

Unstructured Content

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I am a structured content guy. I became convinced of the superiority of the structured approach to content in the late 1980s and there is a sense in which I haven't looked back much. Instead, I have devoted my time to trying to figure out exactly how to understand what structured content is. Back in the late 80s and early 90s, it was common for structured proposition theorists to represent structured propositions as n-tuples. For example, in Soames [1987] we find the following:

The proposition expressed by an atomic formula $[Pt_1, \dots, t_n]$ relative to a context C and assignment f is $\langle\langle o_1, \dots, o_n \rangle, P^*\rangle$, where P^* is the property expressed by P , and o_i is the content of t_i relative to C and f .

It seemed to me that representing structured propositions as n-tuples of their constituents raised a dilemma for structured proposition theorists.¹ Either such theorists were claiming that structured propositions *just are* n-tuples of their constituents or they were simply using n-tuples to *represent* or *stand in for* structured propositions. The former claim struck me as quite implausible for reasons I won't rehearse here.² Hence, it seemed to me structured proposition theorists were stuck with the claim that they were simply using n-tuples to represent structured propositions. But this meant that they hadn't yet said what structured propositions really are. Starting in the mid 90s I set out to do that.

Since I spent my time thinking about those issues, I didn't take much time to think carefully about the reasons I abandoned the unstructured conception of content to begin with. Being asked to speak at a conference on unstructured content seemed to me to provide a perfect opportunity to examine what many have thought to be central

¹ As I made clear in King [2007] pp. 7-9.

² See King [2007] pp. 7-9

difficulties with unstructured content and what can be said in response to them. I am also eager to hear what folks here might have to say about these issues that is new. Because of limitations of time, though I will mention what I take to be the four main problems with unstructured content and gesture at what has been said in response, I will only consider one such problem in detail.

Though there are different conceptions of unstructured content, the view I am going to consider is the view that unstructured sentential contents are functions from the domain of possible worlds to $\{0,1\}$. I'll call this conception of content *P(ossible) W(orld) C(ontent)*. I think it is fair to say that PWC has been the most influential theory of unstructured content in recent philosophy of language. So far as I can see, the problems I will discuss arise for views on which unstructured contents are functions from more complex indices—indices that include more features than just a possible world—to $\{0,1\}$. Because Robert Stalnaker has done more than anyone to address the problems I'm going to discuss, as we'll see, a good subtitle for this paper would be *All About Bob*.

The first problem for PWC is that it has trouble saying intuitive things regarding what propositions are about. Since propositions don't have constituents according to PWC, its advocates can't adopt the intuitive claim that propositions are about their constituents. Stalnaker [1984] suggests that using functions from individuals to propositions—propositional functions—one could say that proposition P is about individual a iff P is the value of some propositional function f when it takes the argument a. But he hastens to add that this can't work, since for any individual a and any proposition P, there is a function mapping a to P. He suggests that perhaps we could get better results by somehow limiting our attention to a certain privileged subclass of

propositional functions but he admits doesn't know how to do that. Stalnaker [1999] suggests that according to PWC, a singular proposition is "a proposition whose truth in any given possible world depends on the properties of some particular individual."³ This perhaps gives a limited notion of aboutness for such singular propositions. But, for example, it gives no account of the fact that the following are about George W. and George H.W. Bush, 2 and arithmetic, respectively:

The proposition that if George W. Bush exists, he is the son of George H.W. Bush.

The proposition that 2 is the even prime.

The proposition that arithmetic is incomplete if consistent.

This seems to me at least very counterintuitive.

The second problem with PWC is a problem for many theories of propositions. It is the problem of explaining how/why propositions have truth conditions and so represent the world as being a certain way.⁴ That a thing has truth conditions, that it represents things as being a certain way, seems to be precisely the sort of thing that is not metaphysically basic and requires further explanation. There are certain properties the possession of which seem to call out for further explanation and whose possession seems as though it should be grounded in the possession of "more basic" properties. It may be hard to give a criterion for being such a property, but properties like *being alive*, *believing that snow is white*, and *being morally good* seem to be examples of such properties. *Having truth conditions* seems to be an example as well. When we consider other things that represent, we have the same inclination to explain what possession of that property consists in and how/why the thing in question manages to possess the

³ P. 160.

⁴ See King [2013] p. 82-83.

property. Sentences, minds, maps, and perceptual experiences all represent. And in each case we feel compelled to explain how/why such things manage to do this. Surely it would seem utterly mysterious to adopt the view that e.g. there is no explanation of how/why perceptual experiences represent things as being a certain way because that they do so is metaphysically basic. The feeling one gets when one hears such a view is “how could something like *that* have no further explanation?”. I think we should think that same thing about the claim that propositions have truth conditions. It just isn’t the kind of thing that could have no further explanation.

Now according to PWC, propositions are functions from worlds to exactly two arbitrary elements, say 0 and 1. Stalnaker [1984] makes this point concisely:

A proposition is a function from possible worlds into truth-values...There are just two truth-values—true and false. What are they: mysterious Fregean objects, properties, relations of correspondence and noncorrespondence? The answer is that it does not matter what they are; there is nothing essential to them except that there are exactly two of them.⁵

But why/how would such functions have truth conditions or represent the world as being a certain way? Certainly, there are lots of functions from a set of elements to $\{0,1\}$ or some other pair of arbitrary elements that don’t have truth conditions. But then why do functions from a set of *worlds* to $\{1,0\}$ have truth conditions? There just isn’t anything in the functions themselves, taken independently of minds and languages, that determines that they have truth conditions.

Further, it does not seem like the functions taken independently of minds and languages determine specific truth conditions either. If a function maps w to 1, is it true or false at w ? Recall that Stalnaker thinks that it doesn’t matter what T and F are so long as there are exactly two of them. Ok, let’s use L.A. and New York instead. If a function

⁵ P. 2

maps w to L.A., is it true or false at w ? Surely, it is hard to take this question seriously—as a question that has some determinate answer in the absence of stipulation.

So the second problem for PWC is that it can't explain why propositions have truth conditions generally, nor why a given proposition has the specific truth conditions it does.

