On the Indispensability of (Im)Possibilia

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ABSTRACT

According to modal realism formulated by David Lewis, there exist concrete possible worlds. As he argues the hypothesis is serviceable and that is a sufficient reason to think it is true. On the other side, Lewis does not consider the pragmatic reasons to be conclusive. He admits that the theoretical benefits of modal realism can be illusory or that the acceptance of controversial ontology for the sake of theoretical benefits might be misguided in the first place. In the first part of the paper, I consider the worry and conclude that although the worry is justified, there can be an epistemological justification for his theory. Next, I outline the so-called indispensability argument for the legitimacy of mathematical Platonism. Finally, I argue that the argument, if accepted, can be applied to metaphysics in general, to the arguing for the existence of concrete (im)possibilia in particular.

1. Introduction: Modal Realism

Modal realism[1] is a thesis according to which the world we live in is a very inclusive thing. It consists of us and all our surroundings, however remote in time and space. Every chair, every person and every city that is spatially and temporarily related to us belongs to our world. However, things might have been different in infinitely many ways. In fact, any way the world *could have been* is a way some real world *is*. We call the ways *possible worlds*.

But what are possible worlds? Lewis (1973; 1986) claims that if we want to know what kind of things possible worlds are, we do not need any sophisticated philosophical explanations. We need merely look around, because possible worlds are just more things of that sort. There are like remote planets (cf.

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[1] For a full and comprehensive outline of the theory, see Lewis' (1986) *magnum opus*.

Kripke, 1972, p. 44), although most of them are much bigger and are not remote. His argument – called also the argument from ways – goes as follows:

> I believe that there are possible worlds other than the one we happen to inhabit. If an argument is wanted, it is this. It is uncontroversially true that things might be otherwise than they are. I believe, and so do you, that things could have been different in countless ways. But what does this mean? Ordinary language permits the paraphrase: there are many ways things could have been besides the way they actually are. On the face of it, this sentence is an existential quantification. It says that there exist many entities of a certain description, to wit 'ways things could have been'. I believe that things could have been different in countless ways; I believe permissible paraphrases of what I believe; taking the paraphrase at its face value, I therefore believe in the existence of entities that might be called 'ways things could have been'. I prefer to call them possible worlds. (Lewis, 1973, p. 84)

As the above paragraph indicates, the primary aim of Lewis' theory is to explain modal notions away by appealing to possible worlds. Moreover, the analyses are non-modal, that is, they do not resort to any primitive modal notions. In other words, taking the paraphrase 'ways the worlds could have been' at face value enables us to grasp modality in purely non-modal notions and, at the same time, decrease the postulation of different ontological kinds at minimum.[2]

On the other side, it was argued by many Lewis' opponents that even if the argument was correct, it in fact says nothing about the very nature of the entities at issue. Since, the objection says, the phrase 'ways the world could have been' can be read at face value, while does not really commit us to the existence of a plenty *concrete* possible worlds, we should reject the Lewisian version of modal realism. So the second Lewisian argument.

The second argument – the so called argument from utility – says that the idea of *concrete* possible worlds is not only a natural existential quantification entrenched in our everyday description of reality. The hypothesis of there being a myriad of concrete possible worlds is also serviceable. Since concrete possibilia bring certain undeniable theoretical benefits, and the cost-benefits methodology plays an important (if not the most important) role in metaphysical methodology, their existence is worth of considering. Put in more

[2] Lewis distinguishes between quantitative and qualitative parsimony. More naturally, if a theory keeps down the number of fundamentally different *kinds* at the expense of extending of their instances, it is *qualitatively* more parsimonious than a theory that does not. See Lewis (1973, p. 87).

comprehensive terms, any theory which a) improves a unified systematization of our pre-theoretical opinions, b) saves economy regarding primitive (and thus unexplained) notions, c) is conservative with respect to our far-entrenched pre-theoretical opinion and, last but not least, d) does well in comparison to its rivals should be preferred. As Lewis shows, any of those criteria are met and thus any modal realist should accept possibilism rather than (one version or another of) *ersatzism*.[3]

To begin with, Lewis' analyses are *systematic*. His theory offers a comprehensive systematization (or unification) of our pre-philosophical opinions through the relations between our pre-theoretical opinions, their capture in the definitional framework and subsequent (controversial or not) metaphysical identifications. Furthermore, modal realism is *ontologically* 'homogeneous'[4] since the ontological primitives are individuals, sets and set-theoretic construction out of them. Also, the theory is *ideologically* parsimonious, because it requires only that we say how the individuals are by invoking natural and qualitative predications of them.

