of possibility. But it doesn't follow that modality is necessarily correctly analyzed *in terms* of the notion of a possible or alternative world.

[18] In this context, the term ''formula'' is to mean ''open-sentence.'' Consider the expression ''x has F.'' This is not an actual sentence, since it has two variables in it, namely ''x'' and ''F''. (These are variables of different types. But that fact isn't central to what we are discussing, and we may safely omit further discussion of it.) When these variables are replaced with constants of the appropriate type (e.g. ''Smith'' and ''the property of tallness''), what results is a sentence. In general, an open sentence is an expression E such that E contains free variables and such that when those free variables are replaced with constants (of the appropriate type), the result is a sentence.

rest of the paper.) A ''model set'' is a set of formulae such that the set of propositions expressed by some interpretation of those formulae constitutes a *part* of maximal consistent set. (By an ''interpretation'' of a set of formulae is meant a set of sentences resulting from a uniform assignment of constants to the variables in those formulae.)[19] Finally, a ''model system'' is a set of state descriptions.

On this basis, Hintikka says the following about the concepts of necessity and possibility. *Possibly p* is true in state description S, belonging to model set M, iff there is some state description S*, also a member of M, fulfilling two conditions. First, *p* is true in S*. Second, S* is an *alternative* to S, meaning that the propositions in S* jointly describe how the world *might* have gone, supposing that the propositions in S jointly describe how the world actually is. *Necessarily p* is true in state description S iff, for every in state description S* in M that is an alternative to S, p is true in S*.

The system just described has provided the basis for a number of extremely fruitful insights into modality, and its value to many research projects cannot be overstated. But it is not viable if taken *as an analysis* of modality. By definition, one maximal consistent set is an ''alternative'' to another exactly if what is possible in the one is actual in the other. So taken as an analysis of the notion of possibility, the view of possibility stated in the previous paragraph is guilty of vicious circularity. The same point (*mutatis mutandis*) applies to the corresponding analysis of necessity.

The circularity is so obvious that Hintikka clearly did not mean it to be taken as an analysis of possibility, but rather as an elucidation of that notion. Thus taken, Hintikka's view is beyond reproach. But in this context we are looking for an *analysis* of possibility, and we have not found that in this particular quarter of Hintikka's important work.

Within the system just described, state descriptions are meant to be, or at least to represent, possible worlds. (See Hintikka, 1969:79–80.) Given this point, there is another problem with the analysis of Hintikka's just considered. In order to identify this problem, we must briefly repeat some points made earlier. The expression ''consistent'' is a modal term. So if we define a ''state description'' as a maximal *consistent* set of propositions, then we condemn to vicious circularity any analysis of possible truth as truth in some state description. Thus, if the analysis of Hintikka's that we just considered is to be free of vicious circularity, a ''state description'' must not be defined as maximal consistent set. Presumably because he is aware of this very problem, Hintikka does *not* define the term ''state description'' in this way. Rather, Hintikka says that a ''state description'' is a set of propositions satisfying requirements (i)–(iv), as defined a few pages ago (pp. xxx), and thus avoids the just mentioned vicious circularity. But as we saw, given only that a set of propositions satisfies conditions (i)–(iv), it does *not* follow that it is consistent or, therefore, that it is (or describes) a possible world.

[19] More explicitly, a model set is a of formulae satisfying the following requirements:

(ii*) For no formula f does S does contain both f and not-f.

(iii*) S contains the closure set of its atomic formulae under the operations of conjunction, disjunction, and existential and universal generalization. (So if S contains f and S contains *g*, then S contains *f and g.* If S contains f, and S contains *not-g*, the S contains *f or g*. And so on.)

(iv*) The formula *a is not identical with a* does not belong to S.

A model set does not contain any analogue of (i). So a model set is a set of formulas that, on some interpretation, constitute at least a *part* of a state-description, though not necessarily a *complete* one. State descriptions may be seen as limiting cases of interpretations of model sets.

3.3. PWS_E and the PWS-analysis of propertyhood

3.3.1 Leaving aside everything said so far, if worlds are taken to be sets of propositions, PWS forfeits some of its most important victories. For the next few paragraphs, to put matters into context, we are going to talk about PWS, as opposed to PWS_E. (By ''PWS'', I mean the doctrine that (i)–(iii), as defined in Section 1, above, are correct, *where it is left open how the word "world" is to be taken*. So ''PWS'', in this context, is neutral as to whether ''worlds'' are meant to be concrete entities or sets of propositions. By contrast, PWS_E is the position that (i)–(iii) are correct, where the word ''world'' is meant to be a representation of some kind, presumably a set of propositions.) We will then return to PWS_E.

Consider the PWS reduction of properties to functions: a property is a function from individuals to truth-values[20] or, equivalently, is a set of individuals (see Lewis, 1986:50–53). So, for example, the property of being a chordate (a creature with a chorda, the dorsal chord or (proto-)spine) is a function F that assigns truth to all and only those individuals having chordas or, equivalently, is the set of creatures that have chordas. The property of being a rhenate (a creature with kidneys) is a function F* that assigns truth to all and only those individuals having kidneys or, equivalently, is the set of all creatures having kidneys.

There is an obvious problem with this analysis. Functions are typically identified with, or at least seen as being individuated by, the sets of ordered pairs associated with them. (So, supposing that its domain is the set of whole numbers, the function F(x) = 2x is identified with the set of pairs:<1,2>, <2,4>, and so on.)

Given this, suppose for the sake of argument that, in this world, all and only rhenates are chordates. It follows that, in this world, F and F* generate exactly the same ordered pairs. Thus, F and F* are the same function, meaning that the PWS-analysis of properties falsely identifies the property of having a chorda with the property of having a kidney.[21]

There are two ways that one might respond to this argument. The first response is to say that objects from *other worlds* are to be included in the domains of the functions with which properties are identified. There are *other* (possible) worlds where there are creatures with chordas but not kidneys. So F and F* generate different sets of ordered pairs, and are thus distinct functions, if their domains include objects from other worlds.[22] The second response is to deny that functions are identical with sets of ordered pairs.[23] Let us consider each of these options, starting with the second.

The view that functions are *identical* with sets of ordered pairs is sometimes known as ''extensionalism.'' But a function may also be thought of as a way of *generating* a set of ordered pairs, without itself being *identical* with any such set. This way of thinking about functions is sometimes referred to (more among mathematicians than semanticists) as ''intensionalism.'' From an intensionalist viewpoint, F and F* are different functions because,

[20] In any case, this is one way that PWS analyzes the notion of a property. What we will say here applies to any PWS-analysis of propertyhood. See also Lewis (1986:50–53) for a discussion of the different PWS-analyses of propertyhood.

[21] See Lewis (1986:55–56): ''Everyone agrees that it won't do to take properties as the sets of its this-worldly instances, because then two properties will be taken to be identical if they happen to be co-extensive.''

[22] Lewis (1986:51) makes exactly this point. But Lewis takes other worlds to be concrete entities, and is invulnerable to the criticisms of PWS discussed in this section. After all, the purpose of this section is to show how PWS lands into certain traps *if it takes other worlds to be sets of propositions (as opposed to concrete entities).*

[23] See Lewis (1986:56): '' 'Triangular' means having three angles, 'trilateral' means having three sides.'' Lewis goes on to say that any conception of propertyhood according to which those are different properties ''demands that properties should be *structured*'' [Lewis' emphasis]. This is not exactly the point I am making, but it is obviously similar.

even though they generate the same ordered pairs (at least in this world), they do so in different ways.

From an intensionalist viewpoint, what is it that distinguishes F from F*? The answer is basically this. Where the one function is concerned, an object's having the property of being a chordate is implicated in a certain way in that function's assigning truth to that object, and that object's being a rhenate is *not* thus implicated; and where the other function is concerned, an object's having the property of being a rhenate is implicated in a certain way in that function's assigning truth to that object, and that object's being a chordate is *not* thus implicated.

The intensionalist distinction between F and F* is thus drawn *in terms of* the properties *rhenate* and *chordate*. Consequently, an intensionalist perspective is not available to someone who wishes to analyze those functions in terms of those properties. PWS is guilty of vicious circularity if it takes an intensionalist view of functions, at least in so far as PWS aspires to analyze properties as functions (or sets) of the sort in question.[24]

Consequently, insofar as she wishes to analyze properties along such lines, the advocate of PWS must take an *ex*tensionalist view of functions, i.e. she must see functions as being nothing but sets of ordered pairs. In that case, as we discussed, if she is to distinguish between F and F*, she must allow objects from other worlds into the domains of those functions. Let us now consider the consequences of going this route. More specifically, let us now see why it is not possible for PWS_E (notice the return of the subscript) to go this route.

3.3.2 Supposing that a possible world is a set of propositions, what do we mean by a possible individual? There are no actual persons who are over 9 ft tall. But such an individual is possible. If we accept PWS, this means that there is such an individual in some world W.

According to PWS_E (note the subscript), W is a set of propositions. So if PWS_E is right, then a possible individual is one who is described, or otherwise implicated, in an admissible set of propositions. So for PWS_E, a possible object would be one that is mentioned or described in a proposition that is a member of a possible world, i.e. an admissible set.[25]

The problem is that every proposition consists of properties. Consider the proposition *John is tall.* This proposition attributes the property of tallness to John.[26] The property of tallness thus seems to be a *constituent* of this proposition or, at any rate, to be a prerequisite to its

[24] There is another, much deeper reason why the intensionalist analysis of functions is not available to the advocate of PWS or, therefore, to the advocate of PWS_E. The essence of PWS is that it reduces the intensional to the extensional. For reasons yet to be given, if functions are viewed intensionally, then *all* of PWS's analyses must be correspondingly re-intensionalized. But in that case, PWS comes to naught, since has failed to extensionalize *anything*. We will spend a great deal of time delineating and defending this line of thought.

[25] A bit more would have to be said. There are maximal consistent sets of propositions that include propositions like *John was thinking about the round square*. So a maximal consistent set of propositions could describe an impossible object (though it seems far less plausible to say that an impossible object could be a *constituent* of any proposition). What seems impossible is that one of the *atomic* propositions composing a maximal consistent set could describe an impossible object, since descriptions seem to involve the use of generalizations of some sort ("there is a round square x such that ..."). So, presumably, given a PWS conception of necessity, and given the view that possible worlds are sets of propositions, a possible object becomes one that is mentioned in (or is described by, or is a constituent of) some atomic proposition composing a possible world.

[26] It isn't really clear whether the proposition *John is tall* is different from *John has the property of tallness.* Of course, the *sentence* "John is tall" is different from the sentence "John has the property of tallness." One could understand the first without understanding the second; the semantic rules assigning meaning to the one do not quite coincide with those assigning meaning to the other. But it is far from clear that those sentences encode different *propositions.*

existence. This point generalizes without limit. Pick any atomic proposition you wish: it attributes a property to something and thus presupposes the existence of some property.[27] Since molecular propositions are built out of atomic propositions, it follows that *every* proposition, and thus every set of propositions, presupposes the existence of some property. So if we identify worlds with sets of propositions, we are guilty of vicious circularity if we identify properties with functions involving worlds.

3.3.3 There is a way that an advocate of PWS might resist this argument. Consider the proposition:

(T) *triangles have three sides.*

According to PWS, T is either a function from worlds to truth values (one that assigns truth to every world where that proposition is true) or, equivalently, it is a class of worlds (the class of worlds where it is true). Let U be the class just mentioned. If T is identified with U, then T is not (at least not in any obvious way) built out of the properties *triangle*, *three*, and so on. For any proposition P, an analogous line of thought would suggest that P is *not* built out of properties. If this is the case, then the argument given a moment ago would seem to collapse.

But there is a well known problem with this maneuver. If propositions *are* the sets of worlds where they are true, then T is identical with the proposition:

(O) *three is an odd number.*

But O and T are not identical.

Advocates of PWS respond to this by treating propositions as *structured* assignments of truth-values to worlds. (See Lewis, 1970, Cresswell, 1985.) So even though T and O assign the same truth-values to the same worlds, they are different propositions since they generate those assignments in different ways. In the one case, the property of triangularity is involved in a certain way in the relevant assignment; in the other case, that property is not thus involved. In the one case, the property of oddness involved in a certain way in the relevant assignment; in the other case, it is not thus involved.

But, of course, the maneuver just described involves taking an *intensionalist* view of functions and thus, for the reasons given a moment ago, renders viciously circular PWS's identification of properties with functions.[28]

The preceding discussion has a consequence worthy of note. Let us refer to properties of individuals (e.g. tallness, baldness) as ''first-order'' properties, and to properties of propositions (e.g. truth, necessity) as ''second-order'' properties.

[27] n-place relations can be treated as properties of ordered n-tuples.

[28] There are different PWS reductions of properties to functions. But the argument just given shows that any one of them is unfeasible. For example, Lewis (1986:55–57) suggests that a property can be seen as a set of its instances. On this view, properties that happen to have the same extensions (e.g. *rhenate* and *chordate*) are falsely identified with each other, unless either objects from other worlds are allowed into the domains of the relevant functions or properties are seen as having *structure*. As we've discussed, propositions are themselves built out of properties. So if other worlds are treated as sets of propositions, then it becomes viciously circular to allow objects from other worlds to be members of the sets that are being identified with properties. This leaves us with the option of distinguishing accidentally co-extensive properties by their internal structures. But if we do that, then we are no longer extensionalizing properties; we have given up on the identification of properties with sets.

Sometimes, advocates of PWS identify each property P with a function phi that pairs off each world W with the class of individuals in W having P. (See Lewis, 1986:53). Considerations similar to those just stated in the main text (in connection with the identification of properties with functions from individuals to truth-values) apply here.