Robert Stalnaker [2012] has objected to this way of putting the second problem for PWC as follows:

One central problem for any theory of propositions, King argues, is to explain their capacity to “represent how the world is,” to explain “how propositions have truth conditions.” But on the account of propositions I will defend, propositions *are* truth conditions.⁶

Stalnaker suggests here that since propositions don't *have* truth conditions but rather *are* truth conditions, there is no need to explain their having truth conditions. They don't have them. I have to say I'm not sure I understand what Stalnaker means here. Further later in the same work he says that propositions *have* truth conditions:

...however propositions are individuated, all who are willing to talk of propositions at all should agree that propositions, as they understand them, *have* truth conditions...⁷

And in earlier work Stalnaker was happy to say that propositions represent the world as being a certain way:

...an act of assertion is, among other things, the expression of a proposition—something that represents the world as being a certain way.⁸

and have truth conditions:

Furthermore, I will assume that the objects of belief—the propositions—are relatively simple unstructured things: that they are, just as truth-conditional semantics would like to assume, entities that are individuated

⁶ p. 11, emphasis in original

⁷ P. 26, emphasis in original

⁸ Stalnaker [1999] p. 78

by their truth conditions.⁹

In any case, when I say propositions have truth conditions, all I mean is that they impose conditions a world must meet for the proposition to be true at that world, and so are true and false at worlds. But then we can reformulate the second problem for PWC in slightly different terms. Propositions are true or false at possible worlds. Many other things, including people, stars, numbers and sets, are not. Having truth-values at worlds is a rather remarkable thing. There should be some explanation as to how propositions manage to do this. After all, we explain how sentences and beliefs manage to have truth-values at worlds by saying they express or have as their objects propositions. To now say that there is no explanation of how propositions themselves manage to have truth-values at worlds seems mysterious. It also makes the explanation of how sentences and beliefs manage to have truth-values at worlds quite shallow. For the “explanation” is that beliefs and sentences have truth-values at worlds by being associated with entities that primitively take truth-values at worlds. That doesn’t seem like much progress

Now according to PWC, propositions are functions from worlds to exactly two arbitrary elements, say 1 and 0. But why/how would such a function have truth-values relative to worlds? There are lots of functions from a set of elements to $\{0,1\}$ that don’t have truth-values relative to those elements. So we need to be told why functions from a set of worlds to $\{0,1\}$ have truth-values at worlds. There just isn’t anything in the functions themselves, taken independently of minds and languages, that determines that they have truth-values relative to worlds. Further, it does not seem like the functions taken independently of minds and languages determine *specific* truth-values at worlds

⁹ Stalnaker [1999] p. 150. More recently, in responding to Scott Soames in Thomson and Byrne 2006, Stalnaker writes: ‘The main presupposition [of Stalnaker’s model of discourse] is that discourse involves the expression of propositions, and that propositions have truth conditions.’

either. If a function maps w to 1, is it true or false at w ? As before, since it isn't supposed to matter what T or F are as long as there are two of them, let's use L.A. and New York instead. If a function maps w to L.A., is it true or false at w ? Again, it is hard to believe that this question has some determinate answer in the absence of stipulation.

So the point here is that construing propositions as functions from worlds to two arbitrary elements doesn't allow us to explain why propositions have truth-values at worlds generally nor why a given such function has the specific truth-values at worlds it is alleged to have.

The third problem for PWC comprises a cluster of difficulties that Stalnaker [1984] has dubbed *the problem of deduction*. PWC seems to require belief and knowledge to be closed under logical consequence; and it seems to require trivial belief in the necessary proposition and trivial non-belief in the impossible proposition. But knowledge and belief don't seem to be closed under logical consequence; and it seems possible to non-trivially believe a necessary truth, to doubt a necessary truth, to believe an impossibility and to nontrivially fail to believe an impossibility. The best attempt known to me for dealing with these problems is due to Stalnaker himself. When we seem to truly attribute to someone non-trivial belief in a necessary proposition, Stalnaker claims that we are really attributing belief in a contingent proposition about the semantic relation between the sentence expressing the necessary proposition and the proposition itself. When we seem to truly attribute belief in the impossible proposition, we are doing something similar: we are attributing belief in a contingently false proposition about the relation between a sentence and the necessary truth.¹⁰ Failure to have one's beliefs closed under logical consequence is explained by having *compartmentalized* or

¹⁰ Stalnaker [1984] p. 75.

fragmented belief states. I'll touch on some of these issues below. As we'll see, I am skeptical about the prospects of success for these strategies.

Now for the final problem and the one I'll discuss in some detail. Notoriously, according to PWC, propositions that are necessarily equivalent are identical: propositions that map the same worlds to 0 and 1 are the same. If we assume that sentences have as their semantic (assertoric) contents relative to contexts propositions, and something like the following:

(RA) An individual i satisfies $\lceil x$ believes/asserts that $S \rceil$ relative to context c and world w iff i in w stands in the believing/asserting relation to the semantic/assertoric content of S in c .

we get the result that belief/assertion ascriptions whose that-clauses contain sentences that express the same proposition relative to c and don't differ otherwise can't diverge in truth-value relative to any w . As virtually everyone in the universe has noted, for PWC this means that belief ascriptions whose that-clauses express necessary truths and don't differ otherwise can't diverge in truth-value. But, assuming truths of mathematics and the truth that Hesperus is Phosphorus are necessarily true, examples such as the following make this appear false:

1a. Keelin believes that $2+2=4$.

1b. Keelin believes that there are an infinite number of primes.

2a. Keelin believes that Hesperus is Hesperus.

2b. Keelin believes that Hesperus is Phosphorus.

It is easy to imagine situations in which the first member of each pair seems true and the second seems false. Following Robert Stalnaker [1984], call this the *problem of equivalence*. Again here, the most sophisticated strategy for dealing with the problem

known to me is Stalnaker's [1984, 1987] own. Hence I propose to examine it.

First, some preliminaries. Stalnaker holds that each participant in a conversation takes certain propositions for granted as part of the background of the conversation. The participant is disposed to act as though she believes the propositions and believes that her fellow participants believe them and so on. These propositions are the *presuppositions* of the conversational participant. Throughout, we'll assume that in a given conversation, all participants presuppose the same propositions (i.e. we'll consider only *non-defective* contexts). Stalnaker represents these presupposed propositions by a set of worlds: the set of worlds in which all the presupposed propositions are true. Stalnaker calls this the *context set*. Here are two principles that Stalnaker [1978] claims govern assertion and the context set:

1. A proposition asserted is true in some but not all worlds in the context set.
2. The same proposition is expressed by an assertively uttered sentence in each world in the context set.

