

# Advanced Modalizing Problems

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*Abstract:* I present an internal problem for David Lewis's genuine modal realism. My aim is to show that his analysis of modality is inconsistent with his metaphysics. I consider several ways of modifying the Lewisian analysis of modality, but argue that none are successful. I argue that the problem also affects theories related to genuine modal realism, including the stage theory of persistence and modal fictionalism.

*Keywords:* Modality, modal realism, advanced modalizing, David Lewis

## I Introduction

David Lewis's modal realism (1968; 1971; 1986) has been hugely influential in the philosophy of modality. It is known to suffer from the advanced modalizing problem (Divers 1999), wherein commitments of Lewis's metaphysics of possible worlds conflict with the content assigned to certain statements of possibility. (I outline the problem in section 2.) A revision to Lewis's analysis of possibility seems to be required, if one is to maintain his modal metaphysics. Here, I consider a range of alternative analyses, and argue that they all fail. I conclude that Lewisian metaphysics is unable to provide an adequate analysis of possibility.

The conclusion is significant because one of the main justifications given for Lewisian modal realism is precisely that it provides the best analysis of possibility (Lewis 1986, Sect. 1.2, Sect. 3). But if it is unable to provide any such analysis, Lewisian modal realism is seriously undermined.

The paper is organized as follows. I outline the commitments of Lewisian modal realism and introduce the advanced modalizing problem in section 2. In sections 3–7, I discuss variant analyses of modality which attempt to overcome the problem without surrendering Lewisian modal realism. I argue that they all fail. In section 8 I show how the problem also affects stage theory (Sider 1996) and modal fictionalism (Rosen 1990). Section 9 is a brief conclusion.

## 2 Lewisian modal realism and advanced modalizing

By 'Lewisian modal realist', I mean someone who holds the following theses:

- (1) There is a plurality of worlds, all of the same ontological kind
- (2) Worlds are maximally spatiotemporally connected, and so distinct worlds do not have any parts in common
- (3) Ordinary individuals are parts of just one world and have their properties simpliciter, not merely relative to this world or that

I shall argue that no analysis of modality is available to someone who holds these theses. My target of course includes Lewis (1968; 1971; 1983b; 1986), but is wider: one might disagree with Lewis on what causation is or on what properties or dispositions are, for instance, and yet still count as a Lewisian modal realist.

Lewisian modal realists, having accepted that individuals are worldbound, are committed to some version of counterpart theory. The standard account analyses a *de dicto* statement of possibility such as ‘possibly, there are *F*s’ as saying that there is a possible world at which there are *F*s, i.e., a world which has *F*s as parts (Lewis 1983b). It analyses a *de re* possibility statement ‘possibly, *a* is *F*’ as saying that there is a world *w* and a counterpart *a'* of *a* in *w* such that, in *w*, *a'* is *F*. More generally, if ‘*A*(*a*<sub>1</sub>, . . . , *a*<sub>*n*</sub>)’ contains constants (or other unbound terms) ‘*a*<sub>1</sub>’, . . . , ‘*a*<sub>*n*</sub>’, then the standard Lewisian account will analyse ‘possibly, *A*(*a*<sub>1</sub>, . . . , *a*<sub>*n*</sub>)’ as follows:

- (4) There is a possible world *w* and counterparts *a*'<sub>1</sub>, . . . , *a*'<sub>*n*</sub> of *a*<sub>1</sub>, . . . , *a*<sub>*n*</sub> (respectively) in *w* such that, at *w*, *A*(*a*'<sub>1</sub>, . . . , *a*'<sub>*n*</sub>)

To complete the account, we need to know how the phrase ‘at *w*’ works. Lewis (1968) provides an account in terms of a translation from quantified modal logic to the extensional language of counterpart theory. On that translation, ‘at *w*’ has the effect of recursively restricting all quantifiers in its scope to *w*’s domain. But Lewis (1986) abandons any such attempt at systematic translation from QML. For Lewis (1986), ‘at *w*’ works ‘mainly by restricting the domains of quantifiers in its scope, in much the same way that the restricting modifier ‘in Australia’ does’ (Lewis 1986, p. 5). But it need not restrict all such quantifiers, just as ‘in Australia’ does not restrict to Australia the ‘any’ in ‘in Australia, there’s some philosopher cleverer than any other’ (Lewis 1986, p. 5). Since I want my target to include both Lewis 1968 and Lewis 1986, I won’t assume that ‘at *w*’ always restricts all quantifiers within its scope. I’ll call the analysis above *the Lewisian analysis*.

