

GENUINE MODAL REALISM AND THE EMPTY WORLD

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ABSTRACT

We argue that genuine modal realism can be extended, rather than modified, so as to allow for the possibility of nothing concrete, a possibility we term 'metaphysical nihilism'. The issue should be important to the genuine modal realist because, not only is metaphysical nihilism itself intuitively plausible, but also it is supported by an argument with pre-theoretically credible premises, namely, the subtraction argument. Given the soundness of the subtraction argument, we show that there are two ways that the genuine modal realist can accommodate metaphysical nihilism: (i) by allowing for worlds containing only spatiotemporal points and (ii) by allowing for a world containing nothing but the null individual. On methodological grounds, we argue that the genuine modal realist should reject the former way but embrace the latter way.

Key words: modal realism, subtraction argument, metaphysical nihilism

We should distinguish two aspects of modal theorizing. First, one might give a metaphysics of unactualized possibility, i.e. a theory of what kinds of things possible worlds are. Second, one might give a theory of what kind of situation is and is not possible, i.e. a theory of what possible worlds there are. Genuine modal realism (GMR) (Lewis 1986b) is an example of the first sort of theory.¹ It maintains that there is a plurality of possible worlds each of which is an individual of the same ontological kind as the

¹ Many, if not most, commentators (e.g. Divers 2002, p. 46) take GMR to include not only a theory of what possible worlds are, but also a theory of what possible worlds there are by including in GMR the principle of recombination, roughly (and metaphorically), the claim that one can 'patch together' parts of possible worlds to form other possible worlds (Lewis 1986b, p. 87). The principle of recombination is an inflationary principle allowing one to infer from some possibilities to the existence of others, and as such it is not a part of the metaphysical theory of what a possibility is. The confusion arises in the following way: GMR analyses modal claims as existential claims about worlds. Thus there can be no sense to the claim that the existence of a particular possible world is a contingent matter. This thought is sometimes inaccurately expressed as 'every possible world that might exist does exist', which looks like the principle of plenitude, and Lewis replaces *that* with the principle of recombination.

actual world, namely, a maximally spatiotemporally interrelated mereological sum of things, and every world is causally and spatiotemporally isolated from all other worlds. If GMR is true, it places a constraint on claims about what possibilities there are: for any proposition *p*, it is possible that *p* only if there is a GMR-possible world in which *p* is true. One might call this claim ‘the GMR constraint on possibility’. For example, according to GMR, there is no possible world containing a pair of spatially and temporally unrelated objects, so it is not possible that there are island universes, i.e. spatially and temporally unrelated regions.² Lewis acknowledges and accepts this consequence, noting that the possibility of island universes does not seem to follow from ‘any interesting general principle about what is possible’ (Lewis 1986b, p. 71). Thus, GMR is a thesis about what unactualized possibilities are, it has some consequences for what possibilities there are, but these consequences are only problematic if they conflict with some attractive theoretical principle about the latter.

Our problem is this: if a possible world is a maximally spatiotemporally interrelated mereological sum of things, then it seems that there is no null world, no possible world consisting of absolutely no spatiotemporally located things. And if that is so, then GMR rules out the possibility of there being no spatiotemporally located things. Put another way, it seems that the possibility of there being nothing, i.e. there being no spatiotemporally located things at all, falls foul of the GMR constraint on possibility, for it seems that the null world is not a GMR-possible world. Now if all spatiotemporal things are concrete,³ GMR seems to require that there had to have been at least one concrete object, ruling out the empty world⁴ of no concrete objects. But the claim that there might have been nothing concrete, a claim Lowe (Lowe 2002) has called ‘metaphysical nihilism’, embodies a fairly secure modal intuition, and more importantly, it is entailed by an interesting and intuitive general principle in the theory of what is possible. So any view that denies metaphysical nihilism would run counter to both intuition and theory. In this paper, we argue that GMR need not incur this cost, in contrast to Lewis’s (Lewis 1986b, p. 73) claims to the contrary. We show that there are two ways of extending, rather than modifying,⁵ GMR which show how it is consistent with metaphysical nihilism. So

² According to GMR there are pairs of spatiotemporally unrelated objects existing at different possible worlds, but not within a world. Since possibility is analysed as truth at a world, island universes are impossible. However, the non-modal claim, using unrestricted quantifiers, ‘There are spatiotemporally unrelated objects’ is true.

³ Just what ‘concrete’ means we explain below.

⁴ We define a ‘null world’ as one with no spatiotemporally located objects and an ‘empty world’ as one with no concrete objects. For ease of exposition we assume that there is at most one of each. As will become clear below, someone might think that the null world is empty but the empty world is not null.