Secondly, the theory of concrete possible worlds is *conservative.* As the ontology and the definitional framework together capture the pre-philosophical opinions, the resultant theory does better for systematizing in a way that promotes the virtues of economy and conservativeness. That means that it respects and does not alter, it would seem, those pre-existing opinions to which we are firmly attached. Although modal realism has to deal with the objection from quantitative (un)parsimony, it "scores well on the measures that matter (most)" (Divers, manuscript, p. 11). For example, linguistic *ersatzism* is not in a position to completely describe every possibility since various pre-theoretically distinct possibilities cannot be identified with their linguistic descriptions in any language available to us. Finally, the overall theory is widely applicable. Having concrete possibilia and the Lewisian definitions at hand, we can clarify questions in many parts of metaphysics, the philosophy of logic, of mind, of language or science. Besides providing non-modal analyses of modal concepts, the theory offers extensional accounts of properties, propositions, counterfactuals and propositional attitudes. A philosophers' paradise.

[3] For now, I consider as *ersatzist* any theory which takes possible worlds to be abstract entities representing possibilities in one way or another. See Lewis (1986, p. 136).

[4] By homogeneity I mean the same as Yagisawa does: "... we want to keep the metaphysical category of world-ways homogeneous in kind, we therefore say that ways the world could be *are* worlds" (Yagisawa, 1988, p. 180, my italics).

2. Are Concrete Possibilia Indispensable?

Without going into further details, the theory of genuine modal realism provides at least two reasons why we should accept it. To repeat, there is the paraphrase argument on one side, several pragmatic reasons for the acceptance of possibilia, on the other. The problem is that these two arguments, however persuasive they may be, do not suffice for the desired claim that possibilia are indispensable for metaphysics (something Lewis doesn't believe himself). In particular, there are certain insurmountable epistemological problems modal realist (if any) has to face. The challenge is the following: even if we have some pragmatic reasons to believe in the existence of concrete possibilia, we have absolutely nothing at hand when it comes to knowledge.[5] Let me explain the objection.

Notoriously, mostly accepted epistemological accounts of justification include a causal component. Thus, to know something, according to the accounts, is to be in a causal contact with the "truthmaker for the known truth bearer" (Bueno & Shalkowski, 2000). But, *ex hypothesi*, there is no causal connection between the actual and merely possible individuals in the Lewisian conception. Since Lewis' worlds are maximal mereological sums of *spatiotemporally interrelated* individuals, the objection concludes, there is basically nothing beyond the purely pragmatic reasons that justifies us to proclaim the existence of concrete possibilia. Briefly, modal realism betrays modal knowledge. End of the objection.

Fair enough. Fortunately though, modal realist is not alone on the philosophical scene who claims to know something about entities spatiotemporally isolated from us. Famously, it is also a practice of philosophers of mathematics to nontrivially consider the realm on (abstract) entities being in no relevant relation to us. They treat numbers, classes, sets or functions as object (of one kind or another) subjected to the rational examination without any causal acquaintance with them. We only have to believe in the existence of realm of mathemata suited to meet the needs of all the branches of mathematics (cf. Lewis, 1986, p. 3).

If that is so, Lewis points out, our ontological commitment to the logical space full of possibilia is, methodologically speaking, not (fundamentally) different from our ontological commitment to the space of numbers, sets etc.

[5] For example, see Richards (1975) and Skyrms (1976).