PWS identifies propositions with functions from worlds to truth-values or, equivalently, with classes of worlds. We've seen that, if this identification is correct, then first-order properties cannot be identified with functions. We would therefore be guilty of a certain theoretical arbitrariness if we identified some, but not all, properties with functions. Thus, if first-order properties are not functions, the same is true of second-order properties. PWS thus requires that second-order properties *not* be functions. But in that case, as I will now argue, the identification of necessity with truth in all worlds collapses.

Let F be a function that assigns truth to a proposition P exactly if P is true in every world. From the viewpoint of PWS, P's being necessarily true is identical with P's being assigned truth by F. We just saw that the property of being necessarily true is not identical with any function. This means that we cannot identify a proposition's being necessarily true with its being assigned truth by F. That is equivalent to saying that we cannot identify necessary truth with truth in all worlds.

3.4. PWS_E and the ineliminability of vicious circularity through use of the meta-language

I would like to end this section by discussing two more reasons why PWS cannot identify worlds with sets of propositions.

3.4.1 Consider the proposition:

(*) necessarily, 1 + 1 = 2.

According to PWS_E, this means (or, at least, is equivalent with):

(**) the proposition *1 + 1 = 2* is a member of every world, i.e. of every admissible set of propositions.

Let U be the class of all admissible sets of propositions. Since (*) is true, it is presumably a member of U. The same is therefore true of (**), supposing that PWS_E is right. Let M be one of the admissible sets to which (**) belongs. M is one of U's members. (**) is one of M's members. Thus, a member of a member of U quantifies over U. (Roughly, U is built out of (**), and (**) is built out of, or at least presupposes the existence of, U.) This is a classic case of a vicious circle, and is thus unacceptable.[29]

To prevent this sort of situation, the advocate of PWS_E cannot allow statements that quantify over all worlds to belong to admissible sets of propositions. According to PWS (and PWS_E) modal statements fall into this category, since they have the form *in all worlds P*, *in some worlds P*, and so on. It follows that modal statements must not be members of admissible sets.

For this reason, advocates of PWS_E do not allow modal statements, like (*) and (**), to be members of worlds. Such statements are relegated to the ''meta-language'', and vicious circularity is thus avoided.

[29] Unless we heroically accept some version of non-standard set-theory. (See Barwise and Moss, 1996.) But presumably PWS doesn't want to make the truth of non-standard set-theory be a pre-condition for its own truth. In any case, if some kind of non-standard set-theory *did* turn out to be correct, it would still be worth pointing out the dependence of PWS on such a theory.

But not *all* statements that refer to worlds are modal statements, and this recreates the sort of vicious circularity just considered. For the sake of argument, suppose that there is a class U such that U contains all admissible sets of propositions, and nothing besides. Now suppose that Smith is a cognitively normal person, but has not yet pondered the concept the concept of a possible world. In that case, the proposition

(a) Smith believes that the proposition possible worlds are not identical with members of U is true.

is not true, since Smith simply hasn't contemplated the nature of possible worlds. (Notice that, while (a) has a statement about worlds embedded in it, (a) is not itself a modal statement.) At the same time, (a) obviously could be true. According to PWS, this means:

(b) In some (possible) world, Smith believes that the proposition possible worlds are not identical with members of U is true.

According to PWS_E, (b) means:

(c) In some member of U, Smith believes that the proposition possible worlds are not identical with members of U is true.

U consists of sets of propositions. (c) is one of the members of one those sets. So one of the members of one of the members of U quantifies over U. In fact, U seems to be one of the *constituents* of (c). U thus ends up being a constituent of a member of a member of itself. In any case, one of the members of the one of the members of U *quantifies* over U. Either way, the situation is unacceptable.[30]

We cannot eliminate this problem by relegating (c) to the meta-language. (c) merely identifies some fact about Smith's person, and therefore can no more be relegated to the meta-language than could *Smith is happy* or *Smith is tall.*[31]

Thinking along lines like those embodied in Russell's Theory of Types, one might be tempted to say that the occurrence of U in the underlined sentence refers to one set of propositions, while the occurrence of U in the quantifier at the beginning refers to some analogous, but numerically distinct, set of propositions of a different ''type'' or ''order.'' (See Russell, 1908.) In this way, vicious circularity could perhaps be avoided.

But this maneuver is not one that can be made in this context. When we say that (a) could be true, we are saying that Smith could believe the proposition: possible worlds are not identical with members of U. It is a simple modal fact that Smith could believe that exact

[30] This argument has a certain similarity to that given by Bealer (1998), which we will later discuss.

[31] Granted, the state of affairs described by (c), and by all others statements about people's mental states, may well supervene on other, lower level states of affairs. But this gives us no grounds at all for excluding (c) from any admissible set. After all, the states of affairs described by propositions like *John is tall* and *that rock weighs four kilograms* supervene on other, lower-level states of affair, but those propositions obviously belong to some admissible sets. There thus seem to be no grounds for denying (c) membership in at least some admissible sets. Consequently, the vicious circularity described a moment ago cannot be removed—at least not by expelling (a) into the metalanguage.

proposition to be true. We are not talking about some analogous proposition concerning a different set of possible worlds.

3.4.2 This brings us to yet another problem with PSW_E. As we just saw, if it is to avoid vicious circularity, PWS_E cannot let modal propositions belong to the same admissible sets as non-modal propositions like *John is tall*. In light of this, consider the proposition:

(1) it is necessarily the case that, necessarily, 1 + 1 = 2.

(1) is intuitively plausible and, indeed, is generally taken to be true (see Kripke, 1963). According to PWS_E, (1) means:

(2) The proposition 1 + 1 = 2 is a member of every admissible set is a member of every admissible set.

As before, let U be the set of all admissible sets. In that case, (2) becomes:

(3) The proposition 1 + 1 = 2 is a member of every member of U is a member of every member of U.

The underlined proposition presupposes the existence of U; indeed, U would seem to be one of the constituents of that proposition.[32] But the underlined proposition is *itself* a member of U. So (3) is viciously circular.

To prevent this, PWS_E would have to say that the occurrence of U in the underlined sentence refers to one set, or tier, of admissible sets, while the non-underlined occurrence refers to some other tier. In that case, the two occurrences of ''necessarily'' in (1) have different (though analogous) meanings. The first means ''in every admissible set belonging to tier A'', while the second means ''in every admissible set belonging to tier B'', where A and B comprise different sets of propositions. For exactly similar reasons, the three occurrences of ''necessarily'' in:

(4) it is necessarily the case that, necessarily, 1 + 1 necessarily equals 2,

would have different (though analogous) meanings.[33]

But this seems quite unacceptable. If our intuitions are to be trusted, the two occurrences of ''necessarily'' in (3), and the three occurrences in (4), all have precisely the same meaning.

Further, if we conceded to PWS_E that those occurrences quantified over different worlds, then it would be necessary to subject the basic theorems of modal logic to counter-intuitive reinterpretations. This would obviously be true of the generally accepted principle

[32] In any case, if we think of propositions as having constituents – as being structures consisting of properties, relations, and perhaps individuals – then it seems that U is one of the constituents of that proposition. And this is a widely accepted regarding propositions—one held by Russell (1985), Kaplan (1989), and others.

[33] Russell's Theory of Types has a similar consequence. See Russell (1908). If that theory is right, then the word ''three'' in ''John has three cars'' has a meaning different from (though analogous to) that borne by its homonym in ''John has three pairs of shoes'', since the first occurrence refers to individuals, whereas the second refers to sets.

that *necessarily p* implies *necessarily, necessarily p.*[34] But the same would be true of *if possibly p, then necessarily possibly p*, since *possibly p* is the same as *not necessarily not p.* In fact, it seems that no quarter of modal logic would remain untouched, since one of the purposes of that discipline is to study the effects of iterating and permuting modal connectives.

We may conclude that PWS_E is not viable, and that it is therefore not an option for PWS to identify worlds with sets of propositions. So if we wish to hold onto PWS, then we must see possible worlds as being concrete entities (''maximal states of affairs'', or some such). In other words, we must consider possible worlds as being in the same metaphysical category as our world.

4. Part III. Why PWS cannot identify worlds with concrete entities

4.1. Some unwelcome consequences of modal realism

I will now argue that, if we see possible worlds as concrete entities, then PWS has a number of unpalatable consequences, one of them being that *every* proposition is necessarily true or necessarily false.

Suppose that, as PWS requires, there are various alternative worlds. In light of this, consider the proposition *Smith is tall in W37*, and suppose that it is true. ("W37" is short for "World 37.") That proposition is true in every world. For example, it is true in W867 that, in W37, Smith is tall. It is irrelevant whether or not Smith is tall in W867.

Here is an analogy. Consider the proposition *it is raining in London on March 22, 2006*, and suppose that it is true. That proposition is true at places and times where it is not raining. The fact that it is not raining in London on July 22, 2006 is irrelevant to the truth of the proposition that it is raining in London March 22, 2006. Similarly the fact that Smith is short in W867 is irrelevant to the truth of the proposition that he is tall in W37. A similar line of argument shows that *Smith is not tall in W37* is false in every world.[35]

If PWS is to avoid making all propositions necessarily true or necessarily false, then it must show that the propositions that we intuitively regard as contingent – the propositions affirmed by utterances of ''Mozart wrote over forty symphonies'' and ''Napoleon became a famous general'' – are not world-indexed and, further, are not equivalent with world-indexed propositions.

In light of this, let W_1 be our world; and let P be the proposition affirmed by an utterance in W_1 of ''Mozart wrote over forty symphonies.'' Presumably P is contingent—it is not in the same category as *water is* H_2O or *1 + 1 = 2.* What must be the case for P to be true? It is irrelevant whether Mozart wrote over forty symphonies in W87 or W8,986. Only one world counts—W_1.

[34] There is one last reason why PWS oughtn't identify worlds with sets of proposition. We saw earlier how PWS elegantly analyzes the notion of truth in terms of set-membership. Let S be the set of worlds where grass is green, and let w be our world. For the proposition *grass is green* to be true is simply for w to be a member of S. If correct, this would shed a striking light on the nature of truth. But this illumination is lost if worlds are identified with propositions. The notion of a proposition is usually understood in terms of that truth: propositions are truths or falsehoods, or they are those things that are non-derivatively true or false. (Later we will briefly revisit this topic.) If (as appears to be the case) the concept of a proposition is to be understood in terms of that truth, then the same is true of the concept of a *world* (i.e. an admissible set of propositions). In that case, to avoid vicious circularity, the concept of a proposition's being true would have to be understood *independently* of the concept of membership in a set of worlds.

[35] See Plantinga (1974:62–65) for a similar, if not identical, point.

The statement is correct exactly if, in W_1, Mozart wrote over forty symphonies, i.e. exactly if the proposition:

(PW1) *Mozart wrote over forty symphonies in W_1*

is correct.

So when you say ''Mozart wrote over forty symphonies'', the proposition that you are affirming has the same truth conditions as a world-indexed proposition. We've seen that, given a PWS framework, PW1 is necessarily true. It follows that, given such a framework, the same is true of the proposition you are affirming. But, in reality, the proposition you are affirming is a paradigm of contingency.[36]

The argument just given is anticipated by Plantinga (1974:62–65). Suppose that Socrates is snub-nosed in W65. In that case, Socrates has the property of being snubnosed-in-W65. It is true in every world, even those where he is not snub-nosed, that Socrates has the property of being snubnosed-in-W65. Plantinga goes on to say: ''It is easy to see that being snub-nosed in [W65] is essential to Socrates'', since Socrates has the property of being snub-nosed-in-W65 in every world, and an essential property is one that a thing has in every world.

Even though his own logic would seem to demand it, Plantinga does not draw the further conclusion that, if we identify necessity with truth in all worlds, then all propositions are necessarily true. Suppose that you are in W65 (where, to simplify the argument, we may suppose that English is spoken) and you say ''Socrates is snub-nosed.'' Your statement is true exactly if Socrates is snub-nosed in W65. It is irrelevant whether he is snub-nosed in W876. So your statement is true exactly if Socrates has some property that, by Plantinga's own lights, he either has in every world or in none, and that he therefore necessarily has or necessarily does not have.[37]

[36] This is not to say that an utterance of ''Mozart wrote over thirty symphonies in W_1'' is identical in respect of linguistic meaning with an utterance, in W_1, of ''Mozart wrote over thirty symphonies.'' A comparison may help. Suppose that you are in location L at time T, and you say ''it is now raining here.'' The proposition you are affirming is true exactly if the proposition: *in place L and time T, it is raining* is true. So the proposition you are affirming has exactly the same truth conditions as the proposition encoded in an utterance of ''in place L and time T, it is raining.'' But there would seem to be a clear sense in which an utterance, in place L and time T, of ''it is now raining here'' is semantically different from an utterance of ''in place L and time T, it is raining.'' (See Kaplan, 1989 for a classic defense of this now widely accepted position.) For example, you could not understand an utterance, in place L and time T, of ''it is now raining here'' without knowing what ''now'' and ''here'' meant; but such a deficiency would not necessarily prevent you from understanding an utterance of ''in place L and time T, it is raining.'' The semantic rules assigning meaning to the one utterance don't coincide with those assigning meaning to the other, even though the truth conditions assigned to the utterances do coincide.

An utterance of ''Mozart wrote over forty symphonies in W_1'' is semantically different from an utterance, in W_1, of ''Mozart wrote over forty symphonies.'' But for analogues of the reasons just considered, this in no way conflicts with the idea that the propositions encoded in such utterances may be equivalent.