⁵ Bricker 2001 and Rodriguez-Pereyra 2004 take the alternative strategy of modifying GMR in order to make it consistent with metaphysical nihilism. If our argument in this paper is correct, that strategy is unnecessary. It may, however, be the case that a modified GMR is a more plausible theory of what possible worlds are than Lewis’s version, which would give one a reason to favour Bricker’s or Rodriguez-Pereyra’s strategy. In this paper we intend to remain entirely neutral on the merits of GMR as a theory of modality.

after all, GMR alone does not rule out the empty world. Furthermore, one of these extensions even countenances the null world of no spatiotemporally related objects. Thus, despite appearances, the GMR constraint on possibility does not even rule out the null world. But both ways of extending GMR incur further metaphysical costs, which we elaborate. We tentatively conclude that the costs incurred by the extension which allows the empty world is also the null world are lighter than those incurred by the other extension to GMR, so for methodological reasons it is to be preferred. Consequently, the genuine modal realist can, and should, be a metaphysical nihilist.

The argument we give is also intended to be an illustration of good practice in the methodology of metaphysics. A valid argument for a theory always leaves us with the choice of accepting the theory or rejecting one or more premises of the argument. And in the absence of valid arguments we may find ourselves needing to choose between theories, each of which has some strong but inconclusive arguments in its favour. If such choices rested solely on relations of consistency and support with other metaphysical theories, then correctness of choice would become relativized to a thinker. To avoid this unwelcome consequence, we need to take seriously the possibility of evaluating the costs and benefits of a theory independently of one's other metaphysical commitments. And it is exactly such an evaluation of GMR which we attempt in this paper.

1. Is metaphysical nihilism true?

In order for the question of whether a genuine modal realist can be a metaphysical nihilist to be of any interest, there must be some principled reason for thinking that metaphysical nihilism is true. We have suggested that metaphysical nihilism is itself well grounded in intuition. Some may deny this (e.g. Armstrong 1989, p. 24) or choose to over-ride the intuition (e.g. Lowe 1996; 1998; and 2002). However, even if we grant that metaphysical nihilism itself does not express a secure modal intuition, it remains that metaphysical nihilism follows from propositions which have the sort of pre-theoretic credibility which makes accommodating them a constraint on the credibility of any philosophical reasoning.

These propositions have found expression in an argument for metaphysical nihilism due to Thomas Baldwin (Baldwin 1996) and refined by Gonzalo Rodriguez-Pereyra (Rodriguez-Pereyra 1997). Baldwin calls this argument 'the subtraction argument', and it contains the following three premises:

- (A1) There might be a world with a finite domain of 'concrete' objects.
- (A2) These objects are, each of them, things which might not exist.

(A3) The non-existence of any one of these things does not necessitate the existence of any other such things.

From these premises, Baldwin (Baldwin 1996, p. 232) argues for metaphysical nihilism in the following way.

By (A1), starting from the actual world W , there is an accessible world w_1 whose domain of concrete objects is finite. Pick any member x_1 of this domain: by (A₂) there is a world accessible from w_1 , w_2 , which is just like w_1 except that it lacks x_1 and any other things whose non-existence is implied by the non-existence of x_1 . Since, by (A3), the domain of w_2 does not contain things which do not exist in w_1 , it follows that the domain of w_2 is smaller than that of w_1 . This procedure of subtraction can then be iterated, until we get to a world w_{\min} whose domain consists of one or more concrete objects, such that the non-existence of one implies the non-existence of all. By (A2) the non-existence of one of these objects is possible, so there is a world w_{nil} just like w_{\min} whose domain lacks all these objects; and since, by (A3), the non-existence of these things does not require the existence of anything else, w_{nil} is a world in which there is no concrete object at all. If one now allows that accessibility between worlds is transitive (the characteristic S4 assumption) it follows that w_{nil} is accessible from, or possible relative to, the actual world.

Baldwin's phrase, 'this procedure of subtraction' is undoubtedly meant to be a metaphor. If it is taken literally, it suggests a physical operation on a possible world to create another possible world by taking away some of the objects in the original possible world. Because possible worlds are not the kind of thing one can create by a physical operation, such a literal interpretation of 'this procedure of subtraction' is thus inadvisable and was surely never intended. Instead of taking subtraction in such a literalist sense, we should understand subtraction in terms of a modal independence property of concrete objects, namely that they could have failed to exist without requiring something else to exist in their place, which can be represented by a relation between the objects which exist at different worlds. In this way, we can make sense of subtraction worlds, that is, worlds whose domains stand in a certain relation to each other, a relation suggested by Baldwin's subtraction metaphor.

With this understanding of the reasoning behind the subtraction argument in hand, we can isolate the intuitions driving the subtraction argument, which are:

- (1) There could be a finite number of concrete objects.
- (2) If there are some concrete objects, there could have been fewer of those concrete objects (and no other concrete objects).

