Possible Worlds I: Modal Realism

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It is difficult to wander far in contemporary metaphysics without bumping into talk of possible worlds. And reference to possible worlds is not confined to metaphysics. It can be found in contemporary epistemology and ethics, and has even found its way into linguistics and decision theory. But what are those possible worlds, the entities to which theorists in these disciplines all appeal?

Call any attempt to answer this question a *theory of possible worlds*. This paper sets out and evaluates a leading contemporary theory of possible worlds. The view's principal proponent is David Lewis, and his label for it is 'Modal Realism,' which I will abbreviate 'MR.'[1] The view accepts the following systematic correspondence between certain modal facts and facts regarding the existence of possible worlds:

(SC) it is possible that ϕ iff there is a w such that w is a possible world and 'ϕ' is true at w.

Lewis proposes MR, in part, as an attempt to specify the nature of the possible worlds whose existence is required by (SC)'s instances.

This paper outlines Lewis's view and discusses some main lines of objection. I will start by noting two competing ambitions for a theory of possible worlds (§1): that a theory of possible worlds be *reductive* and *user-friendly*. I will then outline Lewis's version of MR (§2), and consider objections on the grounds that MR is not reductive (§3) and not user-friendly (§4).

1 Two Ambitions for a Theory of Possible Worlds

There are at least two ambitions one might have for a theory of possible worlds. A principal ambition motivating Lewis is to advance the metaphysics of modality

by giving a theory of the nature of modality, the meaning of modal discourse, or the analysis of modal concepts in terms of possible worlds. Lewis has argued that (SC) provides the means to reduce modal facts, terms, or concepts to non-modal facts, terms or concepts.[2]   On this view, the possibility that Bush have lost the 2000 electoral vote is reduced to, or analyzed as, the existence of a possible world at which "Bush lost the 2000 electoral vote" is true. Reductive proposals along these lines would be one means of specifying the nature of necessity.

(SC) and associated claims hold out the hope of providing reductions only if the notion *being a possible world* is given a non-modal explanation. The other notions deployed on the right-hand side of (SC) seem suitably non-modal. The quantifier 'there is a w' doesn't seem modal. And the notion of truth at a possible world seems to be no more modal than the notion of residence in an urban locality. Whether instances of the right-hand side of (SC) provide matter for a reduction of possibility claims seems then to turn on whether the notion *being a possible world* can be given a non-modal gloss. Thus, if our theoretical aim is reduction, we'll need to provide an explanation in non-modal terms of the notion of a *possible world* (and of the correlative notion of *truth at a possible world*). Let's call a theory of possible worlds *reductive* if it serves the ambition of reducing possibilities to non-modal terms by providing a non-modal characterization of the nature of possible worlds.

Providing a reductive theory of possible worlds is only one of the tasks to which possible worlds have been put. A second ambition for a theory of possible worlds is to explain their nature in such a way as to illustrate and underwrite their fitness as tools for *end-users* in fields far removed from the metaphysics of modality, the semantics of modal discourse, or the analysis of modal concepts. I have already noted that possible worlds are also used as a tool in a wide variety of other philosophical (and not-so-philosophical) projects. For instance, a conspicuous and seminal use of possible worlds is as a basis for a variety of semantic theories; Lewis himself is an enthusiastic participant in these theoretical endeavors. Many authors have defended the identification of propositions – the contents of thought and assertoric speech – with collections of possible worlds. The idea here is that conveying information involves ruling some possibilities out and others in. We can represent the information conveyed as the collection of maximal possibilities – possible worlds – which are ruled in.[3]   Stalnaker (1968) and Lewis (1973) have also proposed analyses of counterfactuals

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in terms of possible worlds. Another example is Stalnaker's suggestion that the progress of a conversation aimed at information exchange should be modeled using possible worlds. Though each of these proposals faces problems, they are all going concerns in contemporary semantics. A quick glance at lots of other fields, including epistemology, ethics, decision theory, and linguistics, would tell a similar story.

Let's call a theory of possible worlds suitable for satisfying this second ambition *user-friendly*, and a theory *user-hostile* insofar as it fails to be user-friendly. A user-friendly theory of possible worlds would underwrite their fitness as tools for theorizing across a wide variety of fields. There are a number of ways in which a theory of possible worlds might be user-hostile. Most obviously, a theory could be incoherent, or imply some contradiction or manifest absurdity. But good old-fashioned implausibility also counts against user-friendliness. As Lewis argues,[4] we can't avail ourselves of a given theory of possible worlds if we can't bring ourselves to believe what the theory says.

