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Modal Realism and Metaphysical Nihilism

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1. Modal Realism is an ontological doctrine whose most characteristic thesis is that there exist non-actual possible individuals which are of a kind with actual individuals. That is, there are non-actual chairs, tables, donkeys, people and stars. As developed by David Lewis, Modal Realism is accompanied by a cluster of theses, for instance that all possible worlds (i.e. actual and non-actual possible worlds) exist, that all possible worlds are of a kind, that possible worlds are maximal sums of spatiotemporally related objects, and that a sentence like ‘it is possible that p ’ is true just in case there is a possible world where p .

Modal Realism has, among its theoretical benefits, a reductive account, within limits, of modality. Among its costs, it counts clashing with several intuitive views. One of these is the view that it is possible that nothing exists, that is, that there could have been nothing. Lewis saw that his Modal Realism is incompatible with this view (Lewis 1986, p. 73 and Lewis 1991, p. 13, footnote 6). Another closely related intuitive view with which Lewis’s Modal Realism is incompatible is what has recently been called *Metaphysical Nihilism*, namely that it is possible that nothing concrete exists, that is, that there could have been nothing concrete.

Metaphysical Nihilism is not only intuitive, there are persuasive arguments in its favour. So, other things being equal, to be compatible with Metaphysical Nihilism is a theoretical virtue. In this paper I shall argue that Modal Realism can be modified so as to be compatible with Metaphysical Nihilism. Such a modification makes Modal Realism neither incur in further theoretical costs nor lose its theoretical benefits. Thus such a modification constitutes an improvement of Modal Realism.

The structure of the paper is as follows. In section 2 I explain why Lewis’s version of Modal Realism is incompatible with Metaphysical Nihilism. In sections 3 and 4 I discuss some ways of making them compatible. In sections 5–7 I present and develop my way of making them compatible. In sections 8 and 9 I discuss objections to

my proposal. In section 10 I further elaborate this proposal. Section 11 is a short conclusion.

2. Consider Metaphysical Nihilism:

(1) It is possible that nothing concrete exists.

(1) is a metaphysical thesis – not an epistemic one. It does not claim that, for all we know/believe/justifiedly believe etc., no concrete objects exist. It claims that even if there actually are concrete objects, and even if we know there are, there could have been none. According to it, it is a genuine metaphysical possibility that no concrete objects exist. Why are Modal Realism and Metaphysical Nihilism incompatible? Consider the following thesis associated with Modal Realism:

(2) There is some kind K such that all and only possible worlds are of kind K.

What is this kind K that is common and unique to possible worlds? Lewis's answer is that worlds and only worlds are maximal sums of spatiotemporally related objects. So he asserts (3):

(3) A possible world is a maximal sum of spatiotemporally related objects.

The spatiotemporal objects (those existing either in space or time or both) that are part of a world are the spatiotemporal objects existing in that world. Spatiotemporal objects are usually held to be concrete objects. So we have (4):

(4) Spatiotemporally related objects are concrete objects.

Modal Realism is usually associated with an account of the truth conditions of modal sentences in terms of non-modal sentences quantifying over possible worlds. Central to this account is:

(5) A sentence like ‘it is possible that p ’ is true just in case there is a possible world where p .

Modal realists should not accept (5) in full generality, for there are counterexamples to it: ‘it is possible that there are many worlds’, for instance. Since there are many worlds, it is true that it is possible that there are many worlds, but there is no world where there are many worlds. But (5) works in general as a principle for many sentences which *may* be characterised as being about intra-world entities (where a world is not an intra-world entity). So the important point is not that (5) should not be accepted in full generality but that it must be accepted by modal realists as valid for a considerable range of sentences. Consider now the following:

- (1) It is possible that nothing concrete exists.
- (3) A possible world is a maximal sum of spatiotemporally related objects.
- (4) Spatiotemporally related objects are concrete objects.
- (5) A sentence like ‘it is possible that p ’ is true just in case there is a possible world where p .

These four theses are jointly inconsistent. Assume (1) is true. By (5) it follows that there is a possible world where nothing concrete exists. By (3) this world is a maximal sum of spatiotemporally related objects. By (4) this world is a sum of concrete objects. If the four theses above are true, the world where nothing concrete exists is a world where some concrete objects exist!

Since (1) and any two of (3), (4), and (5) are mutually consistent, to become compatible with Metaphysical Nihilism Modal Realism only needs to drop either (3), or (4), or (5).

3. Thesis (4) is something Modal Realism clearly need not be committed to. But rejecting (4) is no good way of combining Modal Realism and Metaphysical Nihilism. For the content of Metaphysical Nihilism is simply that it is possible that there are no

chairs, tables, people, planets, animals, minds, physical particles etc. In other words, the content of Metaphysical Nihilism is that it is possible that there are no spatiotemporal objects. So even if one could plausibly get rid of (4) the conflict between Modal Realism and Metaphysical Nihilism would be restored by reformulating (1) in terms of spatiotemporal objects rather than concrete objects, in which case the triad of (1), (3), and (5) would be inconsistent.