We only have to believe in the existence of possibilia and "there we find what we need to advance our endeavors" (Lewis, 1986, p. 4). Yes, possibilia are causally isolated, and thus it is impossible to 'touch' them. But so are numbers, function and sets. Lewis states:

> Set theory offers the mathematician great economy of primitives and premises, in return for accepting rather a lot of entities unknown to *Homo javanensis*. It offers an improvement in what Quine calls ideology, paid for in the coin of ontology. It's an offer you can't refuse. The price is right; the benefits in theoretical unity and economy are well worth the entities. Philosophers might like to see the subject reconstructed or reconstrued; but working mathematicians insist on pursuing their subject in paradise, and will not be driven out. Their thesis of plurality of sets is fruitful; that gives them good reason to believe that it is true. (Lewis, 1986, p. 4)

Thus, according to Lewis, mathematicians and metaphysician have something in common. I said roughly, as the situation is much more complicated. In what follows, several stages of Lewis' position should motivate, elucidate and justify his very strategy.

3. Stage I: Setting the Things Up

Indisputably, we can distinguish between platitudinous uncontroversial claims about mathematics and controversial philosophical claims about it. The former present a great deal of mathematical knowledge, axioms of number theory, proofs, equation, solutions etc., simply all the activities mathematicians are educated and engaged in. It is no doubt that they know what they are talking about, they understand the subject matter, they know even more about the subject than laymen on the street.

Analogically, we can distinguish between uncontroversial platitudinous claims about possibility, necessity or contingency and their rather controversial interpretations. Taking our pre-theoretical opinions for granted, we all believe that there are donkeys, that grass is green or that I am writing this paper. We also all agree that there could have been talking donkeys, that grass could have been blue or even that I could have been a poached egg. Those are simply our pre-theoretical opinions and any philosophical analysis of modality should account for (and not violate) them.

Conversely to that, philosophers of mathematics have formulated particular theories about what mathemata are. According to some, they are Platonic

entities inhabiting the Third realm. According to others, they are physical objects, symbols written on a piece of paper, concepts or immanent universals. All those mainstream views maintain that we have good reasons for thinking that numbers having a particular nature really exist as well as claim to provide the best systematizations of our mathematical knowledge.

And the same holds for modal metaphysics. There are many philosophers who take modality seriously. According to some, modality is best to be analyzed by means of possible worlds considered as real, isolated physical entities. Others have hypothesized rather actual surrogates for possibilia. For example, they say that possible worlds are platonic ideas, essences, universals, set-theoretic construction, fictions or states of affairs. Of course, there is a disagreement about what the entities in fact are. What matters, however, is that philosophers agree about what their pre-theoretical opinions are as well as philosophers of mathematics agree about what their mathematical platitudes are.

Now, given the distinction between pre-theoretical opinions, metaphysical interpretation of the opinions on one side and mathematical platitudes and their philosophical interpretation on the other we get a lattice of the following form:

I. Mathematical Platitudes	II. Pre-theoretical Modal Opinions
III. Philosophy of Mathematics	IV. Modal Metaphysics

Since there is a little dispute about mathematical platitudes (I) as well as our pre-theoretical opinions (II), mathematical and metaphysical *practice* is neutral with respect to many different controversial accounts of their subject matters (cf. Bueno & Shalkovski, 2000, p. 10).[6] Having that in mind, in modal case there is no dispute about what is possible (II). For, any modal realist is willing to accept the claim that possible worlds – whatever their metaphysical nature is – exist. It is because of the fact that various theories of both concrete and ersatz possible worlds typically *are* consistent with our pre-theoretical opinions about what is possible, impossible, contingent and necessary. What really varies is the very philosophical interpretation of the possible worlds discourse (IV). We all agree that there are donkeys, but not all of us would subscribe to

[6] In the lattice, those are (III) and (IV).

the thesis that there exist mind-independent physical objects. By the same manner, we all agree that there could have been talking donkeys, but only minority of us assumes that there exists a merely possible full-blooded talking donkey in a concrete possible world. Finally, I could have been poached egg, although not everybody accepts the claim that it is a counterpart of me, rather than me itself, that is the poached egg. And the same seems to hold for mathematics. Various philosophical accounts of mathematics – (III) – which conflict with mathematical platitudes fail to be good accounts of mathematics. On the other side, those philosophical accounts of mathematics that typically are consistent with the platitudes – most frequent are Platonistic and Nominalistic theories – provide competitive accounts of what the nature of mathematical entities is.