It is difficult to serve two masters. As we shall see, MR in Lewis's hands appears on its face to be a reductive theory of possible worlds. I will note objections to the claim the MR really is reductive. Though, in my view, these objections ultimately succeed, the question of whether MR is really reductive is vexed. On the other hand, it is easy to see that it is not user-friendly.

2   Parallel Spacetimes

Lewis's development of MR is influential despite the fact that no one other than Lewis seems to accept it in its entirety.[5] Lewis's theory holds that x is a possible world iff x is a world.[6] According to Lewis's theory, there are many worlds. Each of those worlds is a cosmos, a thing of the same kind as the cosmos in which we all live, move, and have our being. Our cosmos comprises an entire spacetime and all its contents. Other cosmoses similarly comprise entire spacetimes and all of their contents.[7] Our cosmos, the actual world, is just one cosmos among many, coexisting with the others. There are also many individuals in this array of spacetimes. Some of those individuals are in our spacetime; most are not. The things of one spacetime stand in no spatial or temporal relations to the things of another, nor is there causal interaction between spacetimes; different spacetimes are causally and spatiotemporally isolated from one another. Indeed, Lewis

thinks that the cosmoses are individuated by their spatiotemporal isolation. If a thing in a cosmos x bears spatial or temporal relations to a thing in a cosmos y, then x and y are on that account the same cosmos.[8]

No individual is in more than one spacetime on Lewis's view. This point comports with his conception of a possible world as a spatiotemporally isolated cosmos. Perhaps ordinary individuals like Bush can be scattered, having non-contiguous parts that are at some spatiotemporal distance from one another. But surely they cannot have parts that bear *no spatiotemporal relations what-soever* to one another. So an ordinary individual like Bush cannot be in two entirely separate, disjoint spacetimes.[9]

Lewis introduces a new relation to accompany his newly-discovered cosmoses. There are *counterpart* relations among the individuals of different spacetimes, founded in relations of similarity among them. Roughly, an entity x in one spacetime is a counterpart of an entity y in another spacetime iff x resembles y to a sufficient degree, and no other individual in x's spacetime resembles y more closely than x does.[10] Closeness of resemblance and sufficiency of degree of resemblance are apparently non-modal notions. Thus, counterpart relations are ultimately explained in terms of similarity in non-modal respects, without reference to necessity or possibility. They provide suitable raw material, then, for a proposal to reduce modal claims to a non-modal basis.[11]

MR appears to provide a basis for using possible worlds to reduce possibilities. Lewis completes the proposed reduction by pairing modal claims with proposed analyses in non-modal terms. Lewis's theory separates modal claims into two kinds. The truth of the first kind, the *de re* modal claims, turns on the possibilities for particular individuals. The truth, for instance, of 'Bush might have lost the 2000 electoral vote' turns on what's possible for Bush. Lewis relies on counterparts to analyze *de re* claims. His analysis of the claim at hand is: there is a counterpart of Bush, an inhabitant of some cosmos or other, who lost.[12] This claim is no more modal than the claim that there is an opponent of Bush, an inhabitant of some state or other, who lost the vote. Modal claims of the second kind, the *de dicto* modal claims, do not turn on the possibilities for any particular individual. The truth, for example, of 'there might have been purple penguins' does not turn on how any particular individual might have been, but rather on the possible truth of a general claim to the effect that there are some purple penguins.[13] Lewis's analysis of *de dicto* claims does not appeal

to counterparts. In the case at hand, Lewis's analysis is: there is a cosmos which includes some purple penguins.[14] This claim seems no more modal than the claim that there is a state whose inhabitants include some wealthy surfers.[15]

3   Is MR Reductive?

Lewis's version of MR avoids any obvious modal component in its explanation of the notion *being a possible world*. For this reason, it seems to provide a reductive theory of possible worlds.[16]   Critics have charged, however, that things are not as they seem, and that MR is not really reductive, because the attempted reduction it proposes is inadequate. We will examine two objections on this score.