4. How about rejecting (5)? Prima facie, this way of reconciling Modal Realism and Metaphysical Nihilism is not recommendable. For stripping Modal Realism of its analysis of modal language is stripping it of its main evidence. Though one may have many different reasons to believe in Modal Realism, since postulating such possible worlds serves to account for properties, propositions, etc., the main reason to believe in Modal Realism is that it provides us with a very good reductive, non-modal account of modal language for which (5) is indispensable. So dispensing with (5) would be dispensing with the main credentials of Modal Realism.

But this is too quick. For recently Phillip Bricker has made an interesting attempt to reconcile Modal Realism with the possibility that nothing exists that consists in rejecting (5) and any analogue of it. Though Bricker is concerned with the possibility that nothing exists, and not with the possibility that nothing concrete exists, his attempt needs to be taken into account here, for if he succeeds in making Modal Realism compatible with the possibility that nothing exists he thereby succeeds in making Modal Realism compatible with the possibility that nothing concrete exists, that is, with Metaphysical Nihilism.

Bricker's proposal is that the world quantifiers of Modal Realism should not be singular, but plural. So, for Bricker, 'it is possible that p ' is true just in case there is some world or some worlds where p (Bricker 2001, p. 44). Bricker realises that this analysis of possibility does not accommodate the possibility that nothing exists. So he proposes to modify his analysis so as to include a 'null plurality' of worlds (Bricker 2001, p. 47).

The trouble, as Bricker recognises, is that plural quantifiers do not range over things in the 'null way' that would be required for the modification. But Bricker thinks

that this is a trouble of expression, not of understanding. So he coins a phrase, *true at nothing*, and says that a sentence is true at nothing just in case had no world been actualised, the sentence would have been true. His modified analysis then becomes: possibility is truth at some world, or at some worlds, or at nothing (Bricker 2001, p. 48). Bricker claims that this accommodates the possibility that nothing exists, for 'nothing exists' is true at nothing, and so comes out as possible even if it is true at no world (Bricker 2001, p. 48).

If possibility is what Bricker claims it is then (5) is wrong. And if Bricker analysis does accommodate the possibility that nothing exists, as he claims it does, then rejecting (5) and replacing it for the Brickerian analogue would be a way in which Modal Realism can accommodate Metaphysical Nihilism. What are we to make of Bricker's proposal?

On the face of it, natural language plural quantifiers seem to exclude the null case. But Bricker thinks we can make sense of this, and he gives the following argument:

For we understand second-order logic with the second-order quantifiers ranging over all subclasses of the domain, the null class included. And we understand how to interpret quantification over non-empty classes as ontologically innocent plural quantification. To hold that ontological commitment to non-empty classes can be eliminated in this way, but not ontological commitment to the null class, would be absurd! (Bricker 2001, p. 47).

This is not good as formulated. If quantification over classes is taken as basic then ontological commitment to them has not been eliminated.

But what Bricker seems to be wanting to say in that passage is that natural language plural quantification is not committed to classes, and that natural language plural quantification can be understood without quantifying over classes. Then if one wants to avoid commitment to certain classes, one may instead plurally quantify over the members of those classes. Bricker's point seems to be that it would be absurd that the option of plural quantification be open only when one wants to avoid commitment to

non-empty classes.

But the option of plural quantification is open in the case of non-empty classes because those classes have members over which one may plurally quantify. But the null class has no members. So it is not absurd that the option of plural quantification be open only when non-empty classes are in question. So Bricker has not shown that we understand plural 'null' quantification.

Certainly, if we have a previous understanding of natural language quantifiers ranging in the 'null way' then plural quantification may be used to avoid commitment to the null class. But such an understanding is what Bricker was trying to establish, and we have seen he does not succeed.

George Boolos was clear that a plural quantification like 'There are some gunslingers such that ...' is false if there are no such gunslingers and so that sentence commits one to the existence of some such gunslingers (Boolos 1984, p. 443). So, to accommodate the null case, Boolos proposed to translate second order existentially quantified sentences XF in this way: 'either there are some things such that F^* or F^{**} ', where F^* is the translation of F and F^{**} is the translation of the result of substituting an occurrence of 'x is self-distinct' for each occurrence of Xx in F (Boolos 1984, p. 444). Could Bricker make use of this expedient to accommodate the possibility that nothing exists?

