

# Against Lewisian Modal Realism from a Metaontological Point of View

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**Abstract** Modal realism is an ontological position made familiar by David Lewis, according to which there exist possible worlds other than the actual world that we inhabit. It is hard to uphold modal realism, and indeed modal realism has only a few advocates. However, as most contemporary metaphysicians agree, this does not mean that it is easy to refute modal realism. In this paper, I argue against modal realism from a metaontological point of view. First, I provide a precise formulation of modal realism based on Lewis' discussion of modal realism. Second, I argue that modal realism is undermined unless it incorporates a view of metaontology known as ontological realism. Third, I point out that if modal realism incorporates ontological realism, it comes into conflict with its own formulation.

**Keywords** Modal realism · Metaontology · Fundamentality · Impossible world · Junky world

## 1 Introduction

Modal realism is an ontological position made familiar by Lewis (1986) according to which there exist possible worlds other than the actual world that we inhabit. Although it has been discussed widely, modal realism is an apparently outrageous position with few advocates. However, this does not mean that it is easy to refute modal realism, as most contemporary metaphysicians agree. A standard strategy to refute it is to reject one of assumptions behind it. In this paper, I pursue a different strategy and argue that from a metaontological point of view, it is difficult to defend modal realism even if all of its usual assumptions are accepted. In Section 2, I provide a precise formulation of

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modal realism on the basis of Lewis' discussion of it. In Section 3, I argue that insofar as modal realism is formulated this way, it must incorporate a view of metaontology known as ontological realism to avoid certain objections, and that this can be achieved by appealing to the notion of fundamentality, which ontological realists generally utilise for various purposes. In Section 4, I point out that once modal realism incorporates ontological realism, the resulting formulation of modal realism is either contradictory or else inconsistent with a feature of fundamentality. In Section 5, I generalise this point and argue that a similar threat of contradiction arises however modal realism is formulated. Hence, I conclude that modal realism is untenable from the metaontological point of view.

## 2 A Formulation of Lewisian Modal Realism

Several positions might be taken as versions of modal realism. What I call the "Lewisian" modal realism (hereafter "L-modal realism") is that which is often associated with David Lewis. This is the position that there are many concrete possible worlds in addition to the actual world. To make it precise, I suppose that this position consists of the following three theses:

**Existence** There exist possible worlds as well as the actual world.<sup>1</sup>

**Concreteness** Possible worlds are just as concrete as the actual world is.<sup>2</sup>

**Plenitude** Absolutely every way that the actual world might be is a way in which some possible world is.<sup>3</sup>

At first consideration, these theses might not appear unreasonable. Consider Existence, for example. Philosophers often talk about possible worlds that are supposed to be similar to the actual world but slightly different. These philosophers should at least uphold the mere existence of possible worlds, whatever their nature is. Some might say that possible worlds exist as abstract objects like mathematical or linguistic objects, that they exist as fictional objects, or that they might exist in a metaphorical sense. However, L-modal realism does not merely claim the existence of possible worlds. As Concreteness makes clear, L-modal realism denies that possible worlds are abstract objects just like mathematical or linguistic objects. They are "concrete" in the very sense that our actual world is concrete. Thus, according to L-modal realism, there are

<sup>1</sup> Cf. Lewis (1986, p. 2).

<sup>2</sup> Cf. Lewis (1986, pp. 81–2). Lewis himself carefully avoids using the term "concrete" in his explanation of possible worlds. But his position is often construed in terms of concrete worlds. See, e.g., Sider (2003, Sec. 3.5).

<sup>3</sup> Cf. Lewis (1986, p. 86). This is actually the "naïve version" of Plenitude (Pigden and Entwisle 2012, p. 158). Lewis claims that the naïve version is not a good principle for modal realists to uphold because of the unclarity of what the term "way" means, and adopts the Principle of Recombination instead of Plenitude (e.g., Lewis 1986, pp. 86–8). I use Plenitude rather than the Principle of Recombination because, as I argue later, even if Plenitude is established (by the Principle of Recombination or some other principle), modal realism faces a serious trouble. I am not (at least not primarily) concerned with the validity of the Principle of Recombination, and hence I ignore the objections to modal realism that are based on the principle's inadequacy (e.g., Pigden and Entwisle (2012)'s). Furthermore, Lewis seems to use this principle simply to obtain Plenitude; thus its inadequacy is not fatal for modal realism.

other worlds that are just like the actual world. The only difference between the actual world and other worlds is that the latter are not actualised from our perspective.

If L-modal realism is such an apparently outrageous position, what reasons exist for accepting it? The main reason is that L-modal realism provides the most promising theory for reducing modality.

L-modal realism can reduce modality by utilising the following “systematic correspondence” between modal statements and statements about possible worlds:

**Correspondence** It is possible that  $p$  if and only if there is a  $w$  such that  $w$  is a possible world and ‘ $p$ ’ is true at  $w$ .<sup>4</sup>

With Correspondence in place, the truth values of modal statements can be given by the truths at possible worlds (of course, this requires the notion of *true-at-a-world*). Thus, Correspondence allows us to say that we can get rid of primitive modality, since the truth value of any modal statement can be acquired simply by looking at a corresponding statement about possible worlds.

The reduction of modal statements to statements about possible worlds places three requirements on the term “possible world” in the right hand side of Correspondence. First, the term needs a referent. If this fails to refer to suitable objects, the reduction fails. Second, it, as well as “true-at-a-world”, must be characterized without using any modal notions. If a modal notion is indispensable, the reduction is circular. Third, there should be sufficiently many and various possible worlds to cover all modal statements. If any modal statement does not have a corresponding statement about possible worlds, the reduction is incomplete.

The three theses of L-modal realism—Existence, Concreteness, and Plenitude—are intended to meet these requirements. Given Existence, there is no reason to think that the phrase “possible world” has no suitable referent, since there are possible worlds. Given Concreteness, possible worlds are concrete objects like the actual world. Since the actual world does not seem to need modal notions for its characterization, neither do possible worlds.<sup>5</sup> Plenitude is basically the supposition that there are enough possible worlds to cover all modal statements. Thus, the reason for accepting these three theses is that, together with Correspondence, they help us get rid of primitive modality.