This analysis runs into the advanced modalizing problem (Divers 1999), as follows. The Lewisian modal realist holds that:

- (5) There are many possible worlds

She also accepts the rule of possibility introduction, *from ‘A’ infer ‘possibly, A’*. For, given the inter-definability of ‘possibility’ and ‘necessarily’, possibly introduction is equivalent to the factivity of necessity, *from ‘necessarily, A’ infer ‘A’*, which she accepts. (Divers (1999, p. 218) holds that possibility introduction ‘approaches the status of analyticity’.) So, from (5), the Lewisian modal realist is committed to:

- (6) Possibly, there are many possible worlds

She will analyse this as saying

- (7) There is a possible world at which there are many possible worlds

that is, there is a possible world which contains as parts many possible worlds. But she cannot accept (7), for she holds that worlds are spatiotemporally maximal,

and hence that each possible world has just one possible world, itself, as a part. So a Lewisian modal realist cannot accept the analysis of modality from above. (Divers (1999) discusses and rejects some attempts to head off this argument; see also Divers 2014. I agree with him that the problem is genuine and requires modification to the analysis of modality.)

In what follows, I will investigate alternative (but still broadly Lewisian) counterpart-theoretic analysis of modality which the Lewisian can accept and which overcome the advanced modalizing problem from above. I'll argue that none can be sustained.

### 3 The redundancy analysis

Divers (1999) presents a solution to the advanced modalizing problem, as follows. He claims that, in general, the content of an utterance may be restricted to a single world, or unrestricted, applying to all of modal space. So, we may understand:

(8) There are no flying hippos

in a restricted way, as saying (truthfully):

(8<sup>r</sup>) In our world, there are no flying hippos

or we might understand it unrestrictedly, as saying (falsely, by Lewisian modal realist lights):

(8<sup>u</sup>) There are no flying hippos anywhere in modal space

For Divers, 'the semantic function of a possibility operator on a non-modal quantificational sentence is always that of quantifying in, by way of a variable that is already reserved for worlds' (Divers 1999, p. 229). So prefixing a content of the form: *in w*, *A* with 'possibly' has the effect of changing 'in *w*' to 'there is some world *w* such that, in *w*'. So, prefixing the restricted content (8<sup>r</sup>) with 'possibly' will give us the content:

(9) For some world *w*, in *w*, there are flying hippos

which is true by Lewisian modal realist lights. But Divers notes that, in an unrestricted content such as (8<sup>u</sup>), there is no phrase 'at *w*' for 'possibly' to alter. So prefixing that content with 'possibly' will have no effect. As a consequence, when 'A' is read unrestrictedly, 'possibly, A' will have the same (unrestricted) content as 'A' itself. The same goes for 'necessarily': on unrestricted contents 'A', 'necessarily' has no semantic effect, so that 'necessarily A' and 'A' have the same (unrestricted) content.

Using this analysis, Divers can avoid the problem from above. The Lewisian modal realist of course intends her utterance of 'there are many worlds' to be unrestricted (since it is false when restricted to any world). But then prefixing

‘possibly’ to that content has no semantic effect, and so (6) has the content: *there are many worlds*, and not the content assigned by (7).

Divers’ account has much to recommend it: it is semantically non-ad hoc (Divers 1999, p. 230) and it ties in well with Lewis’s own remarks about the semantic effect of ‘possibly’ (Lewis 1986, p. 5). But it cannot be sustained, for there are (by Divers’ lights) unrestricted contents which (by anyone’s lights) change their truth-value when prefixed by ‘necessarily’. Here is one example.