Remember that what Bricker says is that 'it is possible that p ' is true just in case there is some world or some worlds where p . Taking recourse to second order quantification we can put what he says in this way:

(6) 'It is possible that p ' is true just in case $\exists x (Xx \rightarrow x \text{ is a world where } p)$

Can Bricker make sense of the possibility that nothing exists by translating (6) into natural language plural quantification in the manner recommended by Boolos? Boolos would translate (6) as (7):

(7) 'It is possible that p ' is true just in case either there are some worlds such that if x is one of them then x is a world where p , or every world x such that x is

self-distinct is such that it is a world where p .

This makes 'It is possible that nothing exists' true, for although it does not satisfy the first disjunct, it satisfies the second disjunct. But no world is self-distinct. So this makes 'It is possible that nothing exists' true for the wrong reasons, that is, not because it would have been true if no world had been actualised but because it is vacuously true of every world. Furthermore, according to (7), sentences that assert the possibility of something impossible, that is, sentences that are necessarily false, count as true. So Bricker cannot make use of Boolos's expedient to accommodate the possibility that nothing exists.

But perhaps Bricker could say that 'It is possible that p ' is true just in case there are some worlds such that if all and only they had been actual, p would have been true. Analysing this in Boolos's way would give Bricker what he wants. But if this is Bricker's account of possibility then this raises the question as to whether Bricker's proposal is really a version of Modal Realism. First, this analysis of possibility is couched in terms of counterfactuals and so in terms of modal notions. Thus it is not clear whether Bricker will be able to give a reductive account of modality, which is one of the main aims and benefits of Modal Realism. Furthermore, Bricker himself recognises that his position leads to the abandonment of two theses that are typical of Modal Realism, namely that actuality is indexical and that the actual and non-actual possible worlds are of a kind (Bricker 2001, pp. 28, 29, 41–2). Not only possible worlds are of a different kind to the actual world, for Bricker whatever is of the same kind as something actual is itself actual (Bricker 2001, p. 29). That means that on Bricker's account there are no non-actual chairs, tables, stars and people. But then it is difficult to see what remains of Modal Realism in Bricker's account.

So it seems it is not possible to accommodate the possibility that nothing exists by rejecting (5) in favour of some clause that takes recourse to plural quantification over worlds, or at least it seems not to be possible to do so while remaining in the confines of a recognisable Modal Realism. In any case, whether or not that is possible, in the rest of the paper I shall argue that there is (at least) one other way of modifying Modal Realism so as to render it compatible with Metaphysical Nihilism, a way which does

not involve rejecting (5) and which leaves Modal Realism recognisable as such.

5. The above leaves one option: to reject (3), the claim that possible worlds are maximal sums of spatiotemporally related objects. If worlds are not sums of spatiotemporally related objects then there might well be a world where nothing concrete and nothing spatiotemporal exists.

But is (3) not an essential component of Modal Realism? It was certainly a component of Lewis's version of Modal Realism but, as we shall see, a theory that does not include (3) can still be recognised as a version of Modal Realism. (5), on the other hand, is essential to Modal Realism. For (5) is needed for the reductive account of modality that Modal Realism provides. It might be thought that if (5) is essential to Modal Realism, then so is (3). For Modal Realism's reductive account is effectively reductive because 'possible world' in (5) is understood in non-modal terms as 'maximal sum of spatiotemporally related objects'. But what permits the reductive account is not the specific understanding of 'possible world' as 'maximal sum of spatiotemporally related objects', but that this is an understanding of possible worlds in non-modal terms. So that (5) is essential to Modal Realism does not show that (3) also is.

But simply rejecting (3) is not good enough. One should also (a) give an account of what possible worlds are; furthermore (b) on that account, a world where nothing concrete exists should turn out to be possible; finally, (c) the resulting theory should be recognisable as a version of Modal Realism. In what follows I shall describe a way in which Modal Realism can be made compatible with Metaphysical Nihilism while at the same time meeting these three desiderata.

6. What could possible worlds be if there is to be a world where nothing concrete exists? The answer I shall develop in this paper is: some sort of entities that somehow contain, or consist of, abstract objects. Then, provided the abstract objects in question can exist independently of concrete objects, there will be a world in which only abstract objects exist and so nothing concrete exists in it. In particular I shall show in what follows how Modal Realism can be consistently combined with Metaphysical Nihilism under the assumptions (a) that the only abstract objects there possibly are are sets and

(b) that there are pure sets.

It should be clear from the outset that there is nothing in Modal Realism that rules out sets in general or pure sets in particular. Certainly, in *Parts of Classes*, Lewis rejected pure sets and provided a mereological substitute for the empty set (Lewis 1991, p. 14). But he did not reject pure sets because they are incompatible with Modal Realism. Indeed, before rejecting them, he had admitted pure sets in the context of Modal Realism (Lewis 1983, p. 40).