Some doubt the plausibility of these three theses and have proposed alternative theories.<sup>6</sup> However, most contemporary theorists contend that none of the alternative theories is better than L-modal realism (cf. Sider (2003), Sec. 3.2–4); Divers (2002, Chap. 15–17)). I will not linger on the details of the debate between L-modal realism and its alternatives; instead, I would like to focus on the difficulties that L-modal realism creates for and within itself.

Similarly, I set aside a couple of objections to L-modal realism. Some claim that modality should not be reduced to other notions because it is one of the central notions of metaphysics.<sup>7</sup> This non-reductivist objection will not be discussed. Another

<sup>4</sup> Cf. de Rosset (2009a, p. 998).

<sup>5</sup> To avoid using modal notions, it suffices to characterize possible worlds using mereological notions and spatiotemporal relations, as Lewis himself does. However, it implies that the actual world is ontologically on a par with possible worlds since the characterisation can apply to the actual world too.

<sup>6</sup> Two examples of these are combinatorialism (e.g., Armstrong (1989)) and ersatz modal realism (e.g., Plantinga (1974); Adams (1974)).

<sup>7</sup> This is called “modalism”. See Forbes (1985).

objection that will not be discussed is that L-modal realism is not the best reductive theory of modality. Although the debate over the best reductive theory has a long history, I will refrain from restating past arguments and simply set it aside.

Some possible objections to L-modal realism might still remain. For instance, reduction through Correspondence might be defective, and an attempt to fix the defect might come into conflict with L-modal realism. I do not deny that objections like this may be legitimate. While such objections may be legitimate, I set them aside in order to show that even if L-modal realism is granted all its alleged virtues, it is not promising from a metaontological point of view.

### 3 Metaontology and Lewisian Modal Realism

Metaontology is a subfield of metaphysics and has been intensely discussed in recent years. As its name shows, it is related to ontology, which is concerned with *what there is*. Ontological questions typically inquire whether certain objects exist or not. Metaontology investigates the basis of ontological questions and is concerned with *what is asked by ontological questions*.<sup>8</sup>

L-modal realism is rarely discussed in connection with metaontology; however, this is not because they are not connected. I argue that L-modal realism breaks down when seriously examined from a metaontological point of view. In this section, I explore how metaontological considerations are relevant to L-modal realism, and present a version of L-modal realism that involves metaontology.

#### 3.1 Ontological Realism and Anti-Realism

I begin by considering the metaontological dispute between ontological realism and ontological anti-realism.<sup>9</sup> Ontological realism claims, roughly, that ontological debates are substantive (not merely verbal) and that ontological questions have determinate and objective answers that are settled by reality. According to ontological realism, ontology as an inquiry into the fundamental structure of reality. On the other hand, ontological anti-realism claims, roughly, that ontological debates are merely verbal and that ontological questions have no determinate answers, or at least that their answers are not settled by reality but by *us* (our concepts or linguistic conventions, for instance). According to ontological anti-realism, ontology is a merely verbal, or at most conceptual or linguistic, inquiry.

A good example of this disagreement is the debate over a question called the “Special Composition Question”,<sup>10</sup> which asks under what circumstances many things compose a sum. Some metaphysicians answer “always” while others answer “never”, and the debate still continues. However, an ontological anti-realist answers the Special Composition Question by stating that the composition of a sum depends on our choice of linguistic conventions (more specifically, our linguistic apparatus for expressing existence or “what there is”). We could choose to use our language in a way that many

<sup>8</sup> Chalmers (2009, p. 77) defines metaontology in the way described here.

<sup>9</sup> See, especially, Sider (2009) and Chalmers (2009) for details of this dispute. Ontological anti-realism is sometimes called “ontological deflationism” (e.g., Sider (2011)).

<sup>10</sup> Cf. van Inwagen (1990).

things *always* compose a sum, or we could choose to use our language in a way that many things *never* compose a sum. We are free to choose to use our language in any way, and no choice is better than others. Thus, ontological anti-realism is egalitarianism with regard to language use. According to ontological anti-realism, ontological questions are non-substantive because any answer to them can be accepted. It is simply a matter of choice. Conversely, ontological realism claims that ontological questions are substantive because at least some answers are better than others as they better represent the fundamental structure of reality.<sup>11</sup>

### 3.2 Two Problems from Ontological Anti-Realism

I will not relate in detail the debate between ontological realism and ontological anti-realism. It is significant here only in that if L-modal realism is combined with ontological anti-realism, it faces at least two problems. I call them “the problem of non-substantivity” and “the failure of reduction”. The problem of non-substantivity is the following. According to ontological anti-realism, we might use our language either in a way in which Existence is true or in a way in which Existence is false. If it is a matter of our linguistic conventions whether or not Existence is true, then this question is not substantive. Some non-substantive questions might be worth pursuing. However, surely modal realists should not think their theses are non-substantive.

The failure of reduction is a more serious problem for L-modal realism. Reduction through Correspondence fails if ontological anti-realism is incorporated into L-modal realism. Ontological anti-realism entails that even if reduction through Correspondence is successful, this is due to using language in a way in which reduction succeeds. However, language can be used in a way in which reduction does not succeed; for instance, we might use our language in a way in which there is no possible world and Existence is false (as most metaphysicians claim). In this case, reduction through Correspondence fails. For any statements in the form of “possibly  $p$ ” or “necessary  $p$ ” turn out to be true just in case  $p$  is true at the actual world since the actual world is the only existing possible world. Some might think that it is not a failure at all because it does show that possibility and necessity are redundant. However, it still fails to accomplish one of its intended goals, that is, to preserve the intuitive truth values of (most of, at least) modal statements. It is not possible, for instance, that flying pigs exist (since no such pig exists in the actual world) and that Wittgenstein had a daughter. Any kind of reduction would be much easier if it is allowed to ignore the truth values that all of the statements to be reduced appear to have. Alternatively, we might use our language in such a way that a certain modal statement is true even if there is no world corresponding to it. This means that Plenitude is false.<sup>12</sup> In this case again, reduction

<sup>11</sup> Ontological anti-realism does not claim that there are different *meanings* or *interpretations* of a crucial predicate used to express the Special Composition Question, such as “compose”. See Sider (2011, Chap. 9.4) for this point.