[37] In his discussion of world indexed properties, Plantinga (1974:64) makes a suggestive remark that might seem to have some bearing on our viewpoint:

> ''We must not be misled by our terminology to suppose that a possible world is a place, like Wyoming, so that *being snub-nosed in [W67]* is like *being mugged in Chicago.* A possible world is a state of affairs, not a place; and far be it from me to claim otherwise.''

Plantinga is right that, if there are possible worlds, they are not places. Spatial location is a property that things have *within* a world; worlds themselves do not have it. (If two things are spatially located with respect to one another, then they are *ipso facto* in the same world.) It might seem that our argument involves a false assimilation of worlds to places. But this is not so. A person cannot *just* be mugged: he must be mugged in Chicago or Paris. Socrates cannot *just* be snub-nosed; he must be snub-nosed in some maximal state of affairs, in W65 or W899. Of course, here the word ''in'' doesn't denote spatial location, as Plantinga (in effect) points out. (Perhaps it would be more accurate to say that any case of Socrates' being snub-nosed is a constituent of a maximal state of affairs.) Any case of Socrates' being snub-nosed will be given by a proposition that is world-indexed or equivalent to a world-indexed proposition. The fact that worlds are not places doesn't undermine this.

In conclusion, if we accept PWS's framework, then those propositions that we regard as contingent become necessarily true or necessarily false.

A proponent of PWS might respond to our argument by looking for world-neutral propositions—propositions that are not identical with, or equivalent to, world-indexed propositions. But the problem with this approach is clear. Even if it turns out that there are world-neutral propositions, PWS still turns the propositions that we intuitively regard as contingent—e.g. those affirmed by utterances of ''Mozart wrote over forty symphonies''—into necessary truths or falsehoods. (For further related discussion, see Excursus I 'On Necessity, Contingency, and the Infinite Regressiveness embedded in PWS', at the end of this article.)

4.2. Bealer's argument

Let PWS_{IN} be the doctrine that PWS is correct, with the qualification that the functions that are identified with propositions are to be viewed *intensionally*. Let PWS_{EX} be the doctrine that PWS is correct, with the qualification that those functions are to be viewed *extensionally*. As we noted earlier, PWS_{EX} cannot distinguish between distinct, but analytically equivalent, propositions—between, for example, *triangles have three sides* and *three is an odd number*. Most advocates of PWS deal with this by advocating PWS_{IN}. But in light of what Bealer (1998) says, we must seriously question the viability of PWS_{IN}. Let us now turn to his argument.

According to any version of PWS (including PWS_{IN}), the property of necessity is either a function Φ from propositions to truth-values – a function pairing necessarily true propositions with truth and all others with falsity – or, equivalently, it is a class C that includes all and only necessarily true propositions.

The proposition *necessarily 1 + 1 = 2* is itself a member of C. The property of necessity is itself a constituent of that proposition. So if the property of necessity is identical with C, then that property is a proper constituent of one of its own members. Since this is viciously circular, the property of necessity cannot be identified with C or, by a similar argument, with Φ.

To block this vicious circularity, the concept of necessity would have to be removed from each of the propositions which are members of C (or, equivalently, to which Φ assigns the property of truth). But this would require that *1 + 1 = 2* be falsely identified with *necessarily 1 + 1 = 2*. In light of obvious extensions of the argument just given, *necessarily necessarily 1 + 1 = 2* would have to be falsely identified with *1 + 1 = 2* and also with *necessarily 1 + 1 = 2*, and with countless other propositions involving iterated modal operators.

As Bealer points out, an argument exactly similar to the one he gives shows that, for *any* second-level property, PWS_{IN} generates a regress like that discussed above. We thus have good reason to believe that the PWS_{IN} analysis fails for *some* properties. On this basis, Bealer makes a plausible case that it fails for *all* properties. Presumably, the property of a property is not disjunctive; it is not like the property of being EITHER A BIRD OR A HARPSICHORD-PLAYER. If this is right, then given that the PWS_{IN} analysis fails for some properties, considerations of uniformity demand that we see it as failing for all of them. (For more on the consequences of Bealer's argument, see Excursus II, 'Bealer and the Problem of Circularity', at the end of this article).

4.3. Counterpart theory and its discontents

If worlds are taken to be concrete entities, PWS runs into problems *additional* to those already discussed. Let us talk about the actual Socrates—the man who, in this world, died of hemlock poisoning a few thousand years ago. Suppose that in some world W, distinct from our world, there

is a man x who did not die of hemlock poisoning. In that case, Leibniz's Law would seem to tell us that x is not identical with Socrates.[38] Obvious extensions of this reasoning demand that Socrates exist only in *one* world.[39]

For this reason, Lewis wisely says that Socrates himself does *not* exist in other worlds, even though Socrates has *counterparts* in other worlds (Lewis (1968, 1986)). In general, no object exists in multiple worlds, even though any object will have counterparts in other worlds.

But there are several problems with this view.[40] Some of these are well known, and some are not. Let us start with the former.

In our world, Socrates was wise. Given that Socrates exists only in this world, it follows that there is no world where Socrates was not wise. So it would seem to follow that, by PWS's lights, it is *necessarily* true that Socrates was wise. Given any proposition that we would intuitively regard as contingent, a similar argument shows that, by PWS's lights, that proposition is necessary.

A counterpart-theorist deals with this by saying that Socrates is necessarily wise just in case all of Socrates' counterparts are wise. In general, counterpart-theory must reject the identification of necessity with truth in all worlds. Necessary truth becomes truth under all appropriate substitutions of counterparts for counterparts. The concept of possibility is correspondingly re-analyzed.

But this view is problematic. First, it lacks a certain consonance with our pre-theoretic modal intuitions. Second, it is, strictly speaking, an abandonment of the corner-stone of PWS—the principle that necessary truth is truth in all worlds.

Of course, neither of these points necessarily warrants the *rejection* of counterpart-theory. But, as I now propose to show, it is not hard to give argumentative grounds for the feeling of worry that they awaken.

First of all, what is a counterpart? Here is David Lewis' answer. Socrates' counterpart in W is the thing in W which resembles Socrates more than any other thing in W. If this is right, then counterpart-theory has several problems. First, as Lewis himself points out, by this definition of ''counterpart'', Socrates may have several counterparts in W. In that case, since there are worlds where Socrates has multiple counterparts, the proposition *Socrates is identical with Socrates* presumably fails to be true in every world.[41]

[38] Suppose that there is some world W where somebody x has exactly the same properties as our Socrates, insofar as this is possible. x is not identical with Socrates since Socrates has the property of being in this world, whereas x does not.

[39] One way to resist this would be to say that Socrates is not an *intra*-, but an *inter*-mundane entity. (See Lewis, 1986:198–210.) A comparison might help. *The* property of redness does not exist in any specific place or time, even though each of its instances do. Similarly, Socrates *per se* does not exist in any specific world, even though some of his parts or perhaps instances do. Leibniz's Law obviously doesn't forbid different *parts* of a given thing from having different properties.

Such a view has very little basis in what we know about Socrates. Socrates was born at a certain time and died at certain time. He had a certain height and weight. These are data. If we see Socrates as some kind of compound of various inter-mundane individuals, then these data must be rejected. We must therefore not see Socrates in this way, and must continue see him as we are accustomed to see him. Lewis (1986:198–210) provides a superb and (to me) convincing discussion of this whole issue.

[40] Lewis was aware of many of these. See Lewis (1968, 1986).

[41] See Lewis (1968:112–113), Forbes (1985:75), and Kaplan (1968:102).

Even if some argument could be produced that reconciled counterpart-theory with the presumption that the proposition *Socrates is identical with Socrates* is true in every possible world, it shouldn't be *necessary* to produce such an argument. The law of identity should be enough. So far as counterpart-theory doesn't conflict with the non-controversial view that S is true in every possible world, it implausibly makes the truth of that view contingent on arguments that, if they were even to exist, would inevitably have an extremely controversial character.

Further, it certainly *seems* possible that Socrates might have had very few of the properties that he had in this world, and that somebody other than Socrates might have had many of those properties (see Kaplan, 1968; Kripke, 1980). But if we think of a counterpart in the way proposed, then that is not possible, since anything lacking a high degree of resemblance to Socrates is *ipso facto* not his counterpart.

Counterpart theory does have a way of avoiding this last problem. According to a view suggested by Lewis, Socrates' counterpart in W is the occupant of W which has more of Socrates' *essential* properties than any other such occupant. Consider any of the propositions known to us that distinguish Socrates from other historical figures: he was wise; he was a philosopher; he drank hemlock; he was an excellent orator. None of the properties involved (*wise, excellent orator* . . .) is essential to Socrates. So Socrates' counterpart in some other world might have extremely little resemblance to him, at least by any ordinary measure. In this way, Lewis' counterpart-theory is reconciled with the presumption that Socrates might have been very different from how he actually was.

But there is a problem with this proposal. ''Essential'' is a modal term, A property φ is an essential property of Socrates exactly if Socrates couldn't possibly fail to have φ. We are therefore guilty of vicious circularity if we try to understand necessity in terms of the counterpart relation and then understand the counterpart relation in terms of the concept of essentiality. It thus seems unlikely that any viable version of counterpart-theory can identify Socrates' counterpart in W as that thing in W which shares Socrates' essential properties. (For a discussion of how a counterpart-theorist might parry these points, see Excursus III 'Counterpart Theory and Essential Properties', at the end of this article.)

4.4. PWS and the epistemology of modality

There is another well-known problem with modal realism. (By ''modal realism'' I mean the view that PWS is correct, with the qualification that worlds are to be taken as concrete entities.[42]) Modal realism seems inconsistent with the fact that we can *know* modal truths.[43]

According to modal realism, *triangles have three sides* is necessarily true because, in every world, triangles have three sides.[44] We obviously don't have to leave this world to know that the proposition *triangles have three sides* is necessary. This suggests that the grounds of its being necessary lie in something that we don't have to go to other worlds to discover. This in turn suggests that *necessarily, triangles have three sides* does not hold in virtue of facts about other worlds. In light of this, the fact that *triangles have three sides* is true in all other worlds would seem to be, not the basis or essence of its being necessary, but only a symptom or consequence of that fact.

Lewis considers this exact point, giving a clear and powerful response to it:

> ''Certainly the way to come by modal opinions is not to inspect the worlds one at a time, not only because we cannot inspect the worlds at all, but because we would have to work very fast to run through all of them within a conveniently short time. You might as well think that our knowledge of the real numbers comes from inspecting *them* one at a time! No; our methods must be general, in both the mathematical and the modal cases. Certainly, when

[42] This is not how the term ''modal realism'' is always used, but it is how Lewis uses it.

[43] Blackburn (1984) makes this point.

[44] In this context, let us assume, in deference to modal realism, that the problems it has in relation to counterpart-theory can somehow be managed.

> we reason from recombination by means of imaginative experiments, the method is general; we imagine only some of the salient features, and thereby cover an infinite class of worlds all in one act of imagining." (1986:114)

A page earlier, Lewis writes:

> "In the mathematical case, the answer [to the question how we know general truths] is that we come by our opinions largely by reasoning from general principles that we already accept; sometimes in a precise and rigorous way, sometimes in a more informal fashion. As when we reject arbitrary-seeming limits on the plentitude of the mathematical universe. I suppose the answer in the modal case is similar. I think our everyday modal opinions are, in large measure, consequences of a principle of recombination." (1986:113)

Lewis is surely right that our methods for discovering modal truths involve "general principles." But in saying this Lewis is conceding the very point he is combating. A "general principle" of the relevant kind would be given by a statement of the form:

(*) Proposition P is necessary exactly if P has property φ,

for some property φ. Of course, φ must be such that we don't have to inspect other worlds to determine whether a proposition instantiates that property. Otherwise, (*) would not give us a way to avoid having to go to other worlds to determine whether P is necessary. So φ is an *intra*-mundane property, as opposed to an *inter*-mundane one. Further, φ cannot itself be the property of being necessary; otherwise (*) becomes a sterile triviality that would be of no use in enabling us to distinguish necessary from non-necessary propositions. So φ must be a non-modal, intra-mundane property had by all and only necessarily true propositions.

But if φ satisfies these requirements, then it becomes unclear why we need the concept of other worlds to explicate the concept of necessary truth. An adequate analysis of modality cannot be viciously circular, and thus cannot analyze modality in terms of itself. (On those grounds, *P is necessarily true iff P is true in all possible worlds* is ruled out, at least as an *analysis* of the concept of necessity—though not necessarily as an illuminating statement *about* that concept.) So an analysis of necessity must be given by a statement that gives a *non*-modal characterization of all and only those propositions that are necessarily true. (*) is just such a statement. Given this, why not say that necessary truth is possession of φ, and that truth in all worlds is a mere symptom of possession of φ? If this line of thought is right, then (*) constitutes an adequate analysis of modality *that doesn't involve other worlds*. Thus, the very existence of the sort of principle that Lewis discusses eliminates the need to understand modality in terms of other worlds. (For further related discussion, see Excursus IV 'On Lewis and Modality', at the end of this article.)

5. Part IV. Hintikka on the relevance of sets of worlds to some problems relating to mental and linguistic content

5.1 Hintikka has shown how PWS can be of great assistance in the study of propositional attitudes and mental content. The heart of Hintikka's work here lies in the following statement:

(H) Smith believes P exactly if P is the case in every world compatible with what Smith believes.

