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Propositions, Semantic Values, and Rigidity

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Abstract

King (2003, 2007, Ch. 6) argues (i) that the semantic value of a sentence at a context is (or determines) a function from possible worlds to truth values, and (ii) that this undermines part of Stanley's (1997a) case against the *rigidity thesis*, the claim that no rigid term has the same content as a non-rigid term. I show that King's main argument for (i) fails, and that Stanley's argument is consistent with the claim that the semantic value of a sentence at a context is (or determines) a function from worlds to truth values.

Keywords: propositions; operators; quantifiers; tense; rigidity; two-dimensionalism

1 Introduction

King (2003, 2007, Ch. 6)) argues that the semantic value of a sentence at a context is an eternal proposition, something that is or determines a function from possible worlds to truth values.[1] His motivation is two-fold: First, he wants to defend the "semantic primacy" of propositions, against those (e.g. Lewis (1980)) who take the semantic value of a sentence at a context to be a function from an n-tuple of coordinates (which might include a world, a time, and a location, among other things) to truth values. Second, he wants to undermine an argument due to Stanley (1997a) against the claim that no rigid term has the same content as a non-rigid term (*the rigidity thesis* or *RT*).[2]

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[1] For simplicity, I will assume in this paper that propositions can be represented as functions from possible worlds to truth values (or sets of possible worlds). King's own view is that they are structured entities, but he indicates that his arguments are neutral on the issue (King, 2007, 164). (That said, later in the paper we encounter one argument which may require contents to be structured; see footnote 12.)

[2] See also Stanley (1997b) and Stanley (2002).

King attempts to establish the claim that the semantic value of a sentence at a context is a proposition by arguing that tenses and locations are best represented as object language quantifiers, rather than as operators that shift indices. I first argue that this view of the semantics of tense and location doesn't entail the claim for which King is arguing; one can accept King's main points about the semantics of tense and location and still think that the semantic value of a sentence at a context is something richer than a proposition. I then turn to King's two motivations. I first question the importance of the "semantic primacy" of propositions, and then examine King's claim that if the semantic value of a sentence at a context is a proposition, then Stanley's argument against RT is undermined. I argue instead that Stanley's case against RT is compatible with the claim that the semantic value of a sentence at a context is a proposition.

At the end of the paper, I briefly discuss a broader theme that emerges from this discussion: namely, that the issue of what the objects of assertion are is relatively independent of issues in the compositional semantics of tense and modality.

2 Tenses, quantifiers, and semantic values

One of the central claims in King's discussion is that tenses and location expressions (e.g. *somewhere*) are best understood as object language quantifiers that bind object language variables over times and places (respectively), rather than as genuine operators that shift indices. In this part of the discussion, I'm going to ignore location expressions, and simply focus on tense. This is a harmless simplification, since the considerations involved are more or less the same.

King argues that the most attractive semantic account of tense treats tenses as object language quantifiers, and that, for this reason, most theorists now adopt this approach. I agree with King on this, but disagree with him on what follows from it. In particular, King seems to think that this account of tense entails the claim that the semantic value of a sentence at a context is something whose truth value does not vary over time. But I think this is a mistake: one can accept this account of tense and yet take semantic values to be things whose truth values vary over time, e.g. temporal propositions.

In most of the of theories we will discuss, extensions are given relative to a context c, index i, and variable assignment g. The *semantic value* of a sentence ϕ at a context c is what you get by abstracting over the index:[3]

$$\lambda i.[\![\phi]\!]^{c,i,g}$$

On the sort of theory that King favors, indices only contain one element: a possible world. The temporal interpretation of a sentence is handled by a system

[3]If a theory gives extensions relative to just a context and a variable assignment, we take the semantic value of ϕ at c to be $[\![\phi]\!]^{c,g}$. (The double brackets "$[\![\ ]\!]$" denote the interpretation function of a semantic theory. For most of the theories we'll discuss, they denote a four-place function that takes expression-context-index-assignment quadruples to extensions. For theories without indices, they denote the corresponding three-place function.)

of object language quantifiers and variables that range over times, and so indices do not need to contain time coordinates. On standard views of this sort, each VP has an argument place for a silent temporal pronoun which can either be bound or get its value from the variable assignment. So, using an example and an analysis from Kusumoto (1999, 19), the LF of (1) might be given by (2):

1. Elliott was in Japan.

2. t_1 PAST λt_2 t_2 Elliott be-in-Japan.