<sup>12</sup> More precisely, suppose that in our actual use of language,  $u_1$ , there is a modal truth,  $p$ , such that  $p$  is true if and only if a certain possible world,  $w$ , exists, according to Correspondence. In a different use,  $u_2$ ,  $w$  does not exist, so that  $p$  is false according to Correspondence. This case can be construed in such a way that  $u_2$  makes  $p$  false. However, there may well be a case in which  $p$  is true while  $w$  does not exist; it at least seems difficult for ontological anti-realism to deny this.

through Correspondence fails since the truth value of a modal statement cannot be given through Correspondence.

In both cases, whether reduction succeeds or fails depends on ontological questions, such as whether possible worlds exist and whether there are sufficiently many and various possible worlds to cover absolutely every way that the actual world might be. Since Existence and Plenitude are respectively nothing more than affirmative answers to these questions, ontological anti-realism allows us to get rid of primitive modality through Correspondence *only when* we use our language in such a way that all three theses of L-modal realism are true. This means that L-modal realism is a matter of our language use, which is precisely the viewpoint of ontological anti-realism. However, even if our language is used in such a way, *other* languages might be used differently. Since ontological anti-realism is committed to the egalitarianism of language use, it cannot ignore such different uses nor regard them as exceptional. A use of language that makes Correspondence true is not better than other uses that make Correspondence false. Thus, ontological anti-realism does not allow L-modal realism to reduce primitive modality *entirely* (meaning that it depends on one's language) because it embraces language uses that cause the reduction to fail.

L-modal realists might think that even if whether primitive modality is reduced or not is a matter of language uses, it does not cause a problem for them because according to their language Existence and Plenitude *are* true. Unfortunately, the problem still remains. Remember that modal realism has only a few advocates, which means that most of theorists use their languages in a way that Existence and Plenitude are *not true*. Thus, it seems that modal realism is a view for people who use their language in a very peculiar way, and that there is no reason for others to take it seriously.

### 3.3 How to Make L-Modal Realism Ontologically Realistic

L-modal realism must incorporate ontological realism to avoid the problem of non-substantivity and the failure of reduction. Let us consider how L-modal realism can incorporate ontological realism by appealing to the notion of fundamentality, which is often used to defend ontological realism, conciliating the anti-realistic intuition or rejecting arguments for anti-realism.<sup>13</sup>

Different versions of ontological realism conceptualise fundamentality in different ways; however, in any versions fundamentality can be utilised to conciliate the anti-realistic intuition, even if it is not intended. To demonstrate this, I focus on Jonathan Schaffer's notion of fundamentality in particular.<sup>14</sup> Schaffer agrees with ontological anti-realism that almost all positive ontological questions in the form of "does *x* exist?" are in a sense non-substantive and trivial. This, he claims, is not because these questions have no objective answer, as ontological anti-realists contend, but because they all have the same answer "yes".<sup>15</sup> According to Schaffer, the most interesting ontological question "is not the question of what exists, but is rather the question of *what is fundamental*" (Schaffer 2009a p. 157; emphasis is in the original).

<sup>13</sup> The term "grounding" may be more popular. In fact, fundamentality can be defined in terms of grounding, as shown below. I believe that the difference is a matter of terminology. I use "fundamentality" here because this can be appropriately contrasted with "existence".

<sup>14</sup> Cf., e.g., Schaffer (2009b).

<sup>15</sup> Schaffer calls this stance "permissive about existence." See Schaffer (2009b, pp. 356–362).

Schaffer characterises his notion of fundamentality as follows. First, he defines fundamentality in terms of “grounding”:  $x$  is fundamental if and only if nothing grounds  $x$  (Schaffer 2009b, p. 373). The notion of grounding is primitive, and Schaffer only mentions its formal features: it is supposed to be an irreflexive, asymmetric, and transitive relation, as the proper parthood relation is.<sup>16</sup> Thus, in Schaffer’s view, there is a plethora of entities (since his view on existence is permissive), some of which are grounded on some others, which in turn are grounded on others, and so on. There is a hierarchal structure among things, just as there is a structure of proper parthood in mereology. A class of entities is grounded on nothing. Ontology is primarily concerned with this particular class of entities.

Other ontological realists use different strategies. Fine (2001) appeals to the notions of fundamentality and grounding, and his notion of grounding is a relation on propositions rather than entities. Sider (2011) appeals to fundamentality; his notion of fundamentality can take a different range of *relata* than both Schaffer’s and Fine’s and can be applied to any linguistic category. Despite these differences, however, these figures use their notions of fundamentality to defend ontological realism. Although I will concentrate hereafter on Schaffer’s version for the sake of simplicity, I discuss only what different notions of fundamentality have in common, i.e., their features relevant to the defence of ontological realism.<sup>17</sup>

In addition to these formal features, the relevant notion of fundamentality must meet the following conditions:

**No-Collapse** The distinction between what is and what is not fundamental does not collapse, meaning that it is neither the case that everything is fundamental, nor is it the case that nothing is fundamental.<sup>18</sup>

**Objectivity** The distinction is objective and settled by reality rather than by our linguistic conventions or conceptions.

**Ontological Reflection** Ontological statuses of entities reflect how fundamental they are, as opposed to whether they exist or not.

I first consider No-Collapse. The notion of fundamentality is supposed to serve as an alternative to the notion of existence. Ontological anti-realism entails that the distinction between existence and non-existence is not objective in the sense that it depends on our linguistic conventions or conceptions. If the distinction between what is fundamental and what is not collapses, it does not make for an alternative distinction. Objectivity is required for the same reason. Remember again that the notion of fundamentality is an alternative to existence, and the alternative to the distinction between existence and non-existence must be objective. Once the notion of fundamentality is employed, ontological realism concedes to ontological anti-realism in that it accepts that the question of what exists is non-

<sup>16</sup> Schaffer also crafts the notion of *derivativeness*, which is dual to the notion of fundamentality:  $x$  is derivative if and only if something grounds  $x$ . Fundamentality and derivativeness are exhaustive and exclusive to each other; thus, everything is either fundamental or derivative, and nothing is both fundamental and derivative.