But how could he admit pure sets in the context of Modal Realism if for him possible worlds are maximal sums of spatiotemporally related objects? Since pure sets are not spatiotemporal they are not parts of worlds. But according to Lewis sets, including pure sets, *exist from the standpoint* of worlds (indeed pure sets exist from the standpoint of all worlds). What is to exist from the standpoint of a world? Lewis says that something exists from the standpoint of a world if and only if it belongs to the least restricted domain that is normally appropriate in evaluating the truth at that world of quantifications (Lewis 1983, p. 40).

Thus Modal Realism is compatible with the admission of sets and pure sets, and so is Metaphysical Nihilism. What I shall propose here is that Modal Realism take sets, including pure sets, as constituents of possible worlds and therefore as existing in possible worlds and not merely from the standpoint of possible worlds. For, as it has been pointed out, the relation of existing from the standpoint of a world is suspicious of being vague, *ad hoc* and even improperly explicated (see Divers 2002, p. 89). Furthermore, by making pure sets constituents of worlds we obtain the nihilist result that there is a world where nothing concrete exists. For pure sets do not depend for their existence on anything else except themselves. So it is possible that only the pure sets exist. So given (5) there is a possible world where only the pure sets exist. Let us call the world where only pure sets exist W_{pure} . Given that pure sets are necessarily abstract, W_{pure} is a world where nothing concrete exists.

7. But (3) provides a neat account of what possible worlds are and of what unifies them, that is, of what makes any two entities that exist in the same world to exist in the same world. Once one takes sets and pure sets as constituents of worlds, what is it that

makes any two entities to belong to the same world? How are worlds demarcated from each other?

To begin with, note that there is no need to make worlds *sums*. They might just be some kind of plurality. I shall discuss this and other alternatives in section 10. For the time being all I want to commit myself is that worlds are some sort of collection of certain entities, without specifying what kind of collection they are. It is in this general and unspecific sense of 'collection' that my use of this term must be understood until section 10.

So what kind of things are worlds? Consider (8), where set-theoretically related entities are any entities that are related by some relation that can be defined purely in set-theoretical terms:

(8) A possible world is a collection of set-theoretically related objects.

(8) is wrong; for every two possible objects are related by some relation that can be defined purely in set-theoretical terms. Thus, for instance, a and b are the only members of $\{a,b\}$, whether or not a and b exist in the same world. The following will not do either:

(9) A possible world is a collection of a maximal sum of spatiotemporally related objects and the sets of which those objects are ur-elements.

(9) does not work because it collects into a world only concrete objects and impure sets, but leaves out the pure sets. One might therefore try the following:

(10) A possible world is a collection of a maximal sum of spatiotemporally related objects and all objects entailed by those objects.

The effect of (10) is to collect pure sets into worlds. Both pure sets and impure sets having certain concrete entities as ur-elements are entailed by those concrete entities.

Nevertheless the modal realist cannot use (10) for the present purposes. For

what does it mean to say that an object entails another? It means that, necessarily, if the former exists then so does the latter. In other words, it means that every world in which the former exists is a world in which the latter exists. But what does it mean to exist in a world? It does not mean to exist *simpliciter*. For every thing exists *simpliciter* and therefore we have that any two things exist *simpliciter*, although not every two of them exist in the same worlds. Existing in the same world is, in Modal Realism, being related in some characteristic way. Only by saying what this relation is can the modal realist explain what it means to exist in the same world. But then the realist cannot use the notion of entailment, which presupposes a notion of existing in the same world, to say what the characteristic relation is.

Let me introduce the notion of the *set-theoretical expansion* of a sum S. The set-theoretical expansion of a sum S consists of (a) the sets formed from the (proper or improper) parts of S; (b) the subsets of the sets in (a); (c) the sets formed from the sets in (b); and (d) the sets formed from any combination of parts of S, sets in (a), sets in (b), sets in (c), and any sums thereof.

For example, the set-theoretical expansion of $a+b$ consists, among others, of the following: $\{a\}$, $\{b\}$, $\{a+b\}$, $\{\{a\},\{a+b\}\}$ (these sets are in category (a)); (the empty set is in category (b)); $\{\}$, $\{\{\}\}$ (these sets are in category (c)); $\{a, \}$, $\{a, \{b, \}\}$, $\{a+\}$, $\{\{a\}+\{b\}+\{\}\}$ (these sets are in category (d)).

Having introduced the notion of a set-theoretical expansion, one might then try the following:

- (11) A possible world is a collection of a maximal sum of spatiotemporally related objects and its set-theoretical expansion.

However, replacing (3) by (11) would not turn what was a group of four mutually incompatible theses into a group of four mutually compatible ones. For if worlds are what (11) says they are, there is no possible world where only pure sets, and therefore where only abstract objects, exist. For there would be no spatiotemporally related objects in a world with only pure sets.