PAST is an object language quantifier:

$$[\![\text{PAST}]\!]^{c,w,g} = \lambda p_{\langle r,t\rangle}.\lambda t_r.\text{ there is a } t' < t \text{ such that } p(t') = 1 \text{ in } w.^4$$

Now in (2), t_1 is a free variable over times; in the system in question, Kusumoto stipulates that a free variable over times is always assigned the utterance time t_c (Kusumoto, 1999, 21). With that stipulation in place

$$[\![t_1 \text{ PAST } \lambda t_2\ t_2 \textit{ Elliott be-in-Japan}]\!]^{c,w,g}$$

is a truth value, and so

$$\lambda w.[\![t_1 \text{ PAST } \lambda t_2\ t_2 \textit{ Elliott be-in-Japan}]\!]^{c,w,g}$$

is a function from worlds to truth values, or a proposition. Thus, on this system, the semantic value of a sentence at a context is a proposition.

But it is possible to accept the claim that tenses are to be represented as object language quantifiers, and yet still maintain that the semantic value of a sentence at a context is a function from world-time pairs to truth values (a temporal proposition). To do this, we stipulate that no structure contains any free variables ranging over times: any time variables not otherwise bound are now bound by a λ-binder which occurs at the very top of the structure. On this version of the theory, the correct LF for (1) is (3) rather than (2):

3. λt_1 t_1 PAST λt_2 t_2 Elliott be-in-Japan.

Assuming that the lexical entry for PAST is the same as the one we gave earlier, the semantic value of (3) at a context c will be a temporal proposition:

$$\lambda w.[\![\lambda t_1\ t_1 \text{ PAST } \lambda t_2\ t_2 \textit{ Elliott be-in-Japan}]\!]^{c,w,g}$$

$$= \lambda w.\lambda t.[\![t_1 \text{ PAST } \lambda t_2\ t_2 \textit{ Elliott be-in-Japan}]\!]^{c,w,g^{t/1}}$$

$$= \lambda w.\lambda t.\text{ there is a time } t' \text{ such that } t' < t \text{ and Elliot is in Japan at } t' \text{ in } w.^5$$

[4] Times are of type r, truth values of type t.

[5] The semantics of an object language λ-binder can be given as follows, where ϕ is any expression: $[\![\lambda_1\phi]\!]^{c,i,g} = \lambda x.[\![\phi]\!]^{c,i,g^{x/1}}$ (where $g^{x/1}$ is the variable assignment that maps "1" to x, but is otherwise like g).

Since this is (equivalent to) a temporal proposition, insisting that the tenses be treated as object language quantifiers does not *require* one to adopt the view that the semantic value of a sentence at a context is a proposition.

Theories of this kind are not mere possibilities in logical space. Schlenker (2004) discusses a theory (his 'Theory II') that makes the semantic value of a sentence at a context a *centered proposition* (a function from world-time-individual triples to truth values), and uses object language variables over worlds, times and individuals.[6] On the proposed theory, at the top of each structure are three λ-binders, one binding world variables, one binding time variables, and a third binding individual variables. Thus, this system is similar to the one just discussed, except that: (i) modals are treated as object language quantifiers, and (ii) the system computes centered propositions, rather than temporal propositions. But the point to keep in mind is that not everyone who accepts the claim that tenses should be treated in terms of object language quantifiers and variables thinks that the semantic value of a sentence at a context is something whose truth value does not vary over time.

Overlooking this sort of move also leads King to see a potential problem for his favored thesis where there is none. As King notes (2003, 228-229), some theorists work within a system that treats modals not as operators that shift indices but as object language quantifiers that bind variables over possible worlds—the modal analogue of the tense semantics that King favors. At the end of his (2003), King discusses this problem:

> One final worry looms here. I have argued that various expressions are not operators, and hence indices do not need to contain coordinates for them to shift. What if a similar argument could be mounted for modal expressions? This would mean that worlds would not be needed as coordinates of indices, and hence that variable but simple semantic values would not vary truth-value over worlds! But surely the objects of our attitudes, propositions, do vary truth-value over worlds. Thus, if modal expressions turn out not to be operators, variable but simple semantic values may be unsuited to be propositions... (King, 2003, 228)

King then goes on to sketch three reasons for being skeptical that modals really are object language quantifiers rather than index-shifting operators.