<sup>17</sup> There are other notions in the same vein. For example, ontological dependence and truthmaking may be regarded as versions of grounding, by which other notions of fundamentality could be defined.

<sup>18</sup> Fundamentality may well be gradual, in which case the following conditions can be used instead of No-Collapse: something is more fundamental than others.

substantive. On the other hand, it must maintain that ontology itself is still substantive, being concerned with the substantive question of what is fundamental. If the alternative distinction is not objective, it is arguable that neither this question nor ontology itself is substantive. Objectivity serves to make for the alternative distinction, and in virtue of No-Collapse, it does not collapse. Ontological Reflection serves to make the alternative distinction concerning ontology.

Let us turn to consider how L-modal realism can avoid the problem of non-substantivity and the failure of reduction in relation to Schafferian ontological realism. According to ontological anti-realism, how we use our language determines whether Existence and Plenitude are true or false, which means that the question is not substantive. While Schafferian ontological realists agree with ontological anti-realists that the question of whether possible worlds exist is trivial, they need not accept that Existence and Plenitude depend on how we use our language. Since Schafferian ontological realists are permissive about existence (see note 15), they can claim that Existence and Plenitude are objectively true, which means that Schafferian ontological realism helps L-modal realists to evade the problem of non-substantivity.

L-modal realists can avoid the failure of reduction in a similar fashion. The failure of reduction basically means that the reduction of modality through correspondence can succeed only when one uses one's language in such a way that Existence and Plenitude are true; it fails in other cases. Again, Schafferian ontological realists can claim that Existence and Plenitude do not depend on how we use our language and that they are objectively true (although they hold trivially). Accordingly, the failure of reduction does not arise.

Some might think that L-modal realists evade these two problems with the help of Schafferian ontological realism at a price. Even though Existence is true and the question of whether it holds or not is substantive according to Schafferian ontological realism, it is simply because of its permissivism about existence. In other words, there is no particular reason why it holds; it holds just as other ontological theses hold. Thus, contrary to popular belief, what L-modal realism claims seems not so surprising compared with other ontological claims.

Schafferian ontological realists would not raise any objections to it. According to Schafferian ontological realism, the question of the existence of possible worlds is not so ontologically interesting since, as we have seen, the most ontologically interesting question is not what exists but what is fundamental. Thus, for L-modal realists to evade the problems with the help of Schafferian ontological realism, they must add something about fundamentality to their claim.

This consideration suggests that L-modal realism can be combined with ontological realism by appealing to the notion of fundamentality in a very simple way. What is required for L-modal realism to be ontologically realistic is simple:

***Fundamentality*** Possible worlds are fundamental.

I call the view consisting of Existence, Concreteness, Plenitude, and Fundamentality, "ontological and modal realism" (hereafter O-modal realism); the rest of the paper focuses on this. Other versions of ontologically realistic L-modal realism might exist; however, as O-modal realism is the most prominent among them, I ignore other versions here. As a simple extension of L-modal realism, O-modal realism includes the three theses of L-modal realism, adding only one. This additional thesis,



Fundamentality, involves fundamentality as the standard apparatus of ontological realism, as I argued above. Moreover, Fundamentality relates possible worlds to fundamentality. Thus, O-modal realism is a simple extension of L-modal realism, with an additional thesis connecting what L-modal realism is all about, that is, possible worlds, with the most interesting ontological thing for ontological realism, that is, what is fundamental. Thus, what holds for O-modal realism is likely to hold for most versions of ontologically realistic L-modal realism.

## 4 Is Ontological and Modal Realism Tenable?

In the previous section, I argued that if L-modal realism is considered seriously from the metaontological point of view, it leads to O-modal realism. In this section, I present an argument against O-modal realism and show that it is untenable. The argument against O-modal realism consists of two parts. The first part considers impossible worlds. If impossible worlds are taken into account, O-modal realism faces the problem of how to distinguish between possibility and impossibility.<sup>19</sup> The best way to do so is, I argue, by including impossible worlds among the fundamental entities. The second part of the argument refers to the non-fundamentality of the parts of worlds. If impossible worlds are fundamental and their parts are not fundamental, *junky worlds* or *gunky worlds* are ruled out not only from possible worlds but also from impossible worlds because nothing in them is fundamental. Hence, O-modal realism cannot explain possibility or impossibility in terms of a world.

### 4.1 Problem of Impossible Worlds

Some might doubt whether impossible worlds deserve to be considered in metaphysics, and deny their existence or ontological status. Is it obvious that they do not exist? My answer is no. Impossible worlds should be considered to the same extent as possible worlds because they are too similar to be treated separately; whenever there is a reason to consider one, there is a similar reason to consider the other.

Impossible worlds are frequently or at least increasingly used in many areas of philosophy, such as metaphysics, logic, and philosophy of mind, as well as others. They are used for various purposes, such as the explanation of reasoning with impossible antecedents, the semantics for relevant logic, the representation of impossible or contradictory beliefs, and so on.<sup>20</sup> There is a good reason for L-modal realism not to be silent on the ontological status of impossible worlds. L-modal realism is often championed on the basis of the widespread use of possible worlds in philosophy, that is to say, since possible worlds are quite useful in various areas in philosophy, their nature (including their ontological status) should be theorised. L-modal realism is the best theory for this purpose,

<sup>19</sup> This problem is pointed out in Cameron (2009) and Kalhat (2008). Ross P. Cameron argues for a deflationistic view regarding the existence of possible worlds. O-modal realism, however, can respond to his argument by accepting impossible world as well as possible worlds. Javier Kalhat interprets Lewis' argument as showing that he is almost committed to impossible worlds, and argues that it follows from this interpretation that his reduction of modality is circular. While I agree with this interpretation, I do not agree with what follows from it. See note 23.

<sup>20</sup> Kalhat calls this "The Utility Argument for Impossible Worlds". See Kalhat (2008, p. 10). See also Berto (2013, Sec. 1); Yagisawa (2010, Ch. 8.3–8.5).

(or so its proponents argue). A similar argument for impossible worlds can be easily constructed as follows: since impossible worlds are used frequently in philosophy and the difference between possible and impossible worlds is simply the difference between possibility and impossibility, impossible worlds might be ultimately as useful as possible worlds. If so, the nature and ontological status of impossible worlds should be theorised just as those of possible worlds should be.