Smith believes that snow is white exactly if, in every world compatible with Smith's belief-system, snow is white. Analogues of H can be constructed for other propositional attitudes.[45]

Considered as an analysis of the concept of belief, H is viciously circular, since the term ''believes'' occurs on both sides of the biconditional. Obviously, Hintikka did not mean for H to be an analysis of the concept of belief, but rather as an attempt to show that the contents of our beliefs can be seen as being individuated in terms of sets of worlds.[46]

Looked at from this viewpoint, is H a success? There are some reasons to think not. First of all, H isn't true. The class of worlds compatible with the belief that

(*) triangles have three sides

is identical with the class of worlds compatible with the belief that

(**) there are continuous functions that cannot be differentiated at any point.

But a person could certainly believe (*) without believing (**). So supposing that Smith knows (*) but not (**), the class of worlds compatible with Smith's belief that (*) is identical with the class of worlds compatible with a belief in (**). From this it follows straightforwardly that H is false.

Beliefs are thus individuated more finely than H allows.[47] This reflects a fact about the objects of belief, that is, about propositions. If Smith believes (*), the concept of a triangle is a constituent of the proposition he believes; but this is not the case if he believes (**). (In this context, by a ''concept'' I mean a non-psychological entity: the meaning of a predicate.)

To deal with this, we must take care not to strip beliefs and propositions of their individuating constituent-structure. If we wish to continue to operate within a framework at all like that involved in Hintikka's analysis – that is, if we wish to operate within a PWS-framework – we must see propositions as functions from worlds to truth-values (or, equivalently, as sets of worlds). Given these points, we must say that, even though (*) and (**) are both functions that generate the same ordered pairs, the *way* they do so differs. (In one case, the property or concept *triangle* is involved in a certain way; in the other, it is not thus involved ...) In other words, we must take an *intensionalist* view of those functions.

But if we go that route, then the content of Smith's belief is no longer a class of worlds, but is rather a *structure* consisting of concepts like *triangle, three*, and so on. In general, if we go the route just proposed, what becomes relevant to belief-individuation are the structures that generate the assignments of truth-values to worlds. Those assignments themselves drop out, along with the worlds they involve.

[45] Lewis incorporated these views into his work. For example, see Lewis (1986:123).

[46] Hintikka himself (1969:156) says that they are not meant to constitute analyses, but only elucidations.

[47] Hintikka (1969:156) acknowledges this problem. But he says that it is ''easily parried'' by considering points he makes in his paper ''Are Logical Truths Tautologies?'' (Hintikka 1973:150–173). This seems to me an over-statement. In that paper, the solution given to the problem in question involves treating worlds as sets of propositions (state descriptions), and it makes heavy use of the fact that there are internal, structural differences between analytically equivalent propositions. But, in that case, what becomes relevant to the individuation of propositional attitudes are the internal properties of propositions. The role of worlds in attitude-individuation becomes marginal or non-existent. (That is why, given two propositions that are true in the same worlds, one can believe the one and disbelieve the other. It seems, then, that beliefs are individuated *wholly* in terms of the internal properties of propositions, and to no degree in terms of the sets of worlds where they are true.) This is not to mention the difficulties previously discussed involved in identifying worlds with sets of propositions.

5.2 By itself, this does not mean that it is wrong to see sets of worlds as having a key role in the individuation of mental content. The concepts composing (*) and (**) can *themselves* be seen as functions involving worlds. For example, the concept *triangle* might be seen as a function that pairs off each world with the set of things in it that are triangular. Other concepts would be seen in similar terms. (See Lewis 1986:56.)

Supposing that the approach just described is correct, the functions of which (*) is composed are not identical with the functions of which (**) is composed. Thus, the approach in question is able to distinguish between (*) and (**) and, in general, between distinct but analytically equivalent propositions. Each of (*) and (**) is a function (albeit a highly articulated one) from worlds to truth-values; and both of those propositions assign the same truth-values to the same worlds. But they make those assignments in different ways; and that is why believing (*) is different from believing (**). So it seems that, contrary to what we argued a moment ago, we *can* continue to see mental content as being individuated in terms of functions involving worlds and, therefore, in terms of (inter alia) sets of worlds.[48]

But the problem in question merely recrudesces. Viewed in the manner proposed in the last two paragraphs, the concepts *even prime* and *predecessor of three* will generate exactly the same ordered pairs. At the same time, they are obviously distinct concepts (at least from the viewpoint of the individuation of mental content: somebody who believes *two is the predecessor of three* doesn't necessarily believe *two is the even prime*). Consequently, if we view these concepts as functions involving worlds, then we must see those functions as being individuated not by the sets of pairs they generate, but rather by their internal compositions. (See Lewis, 1986:56.) The one does, while the other does not, involve the concept *predecessor* in a certain way. The one does, while the other does not, involve the concept *prime* in a certain way. For those reasons, and others like them, those functions are distinct. In general, if we wish to identify concepts with functions, then in order to distinguish necessarily co-extensive concepts (e.g. *even prime/predecessor of three*), we must take an intensionalist view of those functions.

But then, as before, what becomes relevant to the individuation of mental content is not the set of ordered pairs generated by those functions, but only the internal structures of those functions. The ordered pairs generated, and the worlds involved in those ordered pairs, drop out. When we want to know whether little Timmy believes *two is the predecessor of three* – as opposed to *two is the even prime* or *triangles have three sides* or *there are continuous functions that can nowhere be differentiated* ... – we don't look to see in what worlds Timmy's belief is true. That procedure won't discriminate among these various candidate beliefs. We don't even look to see at the pairings generated by the functions that are (supposedly) identical with the concepts constitutive of the relevant propositions. That procedure won't distinguish between *two is the even prime* and *two is the predecessor of three.* To adequately individuate Timmy's mental contents, we must look to the *structures* of the *concepts* composing the possible objects of his belief (and we must also, of course, look at the structures of the propositions themselves). So, by itself, the set of worlds where Timmy's beliefs are true is at multiple removes from being able to adequately individuate Timmy's mental contents. In fact, that set is idle in terms of content-individuation: what is doing all the work is the apparatus that *generates*, but is distinct from, that set of worlds.

[48] This is Lewis's (1986:56) approach to the problem being discussed.

5.3 As a way of combating this argument, an advocate of PWS could maintain that *ultimately* we arrive at simple concepts that have no internal composition. The idea would be that, even though the concepts *even prime* and *predecessor of three* obviously have structure, leading to the problem just discussed, the same is not true of the *ultimate* constituents of these concepts. So even though *even prime* is a complex concept that decomposes into *even* and *prime*; and even though (orthography notwithstanding), the concepts *even* and *prime* are, in their turn, complex (since, for example, *even* decomposes into *two* and *divisible* and *number* . . .), nonetheless, if we take our conceptual analysis far enough, we *eventually* arrive at some set of concepts $C_1 \ldots C_n$ such that the concept *even prime* is built out of $C_1 \ldots C_n$ and such that, for each i, C_i is *simple* (i.e. is not built out of other concepts). So, the idea would be, *those* ultimate concepts are identical with functions (involving worlds) that, lacking as they do any internal structure, are to be individuated entirely in terms of the ordered pairs they generate. In general, complex concepts must *ultimately* decompose into simple concepts and, when we are dealing with these simple concepts, there is no possibility of finding a pair of concepts that are distinct but necessarily co-extensive. Thus, when we arrive at these ultimate, simple concepts, the problem we've been dealing with – viz. necessarily co-extensive concepts can be distinct (at least from the standpoint of the individuation of mental content) – altogether disappears.

But there is a reason why we must not accept the viewpoint just described. It is hard to accept the view that there are any concepts that completely lack structure—that there are any ''simple'' or ''ultimate'' or ''primitive'' concepts. In other words, it is hard to believe that there is any set of concepts $C_1 \ldots C_n$ meeting the conditions described in the last paragraph; and these days the sort of atomism presupposed by the view there are such concepts is widely rejected.[49] We've already seen why. Given many, if not all, concepts *F*, there are concepts F_1, F_2, . . . such that, for each i, F_i is not identical with *not-F*, but such that *x has* F_i is nonetheless incompatible with *x has F*. These incompatibilities presumably reflect facts about the structure of *F*. So it seems unlikely that we could ever produce the ''ultimate'' concepts needed by the view we are considering.[50]

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[49] Fodor (1998) is a conspicuous exception.

[50] The argument just given presupposes that concepts typically have analytic structure. But some (most notably Fodor, 1998) argue that *no* concepts have analytic structure. (Fodor allows that there are a few trivial exceptions to this principle. For example, he allows that the concept *large brown cow* has analytic structure, the same being true of all other concepts that are artificially *constructed* out of other concepts.) If that sort of conceptual atomism is correct, then the argument that I just gave would be scuttled. It should be noted that opponents of the analytic-synthetic distinction are committed to the idea that concepts do not, as a rule, have any analytic structure.

But there are two reasons why it is deeply suspect that PWS – a doctrine about *modality* – would rely on a denial of the analytic-synthetic distinction. First, it is, to say the least, a matter of great controversy whether it *is* correct to deny that there is a legitimate analytic-synthetic distinction. Presumably it is analytic that ''x is a square'' entails ''x has four sides'', and presumably it is analytic that ''x is an instance of knowledge'' entails ''x is a belief.'' If these presumptions are correct, then there is an analytic-synthetic distinction, and concepts do have analytic structure.

Second, the denial of the analytic-synthetic distinction, i.e. the denial of analytic truth, would seem to be much more in keeping with a nihilistic attitude towards modality than with a doctrine, like PWS, that clearly has a non-nihilistic attitude towards it. After all, once analytic truth is taken away, one of the main sources of necessary truth has been abandoned. (It is worth noting that Quine – the great opponent of the analytic-synthetic distinction – had a virulently antagonistic attitude towards modality. See Quine, 1960.)

Also, my guess is that the denial of the analytic-synthetic distinction would wreak all manner of havoc on the internal structure of many versions of PWS, especially PWS_E. So even if my argument is misguided – even there is a set of concepts $C_1 \ldots C_n$ satisfying the requirements in question – it is less than clear whether that ultimately helps PWS.

5.4 These issues reflect a more general problem with PWS.[51] That doctrine tries to reduce almost everything – propositions, properties, even individuals – to functions. But, as we've seen, if we are extensionalist about those functions, then distinct propositions and properties end up collapsing into one another. To prevent that, we must take an intensionalist view of those functions. But in that case, what becomes important is no longer the set of ordered pairs, or the class of objects, associated with those functions; rather, it is the way those classes are generated. The *extensions* of those functions, and the worlds they involve, are marginalized. The *intensions* of those functions are what becomes important.

The heart of PWS is the belief that extensions can take the place of intensions—that, for example, sets can take the place of mysterious things like properties and meanings. So one is giving up on PWS if one takes an intensionalist view of functions. But if one doesn't take such a view, then one is stuck with a doctrine that cannot distinguish *triangles have three sides* from *there are continuous functions that cannot be differentiated at any point.*

5.5 Hintikka on substitution-failures

These points help us assess one of Hintikka's many brilliant applications of PWS to semantics. Consider the expressions ''the inventor of bifocals'' and ''the first postmaster general.'' On the face of it, these seem to be co-referring terms (that refer to Benjamin Franklin). Now consider the following two sentences:

(SBFS) ''Smith believes that the inventor of bifocals snored''
(SIBS) ''Smith believes that the first postmaster general snored.''

(SBFS) and (SIBS) may presumably differ in truth-value (on the de dicto reading). This is a consequence of the fact that (when read de dicto) the underlined expressions in those sentences refer to different propositions.

We are faced with a serious problem here. Presumably, the referent of a referring expression is a function of the referents of its parts. This is sometimes known as the 'Principle of Compositionality'.[52] Supposing that this principle is correct, the underlined part of (SBFS) should co-refer with the underlined part of (SIBS), given that the one is what results when a referring term in the other is replaced with a co-referring term. Russell (1919) dealt with this by saying that definite descriptions are not singular terms. Frege (1892) dealt with it by saying that, in contexts like the ones discussed here, those expressions refer to their *senses*, not to their ''ordinary referents.''[53] So in (SIBS), ''the inventor of bifocals'' refers to a *sense* (the concept *bifocal inventor*, or some such), not to a person.

While both of these views have merit, neither is entirely consistent with our intuitions. Hintikka (1962) proposed a brilliant alternative. We see the occurrences of the definite descriptions in (SBFS) and (SIBS) as being what they seem to be: expressions that refer to individuals—not quantifiers, and not expressions that refer to senses. But the individuals referred to needn't belong to the same world. (SIBS) is true only if there is no world compatible with what Smith believes such that the inventor of bifocals *in that world* snored. It

[51] The points made in this paragraph and the next are similar to some made in Bealer (1998).

[52] This principle was stressed by Frege (1892).

[53] Drawing on insights due to Strawson, Recanati, and Kaplan, I try to deal with this problem in a very different way. See my forthcoming *Conceptual Atomism and the Computational Theory of Mind* (John Benjamins) and also my review of Bezuidenhout & Reimer *Descriptions and Beyond* (Kuczynski, 2006).

is irrelevant to the truth of (SIBS) if the *actual* inventor of bifocals (Franklin) snored (though that is obviously relevant to the truth of what Smith himself believes). So we must see the definite description in (SIBS) as referring not to Franklin, but to some bifocal-inventor in another world.[54] The same thing *mutatis mutandis* applies to the definite description in (SBFS). Given this, there is no expectation that those definite descriptions should *co*-refer. Nor is there any reason to adopt the views taken by Frege or Russell.

There is one problem with this otherwise estimable analysis. Consider the following sentences:

(SEP) "Smith believes that the even prime is less than ten."
(SAI) "Smith believes that the unique number n such that $n = 2$ iff arithmetic is incomplete and $n = 3$ otherwise, is less than ten."