This problem is general and applies to many proposals according to which

worlds are set-theoretical hierarchies formed from some ur-elements. For not every group of ur-elements will do as the appropriate base: the ur-elements must be related in some appropriate way. And the obvious appropriate way is spatiotemporal relation. But the empty set, which is the ur-element of the set-hierarchy of the pure sets, is spatiotemporally related to no object. So if the condition for being a world is that the ur-elements of the set-theoretical expansion be spatiotemporally (or causally) related, W_{pure} would not count as a world.

To solve this problem, let us introduce the notion of a *sum**:

S is a *sum** if and only if (a) S is a sum of memberless entities and (b) if S consists of at least two entities, then everything in S is spatiotemporally related to every other thing in S.

There are three important things to note about *sums**. First, no sum of at least two concrete objects not spatiotemporally related to each other is a *sum**. For condition (b) fails for these sums.

Second, the empty set counts as a *sum** on its own. For \emptyset is a *sum**: condition (a) holds because \emptyset is a sum of memberless entities, and condition (b) holds because its antecedent is false, since \emptyset is a sum of only one entity. But $\emptyset = \emptyset$. Therefore the empty set is a *sum**.

Third, the empty set counts on its own as a *maximal sum**. For the empty set is not spatiotemporally related to anything. So fusing the empty set with any other memberless object x will make the resulting sum one which does not satisfy condition (b), for its antecedent will be satisfied but not its consequent, as x and the empty set will not be spatiotemporally related.

Now we can define worlds in this way:

(12) A possible world is a collection of a maximal *sum** and its set-theoretical expansion.

There are two important things to note about (12). First, assuming with Lewis (1986,

pp. 71–2) and a long tradition that there cannot be co-actual disconnected spacetimes, possible worlds where there are spatiotemporal objects satisfy (12). For, under this assumption, the spatiotemporal objects of any possible world constitute a maximal sum*. Together with their set-theoretical expansion they constitute a possible world. Second, (12) makes W_{pure} count as a possible world. For W_{pure} is a collection of a maximal sum*, the empty set, and its set-theoretical expansion (the pure sets).

8. We now have an account of what possible worlds are on which there is a possible world where nothing concrete exists. This account of possible worlds is compatible with Metaphysical Nihilism. But is the theory we are left with recognisable as Modal Realism?

It seems to me this is no less Modal Realism than Lewis's version of it. All that has disappeared is the thesis that worlds are maximal sums of spatiotemporally related objects. But replacing (3) by (12) does not affect the most characteristic thesis of Modal Realism, namely that there exist non-actual possible things which are of a kind with the things that actually exist, that is, the thesis that there exist non-actual chairs, tables, stars and people. Also, replacing (3) by (12) allows one to retain the account of possibility encapsulated in (5). One can also retain the theses that all possible worlds exist, that worlds are causally and spatiotemporally isolated from each other, that individuals are worldbound and that actuality is indexical, all of which are typical theses of Modal Realism. No doubt using (12) instead of (3) allows Modal Realism to achieve its main aim of giving a reductive account of modality, since (12) is a non-modal account of possible worlds. Furthermore, replacing (3) by (12) leaves the resulting theory compatible with Counterpart Theory, a theory typically associated with Modal Realism. Thus replacing (3) by (12) is something that Modal Realism can afford.

But someone may object that replacing (3) by (12) means abandoning an important thesis of Modal Realism, namely that all possible worlds are of a kind. For (12) makes W_{pure} possible – but how can the world where nothing concrete exists be of a kind with worlds where concrete things exist?

W_{pure} and a world with concrete entities are of a kind because they are the same

kind of collection, and they are collections of the same kind of things: they are collections of a maximal sum* and its set-theoretical expansion. Note that Lewis would have given a parallel answer to a parallel question: how can all possible worlds be of a kind when some contain only physical stuff while others contain only non-physical stuff? – Answer: they are of a kind because all of them are maximal sums of spatiotemporally related objects.

Yet this will be objected. For the second condition in the definition of sums* is a conditional that the empty set satisfies vacuously, but the concrete entities in any world satisfy non-vacuously. This difference might be thought to show W_{pure} and worlds with concrete entities not to be of a kind.

The answer to this is that what makes them of a kind is not that they are both maximal sums*, but that they are collections of a maximal sum* and its set-theoretical expansion. *Analogously*, although the empty set and a fire engine are not of a kind, the collection of the empty set and its singleton and the collection of a fire engine and its singleton are of a kind. Similarly, the collection of the empty set and its set-theoretical expansion and a collection of a maximal sum of spatiotemporally related objects and its set-theoretical expansion are of a kind.