Since O-modal realism is a version of L-modal realism, O-modal realism must accept what L-modal realism implies with regard to the ontological status of impossible worlds. L-modal realism must say either that the ontological status of impossible worlds is the same as the ontological status of possible worlds, or that they differ. If they differ, the difference can presumably be explained in terms of the notion of fundamentality since, according to Reflection, the ontological status of possible or impossible worlds reflects how fundamental they are. However, it is not easy to explain impossible worlds in terms of the notion of fundamentality. Objectivity says that the distinction between what is and what is not fundamental is objective and settled by reality. Possible and impossible worlds differ only in that the former are possible and the latter are impossible. Therefore, if possible worlds are fundamental and impossible worlds are not, the distinction between possibility and impossibility is objective and settled by reality. However, there are many kinds of possibility, such as epistemic, metaphysical, physical, logical, and others. This suggests that the distinction between possibility and impossibility cannot be drawn independent of our choice or convention regarding kinds of possibility.<sup>21</sup>

Existence, Concreteness, and Plenitude do not support O-modal realism. These three theses do not, and indeed should not say anything about possibility or impossibility; they are supposed to be used to reduce modality through Correspondence. If they say anything about modality, L-modal realism would be at risk of circularity. Likewise, since Fundamentality is used for reduction, it should not employ any modal notion.

Contending that impossible worlds do not exist does not support O-modal realism either. Even if it is the case that impossible worlds do not exist, if the distinction between possible and impossible worlds depends on our choice or convention regarding kinds of possibility then the non-existence of impossible worlds depends equally on our choice or convention. This is a welcome consequence for ontological anti-realism.

These consequences lead O-modal realism to a highly problematic situation. If its proponents contend that the ontological statuses of possible and impossible worlds differ, they must distinguish possible worlds from impossible worlds, but neither the notion of fundamentality nor the theses of O-modal realism are useful for the purpose. They need a non-circular way to distinguish possibility and impossibility. This is the situation that *linguistic ersatzers* are pushed into by L-modal realism. Thus, O-modal realism faces the very same objection that L-modal realism raises to linguistic ersatz modal realism.<sup>22</sup> Most

<sup>21</sup> This is how Cameron argues for his deflationist view of modality. He holds that the distinction between possible and impossible worlds is “a highly unnatural distinction” (Cameron 2009, p. 13) in the sense that we draw this because of our interests.

<sup>22</sup> Some might think that there is a way to distinguish possibility and impossibility that is unavailable for linguistic ersatzers. Impossible worlds may fall into a different category from possible worlds. For instance, the former is abstract while the latter is concrete (as Concrete states). Linguistic ersatzers cannot accept this distinction because for linguistic ersatzers the actual world is the only concrete world. However, there is no good reason to think that any kinds of possible worlds are concrete entities (and correspondingly any kinds of impossible worlds are abstract entities), given that there are many kinds of possibility and the distinction between possibility and impossibility is unnatural. See note 21.

theorists contend that L-modal realism is the best theory by which to reduce modality because it offers strong objections to the rival theories. For instance, linguistic ersatz modal realism is dismissed on the grounds that either it cannot distinguish possible worlds from impossible worlds, or its definition of possible world is circular. For linguistic ersatz modal realists, possible worlds are maximally consistent sets of statements (or other sentential objects such as propositions), but not any sets of statements are possible worlds. If so, even contradictory statements could be possible. Therefore, linguistic ersatz modal realism has to distinguish between eligible and non-eligible sets of statements. It is widely agreed that this cannot be accomplished without primitive modality (cf., e.g., de Rosset (2009b)). In contrast to this, L-modal realism does not need primitive modality because its proponents can say that if a seemingly impossible world exists—including a round square, say—it is not really impossible but is a possible world. Although it would be more helpful if they could explain why no possible world includes a round square or other impossible entities, such an explanation is not a part of reduction. Thus, L-modal realism does risk being revisionary, but does not risk being circular.<sup>23</sup> This is the main reason why L-modal realism is better than other theories that require primitive modality.

The problem of impossible worlds raises the same problem to O-modal realism as L-modal realism does to linguistic ersatz modal realism. In principle, if there is any way in which possibility is successfully distinguished from impossibility, it is equally available to O-modal realism and linguistic ersatz modal realism (unless it implies that possible and impossible worlds are not sets of statements). Thus, it is questionable whether L-modal realism is the best reductive theory of modality once impossible worlds are taken into account.<sup>24</sup>

The only way out for O-modal realism is to deny that the ontological status of impossible worlds is different from that of possible worlds, and admit that impossible worlds are as fundamental as possible worlds, to put it metaontologically. If there is no difference in ontological status between possible and impossible worlds, the problem of how to draw a line between them will vanish. The view that impossible worlds as well as possible worlds exist is called “extended modal realism”, and it deserves serious consideration on its own right.<sup>25,26</sup>

<sup>23</sup> This is how Cameron construes Lewis’ response to the accusation that his reduction is circular by being implicitly committed to a modal notion—the distinction between possibility and impossibility. See Cameron (2012, p. 10); See also Sider (2003, Sec. 3.9).

<sup>24</sup> The notion of fundamentality might be regarded as offering support for O-modal realism. For example, if there were a single fundamental logic, this could be used to draw the fundamental distinction between possibility and impossibility. Unfortunately, this line of defence of O-modal realism is not very promising because there are many different logics: we have classical, intuitionistic, and relevant logic, as well as other less well-known logical systems. There seems to be no good reason to choose one logic with which to draw the fundamental distinction between possibility and impossibility. Thus, I take many different logics to raise at least a *prima facie* problem, just as many kinds of possibility do.

<sup>25</sup> See Yagisawa (1988, 2010) for extended modal realism. It is less popular than the standard (Lewisian) modal realism, but frequently discussed when the topic of discussion is related to impossible worlds.