We take it that these intuitions are commonly held, and they are pre-theoretically plausible. Now since (2) is a priori, it is necessary.⁶ So we have:

⁶ There are, of course, exceptions to the rule that a priori truths are necessary, but (2) does not appear to be one.

- (3) Necessarily, if there are some concrete objects, there could have been fewer of those concrete objects (and no other concrete objects).

There are a finite number of concrete objects at a world if, for some natural number n , there is at least 1 and at most n concrete objects. Without loss of generality, let $n=2$. We can then formalise (1) and (3) in the following way so that they entail metaphysical nihilism:

$$(A1) \quad \exists w \exists x \exists y ((E!xw \wedge E!yw) \wedge \forall z (E!zw \supset (z = x \vee z = y)))$$

$$(B) \quad \forall w_1 \forall x (E!xw_1 \supset \exists w_2 (E!xw_2 \wedge \forall y (E!yw_2 \subset E!yw_1)))$$

$$(MN) \quad \exists w \forall x \neg E!xw.$$

where ‘E!’ is the existence at a world predicate defined by reference to the domain of a world ($\forall x E!xw$ iff $x \in \text{dom}(w)$) and object quantifiers are unrestricted, with restriction to the domain of a world being achieved by using E!.⁷ This argument, we maintain, constitutes a persuasive case for metaphysical nihilism.⁸ But according to GMR worlds are not containers in which objects exist, but just mereological sums of those of objects. If the empty world is not an empty container but a collection of objects, in which objects could it consist? So, it is a pressing issue for the genuine modal realist whether her theory is consistent with metaphysical nihilism.

2. Methodological constraints on modal metaphysics

But even if the genuine modal realist remains unpersuaded by the argument, it appears that her theory should not exclude metaphysical nihilism, for methodological reasons. There are two methodological principles that constrain metaphysical theories. They can be called ‘Ockham’s Razor’ and ‘Hume’s Razor’:⁹

(OR) Do not multiply kinds of entities beyond necessity.

(HR) Do not multiply necessities beyond necessity.¹⁰

Beyond ‘necessity’ here means: more than is required in order to construct an adequate theory. The razors are instruments of theory choice, so if there is only one adequate

of these exceptions.

⁷ All modal claims in this paper can be formulated in QML with box and diamond, but the quantification over worlds notation is more perspicuous.

⁸ We have defended the soundness of this argument elsewhere, Efird & Stoneham 2005.

⁹ There is a third, which we might call ‘Quine’s Razor’ after Quine 1951:

(QR) Do not complicate theory beyond necessity.

This razor cuts when we try to preserve an ontology in the face of recalcitrant experience by complicating the theory of how those items behave. It is arguable that (HR) is merely a special case of (QR).

¹⁰ If our modal logic is S5, this will have to be restricted to the necessitations of non-modal claims, because in S5 p entails that it is necessarily possible that p .

theory, they have no role. If (HR) is indeed a constraint on philosophical theorising, then it seems that there is a presumption in favour of metaphysical nihilism, which asserts the possibility of there being nothing concrete.¹¹ So by (HR) a theory should exclude metaphysical nihilism only if it must, and if it must, this counts as a relative cost to accepting the theory. Does GMR incur this cost? We argue that it need not below.

But before proceeding to that argument, it is necessary to reflect on the trumping relationship between the two razors, for it is likely that they will come into conflict in theory construction and evaluation. That is, if a theory must violate either of the two razors, which razor should the theorist choose to violate? Despite Russell's assertion that 'I should regard [Ockam's razor] as the supreme methodological maxim in philosophizing' (Russell 1914, p. 145), there may be no general answer to this question. But an answer specific to GMR is fairly clear. We noted in the opening paragraph that GMR generates a constraint on what is possible: by saying what possible worlds are, GMR limits what possible worlds there are and thus what possibilities there are. But given this constraint, GMR is maximally permissible: it is possible that *p* iff there is a possible world at which *p* is true, and every possible world which 'might' exist does exist. The analysis of possibility in terms of the existence of worlds leaves no sense in which the non-existence of a world could be contingent. Put metaphorically, for any proposition *p*, if God was able to create a maximally spatiotemporally interrelated mereological sum of things of which *p* is true, then he did. Of its nature, GMR violates (OR) and respects (HR); as Melia (Melia 1992) observes, GMR violates (OR) to as great an extent as any consistent theory could since for every kind that could be (unicorns, dragons, etc.) there is a possible world in which that kind exists.¹² Furthermore, since GMR is a reductive analysis of modality, it is committed to the claim that there are no brute modal facts, whereas of course there are brute existential facts — which creates an asymmetry between violations of (HR) and of (OR), namely, that the former always need further explanation but the latter are sometimes brute. These give us good reasons for thinking that a genuine modal realist should favour limited violations of (OR) over violations of (HR). If we make clear that (HR) is restricted to the necessitation of non-modal truths, then it seems that in general a violation of (OR) will be preferable to the genuine modal realist than a violation of (HR).¹³ With this methodological constraint in place we can proceed to argue that the genuine modal realist should be a metaphysical nihilist.