But, in light of our earlier discussion of tense, it should be clear that the claim that modals are object language quantifiers does not pose a threat to the claim that the semantic value of a sentence at a context is a proposition. The trick we used above applies here. Take a modalized sentence like (4):

4. Sam should go to confession.

On a system which treats modals as object language quantifiers, we might take the LF of (4) to be given by (5):

[6] Schlenker attributes this idea to lecture handouts prepared by Irene Heim.

5. w_1 should λw_2 w_2 Sam go-to-confession.

Deontic *should* is an object language quantifier over possible worlds:

> $[\![\textit{should}]\!]^{c,g} = \lambda p_{\langle s,t\rangle}.\lambda w_s$. every world w' compatible with what duty requires in w is such that $p(w') = 1$.

In (5), w_1 is free. Now we might stipulate that the contextually determined variable assignment always assigns the world of the context w_c to a free world pronoun. In that case, the semantic value of a sentence at a context is simply a truth value:

> $[\![w_1$ *should* λw_2 w_2 *Sam go-to-confession*$]\!]^{c,g} = 1$ iff every world w' compatible with what duty requires in w_c is such that Sam goes to confession in w'.

So on this theory, the semantic value of a sentence at a context is a truth value, not a proposition, which is why King is keen to resist it.

But we can avoid this result if we stipulate that there are no free world variables in any structure. Instead, at the top of each structure is a λ-binder that binds any world variables that are not bound by a modal (if any) that occurs in the sentence.[7] Given this stipulation, the LF of (4) is (6) rather than (5):

6. λw_1 w_1 should λw_2 w_2 Sam go-to-confession.

Now the semantic value of (4) at a context will be a proposition:

> $[\![\lambda w_1$ w_1 *should* λw_2 w_2 *Sam go-to-confession*$]\!]^{c,g}$
>
> $= \lambda w.[\![w_1$ *should* λw_2 w_2 *Sam go-to-confession*$]\!]^{c,g^{w/1}}$
>
> $= \lambda w$. every world w' compatible with what duty requires in w is such that Sam goes to confession in w'.

So King's worry is no worry at all: treating modals as object language quantifiers that bind world variables poses no threat to the claim that the semantic value of a sentence at a context is a proposition.[8]

[7] A theory of this sort is described and explored in some detail in Percus (2000) (though Percus take propositions to be functions from possible situations, rather than possible worlds, to truth values).

[8] I have been assuming that if tenses are object language quantifiers, they express properties of properties of times, i.e. they are of type $\langle rt, rt\rangle$, and that if worlds are object language quantifiers they express properties of properties of worlds (type $\langle st, st\rangle$). This is the standard way of treating quantification in type-driven semantic theories. King, on the other hand, uses a theory of quantification that is familiar from first-order logic, according to which quantifiers combine with open sentences (King, 2007, 194-195). It may be King's assumptions about quantification that lead him to overlook or ignore the possibility of combining the view that tenses (modals) are object language quantifiers with the claim that the semantic value of a sentence is something whose truth-value varies across times (worlds). For it isn't clear how to make the move we've been making in a system which treats open sentences the way they are standardly treated in first-order logic.

3 The semantic primacy of propositions

So King's main argument for the claim that the semantic value of a sentence at a context is a proposition fails; his remarks about tense are compatible with alternative views of the semantic value of a sentence at a context. I now turn to King's motivation. I said at the outset that King had two reasons for defending the view that the semantic value of a sentence at a context is a proposition. The first is that he wants to reject the "...demotion [of propositions] to objects of secondary importance in semantics and the correlative enshrinement of non-propositional semantic values as objects of primary importance..." (King, 2007, 171). But once we see the picture that King is objecting to, it becomes difficult to see why the "semantic primacy" of propositions matters.