Consider Anna, who is taller than Bill. As Anna and Bill are perfectly normal humans, it is a *contingent* matter that Anna is taller than Bill. Now suppose further that Anna and Bill are not worldmates of one another, but are nevertheless both regular human beings very much like you and me. Then

(10) Anna is taller than Bill

should be true, but contingently so. (10) has either a restricted content:

(10<sup>r</sup>) In the actual world @: Anna is taller than Bill

or it has an unrestricted content:

(10<sup>u</sup>) (In all modal space:) Anna is taller than Bill

The former is clearly false, for Anna and Bill are not worldmates and hence are not both parts of any one world. By contrast, (10<sup>u</sup>) is true, given the genuine modal realist’s metaphysics. So, appealing to charity, we should disambiguate (10) to the unrestricted reading (10<sup>u</sup>). When the genuine modal realist utters (10), we understand her as asserting (10<sup>u</sup>). But prefixing (10<sup>u</sup>) with either ‘possibly’ or ‘necessarily’ is redundant, says Divers. So we can thus infer from the unrestricted content of (10) to:

(11) It is necessary that Anna is taller than Bill

As a consequence, what the genuine modal realist asserts when she utters (10), namely (10<sup>u</sup>), is not contingent. But it clearly is a contingent matter that Anna is taller than Bill. Divers’ analysis gives us the wrong results on this score, and that is reason enough to reject it.

Divers may claim that (11) is harmless, since (by his lights) it says no more than (10). But it is not sufficient for Divers merely to find an acceptable reading of (11). The data to be explained is the deep intuition that (10) is contingent. Anna and Bill are regular human beings (albeit spatiotemporally separated ones) with regular physical human bodies, embedded within physical environments, and subject to physical laws very much like our own. Then it is certainly true – perhaps it is even a conceptual truth – that it is a contingent matter who out of Anna and Bill is taller. But Divers’ redundancy analysis cannot say this, and so must be rejected. We must consider some other analysis of modality.

## 4 The disjunctive analysis

In this section, I consider a broadly Lewisian analysis of modality which takes its cue from Divers' redundancy analysis. The idea is to take 'possibly,  $A$ ' to be true iff it is true *either* on the Lewisian analysis *or* on a redundancy reading of 'possibly'. (My thanks to an anonymous referee for suggesting this analysis.) The content assigned to 'possibly,  $A(a_1, \dots, a_n)$ ', on this theory, is the disjunction:

(I2) *Either* there is a world  $w$  and counterparts  $a'_1, \dots, a'_n$  of  $a_1, \dots, a_n$  respectively in  $w$  such that, in  $w$ ,  $A(a'_1, \dots, a'_n)$ ; *or*  $A(a_1, \dots, a_n)$

Call this the *disjunctive analysis*. One may worry that the approach is semantically ad hoc (on what basis does a sentential operator result in a disjunctive content?), but let us set that worry to one side. The main advantage of this approach is that it overcomes the problems from sections 2 and 3. If we begin with some consistent ' $A$ ' and infer 'possibly,  $A$ ', this cannot lead to contradiction on the disjunctive analysis. A disjunction is inconsistent iff all its disjuncts are; but one disjunct of the resulting analysis of 'possibly,  $A$ ' is ' $A$ ' itself, which we assumed to be consistent.

A problem is not far away, however. We generate the problem by forcing the analysis of 'possibly,  $A$ ' to ignore the redundancy disjunct, ' $A$ '. Take the hunk of desk-shaped matter on which my laptop is currently sitting; call it 'Hunk'. Hunk isn't a world but (by ordinary modal standards) it could have been: things could have been such that Hunk exists unaccompanied by anything wholly distinct from it. Moreover, had Hunk existed unaccompanied, the Sydney Harbour Bridge would not have been a part of Hunk. It certainly need not have been. So:

(I3) Hunk ( $b$ ) isn't a world but it could have been a world lacking the Harbour Bridge ( $b$ ) as a part

Applying the disjunctive analysis and using ' $W$ ' for 'is a world', ' $P$ ' for 'is a part of', and ' $C$ ' for 'is a counterpart of', (I3) has the content:

(I4)  $\neg Wh \ \& \ (\exists w \exists x \exists y (Ww \ \& \ Pxw \ \& \ Cxh \ \& \ Pyw \ \& \ Cyb \ \& \ Wx \ \& \ \neg Pyx) \vee (Wh \ \& \ \neg Pbh))$

As ' $Wh$ ' in the second conjunct's second disjunct contradicts the first conjunct ' $\neg Wh$ ', (I4) entails

(I5)  $\neg Wh \ \& \ \exists w \exists x \exists y (Ww \ \& \ Pxw \ \& \ Cxh \ \& \ Pyw \ \& \ Cyb \ \& \ Wx \ \& \ \neg Pyx)$

But, given Lewisian modal realist metaphysics, this is unsatisfiable. Supposing that there are entities  $w$ ,  $x$ , and  $y$  such that

$$Ww \ \& \ Pxw \ \& \ Cxh \ \& \ Pyw \ \& \ Cyb \ \& \ Wx \ \& \ \neg Pyx$$

we infer  $w = x$  (since  $w$  and  $x$  are worlds and  $x$  is a part of  $w$ ) and hence  $Pyx \ \& \ \neg Pyx$ : contradiction. So (I5) as a whole is unsatisfiable.

We have inferred a contradiction from a truth to which the Lewisian modal realist is committed, and so the disjunctive analysis is no better off than the standard Lewisian analysis or the redundancy analysis. Again, we must consider some other analysis of modality.

## 5 The world-free analysis

In this section, I consider a ‘world-free’ analysis of modal language. The idea is to drop the requirement that the counterparts invoked by an occurrence of ‘possibly’ must be parts of the same world as one another, by dropping quantification over worlds altogether. (This was suggested to me by Harold Noonan.) ‘Possibly’ then has the semantic effect of existentially quantifying over counterparts; but it no longer existentially quantifies over possible worlds (and so does not restrict embedded quantifiers to any particular world). So ‘possibly,  $A(c_1 \dots c_n)$ ’ is analysed as:

- (16) There are counterparts  $c'_1, \dots, c'_n$  of  $c_1, \dots, c_n$ , respectively, such that  $A(c'_1, \dots, c'_n)$

Call this the *world-free analysis*. This approach avoids the advanced modalizing problem from section 2. As (6), ‘possibly, there are many possible worlds’ is *de dicto*, it will be assigned the unrestricted content *there are many worlds*, just as on Divers’ redundancy analysis. More generally, if the Lewisian modal realist accepts ‘ $A(c_1, \dots, c_n)$ ’, then inferring ‘possibly,  $A(c_1, \dots, c_n)$ ’ cannot be problematic as a result of the content it is assigned by the world-free analysis. For then, since each individual is a counterpart of itself,  $c_1, \dots, c_n$  themselves will witness the existential commitments of that content.

On this analysis, what’s possible is fixed entirely by the counterpart relation. This brings with it a number of advantages over the standard Lewisian analysis. It allows us to make sense of possibilities involving transworld individuals, abstract entities, and island universes, for example. It allows that (in an appropriate context) I could have had spatiotemporally disconnected parts, for example. This seems a welcome addition of flexibility to the analysis of modality, especially given that there will remain contexts in which ‘I could have been a transworld individual’ is false.

In analysing whether the world-free analysis is adequate as a theory of possibility, I want to consider the effect it has on *de dicto* modality. By ordinary standards, one can truly assert:

- (17) There could have been no penguins

But this is false on the world-free analysis, which treats (17) as having the false content:

- (18) (Unrestrictedly:) there are no penguins

This is rather bad news for the world-free analysis, for there is clearly *some* sense in which there might have been no penguins.

The defender of the world-free analysis might counter by analysing (17) as a *de re* statement about the actual world, i.e.:

- (19) The actual world could have been such that, at it, there are no penguins

This is true, on the world-free analysis, for the actual world (at least in some contexts) has counterparts which contain no penguins. The general strategy for the world-free analysis, therefore, is to treat each *de dicto* modal claim as a *de re* modal claim about the actual world @, with quantifiers restricted to @.