Thus, we can conclude the following. It would seem that Lewis uses the analogy between mathematics and metaphysics as an analogy between (I) and (IV) to show that there is the same reasoning in them. And that is a wrong way for Lewis to go. Since we do not need to be in a causal relation to possible worlds in order to know what is possible as well as we do not need to be in a causal relation to any mathemata in order to know axioms of number theory, proofs, equation, solutions etc., it is only the analogy between (I) and (II) (and not between (I) and (IV)) that is secure. However, what we really need is the very analogy between (III) and (IV). Put briefly, the argument goes as follows:

a. Modal realist argues for the existence of concrete possibilia in the same way as mathematician argues for the existence of mathematical entities.
b. We all agree that mathematicians gain some knowledge.
c. The uncontroversial mathematical knowledge is platitudinous.
d. If we take the analogy at face value, it secures only uncontroversial modal knowledge.
e. The existence of concrete possibilia is controversial modal knowledge.
f. The desired analogy is secured if and only if controversial modal knowledge is analogical to controversial mathematical knowledge.

Now, it should be clear that the analogy Lewis demands is more controversial than it looked before. It is not an analogy between mathematics (I) and modal metaphysics (IV). What he in fact needs in order for the analogy to work is a premise that commits him to the existence of controversial

mathematical claims (III), the so-called Mathematical Realism (or Platonism). I do not think, however, that it discredits the very analogy. On the contrary. Given that we have some (not only) pragmatic reasons to believe in the existence of mathemata, and given the stronger version of the analogy between controversial claims in mathematics and metaphysics, we would have (not only) pragmatic reasons to believe in the existence of possibilia. I will discuss the reasons in turn.

4. Stage II: Indispensability Arguments in the Philosophy of Mathematics

Famously, the applicability of mathematics penetrates almost any part of human reasoning. It applies to virtually any part of empirical and theoretical science. It also provides elegant and economical statements of many theories. It is therefore not a surprise that given the practice and very success of science, the existence of mathemata used in it is indispensable to our theories. So, if an argument is wanted, here is one:

1. We ought to have ontological commitment to all and only the entities that are indispensable to our best scientific theories.
2. Mathemata are indispensable to our best scientific theories.

Therefore

C1. We ought to have ontological commitments to mathemata.[7]

The argument, as it stands, presupposes at least two things. Firstly, the Quinean criterion of ontological commitment epitomized in his slogans "To be is merely to be the value of a bound variable" and "No entity without identity". Secondly, Quine (and others) suggests that mathematics is epistemically on a par with the rest of science. It is idle to say that there has been a great deal of debate over the success of the argument. As Quine points out, and what is at issue here, the great medieval controversy over universals has flared up anew in the modern philosophy of mathematics. Yet, formulated in this way, the argument seems to be valid. To begin with (1), it is undisputable fact that, say, physics would not work without mathematics as it is partly the results of mathematics that constitute our knowledge of the field. Put differently, the thought is that (1) serves as a general and normative premise about what considerations govern our ontological commitments.

[7] This form of the argument is presented in Colyvan (2011).

Next, it is only very hard to imagine that given that our physical theory is *true* and, to repeat, mathematics is indispensable part of our physical theories, mathemata do not exists. Surely, to follow Shapiro, many of those unmoved by indispensability arguments do not believe the truth – in some heavy sense – of scientific theory in the first place. But for those who do it would seem that someone has to be realist about mathematics if one is a scientific realist. Therefore, mathematical entities do exist.

Shapiro (2000) formulates the argument more precisely. Namely:

1a. Real analysis refers to, and has variables range over, abstract objects called 'real numbers'. Moreover, one who accepts the truth of the axioms of real analysis is committed to the existence of these abstract entities.
2a. Real analysis is indispensable for physics. That is, modern physics can be neither formulated nor practised without statements of real analysis.
3a. If real analysis is indispensable for physics, then one who accepts physics as true of material reality is thereby committed to the truth of real analysis.
4a. Physics is true, or nearly true.