On systems of the sort that King opposes and that Lewis (1980) defends, extensions are given relative to a context c, an index i, and variable assignment g, where i includes a world coordinate w and a series of other coordinates $i_2, ..., i_n$.[9] We'll suppose for simplicity that the index contains only three coordinates, a world w, a time t, and a place p. The reason Lewis's theory requires rich indices like this is that modal, temporal, and location expressions are all treated as index-shifting operators. Thus, on such a theory, the semantic value of a sentence at a context is not a proposition; rather it is a function from world-time-place triples to truth-values. Where ϕ is a sentence and c a context, we have:

Lewis Semantic Value of ϕ at c: $\lambda\langle w,t,p\rangle.[\![\phi]\!]^{c,\langle w,t,p\rangle,g}$

This is the object that ϕ contributes to larger structures in which it is contained, i.e. what it contributes to the interpretation of sentences in which it is embedded under a modal, temporal, or location operator.

But is the Lewis semantic value of ϕ what ϕ is used to *communicate* when assertively uttered in a normal context? Does the Lewis semantic value encode the *information* ϕ would normally be used to convey? Lewis thought the answer to this question was 'no' and King agrees. This is because the Lewis semantic value of ϕ at c is an object whose truth value varies over time and location, and both Lewis (at least in the paper in question) and King think that the objects of belief and assertion do not change their truth value across time and location. Thus, assuming the information that an assertive utterance of a sentence ϕ would normally communicate is something we can believe and assert, the Lewis semantic value of ϕ at c can't be the information an assertive utterance of ϕ in c would communicate. Let's call the information ϕ would normally communicate if assertively uttered in a context c the *proposition expressed* or *communicated* by ϕ at c. Then in that terminology we can say that the Lewis semantic value of a sentence ϕ at a context c cannot be the proposition expressed by ϕ at c.

Now it would be bad, for a number of reasons, if Lewis's semantic theory didn't take a sentence ϕ and a context c and gives us back the proposition expressed by ϕ in c. This would, for example, make it difficult to connect

[9] A well-known system of this sort is developed in Kaplan (1989).

Lewis's semantic theory to a wider account of linguistic communication. In light of this, it might seem that there is a *prima facie* worry about Lewis's theory: we need the theory to deliver the proposition a sentence expresses at a context, but the theory instead delivers non-propositional semantic values.

But in fact, as Lewis (1980) shows, this *prima facie* worry is not a genuine problem. For while the Lewis semantic value of a sentence at a context is not a proposition, Lewis's theory does deliver at least two salient propositions which are candidates for being the proposition expressed by a sentence in a context. The propositions in question are the *horizontal* and the *diagonal*:

Lewis-Horizontal of ϕ at c: $\lambda w.[\![\phi]\!]^{\langle w_c,t_c,p_c,x_c\rangle,\langle w,t_c,p_c\rangle,g}$

Lewis-Diagonal of ϕ at c: $\lambda w.[\![\phi]\!]^{\langle w,t_c,p_cx_c\rangle,\langle w,t_c,p_c\rangle,g}$ [10]

(x_c is the speaker of context c.) Note that in the second, but not the first, the world of the context and the world of the index are the same. We'll come back to the difference between these two; for the moment, the important point is that the semantics determines a proposition, the sort of thing we can be said to believe or assert. Moreover, relative to standard assumptions, the Lewis-horizontal of ϕ at c will be identical to the proposition King's favored theory assigns as the semantic value of ϕ at c.

Nevertheless, there is a sense in which propositions do not have "semantic primacy" in Lewis's theory, since the semantic value of a sentence at a context is not a proposition. But, given a sentence ϕ and a context c, Lewis's theory delivers a proposition which is a candidate for being the proposition expressed by ϕ in c. Moreover, the proposition in question – the Lewis-horizontal – is the same proposition that King's theory assigns as the semantic value of ϕ at c. In light of this equivalence, it is difficult to see what the *prima facie* problem with Lewis's picture is: why does it matter whether propositions have "semantic primacy" or not? The important thing is that we have a semantic theory that yields a proposition, the sort of thing we can be said to assert or believe. This is important because we want a semantic theory that can be integrated into a wider account of linguistic communication, and Lewis's theory satisfies this *desideratum*. As Lewis (1980, 39) puts it: "It would be a convenience, nothing more, if we could take the propositional content of a sentence in context as its semantic value."