This way of treating *de dicto* claims is problematic. There exists something that is not part of our world. So by possibility introduction, the Lewisian modal realist is committed to:

(20) It is possible that there exists something that is not part of our world

But treating this as a *de re* claim about the actual world, as above, this is analysed as:

(21) There exists a counterpart  $w$  of the actual world such that, at  $w$ , something is not part of  $w$

But this is false. Although we allow (with Lewis 1986) that in general ‘at  $w$ ’ need not restrict to  $w$  all quantifiers within its scope, it must so restrict some of them, else ‘possibly’ it is not functioning as a modal operator at all (Noonan 1994). Hence in (21), ‘something’ is restricted to  $w$  and so (21) cannot be satisfied.

The world-free analysis faces an additional problem, which I shall introduce in section 7 (since it is a problem for the analyses discussed in sections 6–7 as well). For now, given the issue just raised, I do not think the world-free analysis is tenable.

## 6 The many-worlds analysis

In this section, I consider yet another variant on the Lewisian analysis. One might locate the problem with the original analysis not in its use of worlds *tout court*, but in its restriction to single worlds in the analysandum. Since cases of advanced modalizing typically focus on situations involving multiple worlds, it is natural to suspect that these problems can be avoided by relaxing this restriction in the analysis of possibility statements. We can do this for a statement ‘possibly,  $A(a_1, \dots, a_n)$ ’ by allowing the counterparts of  $a_1, \dots, a_n$  to be parts of distinct worlds. (This move was suggested by an anonymous referee for this journal.) On this approach, ‘possibly,  $A(a_1, \dots, a_n)$ ’ is treated as:

(22) There are worlds  $w_1, \dots, w_n$  and counterparts  $a'_1, \dots, a'_n$  of  $a_1, \dots, a_n$ , respectively, such that each  $a_i$  is a part of  $w_i$  and, at the plurality  $w_1, \dots, w_n$ :  
 $A(a'_1, \dots, a'_n)$

Whatever is possible according to Lewis’s original analysis is possible according to the many-worlds analysis (just take the case in which  $w_1 = \dots = w_n$ ) but not vice versa. In particular, the many-worlds analysis provides a consistent reading of (6); but unlike the world-free approach, it handles such *de dicto* possibility statements in a standard way. In this respect, it is an improvement on the views considered hitherto.

The problem with the many-worlds analysis is as follows. Consider Anna ( $a$ ) and Bill ( $b$ ) from section 2, who are not spatiotemporally related to one another. The Lewisian modal realist accepts that there is a mereological sum  $s$  of (just) Anna and Bill:  $s = a \sqcup b$ . So, using ‘ $S$ ’ for ‘are spatiotemporally related to one another’, we have:

$$(23) \neg Sab \ \& \ s = a \sqcup b$$

So by possibility introduction, we infer:

$$(24) \text{Possibly, } \neg Sab \ \& \ s = a \sqcup b$$

The many worlds analysis assigns this the content

$$\begin{aligned} \exists w_1 \exists w_2 \exists w_3 \exists x_1 \exists x_2 \exists x_3 ( & Ww_1 \ \& \ Px_1w_1 \ \& \ Cx_1a \ \& \ Ww_2 \ \& \\ & Py_2w_2 \ \& \ Cx_2b \ \& \ Ww_3 \ \& \ Px_3w_3 \ \& \ Cx_3s \ \& \\ & \text{at } w_1, w_2, w_3 : \neg Sx_1x_2 \ \& \ x_3 = x_1 \sqcup x_2) \end{aligned} \quad (25)$$

But this content is incompatible with Lewisian modal realist metaphysics. Since ‘ $\neg Sx_1x_2 \ \& \ x_3 = x_1 \sqcup x_2$ ’ contains no quantifiers (or quantifier-like terms), the phrase ‘at  $w_1, w_2, w_3$ ’ is redundant. Since  $x_3$  is a part of  $w_3$  and  $x_1$  and  $x_2$  are both parts of  $x_3$ , it follows from the transitivity of parthood that both  $x_1$  and  $x_2$  are parts of  $w_3$ . Hence (given the definition of ‘world’)  $x_1$  and  $x_2$  are spatiotemporally connected, contradicting ‘ $\neg Sx_1x_2$ ’.