The first principle is an injunction against asserting propositions that are presupposed or presupposed false. The second principle requires making clear what proposition one intends to assert in uttering a sentence.

Stalnaker holds that 'Hesperus is Phosphorus' semantically expresses the necessary truth. This is a proposition that everyone believes: since it is true in all possible worlds, for any person it is true in every world compatible with what she believes. But then it doesn't appear that this sentence could be informatively uttered. However, utterances of it *can* be true and informative. In order to explain this it appears that PWC must somehow associate with an utterance of 'Hesperus is Phosphorus' a contingently true proposition. Stalnaker famously has an ingenious way of accomplishing that. In a

situation in which speakers felicitously and informatively utter ‘Hesperus is Phosphorus’, what would the context set be like? Well, suppose O’Leary and Daniels are our speakers. Assuming they are not presupposing that Venus is not seen in the morning or the evening the way it is seen in the actual world, the actual world i will be in the context set. But there will also be worlds in which the skies appear more or less as they do in the actual world, but in which some other heavenly body, say Mars, appears in the evening exactly where Venus actually appears. Let j be one such world and suppose for simplicity that the context set is $\{i,j\}$. Now imagine Daniels utters ‘Hesperus is Phosphorus’.

Intuitively, in making this utterance Daniels is conveying a proposition that is true in i and false in j . Since it will be presupposed that he has made this utterance, Daniels makes this utterance in every world in the context set. So we can sensibly ask what proposition Daniels thereby asserts in each world in the context set. Now in j , ancient astronomers will have called Mars by a name from which our name ‘Hesperus’ derives. So in such a world, utterances of ‘Hesperus’ refer to Mars and those of ‘Phosphorus’ refers to Venus. But then, assuming the orthodox semantics for sentences like ‘Hesperus is Phosphorus’, the utterance of it express a necessary truth in i and an impossibility in j .

We can represent this with the following *propositional concept*:

	i	j
i	T	T
j	F	F

The first row represents the fact that ‘Hesperus is Phosphorus’ expresses a necessary truth in the actual world; and the second row represents the fact that utterances of that sentence in j express an impossibility. But it should be clear that we have now violated Stalnaker’s second principle above governing assertions and presuppositions. In such a

case, Stalnaker thinks that in order to bring us back in conformity with that principle while avoiding the assertion of something trivial or trivially false, we reinterpret the sentence ‘Hesperus is Phosphorus’ as expressing the proposition true in *i* and false in *j*. This proposition is represented by the diagonal in the above propositional concept and so is called the *diagonal proposition* (of that propositional concept); we can also talk of conversational participants reinterpreting ‘Hesperus is Phosphorus’ by *diagonalizing*. So Stalnaker’s claim is that what is said/asserted by uttering ‘Hesperus is Phosphorus’ in a case of this sort is the diagonal proposition. He notes that this seems to capture the information a speaker is intuitively trying to convey in such a case, since as we said she intends to rule out *j*. Let me reemphasize a crucial point that I’ll return to below: reinterpreting the utterance by diagonalizing is triggered by the violation of the second pragmatic principle above.

Finally, it was implicit in what I just said that there are two separable parts to Stalnaker’s diagonalization account of how utterances of ‘Hesperus is Phosphorus’ manage to be informative, as he himself makes admirably clear.¹¹ First, such informative utterances of ‘Hesperus is Phosphorus’ must somehow be conveying a contingent proposition. Hence, we must first identify this proposition. Second, we must give a systematic account of how/why the sentence in the contexts in question conveys that proposition. The diagonalization-as-repair-strategy story addresses this second question.

Stalnaker wants to generalize this diagonalization account to explain how and why utterances of 2a and 2b can assert different propositions and so diverge in truth-value. Specifically, in such cases the *that*-clause in 2b will turn out *not* to designate the necessary proposition, just as informative unembedded utterances of ‘Hesperus is

¹¹ Stalnaker [1987] p. 119

Phosphorus' don't *assert* the necessary proposition. Suppose that Daniels and O'Leary are again talking. They both know Keelin and are discussing her. For each world in the context set of their conversation, Keelin is in a belief state that determines the set of worlds not excluded by it. The union of these sets for each world in the context set determines the set of worlds that for all O'Leary and Daniels presuppose are compatible with Keelin's beliefs. This set is the *derived context set* for the conversation about Keelin's beliefs.¹² Suppose the derived context set contains the actual world *i*, where of course Venus occurs in certain places in the morning and the evening, and worlds in which Venus appears exactly where it actually does in the morning and Mars appears exactly where Venus actually appears in the evening. Let *j* be such a world. For simplicity, then, say for all O'Leary and Daniels presuppose to this point in the conversation, the set of worlds compatible with Keelin's beliefs—the derived context set—is $\{i,j\}$. O'Leary then utters 2b. Suppose now we want to define the propositional concept associated with the that-clause in the utterance of 2b on the derived context set. Assume that a that-clause designates the same proposition that the sentence it contains expresses. Notice we cannot ask what proposition the that-clause in O'Leary's utterance designates in *j*. For if Keelin isn't present and isn't aware of O'Leary's utterance, it (or perhaps a counterpart of it) won't exist in *j*. However, we can suppose that O'Leary were to utter in *j* as he is actually uttering and ask in that case what the that-clause in his utterance *would* designate. Since in that case, his utterance of 'Hesperus' would refer to Mars, the that-clause would designate the impossible proposition in *j*. Of course in *i*, it designates the necessary proposition. So we get the following propositional concept associated with the sentence in O'Leary's that-clause:

¹² Stalnaker [1988] p. 157.

	i	j
i	T	T
j	F	F

Stalnaker claims that O’Leary’s utterance of 2b asserts that Keelin believes the diagonal proposition of this propositional concept: the proposition true in i and false in j. Note that this does seem to intuitively capture what Keelin is being said to believe: she is being said to believe something that rules out j. Hence, 2b expresses a different proposition than 2a in such a case. If O’Leary’s assertion is accepted, any world will be dropped from the context set in which Keelin’s belief state doesn’t exclude j (and since j is in the derived context set, there must be such a world). Note that if O’Leary and Daniels are mistaken about Keelin’s beliefs, 2b could well be false in this case, though of course 2a will be true in this situation.