4 Rigidity and two-dimensionalism

The more substantive worry that King has about Lewis's picture has to do with a certain argument against the rigidity thesis (RT), an argument inspired by Stanley (1997a). King uses Stanley's remarks to show how one might use Lewis's

[10] Note that a context is not just *any* world-time-place-individual quadruple. It must be one in which the individual in question is speaking at the time, place and world in question. Consequently, the diagonal is a partial function: it is not defined for worlds w' in which x_c is not speaking at t_c at p_c See Lewis (1980, 38) for discussion.

theory to defend a type of *two-dimensional* semantics that is incompatible with RT. In what follows, I will discuss the two-dimensionalist argument against RT, leaving aside the details of Stanley's own view, which diverges to some extent from the hypothetical two-dimensionalist that King discusses.[11] King claims that the two-dimensionalist's case against RT relies on Lewis's view that the semantic value of a sentence at a context is not a proposition. If this were right, then if King had shown that the semantic value of a sentence at a context *is* a proposition, then he would have undermined the two-dimensionalist's argument against RT. But in what follows, I show that the two-dimensionalist's case against RT is compatible with the claim that the semantic value of a sentence at a context is a proposition.

RT says that no rigid term has the same content as a non-rigid term. Actually, I think we ought to construe RT as a claim about the contents of *sentences* containing rigid vs. non-rigid terms. Here is how I formulate the claim:

> **Rigidity Thesis (RT)**
> For any open sentence ϕ, context c, and terms τ and τ': if τ is rigid and τ' is not, then the the content of $\phi(\tau)$ at c differs from that of $\phi(\tau')$ at c.

The two-dimensionalist begins her case against RT by noting that there is apparent evidence for it and also apparent evidence against it. She then offers a plausible way of reconciling this apparently conflicting evidence, and an upshot of this reconciliation is that RT is false. The crucial question for us is whether or not the two-dimensionalist's reconciliation requires the semantic value of a sentence at a context to be something richer than a proposition, as King suggests.

Let's start by looking at the apparent evidence in favor of RT (cf. Kripke, 1980). Consider the following two sentences:

7. Aristotle is the last great philosopher of antiquity.

8. Aristotle is Aristotle.

Note that (7) is contingent and that (8) is necessary. Thus, (7) is false in some possible situations, whereas (8) is true in every possible situation. Since these sentences are true in different situations, they would seem to have different contents. That gives us one confirming instance of RT, but it also allows us to argue as follows. If we assume that the meaning of a sentence is determined by the meanings of its parts, it would seem that any difference in content between two sentences, ϕ and ϕ', is traceable to a difference in content between some constituent of ϕ and some constituent of ϕ'. Since the only difference between (7) and (8) is that the latter contains an occurrence of *Aristotle* where the

[11] See King (2007, n. 14) for a discussion of the differences between Stanley's view and the two-dimensionalist's. I should emphasize that my remarks only concern the Stanley-inspired two-dimensionalism that King discusses. It might be that some of the other things Stanley says in his wider case against RT require something like Lewis's picture.

former contains an occurrence of *the last great philosopher of antiquity*, we can assume these two expressions differ in content. Since this argument could be presumably be repeated for any pair of of a rigid and a non-rigid term, we have a general result. Further, assume the following: for any open sentence ϕ, context c, and terms τ and τ', if τ and τ' differ in content, then the content of $\phi(\tau)$ at c differs from the content of $\phi(\tau')$ at c. Given this assumption, RT follows.[12]

Now we turn to the apparent evidence against RT. Consider the following pair of sentences:

9. The president of the United States is coming to dinner.

10. The actual president of the United States is coming to dinner.

These two sentences seem to communicate the same thing. To see this, consider the information you would get if someone uttered (9) in a normal conversation. Now consider the information you would get if someone uttered (10) in a normal conversation. Does the information you would come away with in these two situations differ? It seems not. And this seems like a good reason for saying (9) and (10) have the same content. But the sentences only differ in that (9) contains a non-rigid term (*the president of the United States*) where (10) contains a rigid term (*the actual president of the United States*). If RT were true, these two terms would have different contents, and that would seem to imply that (9) and (10) also have different contents. But that seems wrong, and so would appear to cast doubt on the truth of RT.

So we have an argument in favor of RT, and an argument against it. How to resolve this conflict? According to King, a resolution is available if we accept Lewis's picture. As we saw earlier, Lewis associates a sentence-in-context with two types of content: a semantic value and a proposition. These two types of content open up the possibility of explaining our apparently conflicting intuitions about the content of (9) and (10) as follows: Suppose that (9) and (10) have different semantic values, but that, in any context c, the proposition (9) expresses in c is the same as the proposition (10) expresses in c. Then we could account for our intuitions if we said that our intuitions about what a sentence communicates track the proposition it expresses, while our intuitions about a sentence's modal profile track its semantic value.