But then the objection will be that the notion of a maximal sum* is gratuitous. For we could just as well have said that what makes W_{pure} and worlds with concrete entities of a kind is that one is a collection of the empty set and its set-theoretical expansion, and the other is a collection of a maximal sum of spatiotemporally related objects and its set-theoretical expansion. They are collections of something and its set-theoretical expansion – and that's all they have in common. Or so the objection goes.

But they have more in common. For Modal Realism should not exclude possible worlds where only one concrete mereologically atomic object exists. But such an atomic thing will not be spatiotemporally related to anything. To say that it is spatiotemporally related to itself can only be an *ad hoc* way of avoiding a difficulty. For what spatiotemporal relation does it bear to itself? None. It is true that it is at a zero spatiotemporal distance from itself – but this is because it is at *no* spatiotemporal distance from itself. And to say that it is in the same spatiotemporal position as itself can mean no more than that, for every x , it bears the same spatiotemporal relations to x as

itself bears to x . That is true. But the problem here is that there is no x to which it is spatiotemporally related. In this respect the empty set and the solitary concrete entity are on a par: they are not spatiotemporally related to anything.

So even if we restrict ourselves to concrete objects, it is false that a possible world is a maximal sum of spatiotemporally related objects. Even with that restriction we would have to say that a possible world is either a sum of one thing or of more, and if the latter then the things in the sum are spatiotemporally related to each other and to nothing else. But this does not stop worlds where many concrete things exist being of a kind with worlds where only one concrete thing exists.

But what makes them of a kind is not that they consist of concrete things. Any collection of any concrete things consists of concrete things. But not any collection of any concrete entities is a possible world. Some of those collections may consist of concrete things belonging to different possible worlds.

Worlds with many concrete things and worlds with only one concrete thing are of a kind because they (partially) consist of sums including all and only the other things their parts are spatiotemporally related to if they are spatiotemporally related to anything. It is just that some such sums are sums of entities that are spatiotemporally related to nothing at all, and so those sums consist of a single concrete entity.

So the notion of a maximal sum* is not gratuitous. For its function is to pick up part of what is common to possible worlds, namely that they (partially) consist of sums including all and only the other things their parts are spatiotemporally related to if they are spatiotemporally related to anything. That they consist of maximal sums* is what is common to any possible world with more than one concrete entity and a possible world with only one concrete entity.

And this is also what is common to W_{pure} and any world with concrete entities. For both worlds consist of a sum including all and only the other things their parts are spatiotemporally related to, if they are spatiotemporally related to anything, and the set-theoretical expansion of such sum. And since the entities in those sums are memberless, both worlds are a collection of a maximal sum* and its set-theoretical expansion. It is just that the empty set is not spatiotemporally related to anything and so the maximal sum* including the empty set includes only the empty set.

But some might grant that worlds with only one concrete thing and worlds with many concrete things are of a kind while rejecting that W_{pure} is of a kind with worlds with concrete entities. For such worlds contain a maximal sum* whose parts have duplicates which are spatiotemporally related (where a duplicate of an object x is any object having the same intrinsic properties as x). But this is not so with the empty set, for in no world does it have a duplicate that is spatiotemporally related to anything.

But the empty set has no spatiotemporally related duplicate because it is an abstract object. So this objection is really no different from the objection that worlds with concrete entities and W_{pure} cannot be of a kind because the former contain concrete entities and the latter does not. But we have already seen that that objection is wrong. For even if some worlds contain concrete entities and one does not, they are all collections of a maximal sum* and its set-theoretical expansion. Thus W_{pure} and all other possible worlds are of a kind.

Yet here someone may agree that W_{pure} and the other possible worlds are of a kind but question the importance of this point. Given that so dissimilar worlds like W_{pure} and, say, the actual world, are of a kind, to establish that they are does not seem very significant.

But it is important that by accommodating Metaphysical Nihilism Modal Realism does not lose the thesis that all worlds – whether or not they are very similar to one another – are of a kind. For if worlds are of different kinds, then Modal Realism has thereby introduced at least one new kind. And so if the attempt to accommodate Metaphysical Nihilism leads to postulating worlds of a different kind (even if the only world of a different kind is W_{pure}) the cost of accommodating Metaphysical Nihilism is to augment the ontology of Modal Realism.

Whether that would be a cost worth incurring is something that we need not discuss. For we have seen that introducing (12) does not threaten the thesis that all worlds are of a kind. So the result of adopting the conception of possible worlds expressed by (12) adds the benefit of accommodating Metaphysical Nihilism while incurring no extra costs.

9. There is another objection to consider. If W_{pure} is a possible world, then it is a possible world included in any other possible world. Whether worlds are classes, sums, or any other sort of collection is something to be discussed in the next section, but what is clear is that W_{pure} is a member, a part, or some other sort of ‘element’ of any world containing concrete objects. For the collection of the empty set and its set-theoretical expansion exists in every possible world, even though it is a possible world by itself. The objection is that what results from adopting (12) is not recognisable as Modal Realism, since Modal Realism is committed to counterparts and non-overlapping worlds.