3.1   Relevance

The first objection is that goings-on in places spatiotemporally isolated from this spacetime have no bearing on the question of what might have been the case here. For instance, the loss of some electoral vote by someone else in a different spacetime, bearing no spatiotemporal relations to Bush at all, is irrelevant to whether Bush might have lost the electoral vote here in 2000. It is implausible to hold that the victories of other individuals in other elections in other spacetimes has anything to do with the fact that Bush might have lost here. The point is reinforced by a comparison to elections in other places in the spacetime which we all inhabit. The losses of other individuals in other elections in other countries has nothing to do with the possibility of a Bush loss here.[17]   Thus, according to this objection, even if we accept the ontology of MR – even if we accept the existence of a varied lot of parallel spacetimes and their inhabitants – the bearing of that ontology on the modal facts is dubious.

We ordinarily expect the relevance of a proposed reductive explanation to what it purportedly explains to be manifest. The relevance of reducer to reduced is a hallmark of successful reductions. Consider, for instance, the analysis of certain facts about the density of water in terms of facts about configurations of hydrogen and oxygen atoms. Assuming the chemist's ontology is correct, the relevance of facts about hydrogen and oxygen atoms to the density properties of water is manifest. The bits of water which exhibit the properties are composed of hydrogen and oxygen atoms; those atoms are the loci of mass in the water;

and so facts about how close these atoms get to one another are intimately involved in how dense the water is. The chemist's theory has a built-in relevance to the density facts it is supposed to explain. To give a name to this sort of phenomenon, the chemist's reductive explanation of the density facts regarding water has the *relevance effect*. The problem with Lewis's proposed reduction is that it does not have the relevance effect.[18]

Lewis himself dismisses the objection from relevance,[19] asserting that his proposed analysis provides the sort of relevance he needs. For instance, the theory claims that part of what it is for Bush to be a possible loser is for someone resembling Bush to have lost elsewhere. The losses of others elsewhere are relevant to Bush's possible loss according to the theory because they help constitute it; that's just what the theory says. But, as our chemical example shows, the relevance effect is not achieved by fiat. This is a reason to think that the proposed reduction fails.

But not all successful reductions have the relevance effect on first inspection. Some successful reductions achieve relevance by what one might call "fit": accepting the reductive proposal for a certain phenomenon yields a theory which predicts and explains its central features. Consider, for instance, the reduction of temperature in thermodynamic systems to the mean kinetic energy of their molecules. Even if one is convinced that a thermodynamic system contains molecules, there is no reason on the face of the matter to think that the system's temperature has anything to do with how those molecules are moving. The mean kinetic energy of molecules does not have built-in relevance to the temperature of the system. But by accepting the identification of the temperature of a thermodynamic system with the mean kinetic energy of its molecules, together with some ancillary assumptions, we can derive the ideal gas law from Newtonian mechanics. An empirically observed feature of gases is that they (roughly) obey the ideal gas law. So the proposed reduction achieves relevance by fit.

In the present case, MR could achieve relevance if we had a theory of the nature and extent of the cosmoses that, together with the proposed pairings of possibility claims with counterpart-theoretic analyses, exactly predicted what was possible. In fact, Lewis attempts to do just this. The next objection is that Lewis's attempt fails.[20]

3.2 Plenitude

MR needs to achieve relevance by fit if the reduction it proposes is to succeed. Fit can be achieved only by supplementing the view with some claims that guarantee that there is a possible world of the right sort to ground every possibility. Following Lewis, I will call the cosmoses *plenitudinous* if every possibility is backed by a cosmos of the right sort. MR needs supplementation with principles that imply that the cosmoses are plenitudinous. Adding all of the instances of the left-to-right direction of (SC)

(SC)$^{\Rightarrow}$ If it is possible that ϕ, then there is a w such that w is a possible world and 'ϕ' is true at w

might do the trick, if the consequent is analyzed along the lines Lewis proposes. But if the modal idiom in the antecedent of (SC)$^{\Rightarrow}$ is left unanalyzed, then there is a residuum of primitive modality: we achieve fit but lose the reduction. If, on the other hand, we apply the possible worlds analysis of "possible" endorsed by MR, we get the triviality

(USELESS) If there is a w such that w is a possible world and 'ϕ' is true at w, then there is a w such that w is a possible world and 'ϕ' is true at w.