The many-worlds analysis fails. But there is a closely-related approach which avoids this problem, which I’ll discuss in the next section.

## 7 The plurality of worlds analysis

The many-worlds analysis treats a *de re* possibility statement about  $a_1, \dots, a_n$  by requiring that, for each  $a_i$ , there is a world  $w_i$  and a counterpart  $a'_i$  of  $a$  in  $w_i$ . This rules out any of the  $a_i$ s having counterparts bigger than any world: hence the problem from section 6. But we can relax the requirement, saying instead that, for some plurality of worlds,  $a_1, \dots, a_n$  have counterparts *somewhere in that plurality*. Thus ‘possibly,  $A(a_1, \dots, a_n)$ ’ is analysed as:

$$(26) \text{There are worlds } w_1, \dots, w_n \text{ and counterparts } a'_1, \dots, a'_n \text{ of } a_1, \dots, a_n, \text{ respectively, such that each } a_i \text{ is a part of the plurality } w_1, \dots, w_n \text{ and, at the plurality } w_1, \dots, w_n: A(a'_1, \dots, a'_n)$$

This approach seems immune to advanced modalizing problems of the kind used in section 2. If ‘ $A(a_1, \dots, a_n)$ ’ is true of some plurality of worlds, then that plurality of worlds plus  $a_1, \dots, a_n$  themselves will witness (26), and so no contradiction will be derivable. This is, I think, the best analysis of possibility statements available to the Lewisian modal realist. It overcomes all the problems faced by the analyses discussed so far; it retains the spirit of Lewis’s original



proposal; and it allows as possibilities states of affairs which, given Lewisian metaphysics, it is very natural to think should be possible.

The problem with the plurality of worlds analysis concerns not possibility but truth simpliciter. Utterances are true, not merely relative to some world or other, but true simpliciter. These need not be unrestricted utterances such as (5); everyday (restricted) utterances such as ‘I exist’ and ‘there are no unicorns’ are true simpliciter. On Lewis’s analysis, ‘A’ is true simpliciter iff it is true relative to its world of utterance. ‘I exist’ and ‘there are no unicorns’, as uttered by me, are true simpliciter because they are true relative to my world, the actual world. On the plurality-of-world analysis (and also the many worlds analysis), however, we are interested in analysing contents relative to some plurality of worlds. So should we continue to analyse truth simpliciter as truth relative to a given world, or as truth relative to a given plurality of worlds? Neither option is very happy.

Suppose we take the conservative option and continue to say that, by definition, an utterance of ‘A’ is true simpliciter iff it is true relative to the world of utterance. Then it is analytic that, for restricted contents, truth simpliciter requires truth relative to some world. So it is also analytic (given how Lewisian metaphysics defines ‘world’) that truth simpliciter requires truth relative to some spatiotemporally connected entity. But, given the plurality-of-worlds analysis, some possible truths are not like this. ‘There are exactly two penguins, and they are not worldmates’ is false but possibly true, on the plurality of worlds analysis. The problem is that, on the present approach, it is analytic that it is false simpliciter, and an analytically false statement cannot possibly be true. So we must reject this first option.

We avoid the problem if we allow that ‘A’ is true simpliciter iff it is true relative to a plurality of worlds, including the world of utterance. But there are many such pluralities. If we require an utterance ‘A’ to be true relative to all such pluralities in order for it to be true simpliciter, then very little will be true simpliciter. We won’t capture the intuitive truth (simpliciter) of ‘there are no unicorns’ (under its restricted reading), because there are pluralities of worlds which include both ours and a world of unicorns. If on the other hand we require an utterance ‘A’ to be true relative only to some such pluralities, in order for it to be true simpliciter, then we arrive at a contradiction: ‘there are no unicorns’ will come out both true (simpliciter) and not true (simpliciter). So we must reject this option, too. Note that the problem applies equally to the world-free and many-worlds analyses.