But there is no problem here. For the reason to introduce counterparts is that they solve the so-called problem of *accidental intrinsics*, namely the problem of accounting for how things can have properties that are both accidental and intrinsic. But there is no need to admit counterparts for those entities for which the problem of accidental intrinsics does not arise. Indeed Lewis is prepared to admit partial overlap of worlds if the hypothesis that there are universals turns out to be true. For universals, if there are any, seem to have no accidental intrinsic properties (Lewis 1986, p. 205). And this is also the case, I claim, with pure sets. They have no accidental intrinsic properties – all its accidental properties are relational. So the idea that pure sets can be shared by all possible worlds is not problematic at all (indeed, as I pointed out above, for Lewis pure sets exist from the standpoint of all worlds). But since pure sets form a possible world by themselves, this means that possible worlds with concrete objects contain or include that possible world, namely W_{pure} .

Note also that the fact that pure sets exist in more than one world does not affect the important modal realist thesis that worlds are causally and spatiotemporally isolated. Since pure sets are neither causally nor spatiotemporally related to anything, they are causally and spatiotemporally irrelevant. Worlds remain as isolated from each other as in Lewis’s original version of Modal Realism. Also, since sets are not individuals, the fact that pure sets exist in several worlds does not affect the thesis that individuals are worldbound.

Note also that this account of possible worlds can accommodate sets and mereological sums that have members or parts in different possible worlds. Consider for instance the set $\{a,b\}$, where a and b are two concrete objects existing in two different possible worlds, W_1 and W_2 respectively. $\{a,b\}$ exists both in W_1 and W_2 , even if $\{a,b\}$ is neither in the set-theoretical expansion of the maximal sum* of concrete entities of W_1 nor in that of W_2 . How? $\{a,b\}$ exists in W_1 and W_2 by having different ur-elements in W_1 and W_2 . In general, impure sets whose concrete members exist in different possible worlds exist in those worlds by some of their ur-elements existing in those worlds. Similar considerations apply to sums with parts from different worlds.

10. Possible worlds are collections of maximal sums* and their set-theoretical expansions. What sort of collections are possible worlds?

Whatever possible worlds are, they are not sets. A possible world cannot be a set of a maximal sum* S and its set-theoretical expansion because such a set, by satisfying condition (d) for being a set-theoretical expansion, will be in the set-theoretical expansion of S . Such a set would then be a self-membered set, of which there are none.

Could they be proper classes? That is, could they be set-like entities that can have members but cannot be members? Consider (13):

(13) A possible world is a proper class of a maximal sum* and its set-theoretical expansion.

One objection to this proposal is that it makes worlds abstract objects, for proper classes are abstract objects. This, it might be claimed, makes (13) unacceptable to modal realists, for as Lewis claims, possible worlds are concrete (Lewis 1986, p. 86). Furthermore, proper classes are not individuals but, as Lewis (1986, p. 83) says, possible worlds are individuals. Thus possible worlds are not proper classes.

But this objection does not work. For although it is true that Lewis takes worlds to be individuals, modal realists need not do so. Similarly, although he takes worlds to

be concrete, modal realists need not do so. That worlds are concrete individuals, on Lewis's view, is simply a consequence of his conceiving them as sums of spatiotemporal, concrete objects. But that worlds are concrete individuals is not essential to Modal Realism, for as we have seen it is not essential to Modal Realism that worlds be sums of spatiotemporally related objects.

Furthermore, the mere admission of abstract objects as constituents of worlds already compromises the purity of worlds as concrete objects. Even if a world is a sum of objects, if some of these objects are abstract, is that world itself concrete or abstract? I think the most plausible answers here are that it is neither and that it is both, since it would be arbitrary to say that it is either. If the abstract/concrete distinction is taken as exclusive, then it cannot be both and it is plausible to think that it is neither, since taking it to be either concrete or abstract would be arbitrary. If the abstract/concrete distinction is taken as exhaustive, then it cannot be neither and it is plausible to think that it is both, since taking it to be either concrete or abstract would be arbitrary. This is an argument, by the way, that the abstract/concrete distinction may not be both exhaustive and exclusive.

Another objection to (13) might be that it makes worlds lack singletons. But this, the objector would say, shows that (13) is false. For, surely, worlds do have singletons.

This objection does not have force. Yes, if worlds are proper classes, they lack singletons, but this should be no surprise, since proper classes lack singletons. Making worlds lack singletons *might* show a defect in other theories in which worlds are taken to be the kind of entity which are normally taken to have singletons. But surely this is not the present case: if a world is a proper class what we should expect is that it *lacks* a singleton.