¹¹ Someone who is denying metaphysical nihilism is making the strong modal claim that necessarily some concrete objects exist, which is why the issue of metaphysical nihilism has a bearing on the traditional metaphysical question of why there is something rather than nothing. Denying metaphysical nihilism gives a trivial answer to that question.

¹² The theory of unactualized possibilities which did the converse and maximized (HR) violations while minimizing (OR) violations would be an error theory which held that *p* is possible iff *p* is actual, for then every falsehood would be necessarily false.

¹³ Which is not to say that (OR) costs are free, nor that they cannot be decisive. One case in which they are obviously decisive is in the choice between theories which incur no (HR) costs, such as normal scientific theories.

3. Lewis's argument that there must have been something

Lewis, the architect of GMR, argues from this theory against the possibility of there being nothing at all. He writes:

If a world is a maximal mereological sum of spatiotemporally interrelated things, that makes no provision for an absolutely empty world. A world is not like a bottle that might hold no beer. The world is the totality of things it contains, so even if there's no beer, there's still the bottle. And if there isn't even the bottle, there's nothing there at all. And nothing isn't a very minimal something. Minimal worlds there can indeed be. There can be nothing much: just some homogenous unoccupied spacetime, or maybe only one single point of it. But nothing much is still something, and there isn't any world where there's nothing at all. That makes it necessary that there is something. For it's true at all worlds that there is something: it's true whenever we restrict our quantifiers to the domain of parts of a single world, even if the only part of some world is one indivisible nondescript point. Of course, if we don't restrict quantifiers from the standpoint of one world or another, then all the more is it true that there is something rather than nothing: there is logical space, the totality of the worlds in all their glory. (Lewis 1986b, p. 73)

There are two questions to consider here: does the conclusion of Lewis's argument conflict with metaphysical nihilism and, if so, is Lewis's argument persuasive? In what follows we consider two lines of thought. Argument A maintains that Lewis's reasoning is sound but that his conclusion does not in fact conflict with metaphysical nihilism, for it merely rules out the null world of no spatiotemporal objects, not the empty world of no concrete objects. We show that this line of thought incurs substantial (HR) costs. Argument B maintains that Lewis's argument is unsound, assuming he intends the objectual quantifiers only to range over spatiotemporal objects. According to Argument B, there is a world which contains no concrete objects and no spatiotemporal objects, which is also a mereological sum, the only part of which is also a part of other worlds. This object is the null individual, something which only contingently has a spatiotemporal location. Positing the null individual is an (OR) cost.

4. There must have been something but there might have been nothing concrete

The genuine modal realist who thinks that Lewis's argument is sound may try to take the bite out of the required violation of (HR) by arguing that her theory is consistent with metaphysical nihilism; this genuine modal realist then concludes that the violation of (HR) required by her theory is not as costly as it appears to be. This theorist argues as follows, which we shall call 'Argument A.'

We must distinguish carefully the claim that there must have been something from the claim that there must have been something concrete; correlatively we must distinguish the (HR) cost entailed by a theory that includes the former claim from the (HR) cost entailed by a theory that includes the latter claim. Intuition strongly tells against the latter claim, but having distinguished the two claims, it is not at all clear that intuition supports strongly the former claim. So if GMR includes the former but not the latter claim, it avoids the (HR) cost of denying metaphysical nihilism.

While initially attractive, this argument fails to consider the other (HR) costs involved in claiming that there must have been something though there need not have been anything concrete. In order to evaluate these consequences, we must be explicit about what counts as a concrete object.

‘Concrete’ is a term of art variously used to specify different, but overlapping sets of objects in different philosophical contexts, e.g. spatiotemporal objects, causally efficacious objects, middle-sized dry goods. For present purposes, we take a concrete object to be one that satisfies the following severally necessary and jointly sufficient conditions:

- (a) it exists at a location in spacetime,
- (b) it has some intrinsic quality, and
- (c) it has a natural boundary.¹⁴

Abstract objects then are ones that are not concrete. Metaphysical nihilism maintains that there might have been no concrete objects, so understood.