As the label indicates, (USELESS) won't help secure a fit between what's possible and what cosmoses there are. Instances of (USELESS) are tautologies, trivially satisfied by any theory of possible worlds. (USELESS) won't help us sift those theories which exactly predict what's possible from those which do not.[21]

A new idea is needed to secure the fit between the possibilities and the cosmoses without indulging in primitive modality. Lewis proposes a *principle of recombination*. The guiding idea is the Humean thought that anything can coexist with anything: possibilities can be combined at will, *modulo* spatial re-arrangements to make sure that everything fits together. For instance, if there could be a nine-foot-tall man and there could be a purple elephant, then a nine-foot-tall man and a purple elephant could coexist, so long perhaps as they occupied different spatiotemporal regions. In Lewis's hands, this principle takes the following form:

(RECOMBO) If x_1 is an individual in a spacetime w_1, x_2 is an individual in a spacetime w_2, ..., then there is a spacetime $w^{\forall}$ containing any number

(including 0) of duplicates of x_1 and any number (including 0) of duplicates of x_2, and ..., size and shape permitting.[22]

(RECOMBO) is not strong enough to achieve the fit that reduction requires. To the best of my knowledge, no one has ever had skin which had the lime-green color of Oz's Wicked Witch of the West. (Philosophy concerns the underlying nature of things – makeup doesn't count.) Bush might have had skin of that color. But duplicate Bush and the rest of us human beings as many or as few times as you like, and you will never come up with a person with skin that is exactly the right color. If Bush, the rest of us human beings, and our duplicates are the only things that there happen to be that are sufficiently person-like, then Lewis's recombination principles can be satisfied without supplying a counterpart for Bush with skin of the right color. But neither (RECOMBO) nor any other postulate of Lewis's version of MR requires that there be anything sufficiently person-like other than us and our duplicates.

Lewis might hope to get a green-skinned counterpart of Bush out of (RECOMBO) by "pushing down" to the microscopic level. Perhaps it may be held that recombination (and rearrangement) of Bush's cells and some duplicates of frog cells require there to be a spacetime in which the frog cells form a skin which fits over the cells constituting Bush's body without its skin. Or again, perhaps if we push down to the level of atoms, they can be recombined and rearranged so that atoms with green reflectance-profiles are clustered around the outside of what otherwise would be an atom-for-atom duplicate of Bush.[23] But "pushing down" does not really help, since the problem will just reappear at the microscopic level. Suppose there are no particles that have exactly the mass of two electrons, and otherwise have the features of protons. According to the Humean intuitions that back (RECOMBO), it is possible that there be such things. But (RECOMBO) will not secure their existence.

Lewis's recombination principles seem not to guarantee that there are cosmoses of the right sort to back every possibility. Lewis himself acknowledges that "...our principle of recombination falls short of capturing all the plenitude of possibilities."[24]

MR does not achieve relevance by fit, and so still seems not to deliver a reduction of modality to non-modal terms. Further, notice that in embracing the Humean recombination principle, Lewis has incurred a substantial modal commitment. (RECOMBO) settles the dispute over whether laws of nature

are necessary.[25] Assuming it's a law that no electron swerves without being subjected to some force, (RECOMBO) guarantees the existence of a spacetime with one swerving electron and 0 forces. This makes Lewis's view less user-friendly than it was without (RECOMBO), since it holds end-users' theories of possible worlds hostage to the controversial Humean modal metaphysics encoded in (RECOMBO).

If the relevance and plenitude objections stick, MR does not provide an adequate starting point for a reduction of modality.[26] There is reason to believe, then, that MR does not deliver an adequate reduction of modality to non-modal terms.

4   Is MR User-Friendly?

The question of whether MR's proposed reduction of modality succeeds is controversial. A less controversial charge is that MR is user-hostile. I will sketch three objections on this score.

4.1   Paradox

Some[27] have argued that Lewis's theory of possible worlds gives rise to paradox in conjunction with certain plausible principles. They claim, for instance, that

(PARADOX) For any non-empty collection C of worlds, there is a single world which contains non-overlapping duplicates of the worlds in C.

is plausible. Supposing there to be a collection of all possible worlds, (PARADOX) demands the existence of a *maximal* world: a world containing non-overlapping duplicates of them all, including itself. Suppose the maximal world has some cardinal number k of electrons in it. There are $2^k - 1$ non-empty subsets of those electrons. (RECOMBO) implies that, for every such subset, there is a smaller world containing duplicates of exactly those electrons, and no other electrons. Each of these $2^k - 1$ worlds contains an electron and has a duplicate as part of the maximal world. So the maximal world contains at least $2^k - 1$ electrons, contradicting our supposition. Lewis's response to this problem is to deny (PARADOX), on the grounds that a maximal world would require a spacetime larger than any possible spacetime. According to Lewis, the

plausibility of (PARADOX) is founded on the same Humean idea that under-writes his endorsement of (RECOMBO). But, he argues, the resulting principle of recombination needs qualification: possibilities can only be recombined *modulo* spatial re-arrangements to make sure that everything fits together. This is why Lewis's statement of that idea, (RECOMBO), included the qualification "size and shape permitting." According to Lewis, the argument shows that there is an upper bound on the possible size of a spacetime. There isn't room in any possible spacetime to contain non-overlapping duplicates of every possible world; a maximal world is too large to fit into any possible spacetime. Thus, (PARADOX) should be rejected: there is no maximal world.[28]