One would think that as in the previous case, diagonalizing has to be triggered by something here. After all, the standard semantics for the that-clause in 2b has it designating the necessary proposition. Something has to override that. That is, as before we need to give a systematic account of how the that-clauses in such cases designate the diagonal proposition. So far as I can see, Stalnaker doesn’t say what the trigger for diagonalization is in this case. But here is a thought. 2b semantically expresses a proposition that asserts that Keelin stands in the belief relation to the necessary proposition. But, one might think, since conversational participants presuppose that everyone believes the necessary proposition, they presuppose that Keelin does. Hence, the semantic content of 2b is presupposed and so true in all worlds in the context set. But then asserting it violates principle 1 above. Further, the above propositional concept shows that in i the complement of 2b expresses a necessary truth and in j an

impossibility. The conversational participants can't be sure which of these 2b is ascribing belief in and ascribing belief in either would be infelicitous (since Keelin trivially believes the necessary proposition and trivially fails to believe the impossible one). However, if we reinterpret 2b so that its that-clause designates the diagonal proposition of the above propositional concept, we get something that is true in some but not all worlds in the context set, conformity with principle 1 is reinstated and we avoid ascribing belief in something trivially believed or trivially disbelieved. So once again here, diagonalization is triggered by the violation of pragmatic principles and reinterpreting the that-clause is a repair strategy.

In discussing his diagonalization account, Stalnaker is explicit that the explanation for when reinterpretation by diagonalizing occurs exploits a Gricean strategy. For Grice, real or apparent violations of conversational maxims result in sentences conveying information that is no part of their semantic contents. Similarly, as I've already suggested, according to Stalnaker's diagonalization account, the utterance of a sentence results in a violation of pragmatic principles that then triggers a reinterpretation of the sentence uttered. Indeed, Stalnaker appears to compare what triggers diagonalizing to the flouting of a Gricean maxim.¹³ After introducing the idea of reinterpreting by diagonalizing, he writes:

To make the hypothesis precise, we need only spell out the conditions under which the operation is performed. I have tried to go some way

¹³ One disanalogy between the Gricean account of producing an implicature by flouting a maxim and Stalnaker's diagonalization account is that in the case of the latter, the triggered process brings the utterance back in conformity with the principle that was initially violated. However, when a maxim is flouted generating an implicature there is no sense in which this results in the maxim not being violated. On the other hand, in the case of flouting the generation of an implicature *does* preserve the supposition that the flouter is observing the Cooperative Principle. See Grice [1975] p. 30. Such cases in which a speaker violates a maxim but observes the Cooperative Principle are the reason, in giving the pattern for working out a conversational implicature, that Grice [1975] writes "He has said that p; there is no reason to suppose he is not observing the maxims, *or at least the Cooperative Principle...*" (p. 31; my emphasis).

toward doing this in Chapter 4 [‘Assertion’]. The strategy is a Gricean one. There are various independently motivated pragmatic maxims governing discourse. When a speaker seems to be violating one of these in a blatant way, a cooperative conversational strategy may require that the addressee reinterpret what is said in a way that makes it conform to the maxim. One way to reinterpret—a way appropriate to the violation of a particular pragmatic maxim—is to diagonalize: to take the assertion to express the diagonal of the propositional concept determined by the utterance and its context.¹⁴

Note that here Stalnaker talks of a speaker seeming to violate a pragmatic maxim *in a blatant way*. That sounds a lot like the flouting of a Gricean maxim.

What is important for present concerns is that according to Stalnaker diagonalization, with the result that ‘Hesperus is Phosphorus’ expresses, and ‘that Hesperus is Phosphorus’ designates, a contingent truth, is a *repair strategy*. It is triggered by a violation of a pragmatic principle and its operation restores conformity with that principle. I said above that Stalnaker’s diagonalization account is ingenious. It is, but I think the account has difficulties. A central difficulty is traceable to the point just made: that diagonalization is a repair strategy. It seems to me that this is implausible. There are several reasons for thinking so.

First, consider a context in which ‘Hesperus is Phosphorus’ is felicitously uttered. As we saw, this means that not only does the sentence express different propositions in different worlds in the context set but in addition in each world of the context set the sentence expresses either the non-informative necessary truth or the impossible proposition. In order for this to trigger a reinterpretation by conversational participants of the sentence uttered, conversational participants must in some sense be aware of these violations of pragmatic principles. But in such cases, conversational participants are certainly not consciously aware of the utterance being anomalous. It isn’t as though in

¹⁴ Stalnaker [1987] pp. 124-25. See similar remarks in [Stalnaker 2004] pp. 304-305.

such cases conversational participants aren't sure which of two propositions the speaker intends to assert and recognize that the speaker is either asserting something trivial or impossible. Nor are speakers aware of reinterpreting the sentence in question. This means that the awareness of the violation of a pragmatic principle and the resulting reinterpretation must be unconscious and highly tacit. I'll note that this already looks quite different from what happens when Gricean maxims are flouted.

But even if awareness of the violation and resulting reinterpretation is unconscious and tacit, one would expect that conversational participants could be made aware of the fact that they were tacitly sensing an anomaly and reinterpreting. Compare the case of conversational implicatures. Consider a case like an utterance of 'War is war' in which Grice claims that the first maxim of Quantity is flouted. In such a case, Grice claims that hearers recognize that the uttered sentence is uninformative in any context and hence must violate the first maxim of Quantity. They can see that the speaker knows this, and is thus blatantly violating the maxim. Assuming the speaker is nonetheless being cooperative, they identify what the speaker intended by reflecting on why the speaker chose that "particular patent tautology".¹⁵ When ordinary speakers who have not previously heard of conversational implicatures hear this story, it strikes them as plausible that they go through something like the process described: they sense the un informativeness of the utterance and then try to figure out what the speaker intends to convey by the utterance by reflecting on the situation they are in and why the speaker chose the tautology she did. For one thing, when ordinary speakers are given this explanation, they *are* able to recognize that the sentence uttered *was* tautologous and that they were likely at least tacitly aware of this upon hearing the utterance if not explicitly

¹⁵ Grice [1975] p. 33.

aware of it.

In the case of Stalnaker's diagonalization account and 'Hesperus is Phosphorus' the matter couldn't be more different. I have found that when speakers hear this story, they *don't* recognize that they were at least tacitly aware of the alleged fact that they weren't sure which of the necessary and impossible proposition the speaker intended to convey by uttering the sentence she did nor do they recognize that they performed the act of reinterpreting the speaker's utterance. This seems to me to cast tremendous doubt on the plausibility of Stalnaker's diagonalization account. For it means that the alleged process we go through in arriving at the diagonal interpretation is something we are not in any way consciously aware of nor can we be made to see that we were tacitly aware of it. That just doesn't sound like a pragmatic process at all, but rather sounds like something that is hard wired.