Given this understanding of metaphysical nihilism, it seems clear that GMR, in and of itself, is not in conflict with the view: GMR is consistent with there being worlds consisting of only spatiotemporal points, which we may call ‘STP worlds’. An STP world is a GMR-possible world because it is a maximal sum of spatiotemporally related things. But an STP world is also an empty world by the lights of metaphysical nihilism: since spacetime points have no intrinsic qualities, they are abstract by the above characterisation of the abstract/concrete distinction.¹⁵ So the genuine modal realist who takes it that there must have been something can accept metaphysical nihilism by maintaining that the smallest worlds consist of spacetime points. Consequently, the following positions are consistent:

- (i) GMR, which (we are assuming) entails that there must have been something,
- (ii) spacetime points, despite being abstract, count as things,
- (iii) metaphysical nihilism

¹⁴ For a defence of this characterisation of concrete objects in connection with the subtraction argument see Efrid & Stoneham 2005, pp. 310-6

¹⁵ Rodriguez-Pereyra 1997, p. 165, notes that spacetime points are also abstract by his refinement of Baldwin’s characterisation of the abstract/concrete distinction.

But maintaining (i), (ii) and (iii) comes at a certain price, a price which may be paid in a variety of ways, depending on how many spacetime points the smallest worlds must contain. We shall abbreviate the family of theories that result from the conjunction of (i), (ii) and (iii) as ‘GMR+STP’.

Suppose the genuine modal realist maintains (i), (ii) and (iii) by claiming that (iv) the smallest worlds consist of a single point of spacetime.

If only one spacetime point exists it must have a location, since location in space and time is an essential property of a spacetime point. This location cannot be determined by its spatiotemporal relations to other things, since there are none, and so must be determined by reference to absolute, Newtonian spacetime. So (iv) commits our theorist to either:

- (v) necessarily spacetime is absolute, or
- (vi) necessarily, if there are no concrete objects, spacetime is absolute.

Argument A held that the consistency of (i) – (iv) provided a means for the genuine modal realist to avoid the (HR) cost of denying metaphysical nihilism. But (iv) entails (v) or (vi), thus incurring an (HR) cost at least as large as denying metaphysical nihilism. So, Argument A looks entirely unpersuasive in relation to the theory that results from conjoining (i), (ii), (iii) and (iv). Consequently, (iv) should find no home in GMR.

In light of this argument against (iv), the genuine modal realist who accepts (i), (ii) and (iii) may claim that:

- (vii) the smallest worlds consist of at least two spacetime points.

This would not then require either (v) or (vi). But if spacetime is necessarily dense, and each of the smallest worlds contain more than one spacetime point, each such world contains an infinite number of them. So, by taking the smallest worlds to consist of more than one spacetime point, this genuine modal realist must maintain that either:

- (viii) spacetime is necessarily discrete,
- (ix) there is a necessary connection between there being only spacetime points and spacetime being discrete, or
- (x) there must have been an infinite number of things (where spacetime points count as things).

Now maintaining any of these three claims entails a substantial (HR) cost, so argument (A) again looks unpersuasive in relation to the theory that results from conjoining (i), (ii), (iii) and (vii).

Since (iv) and (vii) appear to exhaust the ways in which (i), (ii) and (iii) are consistent, and since both theories which result from including (iv) or including (vii) are unattractive for methodological reasons, it seems desperate to maintain (i), (ii) and (iii).

Furthermore, it is epistemically possible, even plausible, that the nature of spacetime is an empirical matter, and this makes the (HR) costs of accepting GMR+STP especially high. So, it seems that the genuine modal realist who maintains (ii) and (iii) ought to resist Lewis's argument. That is, such a genuine modal realist should take her theory not to exclude the null world of no spatiotemporally located things. Consequently, the genuine modal realist needs to show where Lewis's argument goes wrong, and then give an account of the null world consistent with her theory.

5. *An account of the null world consistent with GMR*

Lewis's argument against the null world seems to come down to this:

A world is a maximal mereological sum of spatiotemporally interrelated objects. Therefore, a world is a mereological sum of spatiotemporally located objects. By definition, the null world contains no spatiotemporally located objects. The mereological sum of no parts does not exist. So the null world does not exist.

However, formal mereology allows one to define the null individual, which is the result of taking an object away from itself, and is, correlatively, a part of every object. If the null world consists of the null individual alone, it would be a mereological sum. But would it be a possible world according to GMR? That is, would it be a mereological sum of spatiotemporally located objects? To answer this question, we shall consider the following argument.

Some care is needed here, because at the null world the null individual has no spatiotemporal location. However, since it is part of every mereological sum, it is part of every world, and thus is a part of many maximal mereological sums of spatiotemporally interrelated objects. In fact, it even has spatial locations at non-null worlds. The question is whether the sum of the null individual and nothing else is itself a possible world. Of course, the proponent of GMR could deny this, but there is one good reason to accept it. The null individual is a part of every world, so we can apply the principle of recombination 'according to which patching together parts of possible worlds yields another possible world' (Lewis 1986b, p. 87) to show that there is a possible world consisting of the null individual alone. The null individual is not a concrete object, by the definition given above, therefore this is an empty world and GMR is consistent with metaphysical nihilism.