Therefore

5a. Abstract entities called 'real numbers' exist.

Now, Shapiro suggests that if we accept physics as true, we are automatically ontologically committed to the existence of real numbers. Thus, again, if the truth of the scientific theory is accepted, then it becomes a straightforward matter to see why one would assume an ontological commitment in accepting the theory as true (see Newstead & Franklin, 2012).

Mathematical Platonism is one metaphysical interpretation of mathematical discourse among many. Generally, it claims that mathematical theories relate to systems of abstract objects, existing independently of us, and that the statements of those theories are determinately true or false independently of our knowledge. Put otherwise, Mathematical Platonism is such a realistic account of mathematical discourse that provides for the fact how mathematical statements get their truth-values.

Although still controversial, the issue is clearer now than of old, because we have a more explicit standard at hand whereby to decide what ontology a given

theory is committed to (cf. Quine, 1951). But if that is so, then we are back in the Lewisian analogy. Surely, by pointing out at uncontroversial mathematical platitudes on one side and our pre-theoretical opinions on the other – (I) and (II) – we gain nothing by the analogy. However, by pointing out the success of a controversial mathematical theory, namely the epistemological justification of Mathematical Platonism (III), and by applying the very (not only on pragmatic reasons based) methodology to modal realism, the Lewisian strategy can succeed.

Modal realist can thus argue in the following lines:

1. We ought to have ontological commitments to all and only those entities that are indispensable to our best scientific theories.
2. Platonic Mathemata are indispensable to our best scientific theories.

C1. We ought to have ontological commitments to Platonic Mathemata.[8]

3. If indispensability argument is valid in the case of mathematics, it should be applied to metaphysics as well.
4. We ought to have ontological commitments to all and only those entities that are indispensable to our best metaphysical theory.[9]
5. The existence of Lewis' possibilia is indispensable to our best metaphysical theory of the nature of possible worlds.

Therefore

C2. We ought to have ontological commitments to concrete possibilia.

Again, what we should have in mind here is the fact that the indispensability argument for the existence of concrete possibilia could be considered as of the same kind as its mathematical counterpart. After all, we showed that for Lewis to stay neutral about the Nominalism/Platonism dispute, and at the same time advocate the analogy between modal and mathematical epistemology, would mean nothing but the (irrelevant) justification of the uncontroversial modal opinions like 'there could have been a talking donkey', 'I could not be writing this paper' etc. It would neither persuade us to legitimately believe in the existence of a counterpart of me not writing this paper, nor give us any reason to believe in the existence full-blooded talking donkeys as parts of different

[8] For a summary of Mathematical Platonism, see Colyvan (2011).
[9] Here I assume that if a metaphysical theory true, it is necessarily so.

concrete worlds. It is a one step further, a route to Mathematical Platonism, that any advocate of the analogy between mathematics and modal metaphysics should undertake.

4.1. Stage III: premise 3

To repeat, the premise (3) claims that if the indispensability argument is valid in the case of mathematics, it should be applied to metaphysics as well. That means that if the existence of Platonic mathemata is indispensable to our best scientific theories, the existence of, say, concrete possibilia is indispensable if modal realism is the best metaphysical theory of what there is. And it raises a methodological worry. Namely, if we do not commit ourselves to such entities as numbers in our scientific enquiries, we lose explanatory power and the predictive value as to the empirical world those theories provide. But what is at stake when we do not commit ourselves to possibilia?

For Lewis, the goal of philosophy is to provide an overall systematization of our pre-theoretical opinions. It is pointless to build a theory, however systematized, that would be unreasonable to believe and it is not even the unity and sytematicity only that matters. A worthwhile theory must be credible and it does not gain its credence if it disagrees with much of common sense. It is common sense – unsystematic folk theory – that we do believe anyways and no theory should violate. We thus have the following imperative when it comes to the methodology of metaphysics: never put forward a philosophical theory that you cannot believe in your least philosophical and most commonsensical moments (Lewis, 1986, p. 135).