The underlined definite descriptions co-refer; moreover, they refer to the same individuals in every world. So Hintikka's method cannot deal with the (apparent[55]) difference in truth-value between these two sentences.[56]

[54] See Hintikka (1969:96–98). Also, consider Hintikka's (1962:102) statement: "Seen in this light, the failure of referential transparency is due to the possibility that two names or other singular terms which *de facto* refer to one and the same object (or person) are not known (or believed) by someone by someone to do so and that they will refer to different objects (or persons) in some of the 'possible worlds' we have to discuss (explicitly or implicitly) in order to discuss what he knows or believes and what he does not. The referential opacity here is not due to anything strange happening to the ways in which our singular terms refer to objects nor to anything unusual about the objects to which they purport to refer. It is simply and solely due to the fact that that we have to consider more than one way in which they could refer (or fail to refer) to objects. What we have to deal with here is therefore not so much a failure of referentiality as a kind of *multiple referentiality.*" (Hintikka's emphasis.)

[55] I say "apparent" because, as I argue elsewhere, when we take into account a number of foundational distinctions – including, but not limited to, the distinction between expression-types and expression-tokens, and the distinction between literal and implied meaning – we must rethink what might otherwise appear to be obviously true, even truistic, viewpoints in semantics.

[56] At this point we must ask a foundational question: what does Hintikka mean by the term "possible world"? Hintikka straightforwardly acknowledges that he must answer this question, and he gives a clear answer. First, by a "possible world", Hintikka does not mean anything like our world. He explicitly says that, as he is using the term "possible world", the truth of statements like "Socrates was a soldier in some possible world" does *not* license the existential: "there is some world W such Socrates is a soldier in W." Borrowing a distinction of Quine's, Hintikka says that possible worlds are part of our "ideology" but not of our "ontology", meaning that they are part of the conceptual machinery by means of which we understand the world, and are not part of that world itself. Hence, the illegitimacy of the existential inference just discussed. See Hintikka (1969:105, 108).

What are we to say about this? Concepts in the *psychological* sense come and go with every human birth and death. But facts about modality are invariant with respect to such changes. The same is therefore true of possible worlds, supposing that, as Hintikka holds, modal truths register facts about them. Possible worlds must be public, non-psychological entities. If possible worlds are to be a part of our ideology, but not our ontology, then presumably they have a status somewhat like that assigned to theoretical entities by those who have an anti-realist view of such things. So possible worlds would be as public as anything posited by any theory, even though they wouldn't really exist. At the same time, their *supposed* existence would have some kind of explanatory utility – a utility similar, perhaps, to that of mass-points and frictionless planes.

But if that is the right view of possible worlds, then we are conceding that they are ultimately *not* necessary for an understanding of modality. The positivists held that statements about unobservables were eliminable in favor of statements about observables. This is what their anti-realism about unobservables amounts to. Similarly, if we take an anti-realist view of possible worlds, then presumably they don't have any enduring explanatory role to play. So it isn't clear how Hintikka's consignment of possible worlds to our ideology, as opposed to our ontology, could be consistent with the belief that they have a lasting place in our understanding of modality.

We saw earlier that mental content cannot be individuated strictly in terms of sets of worlds. Even though there is no possible world where the concepts *even prime* and *unique number n such that n = 2 iff arithmetic is incomplete and n = 3 otherwise* differ in extension, Smith can believe that x falls under the one concept while not believing that it falls under the other. The *semantic* fact that (SAI) and (SEP) differ in meaning reflects this fact about the individuation of mental content. We may thus conclude that, since sets of worlds are inadequate for the individuation of either mental content or linguistic (semantic) meaning, at least some aspects of Hintikka's important work on mental and semantic content are in jeopardy.

6. Part V. Lewis on the relevance of worlds to the analysis of counterfactual truth

6.1 David Lewis has attempted to show that the concept of counterfactual truth can be understood in terms of the concept of a possible world. In this section, I will argue that Lewis' view is fallacious and, further, that the problems with it expose problems with PWS additional to those already considered.

Here is the essence of Lewis' view. Suppose that, in actuality, Smith shot Jones, thereby killing him. Given this, consider the following counterfactual:

(SJ) If Smith had not shot Jones, then Jones would now be in good health.

According to Lewis (1973:13), (SJ) is true exactly if Jones is in good health in any world W such that, in W, Smith does not shoot Jones, and such that W is as much like our world as that last fact allows it to be.[57]

Though initially plausible, Lewis' analysis is not without problems. But we must make some preliminary points before we can discuss these problems. First of all, a theory of counterfactuals should not be revisionist, i.e. it should not require us to regard as false any counterfactuals that we pre-theoretically regard as true, or to regard as true any counterfactuals that we pre-theoretically regard as false.

There is a related point. While it may be *true* that the world is indeterministic, a theory of counterfactuals cannot *require* this. If it is decisively established in ten years that the world *is* deterministic, does that mean all of the counterfactuals that we now believe true – e.g. "if Clinton had resigned, Gore would have become president" – are false? No. A determinist is not necessarily guilty of incoherence in virtue of believing that counterfactual to be true. There is a corollary. *Given only* that the counterfactual just stated is true, it cannot be inferred that the world is *in*deterministic. So while it may be *true* that the world is indeterministic, a theory of counterfactuals cannot *demand* that this be the case. In general, a theory of counterfactuals cannot demand that open empirical issues be resolved a certain way.

We must make one last preliminary point. Suppose that, as Lewis maintains, (SJ) is true in virtue of the occurrences in some other world W. W must be governed by the same laws as our world. If the laws operative in W are different from those operative here, then perhaps Smith will become injured or dead as a result of *not* being shot. Also, it seems unlikely that a world

[57] Lewis (1973:3). It seems to me that the presence of the term "allows" constitutes vicious circularity (as would the presence of a similar term, like "permits"–the term that Lewis uses). After all, what is "allowed" is what is possible; and the concept of what is "allowed" itself has counterfactual content. I leave it open whether this circularity can be removed through judicious rephrasing.

with different physical laws would comprise *any* objects even remotely like Smith. If two worlds differ in their laws, they will differ dramatically in respect of what is in them. (This is a point we will revisit.) In general, the worlds that validate our counterfactuals must be governed by the same laws as our world, except in the atypical case where the counterfactual in question is a counternomic proposition.[58]

In light of these points, let us examine Lewis' analysis of counterfactuals. For the sake of argument, suppose that (SJ) is a true counterfactual. Let E be the event of Smith's shooting Jones, and let $C_1 \ldots C_n$ be the antecedents of E. (So E is an event that actually, i.e. in our world, occurred; and $C_1 \ldots C_n$ are the conditions that actually obtained just prior to E's occurrence.) Finally, let W be a world where Smith does not shoot Jones, but that is as much like our world as that fact permits it to be. (So E does *not* occur in W.)

Trivially, either our world is deterministic or it isn't. For the sake of argument, let us suppose that our world is deterministic, and see what the consequences are for Lewis' argument. After that, we will consider the consequences for Lewis' analysis of supposing that our world is *in*deterministic.

Supposing that our world is deterministic, then for reasons given a moment ago, W must be deterministic as well. For obvious reasons, this means that there must be some i such that C_i does not occur in W; and, for analogues of those same reasons, there must be some j such that C_j also does not occur in W, where C_j is some antecedent of C_i; and there must be some k, such that C_k does not occur in W, where C_k is one of the antecedents of C_j—and so on, into the most remote recesses of W's past.[59] For obvious reasons, each of these differences ramifies into others. Consequently, W will be *very* different from our world—so different that it can be doubted whether Jones even exists in W, let alone in good health.

6.2 Lewis (1973) acknowledges the existence of this very problem, and suggests a plausible way of dealing with it. Suppose that, in W, $C_1 \ldots C_n$ obtain but that, because of a *miracle*, they don't eventuate in E. Thus, Jones remains in good health in W, and W's past is (almost) exactly like the past of this world. Thus, the occurrences in W *do* validate (SJ), and the criticism that we just put forth is nullified.

Before we can evaluate this maneuver of Lewis', we must first make it clear what it involves. Suppose that, under the conditions in question, Smith's trigger finger is supposed, as a matter of natural law, to do X as opposed to Y. Lewis takes it for granted that the relevant laws and forces can be put out of commission, allowing Smith's finger to do Y. This presupposes that the finger is entirely distinct from the forces governing its behavior. On the one hand, there is the finger; on the other hand, there are the various causal laws that govern it; and the two are quite distinct. In general, we can vary the causal laws while keeping the objects they govern the same.

This is a natural, even a standard, way of thinking about physical law. But it is, I believe, one that cannot be accepted. Physical objects *are* law-governed sequences of events, the same being true of anything that endures for more than an instant (see Russell, 1927). In fact, the notion of *enduring* is itself a causal notion, and thus has embedded within it the concept of

[58] An example of a counternomic proposition would be: *if there were no gravity, then my desk would now be floating.*

[59] Strictly speaking, if we really believe that occurrences in other worlds validate (SJ), then we should speak of *counterparts* of $C_1 \ldots C_n$ occurring in other worlds, not of those events *per se.* (In any case, this is, as we discussed earlier, what Lewis would say.) But in this context, if only for expository reasons, let us prescind from that fact. It is easy enough to make the terminological changes demanded by counterpart theory.

natural law (Russell, ibid.).[60] If this is right, then laws are internal to the states of affairs that they govern, and an object can no more be separated from the forces that govern it than the Cheshire cat's grin can be removed from the cat itself. The world seems to be nomic through and through; there doesn't seem to be any anomic residue—there doesn't seem to be anything that is *beneath* the reach of natural law.[61] Supposing that this is true, it is at best an open question whether there is *any* sense in which states of affairs can be separated from the laws that govern them and, consequently, whether there is any sense in which miracles are possible.[62]

6.3 But even if we leave this question aside, Lewis' use of miracles is questionable. Consider the counterfactual:

(L) If Lincoln had not been assassinated, then some miracle would have occurred (at some time prior to t),

where t is the time at which, in actuality, Lincoln died.

Lewis' proposal requires that, if our world is deterministic, then (L) is true. But, regardless of whether our world turns out to be deterministic or not, (L) doesn't seem to be an intuitively correct counterfactual. So Lewis' proposal demands the truth of counterfactuals that we have no pre-theoretic inclination to regard as true. Thus, Lewis' proposal violates the requirement, earlier discussed, that an analysis of counterfactuals not be revisionist.

Lewis might try to circumvent these problems by saying that our world is *in*deterministic and that, consequently, no miracles need occur in a world that validates (SJ).[63] The idea would be this.[64] Let W_{ID} be an indeterministic world whose history up until time t (the time at which E occurs) is just like ours. Because of said indeterminism, $C_1 \ldots C_n$ don't eventuate in E. Consequently, Jones is in good health in W_{ID}.

This move violates the condition that we discussed before—that, while it may be *true* that our world is indeterministic, a theory of counterfactuals cannot *require* it.

[60] Oftentimes, the concept of temporal succession is *itself* analyzed in causal-nomic terms: event E1 occurs before E2 iff there is a possible or actual causal process beginning with E1 and ending with E2. See Reichenbach (1958) for one of many advocates of this view. See also the very last footnote of Kuczynski (2005b).

[61] See Kuczynski (2005b) for a fuller discussion of the legitimacy of the concept of a suspension of natural law.

[62] Here we must make a point in Lewis' defense. Given a certain conception of natural law, there is a clear distinction between the laws, on the one hand, and the objects and states of affairs governed thereby, on the other. According to Hume (2000), laws are just regularities among states of affairs. If Hume's analysis is to avoid vicious circularity, states of affairs cannot themselves be seen in nomic terms. Otherwise laws are analyzed in terms of states of affairs, and states of affairs are, in their turn, analyzed in terms of law. So if Hume's view is right, then states of affairs are fundamentally anomic, and the criticism we put forth is blocked.

According to Ramsey (1929), laws are features of our description of the world, not of the world itself. Let D be a description of the class of all occurrences, past and future, that combines maximal accuracy with maximal economy. Ramsey says that laws are among the statements constituting D. His view, like Hume's, requires that occurrences be anomic. If occurrences are *themselves* embodiments of law, then laws cannot be analyzed as statements about occurrences. So if Ramsey's view is right, then states of affairs are fundamentally anomic, and the criticism we put forth is blocked.

Significantly, Lewis accepts both Hume's and Ramsey's views. But for many reasons, one of which we have considered, such views are replete with problems. For that reason, they are no longer generally accepted, though they still have some distinguished proponents, e.g. Van Fraassen (1989). It is not to the credit of Lewis' analysis of counterfactuals that it presupposes the truth of such a problematic view.

[63] By a "world that validates (SJ)" I mean a world w such that (SJ) holds in virtue of the occurrences or states of affairs in w.

[64] To my knowledge, this is *not* a path that Lewis in fact takes. Nonetheless, it is worth considering the consequences of taking it, if only for the sake of discursive completeness.

But even if we leave aside this last point, the proposal in question fails. If W_{ID} is sufficiently indeterministic to validate the antecedent of (SJ), it may be sufficiently indeterministic that it falsifies its consequent. Any indeterminism sufficient to allow $C_1 \ldots C_n$ *not* to eventuate in E may be sufficient for the occurrence of various outcomes that falsify the counterfactual in question. The very indeterminism that prevents the trigger from being pulled may also permit the gun to fire accidentally, thereby killing Jones. In that case, the occurrences in W_{ID} would *not* validate (SJ).