Exactly similar considerations apply to reinterpreting the that-clause in cases like 2b above. Here too we have no awareness of sensing something anomalous about the utterance and reinterpreting the that-clause by means of a propositional concept defined on the derived context set. Here too even once we are told the story, we do not see that perhaps we really did tacitly go through such a process. And so here too, I think serious doubt is cast on the account.

A second difficulty is that Stalnaker's account requires conversational participants to at least tacitly be aware of the fact that 'Hesperus is Phosphorus' expresses either a necessary or an impossible proposition. For only then could conversational participants be tacitly aware of the propositional concept discussed above leading to the alleged diagonal reinterpretation of the sentence. But I don't think that in general ordinary

speakers can be tacitly aware of the fact that “Hesperus is Phosphorus” expresses a necessary or impossible proposition.¹⁶ It is important here to remember that Kripke gave *extensive arguments* in *Naming and Necessity* for the claim that ‘Hesperus is Phosphorus’ expresses a necessary truth.¹⁷ He clearly thought the view that it expresses a contingent truth was more intuitive at the time. My hunch is that large numbers of ordinary people would find that view more intuitive as well. At any rate, certainly some will. Others will likely have no opinion on the matter, find the issue confusing or never have thought about it. Consider the group of people comprising those who think that ‘Hesperus is Phosphorus’ expresses a contingent truth, those who have no opinion on the matter, those who find the question of whether it expresses a necessary or contingent truth confusing and those who have never thought about it. Certainly an informative utterance of the sentence ‘Hesperus is Phosphorus.’ will seem neither trivially true nor trivially false to such people. Stalnaker must explain that by claiming they are tacitly aware of the propositional concept above and reinterpret the sentence as expressing the diagonal. That requires them to be tacitly aware that ‘Hesperus is Phosphorus.’ expresses a necessary truth or an impossibility. It is hard to see how people who when probed about the matter are disposed to think that ‘Hesperus is Phosphorus’ could have been false or are unsure what to think or have never thought about it are nonetheless tacitly aware that it expresses either a necessary or impossible proposition. So I think that the fact that such people could find ‘Hesperus is Phosphorus’ informative is a real problem for the diagonalization account.

Above I argued that the claim that both in the case of ‘Hesperus is Phosphorus’

¹⁶ The entry on modal illusions in *The Internet Encyclopedia of Philosophy* says that ‘Hesperus is Phosphorus’ strikes many people as contingent on first consideration.

¹⁷ Kripke [1980] pp. 97-103, and 107-110.

and ‘that Hesperus is Phosphorus’ speakers reinterpreting by means of the diagonal is a repair strategy is implausible. What about getting around these worries by claiming instead that it isn’t a repair strategy but is obligatory? That is, whenever the diagonal is different from the horizontal(s), the sentence or that-clause gets obligatorily reinterpreted as the diagonal. Call this the *obligatory diagonal approach*. A worry I won’t press is what the status is of the rule that we obligatorily reinterpret: is it part of the semantics? Could languages differ with respect to this rule? In any case, I think there are problems with this approach as well.

First, this approach is subject to the problem just discussed with the diagonalization-as-repair-strategy approach. Even if diagonalization is obligatory, it has to be performed on the propositional concept mentioned above. For conversational participants to do that, they must be at least tacitly aware that ‘Hesperus is Phosphorus’ expresses a necessary or impossible proposition. But, as I argued above, in many conversations in which the latter is informative or 2b is, there is good reason to think speakers will not be even tacitly aware of this.

Second, consider the following exchange:

3. A: Hesperus is Phosphorus.

B: Really, Hesperus is Phosphorus? Huh!

A: Yes, and in fact that is necessarily true.

Surely A’s final utterance can be read as true. But that requires her use of ‘that’ to designate a necessary truth. It seems hard to deny that it designates the proposition expressed by A’s first utterance and B’s utterance. But that has to be the contingent diagonal if the obligatory diagonal approach is correct and A’s first utterance is

informative. Similarly, one would think that the obligatory diagonal approach would have the consequence that the following is false when uttered informatively:

4. It is true and even necessary that Hesperus is Phosphorus.

That seems wrong. Further, consider the following:

5a. That Hesperus is Phosphorus is necessary and believed by Keelin.

5b. Keelin believes the necessary truth that Hesperus is Phosphorus.

If the that-clause in 5a designates the contingent proposition the obligatory diagonal approach says it does, the sentence should be false. But it seems it could easily be true.

5b could be informative and surely seems to say that Keelin believes a necessary truth.

But that requires ‘the necessary truth that Hesperus is Phosphorus’ to designate a necessary truth contrary to what the obligatory diagonal approach says.

It is worth noting that 3-5 are also a problem for Stalnaker’s original proposal on which diagonalizing is a repair strategy. It is easy to imagine 3-5 occurring in situations in which Stalnaker would want to say that conversational participants repair by diagonalizing. For example, 3 could occur in a situation in which A’s first utterance is informative (indeed, it is naturally read that way). Similarly for 4. Finally, 5a and 5b are naturally heard as attributing a non-trivial belief to Keelin.

In summary, I think the considerations adduced here show that Stalnaker’s diagonal strategy, both for unembedded occurrences of ‘Hesperus is Phosphorus’ and for the that-clause in 2b, has significant problems.

Let’s now turn to Stalnaker’s strategy for explaining how 1a and 1b could diverge in truth-value. Imagine a case in which 1a seems true and 1b seems false. But how could 1b seem false when the that-clause in it designates the necessary truth, which everyone,

including Keelin, believes? According to Stalnaker, 1b in the imagined situation will not convey the claim that she so believes. When sentence structure is complicated, as Stalnaker thinks is the case with the complement of 1b, there is room for doubt as to what proposition the sentence expresses. Stalnaker thinks that in the case at hand, what Keelin doubts is that the complement of 1b expresses the necessary proposition. He claims that 1b conveys the false information that Keelin *believes* that the complement of 1b expresses the necessary proposition (or a truth) and this is why it seems false to us. So far so good, though I think we need more of a pragmatic story about how/why 1b conveys the false information it does and I'll return to this below. According to Stalnaker's strategy here, when belief ascriptions that appear to falsely ascribe belief in a necessary mathematical truth to a subject, they are really falsely ascribing belief in a contingent proposition to the effect that the complement of the ascription designates a necessary truth. Though Stalnaker has given reasons for thinking this isn't a good label, I'll call this the *metalinguistic strategy*.