4.2 Actuality

Some of Lewis's early critics[29] hold that MR delivers implausible or incoherent results when it is applied to facts concerning actuality. These theorists object to MR on the grounds that it requires there to be things that exist, but do not *actually* exist; in addition to all the things that actually exist, Lewis's view seems to require that there are some things that don't, *e.g.* purple penguins. These theorists hold that it is implausible, or even incoherent, to suppose that there are any non-actual things. Lewis counters[30] by showing how to make sense of the distinction between existence and actual existence. He interprets "actual" and its cognates as indexical modifiers which, in a given context, apply to all and only those things in the same spacetime as the speaker. Thus, no purple penguins actually exist, because no purple penguins exist in the spacetime jointly inhabited by you and me.[31]

4.3 Ontological Extravagance

Even though MR escapes paradox and incoherence, there is still a big strike against its user-friendliness. It is ontologically extravagant. According to MR, since it is possible that there be, *e.g.*, flying pigs, there are flying pigs, albeit in other spacetimes. This is certainly a claim we ordinarily would deny. The examples of such violations of ontological modesty can be multiplied.

   Lewis was well-aware of these violations, and acknowledged that this was an objectionable feature of his theory of possible worlds.[32] He claimed, however, that other virtues of MR made it the most attractive alternative on balance. In

particular, the fact that MR facilitates the reduction of modality to non-modal terms was for Lewis a conspicuous virtue.

The ontological extravagance of MR is a severe count against its user-friendliness. Lewis ultimately concedes this objection. He characterizes the issue between MR and competing alternatives as a dispute about the appropriate way to balance violations of ontological modesty and reduction.[33] Lewis holds that analyzing modality is worth the ontological extravagance of MR; reduction is more important than even this very severe form of user-hostility. His opponents disagree. One critic terms the ontological extravagance of MR "an appalling violation."[34]

There are other objections to the user-friendliness of Lewis's version of MR.[35] I have already noted, for example, that Lewis's embrace of (RECOMBO) is a strike against user-friendliness. But Lewis's response to the apparent ontological extravagance of his view indicates that reduction weighs much more heavily with him than does user-friendliness. It is not clear that any form of user-hostility short of incoherence would outweigh reduction in Lewis's estimation.

5   Conclusion

The results of our brief and admittedly incomplete canvass have not been encouraging. Lewis's view suffers from significant user-hostility. It seems at first glance well-suited for reducing modality, but the proposed reduction faces problems. Nevertheless, if one's paramount concern in developing a theory of possible worlds is to reduce modality, then some variant of Lewis's view seems worth pursuing. In particular, the task of developing a theory of the nature and extent of the cosmoses that achieves relevance by fit is indicated. If, on the other hand, user-friendliness has any significance at all, then the extensive respects in which MR is user-hostile motivate looking elsewhere.

Notes

[1]Plantinga (1987) argues that labelling Lewis's view "Modal Realism" is inappropriate. The label has nevertheless stuck. I use the abbreviation 'MR' in order to avoid terminological controversy. Lewis is not the only defender of MR. Others include (Bricker, 2001, 2006, 2008) and (McDaniel, 2004, 2006).

[2]Lewis argues that possible worlds are needed to provide analyses of more than just possibility, necessity and contingency. Of particular interest is Lewis's argument that possible worlds are required for the analysis of certain philosophically crucial supervenience notions; see (Lewis, 1986, pp. 13-17)

[3]A seminal explanation may be found in (Stalnaker, 1978). Lewis (1979) argues that a slightly more sophisticated construction using possible worlds as raw materials is required to handle indexicals.

[4](Lewis, 1986, p. 135).

[5]Other defenders of MR (see (Bricker, 2001, 2006, 2008) and (McDaniel, 2004, 2006)) depart from Lewis's own views at crucial places. See the cited papers for details.