To prevent this sort of catastrophe, one would have to start being very specific about the kind of indeterminism that prevails in W_{ID}. That world must be indeterministic *just* enough to prevent $C_1 \ldots C_n$ from *not* eventuating in E. At the same time, W_{ID} mustn't be so indeterministic that these other unwanted events occur.

But it is suspect that we must employ such artifices to identify worlds that validate our counterfactuals, as it suggests that the occurrences in other worlds tend *not* to do so. A hypothesis that is confirmed only by gerrymandered data is a hypothesis that isn't confirmed at all. Lewis' analysis is supposed to have, and initially *appears* to have, a firm basis in our intuition. It forfeits this advantage insofar as it makes such sophisticated and dubious demands of the worlds that, supposedly, validate our counterfactuals.

6.4 The criticisms just stated presuppose that the worlds mentioned in Lewis' analysis of counterfactuals are to be taken as *concrete* entities, and not as sets of propositions. Given this, it might be suggested that those criticisms are voided if we take worlds to be sets of propositions.[65]

But if we take worlds to be sets of propositions, then the analysis of counterfactuals just discussed collapses into the view that for a counterfactual to hold is for some set of propositions to have the right internal (presumably deductive or confirmational) properties; in other words, that analysis collapses into a version of the so-called "meta-linguistic" view of counterfactuals. But the very raison d'être for a possible-worlds approach is to avoid the supposed inadequacies of the meta-linguistic approach.[66]

6.5 Previously, we saw a number of reasons to reject the identification of possible truth with truth in some alternative world. Given the points just made in connection with Lewis' analysis of counterfactuals, we find additional reasons to reject that analysis of modality.

Consider a particular chair. That chair is not a simple object. Every nanosecond of its existence involves innumerable displacements of mass-energy; and every property had by the chair is identical with, or supervenient on, some property had by some multiplicity of such displacements.[67] In general, objects are identical with, or supervene on, causal sequences—series of causally linked states of affairs. (Henceforth, I will say simply that objects are

[65] In Kuczynski (2005b), I argue that counterfactuals *do* hold in virtue of inter-propositional relations. In agreement with Lewis himself, I regard such a view as being opposed to the one espoused by Lewis.

[66] See Lewis (1973:65–77). Lewis makes it very clear that he wishes the word "world" to be taken literally.

[67] One doesn't want to say that the chair is *identical* with a particular causal sequence. After all, the chair *might* not have had exactly the properties that it does have. You *might* not have spilled your coffee on it; it *might* not have been scratched by the movers; and so on. But if we let S be the series of mass-energy displacements that in fact composes the chair, there is no world where S exists but where the chair does not. So every fact about the chair *supervenes* on some fact about S. In general, every fact about any material object is either identical with, or supervenient on, some fact about some causal-series. See Wiggins (1968) for the classic exposition of the distinction between realization (or supervenience), on the one hand, and identity, on the other.

identical with causal sequences, since the distinction between identity and supervenience is not relevant in this context.)

Let S be the series of mass-energy displacements that, in actuality, compose the chair. Supposing that S is governed by physical laws $L_1 \ldots L_n$, it is presumably an essential fact about S that it is governed by *those* laws, and not others. So it makes little or no sense to say that S could exist in a world where physical laws are not the same as they are in this world. In general, it makes little sense to say of any *actual* causal sequence, or therefore of any object, that it *would* exist in a world where causal laws are different. (See Kripke, 1980:123–144 for similar remarks.).

Concepts like *electron, proton*, and so forth, correspond to fundamental nomic categories—the categories in terms of which the most fundamental causal laws are to be delineated. Supposing that $L_1 \ldots L_m$ are the laws of physics, it is therefore perilously close to absurd to say that there could be electrons or protons in a world governed by laws different from those that govern our world. (See Pap, 1958, Kripke (1980:123–144).) It thus makes little sense to say that a world governed by different physical laws would comprise electrons or protons or any of the micro-particles found in our world.[68]

It is very hard to see how a world that comprised none of the same micro-entities as our world could comprise any of the same macro-entities. It follows that only a world nomically identical with ours could comprise any of the same macro-entities or, therefore, any of the same macro-*events* as ours. Only a world nomically identical with ours can comprise Socrates or the event of his drinking hemlock.

Here we must head off a confusion. It is presumably a contingent fact that there is gold. But it is not a contingent fact that *this* particular gold object exists only in worlds where there is gold. As Kripke (1980:123–126) emphasized, *given* that this object (e.g. my pen) is made of gold, there is no possible world where it exists but where gold doesn't. Similarly, it may be a contingent fact that $L_1 \ldots L_m$ are the laws governing our world. But *given* that the chair's existence is sustained by the operation of those particular laws, there is no possible world governed by different laws where that chair exists.

Let us move onto the next step of our argument. It seems a datum that the proposition

(K) John F. Kennedy lived past the age of seventy

is only contingently false. According to PWS, that is because there is some world W where Kennedy *did* live past the age of seventy. As we previously noted, objects are causal sequences. So if the PWS-analysis of possibility is to be correct, W must contain at least some of the same causal sequences found in our world, and must therefore be governed by the same causal laws as our world. At the same time, W cannot contain *precisely* the same causal sequences as our world. Otherwise Kennedy will *not* live past the age of seventy in W, foiling PWS's identification of (K)'s being possibly true (in our world) with its being true in W.

Causal sequences are individuated by their mutual relations. Once again, consider S (the causal sequence that realizes the chair previously discussed). That causal sequence resulted from many others, e.g. the activities of certain workmen, the tree that yielded the wood of which it is made, the various particles composing the ground that fertilized that tree, the

[68] This does not mean that *there are electrons* (*or protons or muons* ...) has as an *analytic* consequence any true proposition of the form $L_1 \ldots L_m$ *are the laws that govern the physical world*. Rather, it means that some necessities are non-analytic. See Kripke (1980:123–144).

stellar events that yielded those particles, and so on. Any world that lacks enough of these other causal sequences will *ipso facto* lack S. Surely it makes no sense to say that S could exist in a world where the sequences that led to its existence do not. (See Kripke, 1980:123–126.) A corollary is that any world that comprises S will *ipso facto* comprise these other causal sequences, or at least a great many of them. The individuation-conditions of the causal sequences composing objects must be understood in relational, and therefore holistic, terms. Thus, in so far as W comprises any of the same causal sequences as our world – in so far as it has causal sequences corresponding to John F. Kennedy, Joseph Kennedy Sr., the White House, the American political establishment, the nation of Ireland, and so on – it must be extremely similar to our world.

At the same time, if W is to comprise a Kennedy who lives past the age of seventy, W must comprise many causal sequences that are no part of this world. But for the reasons just given, it is at best an open question whether we can tinker with the events in another world just enough to ensure that Kennedy lives past seventy in that world, while not tinkering with them so much that it fails to meet the conditions on which Kennedy's existence is constitutively dependent.

In fact, to adjudicate this very question, we must *already* have a clear understanding of the relevant *modal* principles—of the principles telling us exactly how different an object's origins could have been, and telling us exactly how the degree of difference is to be measured. So in order to settle the question whether it is even coherent to posit the existence of a world like W, we must already employ the modal principles that, according to PWS, are to be understood *in terms of* the existence of such worlds. In general, the modal status of the worlds needed by PWS is itself a substantive modal question; and on pain of vicious circularity, that question cannot *itself* be answered within a possible-worlds framework, since what is in question is the very coherence of such a framework.

We saw earlier that Lewis' analysis of counterfactuals presupposes that the world is permutation-friendly: given any event E that actually occurs, there is a world that doesn't comprise E but that is otherwise very similar to our world. We further saw that, given some plausible views concerning causality, that presupposition may well be false.

What is true of Lewis' analysis of counterfactuals appears to be true of the PWS-analysis of modality. That analysis presupposes that there is a world where Kennedy lives past seventy but is otherwise extremely similar to our world. So that analysis presupposes that the world is highly permutation-friendly. We have seen that, given some reasonable views concerning object-individuation, that presupposition may well be false. The very identities of objects are constitutively linked with many of their causal liaisons. This suggests that any world that is different enough from ours to comprise a Kennedy who lives past seventy may well be *so* different that it cannot comprise a Kennedy to begin with. In fact, it suggests that such a world will necessarily be *systemically* different from ours, and may therefore fail to meet the conditions constitutively necessary for the existence of many, or perhaps even any, of the objects found in our world.

Supposing that this reasoning is on the mark, there are two paths we can take. On the one hand, we can say that (K) is *necessarily* false. On the other hand, we can say that the attempt to understand modality in terms of other worlds is doomed to failure, the reason being that it falsely says of (K) that it is necessarily false.

As I said earlier, it seems a datum that (K) is *contingently* false. In any case, it is obviously not in the same category as $1 + 1 = 4$ or *water is not* H_2O; and this difference is appropriately marked by saying that (K) is contingently false, whereas those others are necessarily false. So

unless we are willing to take the revisionist approach of saying that (K) is *necessarily* false, and is thus in the same modal category as *1 + 1 = 4*, we must reject the attempt to understand possibility, and therefore necessity, in terms of other worlds. Once again, we find that PWS demands a revision of strongly held modal intuitions.

It seems, in fact, that the problems with Lewis' analysis of counterfactuals are merely special cases of these more general problems with PWS. As we saw, it is reasonable to question whether it is coherent to posit the existence of a world sufficiently like ours to comprise Smith and Jones – i.e. sufficiently like ours to validate the antecedent of (SJ) – but where Jones continues to be in good health. In any case, in order to settle the question of whether the concept of such a world is coherent, we must employ the very counterfactual principles that, according to Lewis' analysis, are to be understood *in terms of* such worlds. The proposition *such a world is possible* is equivalent with some proposition of the form *there would be such a world if conditions* $C_1 \ldots C_n$ *were met.* The latter is itself a counterfactual proposition. If that counterfactual is false, then Lewis' analysis is untenable. But Lewis' analysis is untenable even if that counterfactual is correct; for, on pain of vicious circularity, the correctness of that counterfactual could be established only on the basis of a non-Lewisian conception of counterfactual truth. Thus, Lewis' analysis is, at best, parasitic on some other, more fundamental way of understanding counterfactuals.

It should be pointed out that all modal propositions can be seen as counterfactuals. The proposition *(K) is contingently false* is equivalent with *(K) might have been true*; and the latter is equivalent with some proposition of the form *(K) would have been true if conditions* $C_1 \ldots C_n$ *were met.* So it is to be expected that the problems with Lewis' analysis of counterfactuals should correspond to defects with PWS as a whole.

In conclusion, PWS embodies questionable principles concerning object-individuation. Even if those principles were to be vindicated, that could be accomplished only through a modal framework that *didn't* involve alternative worlds. So PWS ends up being false or, at best, parasitic on some other, more fundamental modal framework.

7. Conclusion

If worlds are taken to be representations of some kind, then PWS ends up circularly requiring the very notions that it seeks to analyze. If the term ''world'' is taken literally, so as to avoid this last problem, then PWS demands a revision or outright rejection of our basic views concerning logic and modality. In particular, propositions that we know to be contingent – e.g. those expressed by utterances of ''Mozart wrote over forty symphonies'' and ''John is now making tea'' – are put in the same modal category as that expressed by ''1 + 1 = 2.'' In either case, we see, as I said initially, how possible world semantics, despite its obvious merits, appears to lead us into conundrums of the sort that *ceteris paribus* we should try to avoid. In other words, the jury is still out on PWS—a conclusion we may have to live with for some time to come.

EXCURSUS I. ON NECESSITY, CONTINGENCY, AND THE INFINITE REGRESSIVENESS EMBEDDED IN PWS

As regards my contention that PWS is inconsistent with the existence of contingent propositions, a reviewer at the *Journal of Pragmatics* wisely pointed out that this viewpoint has some antecedents in the literature. I would like to discuss two.

According to Russell (1919:165), necessity and possibility are properties of propositional *functions*, not of propositions proper. Such a function is necessary if true for all values, possible if true for some. So, to use Russell's own example, the propositional function ''if x is a man, then x is mortal'' is necessary, because it is true for all values of the variable. Propositions themselves, says Russell, are either true or false; and there is no sense, he says, in saying that some are contingent while others are necessary.

Before proceeding, there are a few points to make. The propositional function ''if x is a man, then x is mortal'' is not in the same modal category from ''if x is a triangle, then has three sides.'' This is a datum, and Russell's analysis is false since it is inconsistent with this datum. Also, ''Socrates was wise'' can be thought of as a limiting case of a propositional function—one that contains zero free variables. (See Tarski, 1983.) Because that sentence is true, it follows vacuously that it is true for all values of its free variables and thus *is* necessary by Russell's own lights. For similar reasons, it follows that, by Russell's own lights, ''Socrates was not wise'' is necessarily false. Thus, given Russell's own premises, it follows that, contrary to what Russell himself says, necessity and possibility *are* properties of sentences (and propositions).

Like most philosophers, I myself believe that *1 + 1 = 2* is in a different category from *Socrates was wise*, and that this distinction is appropriately marked by describing the first as necessary and the second as contingent. But I also believe that *if* we accept an analysis of modality at all like that put forth by PWS, Russell's position becomes practically inevitable.

Suppose that necessity is identified with truth in all worlds or circumstances. First of all, if that identification is to be taken seriously, and is not to be a disguised way of expressing some very different conception of modality, then there must be different worlds. It would make little sense to say ''necessity is truth in all worlds, but there is only one world'', unless the first conjunct were meant in a highly non-literal fashion.