That, in outline, is the suggested resolution of the conflict. But how does this bear on RT? Well, if (9) and (10) express the same proposition relative to a context, then RT is false, assuming the notion of 'content' at issue in RT is *communicated content*.[13] That is, we get a counterexample to RT: let ϕ = *is*

[12]Thanks to an anonymous reviewer for help in formulating this argument. I should note that the final assumption the argument makes is a sort of restricted 'reverse compositionality' principle. That sort of principle doesn't typically hold in intensional semantic theories of the sort we've been discussing. To see this, let ϕ be a formula that cannot be satisfied at any point of evaluation; then even if τ and τ' differ in content, the contents of $\phi(\tau)$ at c will $\phi(\tau')$ at c will be the same, viz. the empty set. So the argument appears to require the idea that contents are structured.

[13]See Stanley (1997b) for a defense of the claim that RT is a thesis about communicated content.

coming to dinner, τ = *the actual president of the United States*, and τ' = *the president of the United States*.

Now since the two-dimensionalist's overall case against RT appears to presuppose Lewis's picture, King thinks he can undermine it by showing that the semantic value of ϕ at c just is the proposition ϕ expresses at c. If there are not two content-like entities around, then the two-dimensionalist reconciliation cannot be pulled off, and the argument against RT would be undermined. Our intuitions about the modal profile of (9) and (10) would just be intuitions about the propositions expressed by those sentences; since those sentences have different modal profiles, the propositions they express must be different, as RT predicts.[14]

That, I think, is how King understands the dialectic. But when we attend more carefully to the two-dimensionalist's argument, we see that it simply doesn't depend on the claim that the semantic value of a sentence at a context is something richer than a proposition. In the characterization of the two-dimensionalist's argument that I gave above, I suggested that our intuitions about the modal profile of a sentence track the modal profile of its semantic value. But this can't be quite right, for the following reason: on a theory of the sort Lewis endorses, the semantic value of a sentence at a context is a function from rich indices to truth values, i.e.:

$$\lambda\langle w, t, p\rangle.[\![\phi]\!]^{c,\langle w,t,p\rangle,g}$$

But this object presumably doesn't have a modal profile *simpliciter*. That is, this object will not be true or false at a possible world, unless we also specify a time and place. But which time and place is the right one for determining the modal profile of what a sentence ϕ says at a context c? The natural answer is that it's the time and place of utterance, t_c and p_c. In that case, what our modal profile intuitions are tracking is not the modal profile of the semantic value, but the modal profile of the *Lewis-horizontal*, which is the proposition you get when you saturate the Lewis semantic value of a sentence at a context with the time and place of utterance:

$$\lambda w.[\![\phi]\!]^{c,\langle w,t_c,p_c\rangle,g}$$

The idea that the Lewis-horizontal is the object of modal evaluation meshes well with the two-dimensionalist's argument, since the Lewis-horizontal of (9) differs from the Lewis-horizontal of (10):

Lewis-Horizontal of (9):
λw. the president of the United States in w is coming to dinner in w.

Lewis-Horizontal of (10):
λw. the president of the United States in w_c is coming to dinner in w.

[14] Of course, King would then presumably be obliged to give some explanation of why (9) and (10) seem to communicate the same information.

The former is true at a world in which John McCain wins the 2008 election and is coming to dinner, whereas the latter is false at such a world. The latter is true only at worlds in which Barack Obama is coming to dinner, whether or not he is the president in those worlds (we assume throughout our discussion that the world of utterance is always the actual world).

The other half of the two-dimensionalist's argument is the observation that (9) and (10) seem to communicate the same information. What is that information? A plausible answer is that it is the Lewis-diagonal, since (9) and (10) have the same Lewis-diagonal:

> Lewis-Diagonal of (9):
> λw. the president of the United States in w is coming to dinner in w.
>
> Lewis-Diagonal of (10):
> λw. the president of the United States in w is coming to dinner in w.