Bricker’s (2001) solution to the problem is to adopt an absolute notion of actuality. On this view, some world or plurality of worlds is uniquely actual; all the other worlds are somehow not ontologically on a par with these. They exist but are, in a deep metaphysical sense, non-actual. Bricker’s approach resolves the issue because then truth simpliciter can then be treated as truth relative to the unique actual world or plurality of worlds. There are a host of problems with for Bricker’s view. But we can ignore them for present purposes, for the approach is not compatible with Lewisian modal realism. It is precisely the Lewisian insistence that each possible world is ontologically on a par which generates the problem; hence Lewisian modal realists cannot accept the plurality of worlds analysis.

## 8 The scope of the problem

So far, I have argued that no analysis of modality is compatible with Lewisian modal realism. I have done that by considering and rejecting a number of proposals. Of course, there may be an analysis of modality, compatible with Lewisian modal realism, which I have not considered here. But there is strong reason to believe that, even if there is some further analysis to be given, it cannot differ too greatly from the analyses discussed above. Lewisian modal realism, in accepting non-overlap of worlds, commits one to a counterpart-theoretic analysis of modality. Given the need to analyse restricted *de dicto* contents such as (17), worlds must play a role at some point of the analysis, where all of those worlds are ontologically on a par. Given those constraints, it is highly likely that any Lewisian modal realist analysis of modality will suffer from the problems discussed above.

Before concluding, I want briefly to consider whether these arguments also affect metaphysical theories which are parallel to or parasitic upon Lewisian modal realism. I'll consider the stage theory of persistence (Sider 1996) and modal fictionalism (Rosen 1990). Stage theory (Sider 1996) is four-dimensional in its ontology: past, present, and future entities exist. It differs from the Lewisian 'worm view' of persistence (Lewis 1976), on which an ordinary material object is a four-dimensional fusion of object-stages, in that stage theory identifies the ordinary objects with the temporal stages. According to the stage view, a person is a particular temporal stage, rather than a fusion of suitably-related person-stages.

Stage theory deals with temporal statements in much the same way that the Lewisian analysis deals with modal statements. Lewis's *unity relation I* (Lewis 1976) and world-stages are for the stage theorist what the counterpart relation *C* and possible worlds are for the Lewisian modal realist. According to stage theory, '*a* was taller than *b*' says that there is a past world-stage with parts *x* and *y* such that *x* is *I*-related to *a*, *y* is *I*-related to *b* and *x* is taller than *y*. (It does not say that a past stage *I*-related to *a* is taller than a past stage *I*-related to *b*, else 'I was taller than my father' would be true, even though I've always been shorter than him.) Given this parallel, an argument can be run against stage theory in just the way it is run against the Lewisian analysis of possibility, with the 'at some time' operator for 'possibly' and the 'is a world-stage' in place of 'is a world'. The various amendments to the Lewisian approach discussed in sections 3–7 are all *prima facie* available to the stage theorist, but all suffer from analogues of the problems discussed in those sections. (For brevity, I won't discuss those arguments here.) So stage theory appears to be as bad off as Lewisian modal realism.

Modal fictionalism (Rosen 1990) does not accept that there is a plurality of worlds; but it nevertheless uses a fiction of modal realism (roughly, *The Plurality of Worlds*) to analyse modal statements. It treats '*A*' as true iff '*A*<sup>@</sup>', the Lewisian analysis of '*A*' relativised to the actual world @, is true according to the fiction of genuine modal realism, suitably supplemented by an encyclopaedia of all actual, non-modal truths. Thus, the fictionalist will not assert things like 'there are flying hippos at other worlds', but will assert that, according to the fiction, there are flying hippos at other worlds, and hence that (literally) there could have been flying hippos.