Field [1978, 2001b] points out that this strategy won't work in some cases.¹⁸ Field considers the conditional whose antecedent is the conjunction of the axioms of set theory (including the axiom of choice) and whose consequent is the Banach-Tarski theorem. Call this the *Banach-Tarski conditional (BTC)*. This conditional is a logical truth and so the proposition it expresses is the necessary one. Field considers a person, say O'Leary, who dissents from BTC because he believes set theory but, as we would put it, believes the Banach-Tarski theorem to be false.

Then the following will seem false when S is BTC:

¹⁸ Pp. 34-35 and 100-103. Stalnaker [1984] credits a similar point to Larry Powers and Saul Kripke as well. See p. 76 note 17

6. O'Leary believes that S.

According to the metalinguistic strategy, such a person does not really doubt the proposition expressed by BTC (the necessary proposition), but rather doubts the proposition expressed by the following:

7. The semantic rules for the language of set theory relate BTC to the necessary truth.

Further, Stalnaker claims that 6 in the relevant context conveys the claim that O'Leary believes 7 and that is why it seems false.¹⁹ Now, Field says, suppose O'Leary knows what the semantic rules of the language of set theory are. Let their statement be R. The only way O'Leary could doubt what is expressed by 7 is if he doubts what is expressed by:

8. The semantic rules R relate BTC to the necessary truth.

But 8 expresses a necessary truth and so cannot be what O'Leary doubts. So Stalnaker's attempt to explain why 1a and 1b can seem to diverge in truth value when their complements are logically equivalent by claiming that sometimes sentences like 1b convey not that Keelin believes the propositions expressed by their complements, but rather that she believes that the complements express truths appears to fail in at least some cases. Specifically, Stalnaker's account can't explain how 6 could seem false and the following could seem true:

9. O'Leary believes that $2+2=4$.

The problem Field notes here with explaining how 6 could seem false by means of the metalinguistic strategy is that it ends up once again requiring us to say that O'Leary doubts the necessary truth 8 repeated here:

8. The semantic rules R relate BTC to the necessary truth.

¹⁹ Stalnaker [1984] pp. 73-74.

And so, as Field says, nothing has been gained by the metalinguistic ascent to explain why 6 seems false. But perhaps Stalnaker could appeal to a different strategy to explain why it seems true to say O'Leary doubts 8. For Stalnaker, the notion of believing a proposition is to be understood in terms of the more basic notion of a *belief state*. This is represented as the set of worlds compatible with the belief state: the set of worlds that are ways things might be. To believe that P is for P to be true in all the possible worlds in one's belief states. Now Stalnaker thinks that a given agent can be in multiple belief states that aren't integrated with each other. In such a case beliefs are *fragmented* or *compartmentalized*:

It is compatible with the pragmatic account that the rational dispositions that a person has at one time should arise from several different belief states. A person may be disposed in one kind of context, or with respect to one kind of action, to behave in ways that are explained by one belief state, and at the same time be disposed in another kind of context or with respect to another kind of action to behave in ways that would be explained by a different belief state.²⁰

For the most part, Stalnaker uses these non-integrated belief states to explain the fact that one's beliefs are not closed under logical consequence and that one can have inconsistent beliefs. A given belief state *will* be closed under logical consequence. Consider a belief state B of agent A and suppose A believes that P relative to B. Then P is true in all the worlds in B. If P entails Q, then Q is true in all the worlds in B. So A believes Q relative to B. However, if an agent A is in belief state B₁ and believes R relative to it, and A is also in belief state B₂ and believes S relative to it and B₁ and B₂ are not integrated, there may be no belief state such that A believes R&S relative to it. In such a case, A believes R and A believes S, but A does not believe R&S.²¹ Similarly, A

²⁰ Stalnaker [1984] p. 83

²¹ Stalnaker [1984] p. 83.

may believe P relative to B_1 and $\sim P$ relative to B_2 , where B_1 and B_2 are not integrated. In such a case there is a sense in which A has inconsistent beliefs but we avoid the disastrous conclusion that A believes $P \& \sim P$ relative to any one belief state and so believes everything.²²

However, at one point Stalnaker appears to use compartmentalized belief in a somewhat different way to explain apparent ignorance of mathematical truth.²³

To take a simple case of calculation, a person may display his belief that four plus three equals seven by performing certain operations on numerals that contain three and four as digits—for example by writing down “7” as the first step in adding sixty-four and twenty-three. A person who is competent at doing sums but not particularly quick or intuitive could manifest *his separate beliefs that four plus three equals seven and that six plus two equals eight* in calculating the sum of sixty-four and twenty-three, but *he would show that before doing the calculation he did not have the belief that sixty-four plus twenty-three is eighty-seven. That last belief results only after the two simpler arithmetic beliefs were put together against a background of more general beliefs and presuppositions about arithmetic operations.*²⁴

The passage is puzzling because in the italicized passages Stalnaker mentions three beliefs using that-clauses that by standard semantic rules designate necessary truths: the belief that four plus three equals seven, that six plus two equals eight and that sixty-four plus twenty-three equals eighty-seven. The first two beliefs are said to be “separate”, which I take it means they are initially believed relative to different, nonintegrated belief states. Since necessary truths are believed relative to every belief state, I take it that the that-clauses ‘that four plus three equals seven’ and ‘that six plus two equals eight’ must

²² Stalnaker [1984] p. 83.

²³ Mathematical truths will be true relative to any belief state. Hence, you could not explain S’s apparent ignorance of mathematical truth M by saying that though S believes P and Q and these jointly entail M, P is believed relative to belief state B_1 and Q is believed relative to belief state B_2 and S has not integrated B_1 and B_2 . The problem, of course, is that S trivially believes M relative to both B_1 and B_2 , and so is in no sense ignorant of M. Thus my talk of *apparent* ignorance of M and compartmentalized belief being used here in a *different way*.