If there are different worlds, then ''John is tall'' (when assigned the significance that it *actually*, i.e. in our world, has) is true in some of them and false in others—much as *x is tall* is true for some values of x and false for others. Supposing that this is right, ''John is tall'' really means *John is tall in w* (where ''w'' is a variable ranging over worlds), and is thus true for some values of w and false for others. But in that case, ''John is tall'' expresses, not a proposition, but rather a propositional function of the form *John is tall in w*; and in order for that propositional function to yield a genuine proposition, the variable must be replaced with a specific world. Thus, what is meant by ''John is tall'' – namely, the propositional function *John is tall in w*—is necessary if, for all values of w, the result is a truth, and a falsity otherwise. Thus , what is meant by ''John is tall'' is contingent (possibly true, possibly false) because what it expresses is a propositional function that is true for some, but not all, values of its variable. By contrast, what is expressed by ''John is either tall or not tall'' – namely, the propositional function *John is either tall or not tall in w*—is necessary since it is true for all values of the variable; and what is expressed by ''John is tall and not tall''—namely, *John is tall and not tall in w*—is necessarily false, since it is false for all values of the variable.

We would thus have to see every affirmation as involving some kind of relativization to a world, just as in actuality there is always some kind of relativization to a time (though often an implicit one) in our utterances (except in cases of utterances to which temporal considerations are obviously inappropriate, e.g. mathematical statements). So if one said ''Mozart wrote over forty symphonies'', we would have to take the proposition encoded in that utterance to be equivalent with: in *this* world Mozart wrote over forty symphonies. For reasons previously discussed this means that all such utterances would be true in all or no worlds, and thus, by PWS's lights, necessarily true or false.

Thus, if we accept PWS, Russell's counterintuitive analysis of modality is vindicated: necessary truth is truth for all arguments; possible truth is truth for some arguments. (Of course, Russell did not countenance the idea of other worlds. So this must be seen as an extension, not an identification, of Russell's views.)

It seems a datum to me and most others that *bone fide* propositions fall into different modal categories—that some of them are necessary, and others contingent. So we must reject any view that has the consequence that it is propositional functions, not propositions, that have those properties. If the argument put forth in this paper is correct, PWS is in fact such a view.

Leibniz held that all true propositions are necessarily true. His reasoning was as follows. If Caesar crossed the Rubicon, then it is part of the *concept* (not my or anyone else's concept, but *the* concept) of Caesar that he did so. (''[E]very predicate, necessary or contingent, past, present, or future, is comprised in the notion of the subject.''[69]) Of course, I may be able to entertain thoughts about Caesar without knowing that Caesar crossed the Rubicon. But that merely reflects my ignorance of certain features of that concept, not anything about the concept itself. For exactly similar reasons, every fact about Caesar is, for Leibniz, a necessary fact.

The problem with Leibniz's position is not hard to identify. Not every fact about a thing has a purely conceptual basis. Suppose that Smith has as perfect an understanding of the concept *even number* as is humanly possible. Smith will not on that account know that Jones has an even number of cars. That fact about Jones does not have a basis *wholly* in facts about the concept *even number*; it has a basis in empirical, non-conceptual realities. The same consideration applies to Caesar's crossing the Rubicon. In Kuczynski (2005a), I discuss this doctrine of Leibniz's, giving a variant of the argument just presented.

Let us now consider another point that might be made by an advocate of PWS in response to our argument that PWS turns contingent propositions into necessary ones. (I should point out that the need to address this point was indicated to me by an astute reviewer at the *Journal of Pragmatics*. I am following, and building on, that reviewer's suggestions as to how to address this objection.) I will put this objection in the mouth of an imaginary interlocutor:

> ''Your argument involves a confusion concerning the theoretical function of possible worlds. Within the framework of PWS, possible worlds are elements of the metalanguage that gives the semantics of sentences of the object language. Suppose that, in our world (W_1), somebody utters the sentence 'John is tall.' That utterance belongs to the object-language. To say what is meant by that utterance, we must use a meta-language. That meta-language refers to various worlds. The meta-language thus includes statements like: 'the proposition meant by an utterance in a given world W of ''John is tall'' is a function which assigns truth to W, if John is tall in W, and falsity otherwise', and 'an utterance in W of ''John might have been tall'' is true if there is a possible world accessible to W where ''John is tall'' is true.'
>
> ''To avoid various well-known antinomies, we must enforce a rigid distinction between object-language and meta-language. This blocks your argument. That argument asserts that 'John is tall', uttered in W_1, and 'John is tall in W_1' have the same truth-conditions. But 'John is tall' is a sentence of the object-language, whereas 'John is tall' is a sentence of the meta-language. The former is evaluated with respect to the possible worlds referred to in the meta-language. The latter is *not* evaluated with respect to those same worlds. (The latter is either evaluated with respect to worlds described in the meta-meta-language, or it is not

[69] Quoted in Russell (1992:27).

evaluated with respect to possible worlds at all.) So there is no world with respect to which *both* of those utterances can be evaluated. Consequently, there is no world W_1 such that 'John is tall', as uttered in W_1, is true exactly if John is tall in W_1 and such that 'John is tall in W_1' is true exactly if John is tall in W_1. So the equivalence on which your argument rests – that between 'John is tall in W_1' and 'John is tall' (as uttered in W_1) – does not hold. In conclusion, your argument is null and void, since it conflates object-language with meta-language.''

There are several problems with this response. According to it, possible worlds are ''elements of the meta-language.'' But as we saw earlier, PWS needs worlds to be concrete entities. If they are mere representations – e.g. sets of expressions or propositions – then PWS is eviscerated.

The objector might counter-respond by saying that, according to PWS, possible worlds are *not* merely linguistic entities but that, nonetheless, there must not be any expressions in the object-language referring to them. But this counter-response is not entirely satisfying. The concept of a possible world lies at the heart of PWS. Given this, it is odd (as the aforementioned reviewer pointed out to me) that propositions *about* worlds should be permissible only under such special circumstances. If, as PWS requires, there are such things as possible worlds, then it ought to be possible to discuss them without having to sequester statements about them within a special language.

The objector's position has another unwelcome feature. According to that view, the possible worlds with respect to which statements in the meta-language are to be evaluated are different from those with respect to which statements in the object-language are to be evaluated. By an obvious extension of the objector's reasoning, the possible worlds with respect to which statements in the meta-meta-language are to be evaluated are different from those with respect to which statements in the meta-language are to be evaluated. And so on *ad infinitum*. So PWS ends up positing an infinite hierarchy of sets of worlds. But we must question the viability of a theory that has to go to such great lengths to stay afloat. PWS is meant to have a solid footing in our intuitions about modality. But it loses any such footing in so far as it has to posit an infinite hierarchy of infinitely large sets of alternative worlds. This is not to mention that any such *ad hoc* proliferation of theoretical structure is the mark of what Lakatos (1977) referred to as a ''degenerating research program.''

To block the need for this infinite hierarchy, an advocate of PWS might say that modal statements in the meta-language (or, at least, in one of the meta-languages) are *not* to be evaluated with respect to possible worlds. But to take this position would be to admit that modality is ultimately *not* to be understood in terms of the concept of a possible world.

Also, the distinction between object-language and meta-language is not sharply drawn (as the aforementioned reviewer pointed out to me). It seems not to apply to natural languages (as Tarski (1983) and Russell (1908) pointed out), and to apply only to artificial languages—to languages that we construct with the conscious intention of avoiding the antinomies discussed by Tarski and Russell. The objector requires the possibility of an artificial language L that is, on the one hand, rich enough to allow us to make the modal statements that we intuitively wish to make and, on the other hand, is sufficiently well-behaved to avoid the antinomies associated with languages that aren't stratified into object-language and meta-language. But it is an open question whether such a language is a possibility. In any case, even if such a language is possible (as it may well be), it speaks to the frailty of PWS that the viability of its analysis of notions like possibility and necessity – notions that are so central to our thinking – is predicated on the truth of some exotic result in formal semantics.

This would be a good place to discuss another objection that an advocate of PWS might have to my analysis of that doctrine—or, more specifically, to my analysis of PWS_E. (The need to consider this sort of response was made clear to me by the previously mentioned reviewer at the *Journal of Pragmatics*.) When discussing PWS_E, I made the point that we must use modal terms in order to identify the sets of propositions that are to be identified with worlds. Like Lewis (1986:150–153), I concluded that PWS_E was guilty of vicious circularity. But there is a powerful objection to be made to this argument. As before, I will put that objection in the voice of an imaginary spokesperson for PWS:

> ''PWS_E identifies possibility with membership in sets of some kind or other. As you've discussed, the *description* of such a set involves use of a modal term, and this certainly creates the *appearance* of vicious circularity. But those sets do not themselves contain any modal statements. So the structures and relations in terms of which PWS_E identifies possibility are innocent of any modal content. Although we may have to use modal terms to *describe* the PWS_E analysis of modality, that analysis itself is free of any circularity. The appearance to the contrary involves a failure to distinguish the thing described from the description of it—a failure to distinguish meta-language from object-language.
>
> ''Here is an analogy: if you use a computer to write an analysis of the concept of a computer, you are not guilty of circularity; for even though a computer is involved in your *presentation* of your analysis, it is not itself part of the *content* of that analysis.''

Let us make things as simple as possible by conceding everything that the objector says; let's suppose that my argument against PWS_E *does* involve a failure to distinguish PWS_E's analysis of possibility from the mere means used to identify that analysis—a failure, as we might put it, to distinguish meta-language from object-language. Even so, the problem is only pushed back, not eliminated. The purpose of any form of PWS (including PWS_E) is to analyze modal notions. If the objector's point is correct, then PWS_E eliminates them from the object-language only by conceding their ineliminability from the meta-language. But in that case we are simply displacing the problem, not solving it: we are stuck with unanalyzed modal expressions in the meta-language.

For reasons exactly similar to those just given, no progress would be made if we tried to use the notion of a maximal consistent set to analyze the modal terms in the meta-language. We would end up with unanalyzed modal terms in the meta-meta-language. So I don't believe that the circularity in question is merely a reflection of a failure to distinguish the PWS_E analysis of possibility from the means used to describe it.

There is another possible objection to our analysis of PWS that I would now like to discuss.[70] This objection concerns my attempt to show that, given a realistic understanding of the term ''alternative world'', PWS incurs the result that every proposition is necessarily true or necessarily false. Once again, I will put that objection in the mouth of an imaginary advocate of PWS:

> ''Consider the proposition *John is tall in W345*. It seems to me that there is no way, even in principle, to know whether this proposition is true or not. Of course, it is easy to know the truth-value of the proposition *John is tall in some possible world.* (That proposition is true.)

[70] As before, I should point out that the need to address this objection was indicated to me by an astute reviewer – the same as the one previously mentioned – at the *Journal of Pragmatics*. And as before, I am following, and building on, that reviewer's suggestions as to how to address that objection.

> But given any specific world, other than our own, it seems necessarily impossible to assess the truth-value of *John is tall* in that world. Given that fact, it becomes questionable whether, for example, *John is tall in W345* is true or false at all.
>
> ''Even though verificationism is no longer seen as *generally* viable, some still see it as having certain applications. (For example, some have argued that the undecidability of certain mathematical statements warrants the conclusion that we must adopt a kind of verificationism or constructivism – *x is true iff x is (or can be) proven* – with regard to such statements.) Perhaps we've just uncovered yet another application for verificationism.''

Whatever merits this position might have, it doesn't seem to available to a proponent of PWS. The essence of PWS is that there really are other worlds and that there really are facts about them. The kind of verificationism about possible worlds just discussed seems hardly different from an anti-*realism* about them. But an anti-realist about possible worlds isn't really an advocate of PWS.

Consider a further possible response to our argument. (Some basis for this response is found in Plantinga, 1974:91–92). As before, I will put this argument in the voice of an imaginary objector:

> ''Suppose that Socrates has the property of being bald in W_1 and also of being bald in W_2. In that case, there is some property (namely, baldness) that Socrates has in at least two different worlds. That much is uncontroversial. Socrates has the further property of being bald-in-W_1. That is a *different* property from that of being bald. You yourself have said why. Socrates has the property of being bald-in-W_1 in every world, whereas Socrates does not have the property of being bald in every world.
>
> ''An analogue of this point undermines the argument you've given. Consider the proposition: *Socrates is bald in W_1*. Just as the property of being bald must be distinguished from the property of being bald-in-W_1, so the proposition *Socrates is bald* must be distinguished from the proposition *Socrates is bald in W_1*. For reasons that you and Plantinga have given, the latter proposition is true in every world. But just as Socrates is not bald in every world, even though he is bald-in-W_1 in every world, so the proposition *Socrates is bald* is not true in every world, even though the same cannot be said of *Socrates is bald in W*.''

Suppose that you are in W_1 (our world) and you say ''Socrates is bald.'' (For purposes of exposition, let us prescind from the fact that the right sentence would be ''Socrates *was* bald.'') For your statement to be true, it is not enough that there *be* a function F assigning truth to W_1 exactly on the condition that Socrates is bald in W_1. That condition must actually be *satisfied*. The mere *existence* of such a function is compatible with Socrates' *not* being bald in W_1. After all, such a function might assign falsity, or might otherwise fail to assign truth, to W_1.

Given this, suppose for the sake of argument that PWS is right to identify the proposition *Socrates is bald* with a function F of the kind just described (viz. a function that assigns truth to a world exactly if, in that world, Socrates is bald). In that case, if you are in W_1 and you say ''Socrates is bald'', or utter a corresponding sentence of another language, what you are affirming has the same truth-conditions as the proposition:

(*) *F assigns truth to W_1.*

After all, as we discussed, if you are in this world (W_1) and you say ''Socrates is bald'', your statement is true just in case Socrates is bald in *this* world, it being irrelevant whether he is bald in

other worlds. So your statement is true just in case F assigns truth to W_1, and is thus equivalent with (*). Obviously (*) is neither identical nor equivalent with F itself. So if we grant to PWS that the proposition:

(**) *Socrates is bald*

is some function F from worlds to truth-values, then we must hold that what you affirm when you utter ''Socrates was bald'' is distinct from, and not equivalent with, F.