The problem with this approach is that the advanced modalizing problem shows that the fiction of modal realism is inconsistent with that analysis of possibility statements. The modifications to the analysis of possibility discussed in sections 3–7 carry over to the modal fictionalist analysis: ‘A’ will be true iff the relevant analysis of ‘A’ is true according to the fiction of Lewisian modal realism. But the arguments from sections 3–6 show that the first four of those analyses are problematic: in each case, both the analysis of ‘A’ and the negation of the analysis are true, according to the fiction. But if the fiction is inconsistent, then everything is true according to it; and so truth simpliciter, without the fiction, trivialises.

I want to consider, briefly, whether the modal fictionalist fares better if she adopts the plurality-of-worlds analysis (section 7) as her way of mapping modal statements onto her fiction. The worry considered in section 7 concerned truth simpliciter. We cannot take truth simpliciter to be truth relative to the world of utterance, since some truths concern more than a single world. But neither can we take truth simpliciter to be truth relative to some plurality of worlds, for there are many such pluralities and not all will agree on the truth of some ‘A’. Modal fictionalism seems to offer a way out of this worry. A unique fictional world or plurality of worlds has a special status, namely, being the world or plurality of worlds which represents concrete actuality. So there is a distinguished fictional world or plurality of worlds (just as there is on Bricker’s (2001) solution), even though the fiction is Lewisian. Thus, ‘A’ is true simpliciter iff its plurality-of-worlds analysis is true in the fiction, relative to whichever fictional world or plurality of worlds corresponds to concrete reality. (For simplicity, call that unique fictional world or plurality of worlds *actual*.) So prima facie, the modal fictionalist can avoid the worry from section 7.

A problem remains, however. Truth (simpliciter) is governed by the T-scheme: A iff ‘A’ is true (simpliciter). So given the suggested analysis of truth (simpliciter),

(T) A iff the analysis of ‘A’ is true in the fiction, relative to the actual world or plurality of worlds

will be an analytic truth. But what modal status does (T) have? Suppose we evaluate the right-hand-side of (T) relative to some world of the fiction. To do so, we need to know whether ‘the fiction’ and ‘the actual world’ behave rigidly. Suppose they do not, so that the referent of ‘the fiction’ varies across worlds. Then, we will have a fictional world  $w$  whose fiction disagrees with  $w$  on what is the case. Then some instance of (T) will be false relative to  $w$  and so the fictionalist must take (T) to be possibly false. But (T) is analytic, and so cannot be possibly false.

Suppose instead that ‘the fiction’ and ‘the actual world’ behave rigidly. Then whatever is true relative to the actual world or plurality of worlds is necessarily true relative to the actual world or plurality of worlds. So for some contingent ‘A’, the right-hand-side of (T) will be true relative to any world of the fiction. But since that ‘A’ is contingent, for some world  $w$  of the fiction, ‘A’ will be false relative to  $w$ , and so (T) as a whole will be false relative to  $w$ . Again, the fictionalist must take (T) to be possibly false. But (T) is analytic, and so cannot be possibly false.

So the modal fictionalist cannot make use of the approach from section 7 after all. In sum, modal fictionalism (if based on Lewisian modal realism) must be rejected.

## 9 Conclusion

I have argued that Lewisian modal realism cannot give a satisfactory analysis of modality. If so, the justification for Lewisian modal realism is seriously undermined. I also argued that parallel arguments equally affect stage theory and modal fictionalism (as based on Lewisian modal realism).

I defined Lewisian modal realism by its central commitment to (1)–(3). Surrendering (1) in favour of a plurality of ersatz worlds would avoid the advanced modalizing problem with which I began (section 2), as well as the problem from section 5. Surrendering (1) by holding an absolute notion of actuality, as Bricker (2001) does, would avoid the argument from section 7. Surrendering (2) would allow a world to contain other worlds, thus avoiding the problems from sections 2 and 5. Rejecting (3), as McDaniel (2004) and Yagisawa (2010) do, may avoid commitment to counterpart theory at all (since individuals may then be parts of multiple worlds). But it is not clear that this will resolve the issue, given that the problems from sections 2 and 5 concern *de dicto* possibilities. These are precisely the options that Lewis (1986) argued so forcefully against. So there are options for modal realists, but none the Lewisian would accept.

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