[6]I think this is a useful way to think of the view; I do not claim that Lewis himself thought of his view in this way, though the discussion in (Lewis, 1973, §4.1) and the title of (Lewis, 1986) are suggestive.

[7]More cautiously, other cosmoses comprise either entire spacetimes or entities analogous to spacetimes; see (Lewis, 1986, pp. 75-6) for this wrinkle.

[8](Lewis, 1986, pp. 1-2, 69-81).

[9]McDaniel (2004, 2006) describes a view that attempts to reconcile the idea that possible worlds are worlds with the idea that a single individual is in more than one spacetime. The view accepts that Bush does not have parts in disjoint spacetimes, claiming instead that Bush is wholly located in disjoint spacetimes. I will not here pursue in detail the interesting vicissitudes of McDaniel's view, but see n. 20.

[10]This explanation of the counterpart relation follows the treatment in (Lewis, 1968).

[11](Lewis, 1986, p. 88). Lewis's discussion of the counterpart relation is extremely complicated, and the rough gloss I have given does not really do it justice. The important point for present purposes is that the counterpart relation is explained solely in terms of similarity in non-modal respects, without reference to necessity or possibility.

[12](Lewis, 1986, pp. 12-3). Corresponding to each pairing of a claim of the form 'it is possible that ϕ' with a non-modal analysis is an account of what's required for ϕ to be true at a cosmos. The truth of claims concerning particular individuals at a given cosmos is given by the properties of those individuals' counterparts (if there are any) in that cosmos. In this case, 'Bush lost the 2000 electoral vote' is true at a cosmos w iff Bush has a counterpart in w who lost a counterpart in w of the 2000 electoral vote.

[13]See (Plantinga, 2003) for an introduction to the distinction between modality *de dicto* and *de re*.

[14](Lewis, 1986, pp. 12-3). Again, Lewis gives us an account of what's required for a generalization like 'there are purple penguins' to be true at a cosmos; the generalization is true at a cosmos just in case the cosmos contains some purple penguins.

[15](Lewis, 1968) provides a general scheme for pairing any possibility claim in English with a non-modal analysis in terms of worlds, individuals, and counterparts. This scheme is repudiated, however, at (Lewis, 1986, pp. 12-3). Lewis would still endorse the analyses offered for the uncontroversial cases in the main text.

[16]There are worries, however, about how well MR captures certain epistemological motivations for reduction. One rough-and-ready epistemological motivation for reducing modal facts to non-modal facts is that our standard techniques for gathering evidence about, *e.g.*,

Bush only provide information about how he is; our observational and perceptual evidence gives us no information about how he might have been (other than the trivial information we glean by observing how he is). Similarly, our observational and perceptual evidence gives us no information concerning unactualized *de dicto* possibilities, like the possibility that there be purple penguins. How, then, can we know about unactualized possibilities? If we can reduce unactualized possibilities to non-modal matters of fact, then we can know about the former in the same way we know about the latter. But Lewis-style reductions just reintroduce the problem. Unactualized possibilities for Lewis turn on facts concerning how matters are in spacetimes which we do not observe or perceive. See (Lewis, 1973, p. 87) and (Lewis, 1986, §2.4, pp. 108–15) for some responses to such epistemological objections. Lewis's response in effect is to reject the claim that our standard techniques for gathering evidence about Bush or penguins exhaust our techniques for gathering such evidence.

[17]The loss of someone else elsewhere might provide *evidence* that Bush might have lost. But this is not the sort of relevance at issue. According to Lewis's version of MR, part of what it is for Bush to be a possible loser is that someone elsewhere who resembles Bush is a loser in fact. The objection at hand holds that such constitutional claims require more than just evidential relevance.

[18]Philosophers who have offered this objection from relevance include (van Inwagen, 1985, p.119), (Plantinga, 1987, p. 209), and (Cameron, 2007). It might be what Kripke had in mind by the so-called "Humphrey objection" (Kripke, 1980, p. 45n). It's difficult to tell, since the passage in question is just a joke; the underlying objection is left inexplicit.

[19](Lewis, 1986, p. 98).