<sup>26</sup> A reason to accept extended modal realism is, some argue, that Plenitude allows for a world that creates a serious problem for L-modal realism. Charles Pigden and Rebecca E. B. Entwisle argue that their interpretation of Plenitude entails the existence of “spread worlds”, which “spread through logical space and exclude all alternatives” so that “there is only one way the world could be” (Pigden and Entwisle 2012, p. 163). This objection to L-modal realism can be blocked if there are impossible worlds and this spread is limited to certain impossible worlds.

Unfortunately, it is not enough to combine O-modal realism with extended modal realism to avoid the problem that impossible worlds raise for O-modal realism. Consider a version of O-modal realism in which possible and impossible worlds are on a par. This consists of the following four theses:

***Extended-Existence*** The actual world exists alongside other worlds, including impossible worlds.

***Extend-Concreteness*** Other worlds, including impossible ones, are just as concrete as the actual world.

***Extend-Plenitude*** Absolutely every way that the actual world might or might not be is a way that some other world is.

***Extended-Fundamentality*** All worlds are fundamental.

These theses extend the theses of O-modal realism so as to concern impossible worlds. The extended and original theses only differ in that while the latter only concern possible worlds, the former concern both possible and impossible worlds. I call the view consisting of these extended theses “extended ontological and modal realism” (E-modal realism, hereafter).<sup>27</sup> I argue below that either this contradicts its very formulation, or the notion of fundamentality fails to meet the required conditions.

## 4.2 Against Extended Ontological and Modal Realism

According to E-modal realism, all worlds are fundamental. However, given No-Collapse, there must be something that is not fundamental, and therefore there exist some non-fundamental thing. What kind of thing is it? The simplest answer to this is that if something is not a world, it is not fundamental, that is, all entities other than worlds are non-fundamental. Suppose that worlds are maximal sums of spatiotemporally related things, as Lewis (1986, pp. 69–71) does.<sup>28</sup> It is easy to derive a mereology-based characterisation of fundamentality: something is fundamental if and only if everything that it is a proper part of has a part that is not spatiotemporally related to it.; non-fundamentals can be characterised in a similar way.

The mereology-based characterisation of fundamentality leads to a view that is quite similar to priority monism.<sup>29</sup> In fact, if fundamentality is construed

<sup>27</sup> Correspondence, too, should be slightly modified to be relative to some criteria of possibility. An example of this as follows:

***Extended-Correspondence*** It is possible relative to  $c$  that  $p$  if and only if there is a  $w$  such that  $w$  is a world that is a member of the class specified by  $c$ , and ‘ $p$ ’ is true at  $w$ ,

where  $c$  is a criterion of possibility and specifies a class of worlds relevant to a given kind of possibility. Yagisawa (2010, p. 177) presents the truth conditions of modal statements in a similar way.

<sup>28</sup> I ignore the difference between genuine and analogous spatiotemporal relations described in Lewis (1986, pp. 75–76).

<sup>29</sup> Priority monism is an ontological position according to which there is only one fundamental entity among concrete entities. See Schaffer (2014) for details.

along the line of the mereology-based characterisation, E-modal realism meets the condition for priority monism introduced in Schaffer (2014, Sec. 3) with a proviso that the domain of quantification is restricted to a single world.<sup>30</sup> According to this “Monism-like” version of E-modal realism, worlds are fundamental but their (proper) parts are not fundamental. More precisely, Monism-like E-modal realism is characterised by two additional theses:

- Lewisian-World** Worlds are maximal sums of spatiotemporally related things.  
**Sum-Priority** Sums are more fundamental than their proper parts are.<sup>31</sup>

Monism-like E-modal realism faces a serious problem in that it contradicts Extended-Plenitude.

Consider a *junky world*, a world in which there is no maximal sum of spatiotemporally related things.<sup>32</sup> In other words, anything in a junky world is a proper part of some other thing therein. Thus, if Monism-like E-modal realism is true, there is no fundamental entity in a junky world, since there is no *maximal* sum therein.

Some might think that there are no junky worlds by definition; it follows from Lewisian-World, viz., that worlds are maximal sums of spatiotemporally related things, that no world can be junky.<sup>33</sup> However, being a junky world is a way the actual world might (or might not) be. In fact, some metaphysicians take the possibility of junky worlds seriously (e.g., Bohn (2009); Watson (2010); Contessa (2012)). Thus, if junky worlds do not exist, Extended-Plenitude is false.

Junky worlds cannot be easily dismissed. However ridiculous the idea sounds, junky worlds are ways that the actual world at least might *not* be, that is, ways that some impossible worlds actually are. Therefore, junky worlds exist, according to Extended-Plenitude.

Similarly, it does not help to appeal to the laws of mereology. According to the classical system of mereology known as General Extensional Mereology, or GEM,<sup>34</sup> there exists a single object that is the sum of everything. With this system in mind, some might think that junky worlds violate GEM, and thus should not be considered seriously. However, GEM is *simply a system of mereology*. Many other such systems can easily be found, even if they are not as strong or as useful as GEM. Although GEM rules out junky worlds, not all systems of mereology do. Thus, a junky world is simply a world where a

<sup>30</sup> The condition for priority monism is the following:

**Priority Monism**  $\exists x(x \text{ is fundamental} \ \& \ \forall y(y \text{ is fundamental} \ \rightarrow x = y))$

<sup>31</sup> Sum-Priority suggests a different version of E-modal realism with the thesis that the *logical space* — the maximal sum of absolutely everything—is fundamental, instead of Extended-Fundamentality. This version might appear to resemble priority monism more than Monism-like E-modal realism does; however, it faces the same problem as Monism-like E-modal realism.

<sup>32</sup> For details of junky worlds, see Bohn (2009, Sec.I). The notion of “junky” is the converse of the notion of “gunky”. See also note 39.

<sup>33</sup> Schaffer holds that a junky world is metaphysically impossible. See Schaffer (2010, pp. 64–5).

<sup>34</sup> Cf., e.g., Varzi (2015, Sec. 4.4). The original formulation is found in Leonard and Goodman (1940).

certain non-classical system holds; it may well be an impossible world, and if so, it must be considered.<sup>35</sup>

There is a way to avoid the problem of junky worlds. The idea is that although L-modal realism has been construed as if it is a view of possible worlds, it can also be regarded as a view on *possibilia*. Anyone familiar with the doctrine of Humean Supervenience will agree that the most basic “blocks” in the Lewisian ontology are not possible worlds but point-sized possible objects that compose worlds and other objects, and that instantiate perfectly natural properties and relations, such as spatio-temporal relations. Although Lewis himself barely discusses metaontology (as I mentioned in Section 2), what he claims about Humean Supervenience suggests that the smallest *possibilia* are fundamental in the metaontological sense.