²⁴ Stalnaker [1984] pp. 86-87, my emphasis.

not designate the necessary truth in the quotation. I *think* Stalnaker thinks that they designate contingent propositions about the relation between a sentence and the necessary truth. That is, I think Stalnaker must be assuming the metalinguistic strategy here in talking about these beliefs not being integrated. But what of the claim that the person in question didn't believe that sixty-four plus twenty-three equals eighty-seven prior to performing the calculation? This can't be a denial that the person believed the necessary truth prior to performing the calculation. I also don't think it can be a denial that the person believed a proposition about the relation between the sentence 'sixty-four plus twenty three equals eighty seven' and the necessary truth. For earlier Stalnaker appears to deny that the metalinguistic strategy yields a plausible account of the ignorance of the result of a calculation:

The suggestion [the metalinguistic strategy] implies that whenever a person fails to know some mathematical truth, there is a nonfactual possible world compatible with his knowledge in which the mathematical statement says something different than it says in this world...But this does not seem to locate the source of mathematical ignorance in the right place.

Take a simple case of calculation: I did not know before I performed some calculations that $689 \times 43 = 29,627$. But it is surely not plausible to explain my ignorance with an epistemically possible world in which '689' or '43' denotes a different number or in which the multiplication sign represents a different operation.²⁵

It looks like what Stalnaker is claiming in the previous quotation is that the person's ignorance *that sixty-four plus twenty-three equals eighty-seven* is ignorance of a contingent proposition that is entailed by the separate metalinguistic beliefs that four plus three equals seven and that two plus six equals eight, together with "general beliefs and presuppositions about arithmetic operations". I am not sure exactly which proposition that is, but Stalnaker must think that the that-clause 'that sixty-four plus twenty-three

²⁵ Stalnaker [1984] p. 76

equals eighty-seven' designates it here.

The question is: in saying that O'Leary doubts and hence is ignorant of 8 above, can we apply a similar strategy? That is, when we say that O'Leary doubts that the semantic rules R relate BTC to the necessary truth, can we say that the that-clause here designates some contingent proposition that is entailed by some non-integrated beliefs, perhaps together with other background beliefs and presuppositions and that this is what O'Leary is said to be ignorant of? The only candidates I can think of for being the relevant non-integrated beliefs are things like the beliefs that R are the semantic rules governing the language of set theory, that C is the conjunction of the axioms of set theory, that the BTC has C as its antecedent and such-and-such mathematical statement, which is in fact the Banach-Tarski theorem, as its consequent and so on. The problem is that it appears that we can tell our story about O'Leary in such a way that these candidate beliefs seem to be integrated and yet it still seems true to say that O'Leary doubts 8.²⁶ Just imagine that he is attending to the semantic rules R, the conjunction C and BTC, while applying the rules R to BTC. We can even imagine that he is performing inferences that require all the relevant beliefs: perhaps he is applying the rules R to BTC and inferring that the antecedent of BTC is true iff each conjunct is true, and so on. But then surely all the relevant beliefs must be integrated. Since it could still seem true to say that O'Leary doubts 8, it can't be that we are using that claim to convey the claim that O'Leary is ignorant of some contingent proposition P, where the ignorance is due to the fact that the relevant beliefs entailing P are believed relative to different, non-integrated belief states. So in the end, it seems to me that Field's objection here to the metalinguistic strategy stands.

²⁶ Closely related points are made in Field [2001b].

I'll add as an aside that considerations of the general sort we just adduced in the case of O'Leary make me skeptical of the claim that the fragmented belief approach will be capable of accounting for all cases in which belief and knowledge aren't closed under logical consequence and all cases of coherent inconsistent belief. For it seems that we will be able to describe cases in which a subject has integrated the relevant beliefs and still fails to believe some of their consequences. And we'll be able to describe cases in which a subject coherently believes integrated inconsistent beliefs.²⁷

A second worry with the metalinguistic strategy concerns how 6 above manages to convey not the claim that O'Leary believes the necessary truth, but rather the claim that O'Leary believes that the complement of 6 designates the necessary truth. Stalnaker is a bit cagey about this, but I think he thinks it is just a matter of diagonalizing again.²⁸ I *think* the idea is this. In a context in which someone would utter 6, for all the conversational participants are presupposing, in some of O'Leary's belief worlds the complement of 6—BTC—designates a necessary falsehood and in some of O'Leary's belief worlds the complement designates a necessary truth. Call a representative world of the former sort *i* and a representative world of the latter sort *j*. Then we can take {*i*,*j*} to be the derived context set for the conversation about O'Leary's beliefs. This means that the propositional concept associated with the that-clause in 6 looks as follows:

	i	j
i	F	F
j	T	T

Now we reason just as we did in the case of Keelin and 2b above. 6 semantically

²⁷ Field [2001a] p. 102 makes this latter point.

²⁸ This is suggested by remarks in Stalnaker [1986] pp. 120-21 and in Stalnaker [1984] pp. 73-74 and note 16.

expresses a proposition that asserts that O'Leary stands in the belief relation to the necessary proposition. But one might think, since conversational participants presuppose that everyone believes the necessary proposition, they presuppose that O'Leary does. But then the semantic content of ϕ is presupposed and so true in all worlds in the context set. But then asserting that violates principle 1 above. Further, the above propositional concept shows that in j the complement of ϕ expresses a necessary truth and in i an impossibility. We can't be sure which of these ϕ is ascribing belief in and ascribing belief in either would be infelicitous (since O'Leary trivially believes the necessary proposition and trivially fails to believe the impossible one). However, if we reinterpret ϕ so that its that-clause designates the diagonal proposition of the above propositional concept, we get something that is true in some but not all worlds in the context set, conformity with principle 1 is reinstated and we avoid ascribing belief in something trivially believed or trivially disbelieved. Further, the diagonal proposition does seem to be about the relation between the that-clause/embedded sentence in ϕ and the necessary truth. For it is the proposition that is true in the world where the that-clause designates the necessary truth and false in the world where it designates the impossible proposition.

Unfortunately, however, this is just the diagonalization-as-repair-strategy approach all over again. But then the arguments we gave against it above in the cases of 'Hesperus is Phosphorus' and 'Keelin believes that Hesperus is Phosphorus' apply here as well. Specifically, once again in the case of both informative utterances of 'There are an infinite number of primes' and 'Keelin believes there are an infinite number of primes' speakers are not consciously aware of sensing an anomaly and reinterpreting to avoid it. That means these processes must be highly tacit. But again here, even after speakers are

told that they are going through these allegedly highly tacit processes, they are unable to recognize they have done so. Just as before, this does not look like a pragmatic process at all.