[20]Lewis explores a view (Lewis, 1983) which appears to sidestep the relevance objection, by claiming that individuals like Bush are trans-spatial: they have proper parts in different spacetimes. Bush, for instance, has a winning part in the actual world, but a losing part in some other spacetime. Where MR speaks of the many counterparts of Bush, the new view will speak of his many spatiotemporally isolated parts. Lewis calls such individuals "modal continuants." This view appears to evade the relevance objection because the features of Bush's parts are manifestly relevant to how Bush might have been: since Bush's skin is pale, he is pale, and so might have been. The view Lewis explores, without endorsing, has it that being a possible loser will succumb to a similar treatment. Kris McDaniel (2004) defends another version of MR which appears at first glance to sidestep the relevance objection. The view McDaniel explores holds that ordinary individuals like Bush don't just have parts in other spacetimes, but are *wholly* present in different spacetimes. Versions of the relevance argument can be resurrected for both of these variant views, however, by focusing on a different possibility claim. If Bush turns out to be present (either in part or in whole) in other spacetimes, we can still ask after the possibilities for spatiotemporal regions of the actual world containing him. For instance, any spacetime region which in fact contained his victory might have contained a Gore victory instead. Presumably at least one of those spacetime regions is not present – either in part or in whole – in other spacetimes.

[21]This abbreviated discussion of the merits of supplementing MR by adding (SC)$^\Rightarrow$ or (USELESS) follows and simplifies the discussion at (Lewis, 1986, pp. 86–7)

[22](Lewis, 1986, pp. 87–90).

[23]Notice that we need to do some rearrangement of duplicates at the microscopic level to get

the right sort of counterparts, so, strictly speaking, (RECOMBO) requires supplementation; see (Divers and Melia, 2002).

[24]See (Lewis, 1986, p. 92). (RECOMBO) relies on recombining duplicate individuals to achieve plenitude. Armstrong proposes to replace (RECOMBO) with a principle that relies instead on recombining properties. Sider (2005) gives a sophisticated battery of objections to Armstrong's proposal.

[25]As Lewis writes, "Another use of my principle is to settle – or as opponents might say, beg – the question of whether laws of nature are strictly necessary." (1986, p. 91) See (Shoemaker, 1980) for a defense of the view that laws of nature are necessary.

[26]Divers and Melia (2002) argue that no principle of plenitude can achieve the fit needed to meet the constraint of reduction. The presentation here differs from theirs in that they insist that achieving fit is a basic constraint on successful reduction, while I have argued that it flows instead from the need to achieve relevance by fit.

[27]See (Forrest and Armstrong, 1984).

[28]See (Lewis, 1986, §2.2). There are other responses available. One could deny that there is a collection of all possible worlds. Or one could deny that there is a cardinal number of electrons in a maximal world.

[29]See, for instance, (Richards, 1975) and (Lycan, 1979).

[30]See, *e.g.*, (Lewis, 1986, pp. 99-101). See also (Lewis, 1970, §9).

[31]Bricker (2006; 2008) has argued that this makes the notion of actuality objectionably relational and derivative: black-and-white penguins are actual in virtue of being spatiotemporally related to me, the speaker in the present context. According to Bricker, the notion of actuality is both categorical and absolute. Bricker (2006; 2008) develops a version of MR on which actuality is both absolute and fundamental. It is not clear, however, whether Bricker's proposal is an improvement on Lewis's, because (i) it is not obvious that actuality really is fundamental and absolute; and (ii) actuality seems to be a modal notion, so accepting it as fundamental means abjuring the goal of reducing modality by means of possible worlds.

[32](Lewis, 1986, p. 135). Lewis also attempts here to mitigate the ontological extravagance by arguing that our ordinary denial of the existence, *e.g.* of flying pigs is consistent (when interpreted correctly in context) with MR. His response, in essence, is that when we say "there are no flying pigs", we ordinarily mean that there *actually* are no flying pigs. On Lewis's semantics for "actual" (see §4.2 above), a proponent of MR who acknowledges the possibility of flying pigs can comfortably deny that there *actually* are any, *i.e.*, that there are any in our cosmos. See also the response to this problem at (Lewis, 1973, pp. 86-7).

[33](1986, p. 156)

[34](Melia, 2008, p. 136)

[35]For instance, Bricker (2001; 2008) objects to Lewis's view on the grounds that it requires that it be impossible that there should be disconnected spacetimes. Notice that Lewis's analysis of the *de dicto* claim "it is possible that there be two disconnected spacetimes" is that there is a cosmos containing two disconnected spaces. Since Lewis's version of MR says that cosmoses are individuated by their spatiotemporal isolation, there is no such cosmos on Lewis's view. To be sure, this is another count against user-friendliness. Further, it may be a reason to reject Lewis's version of MR if it turns out that there is independent reason to believe that disconnected spacetimes are possible. Lewis (1986, pp. 71-3) bites

the bullet here, arguing that it isn't really possible for there to be disconnected spacetimes, though some related claims are possible. Bricker's version of MR addresses the problem by identifying possible worlds with mereological fusions of cosmoses.