I think that worlds can be taken to be proper classes and that the result of adopting (13) is a recognisable version of Modal Realism. Nevertheless the problem with taking worlds to be proper classes is that it adds an extra element to the ontology of Modal Realism, for proper classes are of a different kind than sets.

Some people may think that accommodating Metaphysical Nihilism is not worth adding an extra kind to the ontology of Modal Realism. But there are other things

Modal Realism could say about what kind of things worlds are that do not make Modal Realism incur in extra ontological costs. For instance worlds might be sums rather than proper classes. If so we should replace (3) by (14):

(14) A possible world is a sum of a maximal sum* and its set-theoretical expansion.

Worlds, on this view, being sums, do have singletons. But it might be objected that if a world is such a sum, then it will include its own singleton. So the world will be a sum having as a proper part something having it as a member. Conversely, the singleton of the world will have a member having it as a proper part. This may sound strange, but as far as I can see it does not lead to paradoxes or similar problems.

Worlds, on this account, will not count as individuals, since they will have sets as parts. But as we saw before there is no reason why Modal Realism should take worlds to be individuals. Lewis took them to be individuals because he took them to be sums of individuals, namely spatiotemporally related objects. Similarly, it is doubtful that worlds will count as concrete according to (14), since they will have abstract parts. But the concreteness of possible worlds is not essential to Modal Realism. In Lewis's version of Modal Realism worlds are concrete simply because they are sums of concrete objects. It should be no surprise if by taking pure sets to be constituents of worlds one drops the thesis that worlds are concrete individuals.

But taking worlds to be sums allows one to retain the theses that there exist non-actual possible things which are of a kind with the actual things, that all possible worlds exist and are of a kind, that worlds are causally and spatiotemporally isolated from each other, that individuals are worldbound and that actuality is indexical. Adopting (14) is also compatible with Counterpart Theory. Finally, replacing (3) by (14) allows one to retain the account of possibility encapsulated in (5) and since in (14) possible worlds are accounted for in non-modal terms, it allows Modal Realism to give a reductive account of modality.

Thus taking worlds to be sums of maximal sums* and their set-theoretical expansions leaves one with a recognisable version of Modal Realism. Furthermore

taking worlds to be sums does not thereby make Modal Realism add an extra kind to its ontology. Thus this version of Modal Realism has the benefit of accommodating Metaphysical Nihilism without incurring extra costs.

There is another option, which is to identify worlds with pluralities rather than with any single entities. So a possible world is no single entity – not even a sum – it is just a plurality of certain things, in particular it is a maximal sum* and the sets that form its set-theoretical expansion. The modal realist will then be committed to the claim that all possible worlds are pluralities of this kind:

(15) A possible world is a maximal sum* and its set-theoretical expansion.

This also requires dropping the thesis that worlds are concrete individuals, but we have already seen that this does not affect the essence of Modal Realism. As in the previous case replacing (3) by (15) leaves one with a theory that retains the main theses of Modal Realism. Also, since in (15) possible worlds are accounted for in non-modal terms, it allows Modal Realism to give a reductive account of modality. So the result of taking (15) as the account of possible worlds is a recognisable version of Modal Realism. Furthermore, by taking worlds to be pluralities one does not thereby introduce any further kind in the ontology of Modal Realism. So this version of Modal Realism, like the previous one, has the benefit of accommodating Metaphysical Nihilism without incurring extra costs. There is thus ample room for Metaphysical Nihilism in Modal Realism.

11. My aim was to show how Modal Realism and Metaphysical Nihilism can be consistently combined. We have seen that Metaphysical Nihilism can be accommodated if one replaces (3) by (14) or (15). Furthermore the result of such a replacement is recognisable as Modal Realism. To modify Modal Realism in this way is a positive thing, for it makes Modal Realism compatible with Metaphysical Nihilism – a thesis with independent intuitive and theoretical support – without making Modal Realism incur any extra costs and without making Modal Realism lose its benefits.

Yet some people might object that showing this is not really important, for it

makes nothing to show that Modal Realism is compatible with a stronger version of Metaphysical Nihilism, namely the thesis that it is possible that nothing, whether concrete or abstract, exists.

This objection grants the conclusion of this paper but questions its value. But the objection begs the question that such stronger Metaphysical Nihilism is true. And this is begging an important question, because it amounts to begging the question as to whether there are any necessary objects. We need an argument, not a mere assertion, that it is possible that there is nothing, whether concrete or abstract. Many philosophers, on the contrary, believe that at least some abstract objects, like pure sets, are necessarily existent. If this is so, then the stronger Nihilist thesis is false. In any case it is good to know that Modal Realism and the weaker and more likely true version of Metaphysical Nihilism are compatible.

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