Finally, there is a further problem that is an analog of another problem I raised with the account of Keelin and 2b above. As we saw, to arrive at the above propositional concept for 6 we assumed that for all the conversational participants presuppose, the complement of 6 expresses the necessary proposition in some of O’Leary’s belief worlds and the impossible proposition in the others. However, why do the conversational participants presuppose that in each of O’Leary’s belief worlds the complement of 6 designates either the necessary or impossible proposition? It must be because they presuppose that O’Leary knows that mathematical sentences express necessary truths or necessary falsehoods. But why would they presuppose that? O’Leary is just an ordinary guy who like most ordinary guys has thought almost not at all about metaphysical possibility and necessity. Or maybe O’Leary has thought about it and sides with Descartes’ view that God could have made the truths of mathematics false or thinks such truths could have been false for other reasons. When you Google ‘Could the truths of mathematics have been false?’ or ‘Could God have made the truths of mathematics false?’ you find such gems as the following:

QA “It is therefore more correct to say that God says what shall be true for his creation, and mathematical truth is part of this truth.”

QB “The basic idea is: if we ever had empirical evidence that some truth of arithmetic was false we would have to admit that it was false. But if so then mathematics is empirically justified. To make the case consider the following scenario. Suppose that you had two pens of sheep; one with 6 and one with 7 sheep. Now suppose that you counted the sheep individually in each pen (and got 6 and 7) and then you counted all of the sheep and got 14. Suppose you did it again. 1. 2. 3. 4. 5. 6. Yep six sheep in that pen. 1. 2. 3. 4. 5. 6. 7. Yep seven sheep

in that pen. Then all the sheep. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. Suppose that this was repeated by all of your friends with the same results. Suppose that it was on the news and tested scientifically and confirmed. Suppose that this phenomenon was wide spread, observable, and repeatable. If this were the case we would be forced to admit that $7+6=14$ is true therefore mathematics is empirically justified.”

QC “Mathematics is an invention of the human mind and exists only when human minds do.”

QD “Hence, mathematical definitions were chosen by humans to model physical reality so that we could make useful predictions, not to encapsulate metaphysical truth, so really, why should we expect math to be true?”

QA shows that some people take God to decide what the mathematical truths are. The author makes clear that God could have settled on different “truths for his creation”. QB shows that some people take arithmetic to be something like true generalizations from experience and the author makes clear that if our experience were different, we would truly generalize differently. The author of QC makes clear that he thinks that mathematics would not exist if human minds didn’t and presumably in such a case mathematical truths wouldn’t be true. QD is representative of a surprising number of people who think that at least much of mathematics isn’t *actually* true but most such people seem to think that it could have been (e.g. had the universe been more “ideal”). So lots of people think that mathematical sentences express claims that are contingent. Many more have never considered the question of the modal status of the propositions expressed by mathematical sentences or have no opinion on the matter.²⁹ But that means that in very many ordinary conversations people will not presuppose that mathematical sentences express necessary or impossible propositions either because they think that is

²⁹ I discovered this by asking people on chair lifts whether ‘ $2+2=4$ ’ could have been false when I was on sabbatical and skiing at Mammoth Mountain in the 2015-16 ski season. Of the many people I asked, only one ventured the opinion that she didn’t see how that could be.

false, or because they have no view on the matter or because they have never given it any thought. When such people are talking about O’Leary and presuppose he is like them in this regard, it will simply not be true that they presuppose that in each of O’Leary’s belief worlds the complement of 6 expresses the necessary or the impossible proposition. But then in such a context, the propositional concept above will not be associated with the complement of 6 and so it won’t designate the diagonal of that propositional concept. This means that the metalinguistic strategy cannot explain why 6 could well seem false in such contexts. For such cases we would need some other as yet unknown explanation of this.

Finally, though I won’t rehearse them again, all the arguments against the obligatory diagonal account that I gave above in the case of ‘Hesperus is Phosphorus’ and ‘Keelin believes that Hesperus is Phosphorus’ apply equally here.

Conclusion

I began by enumerating four outstanding problems for PWC:

1. It can’t give an intuitive account of what propositions are about.
2. It can’t explain why propositions are the kinds of things that are true and false relative to worlds, nor why a given proposition has the specific truth-values it does relative to worlds.
3. It faces the problem of explaining why beliefs don’t seem to be closed under logical consequence, why it seems one can fail to believe or non-trivially believe necessary truths and why it seems one can believe or nontrivially fail to believe the impossible (the problem of deduction).
4. It must explain how/why two belief ascriptions that differ only in having different that-clause that both designate the necessary truth can appear to express different propositions and so diverge in truth-value (the problem of equivalence).

In the case of 1, I suggested some strategies for addressing the problem and found them wanting. In the case of 3, I mentioned the best strategy for addressing the problem

known to me and argued that at least in cases of the sort brought out by Field the strategy seems to fail.

4 was the problem I spent most of my time on. I first argued that there were problems with the explanation of how/why the following sentences could express different propositions and so diverge in truth-value:

2a. Keelin believes that Hesperus is Hesperus.

2b. Keelin believes that Hesperus is Phosphorus.

First, I argued that the idea that 2b can express a different proposition from 2a because the that-clause in it gets reinterpreted as designating a contingent proposition by means of a repair strategy is implausible. Second, I argued that the explanation required that conversational participants be at least tacitly aware that ‘Hesperus is Phosphorus’ expresses a necessary or impossible proposition and that in general this was implausible. Finally, I considered the idea that diagonalization was obligatory instead of a repair strategy. I argued that this view was subject to one of the difficulties with the diagonalization-as-repair-strategy approach and had additional difficulties that ended up applying to the diagonalization-as-repair-strategy approach as well.

Finally, I turned to the explanation PWC gives for how the following could express different propositions and so diverge in truth-value

1a. Keelin believes that $2+2=4$.

1b. Keelin believes that there are an infinite number of primes.

Here I argued, first, that the strategy cannot work in cases of the sort raised by Hartry Field [1978, 2001b]. Second, I claimed that again here Stalnaker relies on the diagonalization-as-repair-strategy approach and hence that the arguments I gave against

that approach apply here as well. Finally, I argued that the explanation assumed that conversational participants presuppose that sentences of mathematics express necessary or impossible propositions (and presuppose that subjects of their ascriptions presuppose this) and that in the general case this is implausible. If these arguments are correct, 4 appears still to be a significant problem for PWC despite heroic attempts by its adherents to address it.

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