Call this 'Argument B'.¹⁶

To assess Argument B we need to know more about the null individual. In formal mereology, the null individual is defined as the intersection of two sums which have no parts in common, sometimes expressed as 'that which remains when an object is

¹⁶ Thinking back to Baldwin's subtraction metaphor, that the null world consists of the null individual is just what one would expect since it is surely possible that there is a single concrete object which has the property of subtractability, and the null individual is that which remains when an object is subtracted from itself.

subtracted from itself'. This is analogous to the definition of zero in number theory. More intuitively, it is a part of every object, and this relational property is essential to it. Like spacetime points, the null individual lacks any intrinsic properties.¹⁷ Since the null individual has no intrinsic properties, it is abstract, and since it is a part of every object, every concrete object has an abstract part. And if every concrete object is 'subtractable' in the sense specified in the subtraction argument, it does not follow that all of its parts are 'subtractable', specifically, the part that is the null individual may not be 'subtractable'. If the empty world required by metaphysical nihilism consists of the null individual, then in 'subtracting' a concrete object from a world in which it is the only concrete object, one does not subtract all of its parts – only its concrete parts are subtracted. This would entail that the null individual is an abstract, necessary existent. Furthermore, if there is more than one object, the null individual is a part of each, and is thus, like an immanent universal, multiply located.

The null individual also has accidental properties, which either (i) have the form: being a part of such-and-such object, or (ii) derive from the properties and relations of the objects of which it is a part. Suppose a world consist of two objects, a and b, which are 3 metres apart. In that world the null object has the following accidental properties: it is a part of a, it is a part of b, (given $a \neq b$) it is a part of two objects, it has two occurrences, it has an occurrence 3 metres from a, it has an occurrence 3 metres from b, it has two occurrences 3 metres apart, etc. These accidental properties are obviously extrinsic, so all of the null individual's accidental properties are also extrinsic.

Now it might be thought that an individual with these characteristics is simply too weird to be intelligible. This is Lewis's view. He argues that the null individual does not exist on the basis (i) that there is no good reason for supposing that it does exist, and (ii) that if it does, it gives rise to unpalatable consequences. These unpalatable consequences include: that the mereological sum of the null individual and something else is simply the something else, that everything has a common part with everything else, and that there is an individual that has no proper parts. Lewis writes:

But it is well-nigh unintelligible how anything could behave as the null individual is said to behave. It is a very queer thing indeed, and we have no good reason to believe in it. Such streamlining as it offers in mereology – namely, that intersections of things come out well-defined even when they shouldn't – can well be done without. Therefore, reject the null individual; look elsewhere for the null set (Lewis 1991, p. 11).

As Lewis notes, there are theoretical advantages for postulating the existence of the null individual for mereology. Specifically, if such an individual exists, then mereology is a

¹⁷ Someone might try to argue that the relational property of being a part of every object is in fact intrinsic because it is two-way independent of loneliness (as long as it is allowed that lonely objects can have parts), which is the Langton & Lewis 1998 definition of intrinsicness. However, this consequence is best seen as a counterexample to the Langton-Lewis definition (e.g. Hawthorne 2001).

complete Boolean algebra. Thus, one might accept the existence of the null individual on grounds of formal simplicity. But an argument based solely on formal considerations would hardly be persuasive.

A better argument aimed specifically at the genuine modal realist might be this:

The question of whether or not the null individual exists is not settled by GMR alone. So the genuine modal realist could adopt the existence of the null individual, which is sufficient to give a GMR-acceptable account of the null world and avoid the (HR) cost of denying metaphysical nihilism. In this way, the genuine modal realist can accommodate metaphysical nihilism and the intuitions backing the subtraction argument. So, the genuine modal realist should accept the existence of the null individual.

But can GMR really accommodate the null individual? Doubts might be raised on the basis of the following argument:

Possible worlds are maximally spatiotemporally interrelated mereological sums of things. Possible worlds do not overlap each other, i.e. possible worlds have no part in common. If there is a null individual, it is by definition part of every world. So, there is no null individual.

That possible worlds do not overlap is an addition to the set of claims characterising GMR that we have thus far considered, but it is one that Lewis (Lewis 1986b, pp. 198-209) has argued is essential to GMR. He argues that it is a formal feature of GMR that prohibits worlds from sharing parts in common. If this argument is sound, then it seems that GMR must deny the existence of the null individual. And so we would have a case of the first aspect of modal theorizing, namely, a theory of the nature of (un)actualized possibilities, constraining the theorist's overall ontology, namely, in excluding the null individual from her ontology. We would also have a case of this first aspect constraining the second aspect, which is the theory of what kinds of possibilities there are, for if the theorist's overall ontology excludes the null individual, then it does not exist in any possible world, and so could not exist. But it would be too quick, we think, to rule out the existence of the null individual on the basis of this argument since the reasoning behind Lewis's prohibition against overlap allows for two exceptions.