According to Humean Supervenience, perfectly natural properties and relations are fundamental since every (contingent) truth supervenes on how they are instantiated.<sup>36</sup> This doctrine also says that perfectly natural properties and relations are instantiated by point-sized possible objects. If fundamental entities are what instantiate fundamental properties and relations, and perfectly natural properties and relations are fundamental, then point-sized possible objects are fundamental. Moreover, for Lewis, worlds are maximal sums of spatiotemporally related objects, just as Lewisian-World entails. In other words, worlds are composed of spatiotemporally related objects, which in turn are composed of smaller spatiotemporally related objects. Thus, at bottom, worlds are composed of the smallest things, or atoms, viz., things with no proper part.<sup>37</sup> Thus, since point-sized *possibilia* are the smallest parts of possible worlds, they deserve to be fundamental. In short, if the fundamentals are what instantiate fundamental properties and relations, the smallest parts of worlds are fundamental under the doctrine of Humean Supervenience.

This point leads to a version of E-modal realism, and it is obtained by simply replacing Extended-Fundamentality with the following thesis:

**Atom-Fundamentality** The smallest parts of worlds are fundamental.

This version of E-modal realism consists of Extended-Existence, Extended-Concreteness, Extended-Plenitude, and Atom-Fundamentality.<sup>38</sup>

Just as Monism-like E-modal realism is similar to priority monism, this version of E-modal realism is similar to the priority version of what van Inwagen (1990) calls nihilism. Nihilism states that composite objects do not exist at all, and hence there only atoms exist. I call this version of E-modal realism “Nihilism-like E-modal realism”. According to Monism-like E-modal realism, worlds are fundamental, whereas, according to Nihilism-

<sup>35</sup> It seems obvious that the problem of junky worlds can be avoided simply by rejecting Lewisian-World. However, this is not easy for E-modal realists to do, since E-modal realism is motivated by the definition of possible worlds that Lewis himself endorses. Moreover, a similar problem would presumably arise insofar as a world is defined as an “aggregate” in some formal sense.

<sup>36</sup> Cf. Lewis (1994). Lewis actually uses the term “fundamental” for properties and relations on which truths supervene. For example, “any contingent truth whatever is made true, somehow, by the pattern of instantiation of fundamental properties and relations” (*ibid.*, p. 473).

<sup>37</sup> The definition of an atom is as follows:  $x$  is an atom if and only if  $x$  has no proper part.

<sup>38</sup> It can retain Lewisian-World but not Sum-Priority, which must be replaced by something like the following thesis:

**Part-Priority** Proper parts are more fundamental than their sums.

like E-modal realism, the smallest parts of worlds are fundamental. Nihilism-like E-modal realism avoids the problem of junky worlds, since these have no maximal sums.

However, Nihilism-like E-modal realism cannot avoid a problem similar to the problem of junky worlds. Consider a *gunky world*, a world such that there are no atoms in it.<sup>39</sup> In other words, nothing in a gunky world is a proper part of some other thing therein. Thus, if Nihilism-like E-modal realism is true, there is no fundamental entity in a gunky world, since it has no atoms.

The problem of gunky worlds is more troublesome than the problem of junky worlds is. First, gunky worlds cannot be dismissed by appealing to Lewisian-World, because this does not depend on the definition of worlds. Second, being a gunky world is widely accepted in metaphysics as a way that the actual world might be. Some metaphysicians even argue that there is a realistic possibility that the actual world is gunky. Physicists have discovered that molecules are composed of atoms; atoms are composed of subatomic particles, such as protons or electrons; and some of these are composed of elementary particles, such as quarks or leptons. It is not unrealistic to think that their discoveries might not come to an end at any level. Third, it is again not helpful to appeal to the laws of mereology. In fact, GEM does not tell us whether there are atoms or not.

Monism-like E-modal realism faces the problem of junky worlds. Nihilism-like E-modal realism faces the problem of gunky worlds. These two problems share a basic source, in that they characterise what is fundamental in terms of mereology, or more precisely, maximal sums and atoms, respectively. These problems arise because there are worlds in which no maximal sum or no atoms exists. As far as impossible worlds are considered, such worlds exist.

Can E-modal realists deny the difference in ontological status between sums and their parts, just as they deny the difference between possible and impossible worlds? They have little justification to do so. If they do deny this, it becomes unclear which entities are non-fundamentals. According to No-Collapse, there must be some non-fundamentals; if there are none, the problem of non-substantivity returns as the question of what is fundamental, the most interesting ontological question, becomes non-substantive, since everything is fundamental.<sup>40</sup>

It is no viable option for E-modal realists to accept worlds without fundamentals. This option contradicts Extended-Fundamentality. Granted, it does not contradict Atom-Fundamentality, but implies that gunky worlds are groundless in the sense that nothing in a gunky world is grounded on fundamentals. This consequence is not desirable, even less so if fundamentals are the ultimate “blocks” of reality. The areas in reality where gunky worlds are located would look like “holes” of reality, with no

<sup>39</sup> See Sider (1993). As I mentioned in note 32, the notion of “junky” is the converse of the notion of “gunky”.

<sup>40</sup> E-modal realists might actually be able to deny the ontological difference between sums and their parts if they accept non-fundamental *abstract* entities. Such abstract entities are not part of worlds, since worlds are concrete, according to Concreteness. (I am grateful to Ted Sider for suggesting this option to me.) In pursuing this line of response, E-modal realists must explain exactly how different abstract entities are from concrete objects and the nature of the relationship between them. More particularly, any alleged distinction between abstract and concrete objects must satisfy Objectivity. This requirement is not easy to meet.

ultimate block in those areas. This suggests that gunky worlds are not a part of reality; nonetheless, there must be gunky worlds, according to Extended-Plenitude.