Now we can close the argument. The truth-value of (*) obviously doesn't vary from world to world. If it is true, then (*) is true in *every* world (and, if it is false, then (*) is false in every world). So, just as we argued, if there are multiple different (concrete) worlds, then what you affirm when you utter ''Socrates was bald'' is equivalent with some proposition that is true in all worlds and is therefore, by PWS's lights, necessarily true. Given any contingently true proposition P, an obvious analogue of this argument shows that, by PWS's lights, P turns out to be necessarily true and not-P turns out to be necessarily false. So we must reject PWS, unless we are willing to take the revisionist approach of saying that all true propositions are necessarily true.

There is one last point. As we've discussed, if you are in this world and you utter ''Socrates is bald'', what you are affirming is equivalent with (*), which is neither identical nor equivalent with F. Therefore, if PWS is right to identify (**) with F, then when you say ''Socrates is bald'', what you are affirming is not identical or equivalent with (**). In a word, if PWS is right, then when you utter ''Socrates is bald'', you are not affirming (**). But it seems a datum that (**) is precisely what such an utterance affirms. So, to echo what I said a moment ago, we must reject PWS, unless we are willing to take the revisionist (and implausible) approach of saying that an utterance of ''Socrates is wise'' does *not* affirm the proposition *Socrates is wise.*

EXCURSUS II. BEALER AND THE PROBLEM OF CIRCULARITY

As we saw earlier, Bealer shows that PWS is guilty of a certain kind of vicious circularity. But the circularity in question goes much deeper than Bealer himself indicates. Whenever PWS analyzes a concept, it does so by extensionalizing it: propositions become sets of worlds (or functions characteristic of those sets); properties becomes sets of individuals (or functions characteristic thereof); and the proposition *x has F* becomes the proposition *x is a member of K*, where K is the class of all individuals (including those in other worlds) that have F.

It would thus be no exaggeration to say that PWS cannot analyze what it cannot extensionalize. For the reasons discussed in Section 4.2, *P is necessary* cannot be analyzed as *P falls into C* (where C is the class containing all necessary propositions, and nothing besides). This means that PWS is either forced to take the property of being necessarily true as a primitive, i.e. to regard it as unanalyzable, or that it must analyze it very differently from the way it analyzes other properties.

Of course, the analysis of *P is necessary* typically associated with PWS is *P is true in all worlds*, not *P falls into C.* But if the PWS identification of necessity with truth in all worlds is to harmonize with the PWS analysis of properties, and of intensions generally, then PWS must, at the very least, regard *P is true in all worlds* as being equivalent with *P falls into C.* But PWS does not do so, as I would now like to show.

Since (**) is a member of C, and the property of necessity is a component of (**), we would circularly make (**) be a member of a proper part of itself if we said that being necessary involved being a member of C. So to avoid the circularity discussed by Bealer, PWS must say that *P is a member of C* is *not* equivalent with *P is necessary.* So PWS cannot, without vicious

circularity, regard *P is a member of C* as equivalent with *P is necessary.* Thus, PWS is *not* able to make its identification of necessity with truth in all worlds fit naturally with its general analysis of property instantiation. By itself, this sort of inconsistency is worrisome.

Moreover, it seems a simple fact of logic that *P is a member of C* is equivalent with *P is necessary*. It is thus to the discredit of PWS that it cannot recognize that equivalence (at least not without lapsing into vicious circularity). So PWS proves to be incapable of accommodating a rather basic theorem of logic.

To deal with this, PWS would presumably have to say that the concept of *all* necessary propositions – and therewith the concept of a class such as C – violates some sort of type-theoretic stricture, like the concept of the class of all classes that don't have themselves as members. But if that concept does violate some such stricture (as, I suspect, it does), that is *itself* a strike against PWS, as the following shows.

As we've already discussed, we don't want the word ''necessary'' to become ''systematically ambiguous'' (to use Russell's, (1908) expression) between ''necessary$_1$'', ''necessary$_2$'', and so on, where for each i, *necessary$_i$* is a predicate of propositions of level $_{i-1}$. In light of this, suppose that PWS puts into effect the type-theoretic stratification demanded by the move just proposed. So PWS distinguishes between C_1, C_2, and so on, where for each i, C_i is a class that includes the propositions of level$_{i-1}$ that would intuitively be regarded as necessary. So C_1 would include *1 + 1 = 2*, and C_2 would include *necessarily, 1 + 1 = 2*, and so on.

In that case, for each i, *P is a member of C_i* would be equivalent with *P is necessary*, provided that P was a proposition of the appropriate level. So *necessarily 1 + 1 = 2* would be equivalent with *the proposition 1 + 1 = 2 is a member of C_1*; and *necessarily, necessarily 1 + 1 = 2* would be equivalent with *the proposition that 1 + 1 = 2 is necessary is a member of C_2*; and so on. In this way, PWS would, after a fashion, be able to recognize the presumptive equivalence of *P is a member of C* with *P is necessary.* But this equivalence would be purchased by seeing the three occurrences of ''necessarily'' in ''it is necessarily the case that, necessarily, Socrates is necessarily self-identical'' as having three different (though parallel) meanings. (One would correspond to membership in C_3, the other to membership in C_2, and so on.) But, as we previously discussed, this seems very wrong at an intuitive level. So even though appropriate use of type-theory might enable PWS to circumvent the vicious circularities discussed by Bealer, the result would only be a counter-intuitive splitting of the concept of necessity into a number (an infinite number, actually) of different (though analogous) concepts.

Of course PWS could avoid this problem by choosing *not* to identify necessity with membership in any class. But in that case, as we saw, the PWS analysis of necessity would not be of a piece with its analyses of other properties.

An extension of Bealer's argument makes it clear how deep these problems with PWS are. Consider the property of being false. According to any version of PWS (including PWS*), that property is a function from propositions to truth-values (a function that assigns truth to false propositions and falsity to true propositions) or it is the class of false propositions. Let $\underline{F}$ be that function (or, if you prefer, that class). Of course, some false propositions themselves have the concept of falsehood as a constituent, e.g. *it is a falsehood that Mozart was a composer.* Let P be that proposition. Being false, P itself falls in the class of false propositions, i.e. it falls in $\underline{F}$ (or, if you prefer to think of $\underline{F}$ as a function, P itself is in the domain of $\underline{F}$). So P has the concept of falsehood as a constituent. At the same time, that concept is itself a class that has P as a constituent (or, equivalently, is a function whose domain includes P). So P consists of $\underline{F}$, which in turn consists of P. Unless we are willing to take the heroic step of accepting a non-standard form of set-theory, this is not an acceptable result.

EXCURSUS III. COUNTERPART THEORY AND ESSENTIAL PROPERTIES

Earlier we argued that counterpart-theory is guilty of vicious circularity: the concept of a counterpart is defined in terms of the concept of an ''essential'' property. At the same time, the concept of an ''essential'' property is a modal concept, and thus cannot be non-circularly used in this context.

But given only this point, counterpart-theory might still not be guilty of vicious circularity, as the following line of thought shows. As before, I will put that argument in the mouth of an imaginary interlocutor:

> ''For the sake of argument, suppose that we found a way to understand the concept of essentiality that did not, in its turn, involve the notion of necessity or the notion of a counterpart. (This is not an unreasonable supposition.) In that case, counterpart-theory would *not* be guilty of any vicious circularity in saying that Socrates' counterparts are those things which share his essential properties. So your argument against counterpart-theory would be nullified.''

The objector is right that counterpart-theory wouldn't be guilty of vicious circularity if it turned out that the concept of an essential property could be understood in non-modal terms. But this would not help the counterpart-theorist. If, as the interlocutor's argument requires, we had a *non*-modal characterization of the concept of essentiality, then there would be no need whatsoever for any form of counterpart-theory. For, by supposition, we would no longer need the notion of a counterpart to say what properties Socrates *must* have and, therefore, what properties he might not have. The objector's point liberates counterpart-theory from vicious circularity only by making counterpart-theory completely unnecessary for an understanding of modality.

There is another problem with the proposal that Socrates' counterparts are those things which share his essential properties. Suppose that Socrates parents were A and B. According to the plausible and widely accepted doctrine of the ''essentiality of origins'' – henceforth referred to as ''(EO)'' – it is an *essential* fact about Socrates that these were his parents. (Kripke (1980) gives a clear and powerful statement of this view.) According to counterpart-theory, A and B don't exist in W: only their counterparts do. So, according to counter-part theory, the fact that Socrates' origins are essential to him corresponds to the fact that, in W, the counterparts of A and B were parents of Socrates' counterpart. But who are the counterparts of A and B? Presumably they are the people whose parents were, respectively, the counterparts of the parents of A and the counterparts of the parents of B.

But now we are caught in a circle. EO says: if x has parents y and z, this is an essential fact about x. Counterpart theory says: for this to be an essential fact about x is for the parents of x's counterpart in any world W to be the counterparts of y and z in W. The concept of a counterpart is understood in terms of the concept of same origins; and the concept of same origins is in its understood in terms of notion of a counterpart. Clearly this is viciously circular.

But if we choose *not* to understand the notion of counterpart in terms of the notion of an essential property, how are we to understand it? We could understand it in the way that was proposed earlier: x is Socrates' counterpart in W iff x resembles Socrates more closely than anything else in W, provided that the notion of resemblance is *not* understood in terms of an essential property. But we've already seen the problems with this proposal.

The only remaining option, as Lewis (1986) points out, is to take the counterpart relation as primitive: x just *is* Socrates' counterpart in W; this fact about x does not supervene on x's having

such and such properties—on, for example, x's having such and such parents or on x's being a wise, bald Greek philosopher. But in that case, as Lewis himself (1968:126) says counterpart-theory ceases to have much basis in our intuitions. Suppose that x is somebody in some other world W whose life bears little or no resemblance to mine. It is hard to see why x's fortunes should validate modal or counterfactual claims about me.

There is a problem with counterpart-theory deeper than any thus far discussed. For obvious reasons, if the analysis of counterfactuals given by counterpart-theory is to avoid vicious circularity, then there must be some way of individuating properties, of giving their essences, that does not involve claims about counterparts. But this does not appear to be possible, since the very notion of a property has counterfactual content.

Clarence Lewis (1929) showed that, when we classify a thing as having a particular property – as being wet or cold or solid – we are *ipso facto* making claims about its behavior under counterfactual circumstances. His point applies to almost all of the properties in terms of which we describe and understand spatiotemporal individuals. (I say ''almost'' because there may be a few exceptions to it. For example, it may not apply to *strictly* phenomenal properties.) If this is right, then practically any attribution of a property to anything spatiotemporal has counterfactual content. In that case, for the reasons given in the last paragraph, counterpart-theory is guilty of vicious circularity.

But counterpart-theory fails even if it turns out that *there is* some innocent characterization of things' essential properties. (By an ''innocent'' characterization, I mean one that doesn't use notions like *counterpart* or *necessity* or any other notion that, in this context, would lead to vicious circularity.) As we saw earlier, if there were such a characterization of the concept of an essential property, then we wouldn't need to invoke the notion of an alternative world, or *a fortiori* of a counterpart, to explicate modal propositions. So if the concept of an essential property is to be understood in counterfactual terms, then counterpart-theory is guilty of vicious circularity. If the concept of an essential property is *not* to be thus understood, then the concept of a counterpart becomes irrelevant to modal analysis.

EXCURSUS IV. ON LEWIS AND MODALITY

We previously saw some reason to believe that a proposition is necessarily true wholly in virtue of its internal-structural properties. In connection with this, we saw that a proposition's being true in all worlds is merely a symptom, and not the essence, of its being necessary. Ironically, Lewis' own remarks seem to reinforce the plausibility of such a view, as I would now like to argue.

Lewis says that we discover whether P is necessarily true by employing ''a principle of recombination.'' (See Lewis, 1986:113–114.) The idea seems to be this. P is necessarily true exactly if P's constituents are combined in a certain way, i.e. if P has certain internal, combinatorial features. Of course, we can know that P has such features without leaving this world. Further, by Lewis' own hypothesis, we know that P's having such features is sufficient for P's being true in all worlds. So if P has said structural features, we may correctly conclude that P is true in all worlds.

But in that case, why not analyze ''P is necessary'' as ''P has the aforementioned combinatorial features''? In other words, given Lewis' views on the epistemology of modality – given his point that we know the modal status of a proposition by employing a ''principle of recombination'' – it seems to follow that modality is *not* to be understood in terms of the concept of other worlds.

An illustration may be in order. Consider the proposition

(T) *triangles have three sides.*

(T) is necessarily true. How do we know this? Here is an answer that, while being vague, has some intuitive appeal (and that the present author believes to be correct, at least on one of its delineations). We look at how T's ingredients – the concepts *three*, *triangle, side*, and so on – relate to one another, and at how they are organized in that proposition. On the basis, we can infer that T is true in every world. But supposing that this is correct, why not say that (T)'s being necessarily true consists in its having those internal, structural properties, and that its being true in all other worlds is a symptom or expression of its being necessary, and not the essence of it?

This is what many of us are independently inclined to say. We know that (T) is true in every world because we know that (T) has the right internal properties. This means that we see (T)'s being true in every possible world as a *consequence* of its having those internal properties. In Kuczynski (2005a), I argue on behalf of this view.

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