The first case of acceptable overlap is when two worlds share a common part that has no accidental intrinsic properties. To appreciate this case, we must first examine Lewis's argument against overlap. Lewis writes:

My main problem is not with the overlap itself. Things do have shared parts in common, as in the case of the Siamese twins' hand. Given the unrestricted mereology I favour, sharing of parts is altogether commonplace. Indeed, any part of any world is part of countless mereological sums that extend beyond that world. But what I do find problematic – inconsistent, not to mince words – is the

way the common part of the two worlds is supposed to have different properties in the one world and in the other. (Lewis 1986b, p. 199)

This inconsistency, Lewis argues, arises in some cases of overlap, such as a case in which Humphrey is a part of two different worlds but has a different number of fingers in each world:

So Humphrey, who is part of this world and here has five fingers on the left hand, is also part of some other world and there has six fingers on his left hand. Qua part of this world he has five fingers, qua part of that world he has six. He himself – one and the same and altogether self-identical – has five fingers on the left hand, and he has not five but six. How can this be? You might as well say that the shared hand of the Siamese twins has five fingers as Ted's left hand, but it has six fingers as Ned's right hand! That is double-talk and contradiction. Here is the hand. Never mind what else it is part of. How many fingers does it have? (Lewis 1986b, pp. 199-200)

The problem Lewis here raises about overlap turns upon the overlapping objects having accidental intrinsic properties and thus would not apply to objects which either had no intrinsic properties or had all their intrinsic properties essentially. Since the null individual has no intrinsic properties, the argument, as stated, does not pose a problem for the inclusion of the null individual in GMR.

However, the argument can be transposed to accidental pure extrinsic properties, that is properties which hold independently of the intrinsic properties of any objects (see Lewis 2001b, p. 384), such as being 200 miles from London. Suppose two objects, Bill and Ben, both existed at w_1 and at w_2 . At w_1 , Bill is no more than 3 metres away from Ben and at w_2 Bill is at least 5 metres away from Ben. So now we can ask Lewis's question: here are two objects, Bill and Ben, how far apart are they? Again, the answer appears to be 'double-talk and contradiction'.

As we noted above, the null individual certainly has accidental pure extrinsic properties, so this version of Lewis's argument would apply. However, allowing the null individual to exist at more than one world does not generate any more contradiction and double-talk than allowing it to exist at just one world. For it is part of Bill and part of Ben and also part of Claire, who, in w_1 , is at least 5 metres from Bill. So in w_1 , the null individual is multiply located and thus both at most 3 and at least 5 metres away from Bill. If we can accept multiply located items within a world, then the problem of accidental pure extrinsics does not arise. This suggests that the null individual is an example of the second case of acceptable overlap, namely the trivial overlap of immanent universals.

In the initial section of the first chapter of *On the Plurality of Worlds*, namely, 'The Thesis of Plurality of Worlds', and in the paragraph where Lewis defines 'modal realism', when he should have been most careful about exactly what GMR involves, Lewis characterises worlds in the following way:

They are isolated: there are no spatiotemporal relations at all between things that belong to different worlds. Nor does anything that happens at one world cause anything to happen at another. Nor do they overlap; they have no parts in common, *with the exception, perhaps, of immanent universals exercising their characteristic privilege of repeated occurrence.* (Lewis 1986b, p. 2; emphasis added)

In what should have been his most carefully considered statement of GMR, Lewis allows that worlds can overlap, in what might be regarded as a trivial manner: if there are immanent universals, then they are trivially part of many worlds in virtue of having instances at those worlds. In previous work, Lewis (Lewis 1983) gives reasons for adding universals to his ontology, so combining modal realism with a theory of universals must have been a live possibility for him. He later (Lewis 1986a) rejects universals, but this rejection should not be taken to imply that GMR cannot accommodate universals, since the genuine modal realist can allow for a trivial overlapping of worlds. In his (Lewis 2001a, p. 604), Lewis reiterates that the genuine modal realist can admit universals into her ontology, and clarifies his claim that worlds do not overlap as the prohibition against worlds having particular parts in common. Now is the null individual a particular or a universal? In many ways it seems to be a particular, since its relation to other particulars is the part-whole relation not the instantiation relation, which is why it is called the 'null individual', but it also shares with immanent universals the properties of being intuitively abstract, multiply located and trivially part of more than one world. This seems to be a case where the particular/universal distinction is not sharp enough to do independent philosophical work. In any case, even if the null individual's being trivially part of every world is not seen to be analogous to immanent universals being trivially part of multiple worlds, the null individual's being part of every world presents no difficulty for the genuine modal realist since it has no intrinsic properties, and its accidental extrinsic properties do not vary across worlds in ways that they cannot also vary within a world, as discussed above. Thus, there is no argument against the null individual even from the augmented characterisation of GMR considered here, and Argument B serves to show that GMR can avoid the (HR) cost of denying metaphysical nihilism.