Most metaphysicians agree that junky worlds or gunky worlds might well not be parts of reality, but the reason for this should not be that they are groundless by the definition of fundamentality. It is the fault of the definition of fundamentality if it cannot fit in the well-known metaphysical debate regarding junky worlds and gunky worlds.<sup>41</sup>

## 5 Conclusion

To summarise, I have argued in this paper that Lewisian modal realism should incorporate ontological realism, and this comes with serious problems. Being ontological realism, Lewisian modal realism needs to offer a way to distinguish determinately between fundamentals and non-fundamentals. However, this is quite difficult because, no matter how they are distinguished, the possibility (or impossibility) always remains that there are no such fundamentals in the world. This is equivalent to the claim that there is a possibility (or impossibility) that there is no world, and contradicts Plenitude, one of the principles of Lewisian modal realism.

Although I used junky worlds and gunky worlds in arguing that it is possible that there are no fundamentals, it does not follow that my argument depends on mereology. It should be remembered that Objectivity requires the distinction between fundamentals and non-fundamentals to be objective and settled by reality. The mereology-based characterisation I gave in Section 4.2 is just one example of a way to satisfy Objectivity. Fundamentality should be formally characterised insofar as the fundamental structure of reality is formally represented, at least approximately. Ontological realists should agree on this, since, if there is no formal way to represent the fundamental structure of reality, the notion of fundamentality itself seems dubious. Any formal characterisation is based on a formal system. For any formal characterisation of fundamentals, it seems that there is a corresponding characterisation based on a different system according to which there no fundamentals exist, if the argument in 4.2 can be generalised to other

<sup>41</sup> Although the argument against E-modal realism I gave in this section presupposes Schafferian ontological realism, related arguments can be constructed for other versions of ontological realism. As for Sider's version, for example, Monism-like E-modal realists must say that their "world view"'s ontology includes not only worlds (including junky ones) and entities that are asserted to be their parts in non-fundamental languages but also other entities similarly asserted a junky world is a part of. There seems no way to obtain these entities since the latter entities violate Lewisian-World. Nihilism-like E-modal realists face a similar problem. They need entities that are asserted to be proper parts of point-sized *possibilia* but they violate Atom-Fundamentality.

As for Fine's version, Monism-like E-modal realists would say that a fact about the existence of any contingent object is grounded in the fact that there exists a world that it is a part of and that the latter fact is fundamental (there is no grounding fact for it). However, it cannot be true for a junky world. If it is true, objects in a junky world are parts of it. In this case, the junky world is not fundamental because the fact about its existence should be similarly grounded in a fact that there exists something that the junky world is a part of. Nihilism-like E-modal realists would similarly say that a fact about the existence of any possible object is grounded in the fact that there exist point-sized *possibilia* that are parts of it and that the latter fact is fundamental, but in a gunky world, since even point-sized *possibilia* have a proper part, the fact about their existence is not fundamental in the same way.

Other versions may require more different and complicated arguments. Still, it seems plausible that my argument relies on only basic features of the relevant notion of fundamentality.



formal systems. That is, it is plausible that, insofar as fundamentals and non-fundamentals are distinguished on the basis of a *formal system*, there is *another formal system* implying that there no fundamentals exist.<sup>42</sup>

E-modal realism offers O-modal realism no way out of the problem of impossible worlds. O-modal realism must either abandon E-modal realism or accept it and face the problem of junky worlds or gunky worlds. The former option is only slightly better than the later.<sup>43</sup> I argued in the paragraph above that a formal characterisation of fundamentals always has another corresponding characterisation according to which there are no fundamentals. Even if O-modal realism is separated from E-modal realism, O-modal realism must provide an explanation as to why the corresponding characterisation does not imply the possibility but the impossibility of worlds without fundamentals. Surely it is easier to offer such an explanation than to offer an explanation as to why the corresponding characterisation entails only conceivability. However, it is natural to construe this as entailing possibility, as opposed to impossibility and conceivability.

At any rate, O-modal realism must distinguish between fundamentals and non-fundamentals in a way that is settled by reality. It does not matter whether it distinguishes possibility from impossibility, or fundamentality from non-fundamentality. The problem of junky worlds and gunky worlds suggests that this requirement cannot be met without rejecting Plenitude.

This conclusion may come as no surprise for those familiar with the dispute concerning Lewisian modal realism. Many critics find that Plenitude is the most problematic principle of Lewisian modal realism.<sup>44</sup> In this paper, I have attempted to add to this discussion by showing that there is no way to maintain Plenitude if metaontological considerations are taken into account. To maintain Plenitude involves rejecting the notion of fundamentality, without which the problem of non-substantivity will return: the question of what is fundamental—the most interesting ontological question, according to Schaffer—is not substantive. If a notion of fundamentality does not meet No-Collapse, then nothing is left to deserve the name “fundamental”, since everything is fundamental (or not fundamental). If a notion of fundamentality does not meet Objectivity, any distinction between fundamentals and non-fundamentals is drawn by linguistic conventions, meaning that Plenitude holds only because our linguistic convention contingently makes it so.

In conclusion, Lewisian modal realists face either the problem of non-substantivity or the failure of reduction. The former leads to ontological anti-realism, which claims that the question of the existence of possible worlds is not substantive; the latter leads to the denial of the advantages of modal realism over other reductive theories of modality. Either way, we metaphysicians are justified in paying much less attention to modal realism than before.

<sup>42</sup> This is a response to the concern that although metaphysicians do discuss junky worlds and gunky worlds, this might be because junky worlds and gunky worlds are merely *conceivable* rather than possible or impossible. In fact, Williams (2006) argues that we conceive of gunky worlds but that their existence is only an illusion. In response, I argue that gunky worlds are not merely conceivable; this is not plausible since both kinds of worlds are characterised in terms of a formal system. I am grateful to Masashi Kasaki for raising this concern.

<sup>43</sup> It may be worse, since there are objections to modal realism that can be easily blocked for E-modal realists. See note 26.

<sup>44</sup> Such critics include Lycan (1988); Shalkowski (1994); and Pigden and Entwisle (2012). (More precisely, they discuss the Principle of Recombination, the elaborated version of Plenitude. See also note 3.) Replies to their criticisms are found in Sider (2003) and Cameron (2012).

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