References

Philip Bricker. Island Universes and the Analysis of Modality. In Gerhard Preyer and Frank Siebelt, editors, *Realism and Humean Supervenience: Essays on the Philosophy of David Lewis*, pages 27–55. Rowan and Littlefield, Lanham, MD, 2001.

Philip Bricker. Absolute Actuality and the Plurality of Worlds. In John Hawthorne, editor, *Philosophical Perspectives: Metaphysics*, volume 20, pages 41–76. Blackwell, 2006.

Philip Bricker. Concrete Possible Worlds. In Theodore Sider, John Hawthorne, and Dean W. Zimmerman, editors, *Contemporary Debates in Metaphysics*, pages 111–34. Blackwell, 2008.

Ross Cameron. Lewisian Realism: Epistemology, Methodology, and Circularity. *Synthese*, 156(1):143–59, 2007.

John Divers and Joseph Melia. The Analytic Limit of Genuine Modal Realism. *Mind*, 111(441):15–36, January 2002.

Peter Forrest and D.M. Armstrong. An Argument against David Lewis's Theory of Possible Worlds. *Australasian Journal of Philosophy*, 62(2):164–8, June 1984.

Saul Kripke. *Naming and Necessity*. Harvard University Press, Cambridge, 1980.

David Lewis. Counterpart Theory and Quantified Modal Logic. *Journal of Philosophy*, 65:113–126, 1968.

David Lewis. Anselm and Actuality. *Noûs*, 4(2):175–88, May 1970.

David Lewis. *Counterfactuals*. Harvard University Press, Cambridge, MA, 1973.

David Lewis. Attitudes De Dicto and De Se. *Philosophical Review*, 88(4):513–43, October 1979.

David Lewis. Postscripts to "Counterpart Theory and Quantified Modal Logic". In *Philosophical Papers*, volume 1, pages 39–46. Oxford University Press, Oxford, 1983.

David Lewis. *On the Plurality of Worlds*. Blackwell, Oxford, 1986.

William Lycan. The Trouble with Possible Worlds. In Michael J. Loux, editor, *The Possible and the Actual: Readings in the Metaphysics of Modality*, pages 274–316. Cornell University Press, 1979.

Kris McDaniel. Modal Realism with Overlap. *Australasian Journal of Philosophy*, 82(1):137–52, March 2004.

Kris McDaniel. Modal Realisms. In John Hawthorne, editor, *Philosophical Perspectives: Metaphysics*, volume 20, pages 303–31. Blackwell, 2006.

Joseph Melia. Ersatz Possible Worlds. In Theodore Sider, John Hawthorne, and Dean W. Zimmerman, editors, *Contemporary Debates in Metaphysics*, pages 135–51. Blackwell, 2008.

Alvin Plantinga. Two Concepts of Modality: Modal Realism and Modal Reductionism. In James E. Tomberlin, editor, *Philosophical Perspectives: Metaphysics*, volume 1, pages 189–231. Ridgeview Publishing Company, Atascadero, CA, 1987.

Alvin Plantinga. De Re et De Dicto. In Matthew Davidson, editor, *Essays in the Metaphysics of Modality*, pages 25–45. Oxford University Press, 2003.

Tom Richards. The Worlds of David Lewis. *Australasian Journal of Philosophy*, 53(2):105–18, August 1975.

Sydney Shoemaker. Causality and Properties. In Peter van Inwagen, editor, *Time and Cause*, pages 109–35. Reidel, Dordrecht, 1980.

Theodore Sider. Another Look at Armstrong's Combinatorialism. *Noûs*, 39(4): 679–95, December 2005.

Robert Stalnaker. A Theory of Conditionals. In Nicholas Rescher, editor, *Studies in Logical Theory*, pages 98–112. Blackwell, 1968.

Robert Stalnaker. Assertion. In P. Cole, editor, *Syntax and Semantics: Pragmatics*, volume 9, pages 315–22. Academic Press, Inc., 1978.

Peter van Inwagen. Plantinga on Trans-World Identity. In J.E. Tomberlin and P. van Inwagen, editors, *Alvin Plantinga*, pages 101–120. Reidel, 1985.