If the genuine modal realist accepts this account of the null world, as a world consisting of the null individual, a theory which we shall abbreviate as 'GMR+NI' then a certain consequence concerning the nature of possible worlds follows. To begin, just as the null individual is abstract, so is the null world: it consists of nothing but the null individual which lacks any intrinsic properties, so the null world lacks any intrinsic properties; hence it too is abstract. Furthermore, if all worlds are of the same ontological type, then all worlds are abstract. This ruling goes against the received view that on GMR all worlds are concrete. But Lewis (Lewis 1986b, p. 81) himself is 'reluctant' to endorse the argument that if all worlds are of the same ontological type and the actual world is concrete, then all worlds are concrete, because it is not clear to him 'what philosophers mean when they speak of "concrete" and "abstract" in this connection'. Given

the conception of the abstract/concrete distinction that we have been using, we should not be surprised to find that it is a little unclear whether possible worlds are abstract or concrete. For do they have spatial locations? All their parts do, but there does not seem to be any sense to be made of the claim that the possible world itself has a location in space and time, as opposed to an extent and a duration. But if we want to save the intuition that the actual world is concrete, not abstract, we can define a notion of concreteness called 'concrete*' whereby something is concrete* iff either it is concrete or it has concrete parts. Then we could say that no worlds are concrete, but some, in fact the overwhelming majority, are concrete*. We should note that exactly the same issues will arise with GMR+STP.

6. *A third way?*

At this point someone might wonder what all the fuss is about. Both GMR+STP and GMR+NI make GMR consistent with metaphysical nihilism by allowing a world which is composed entirely of abstract objects, in one case spacetime points and in the other the null individual. But if metaphysical nihilism only requires there to be no concrete objects, why not say that the empty world is composed of such common-or-garden abstract objects as numbers and pure sets? In particular, if GMR+NI is acceptable, then worlds can be composed of abstract objects with no spatiotemporal location, so the obvious reason to exclude a world consisting solely of numbers and sets will not do.

But there is an important difference. The numbers and sets which might populate the empty world are not part of the mereological sums which, according to GMR, are the actual world and the other non-empty possible worlds. Everything which is 'part of our world' must 'exist at some distance and direction from here, or at some time before or after or simultaneous with now' (Lewis 1986b, p. 1). Numbers and abstract sets fail to meet this condition and thus fail to be part of this world. So we cannot use the principle of recombination to argue that a mereological sum of numbers and sets is a possible world. In contrast, both spacetime points and the null individual are part of this world, and thus sums consisting of just those things count as worlds. Thus there is no GMR-possible world consisting of just numbers and sets, but there are GMR-possible worlds consisting of just the equally abstract spacetime points or null individual.

7. *The time to choose*

Having outlined GMR+STP and GMR+NI we can see that GMR is consistent with metaphysical nihilism and with its denial. Since we think there is a good reason to accept metaphysical nihilism, we think the genuine modal realist should choose between these two extensions of his theory. The correct method here is to weigh the costs of

each theory. To begin, they both agree that the empty world is not absolutely empty, it contains an abstract object: on GMR+STP, the null world contains spacetime point(s), and on GMR+NI it contains the null individual. Here is where the agreement ends. As outlined above GMR+STP entails two (HR) costs: that there necessarily exist spacetime points and either that spacetime is necessarily absolute or necessarily dense (or the weaker, conditional versions of these claims). GMR+NI entails an (OR) cost, because it postulates the null individual which is not required by GMR+STP, and an (HR) cost, because the null individual is a necessary existent. We argued above that, for a genuine modal realist, (HR) trumps (OR), so it would seem that there are methodological reasons to prefer GMR+NI. Furthermore, as noted above, the fact that there is an epistemic possibility that the questions of the absoluteness and density of spacetime are empirical makes the (HR) costs of GMR+STP rather high. In contrast, it is fairly clear that the existence of the null individual is an a priori matter. Of course, if one had independent reasons to believe in necessarily absolute or dense spacetime, then one would have already paid the costs of GMR+STP. Equally, if one had independent reasons to believe in the null individual, one would have paid the costs of GMR+NI. But considered entirely on their own merits, GMR+NI is the better theory.¹⁸

¹⁸ The authors would like to acknowledge support from the Arts and Humanities Research Council for a Research Leave Award (Stoneham) and from the University of York for an Anniversary Lectureship (Eford). We would like to thank audiences at a Modality Workshop at the Arché Research Centre in St. Andrews, the University of Keele and the University of York where portions of this paper were presented. The authors are grateful to John Divers and Gonzalo Rodriguez-Pereyra for helpful discussions on the material presented here.

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Received: June 4, 2005

Accepted: August 8, 2005

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