And this proposition does indeed seem to be the information that would be communicated by an assertive utterance of either of these sentences. And, crucially, if the proposition expressed by a sentence ϕ at a context c is the Lewis-diagonal of ϕ at c, then (9) and (10) express the same proposition, contrary to RT.

This is how I think we should understand the two-dimensionalist's argument against RT. But *this* argument doesn't depend on the claim that the semantic value of a sentence at a context is a function from rich indices to truth values. All the argument requires is a semantic theory according to which (9) and (10) have different horizontals, but the same diagonal. But even theories of the sort that King favors will have this feature.

We haven't used the terminology *horizontal* and *diagonal* in connection with the sort of semantic theory King favours, but it isn't hard to see how to define these notions within such a theory. On King's theory (as I shall call such theories), the semantic value of a sentence at a context is a proposition. This proposition is the *horizontal*:

> King-Horizontal of ϕ at c: $\lambda w.[\![\phi]\!]^{\langle w_c, t_c, p_c, x_c\rangle, w, g}$

On King's theory, the *diagonal* is defined as follows:

> King-Diagonal of ϕ at c: $\lambda w.[\![\phi]\!]^{\langle w, t_c, p_c, x_c\rangle, w, g}$

The reason the two-dimensionalist can accept King's theory is that he can define a horizontal and diagonal for each sentence-in-context, and, given those definitions, (9) and (10) will have different horizontals, but the same diagonal. The two-dimensionalist can then run his argument against RT exactly as he did before.

To see this, first note that the propositions that King's theory assigns as the semantic values to (9) and (10) are identical to the horizontal propositions that Lewis's theory assigns to (9) and (10), respectively:

King-Horizontal of (9):
λw. the president of the United States in w is coming to dinner in w.

King-Horizontal of (10):
λw. the president of the United States in w_c is coming to dinner in w.

Our intuition that (9) and (10) have different modal profiles can be explained on King's theory by the fact that they have different semantic values (horizontal propositions).

The intuition that these sentences express the same proposition can also be explained on King's theory, since (9) and (10) have the same diagonal:

King-Diagonal of (9):
λw. the president of the United States in w is coming to dinner in w.

King-Diagonal of (10):
λw. the president of the United States in w is coming to dinner in w.

The two-dimensionalist who accepts King's theory will claim that the proposition expressed by a sentence ϕ at a context c is the King-diagonal of ϕ at c. Thus, the two-dimensionalist will say that, since (9) and (10) express the same proposition, RT is false.

So the two-dimensionalist has nothing to fear from the claim that the semantic value of a sentence at a context is a proposition. For the two-dimensionalist's two semantic 'dimensions' are not *rich semantic value* and *proposition*, but *horizontal proposition* and *diagonal proposition*.

The flip-side of this point is that both Lewis's and King's theories are compatible with the denial of this kind of two-dimensionalism. The key two-dimensionalist claims are (i) that our intuitions about the modal profile of a sentence track the modal profile of the sentence's horizontal, and (ii) that the proposition expressed by a sentence is its diagonal. The natural way to reject this picture is to reject that second claim and instead maintain that the proposition expressed by a sentence is its horizontal. This would suggest that RT is true, since (9) and (10) have different horizontals. So if King wishes to defend RT, he must show that the proposition a sentence expresses at a context is its horizontal. But whether or not that claim is true seems largely independent of whether or not the semantic value of sentence at a context is a proposition.

5 Conclusion

One broad theme that emerges from our discussion is that the question of what is communicated by an assertive utterance of a sentence in a context is relatively independent of our compositional semantics for things like modality and tense. There are two illustrations of this: First, how we decide to theorize about things like modality and tense – do we treat modals/tenses as operators or as quantifiers? – places few constraints on how we answer the question of what a sentence

at a context communicates. As Lewis observes, we can treat modals, tenses, and location expressions as operators, and still take the objects of assertion to be propositions. The arguments of §2 show that the converse is also true: we can, for example, treat modals and tenses as object language quantifiers, and still take the objects of assertion to be things whose truth values vary across possible worlds and times. Second, as our discussion of the rigidity thesis shows, even if we accept the claim that the semantic value of a sentence at a context is a proposition, that doesn't show that *that* proposition – the horizontal/semantic value – is the proposition expressed by the sentence-in-context. Even here, where we've settled all of the relevant details of our compositional semantic theory, we still face a choice about what to take the information communicated by a sentence at a context to be.

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