Moreover, other methods of philosophy govern metaphysical theorizing. For example, metaphysical endeavor concerns linguistic and conceptual analysis, employs the findings of science or applies theoretical virtues in metaphysical theory choice such as simplicity, explanatory power, systematicity and even its esthetic features. Philosophical theories, and especially those metaphysical ones, simply have to fulfill some requirements as to be accepted into the "theories battle".

The question now is: what is the best philosophical systematization of our pre-theoretical opinions? Lewis is looking for such a theory that combines: firstly, the best balance of conservativeness and economy in our pre-theoretical opinions and metaphysical postulates, respectively; secondly, preserves all (or

almost all) of our pre-theoretical opinions; and thirdly, when compared with different theories, its positive results overweigh the results of its competitors.

Having that in mind, we seem to have an idea of what the best metaphysical theory should do. Definitely, it is not its business to undermine pre-philosophical opinions. On the contrary, its business is to systematize them by means of the balance between metaphysical postulates, conservativeness, simplicity, explanatory power and economy. And if the advantages of a theory that meets the requirements overweigh the advantages of its rival, we have serious, even indispensable, reasons to accept it. Together with its ontological commitments, or course.

4.2. Stage IV: premise 5

I admit that the decision as which theory is the best when it comes to the above criteria is highly disputable. I also admit that the existence of Lewis' possible worlds raises a lot of incredulous stares. Yet, explanations of all sorts are offered by modal realism and these explanations are, for the most part, successful. For example, an accurate and appropriately non-modal analysis of modality is undefeated. Moreover, it can be even showed that the applications afforded by modal realism are greater than those afforded by its actualistic counterparts and the ontological costs of it not clearly greater than those of actualism (of one sort or another) (cf. Divers, 2002).

Unfortunately, to provide a full defense of modal realism would go far beyond the scope of this paper. Let me thus only mention the main sources of defense. Most importantly, it is Lewis'(1986) *magnum opus* in which he provides the most comprehensive advocation of modal realism. It is also Divers (2002) which, for example, defends modal realism against the objections concerning quantification over non-actuals, meets some epistemological worries concerning the theory and shows that no objection shows counterpart theory in any worse light than any other possible worlds account of *de re* modal content. The objection from circularity of Lewis' analyses is overcome in Divers (2002), Daly (2008), Kiourti (2010) and Cameron (2012), among others.

Despite the above I can still insist on the weaker reading of the premise. Namely, even if the reader is not persuaded by arguments on behalf of modal realism, my argument can be conditional. That is, no argument for the existence of concrete possible individuals is needed. Rather, the existence of

concrete possible individuals can be assumed in a sense that if there are concrete impossible individuals there are such and such problems and such and such potential solutions. Briefly, I pursue the following strategy: 'were the assumptions I am hypothetically endorsing to be true such and such would be the case'.

5. Extended Modal Realism

What about impossibilia? For example, Takashi Yagisawa (1988; 1992; 2010) argues that modal realism, if fully comprehensive, should include impossible individuals into its ontology. By pointing out some deficiencies in the Lewisian analyses, Yagisawa finds Lewis' theory incomplete. Granted, there are other ways of the world than the way the world actually is. Those are Lewis' possible worlds. But beside these ways, Yagisawa adds, there are other ways of the world than the ways the world *could* be, namely ways the world *could not* have been. And we have the argument from ways.

Secondly, the existence of impossibilia seems to solve a lot of problems arising from the Lewisian conception. To give the reader a hint, Lewis' nominalistic approach to intensions cannot differentiate between various impossible and necessarily coextensive properties and propositions, unless we commit to the existence of impossibilia. Next, counterfactuals with impossible antecedent turn out, according to Lewis/Stalnaker analysis of counterfactuals, to be trivially true.[10] Consider the following pair of counterpossible conditionals:

a*. If Sally were to square the circle, we would be surprised.
b*. If Sally were to square the circle, we would not be surprised.

Apparently, if one of the conditional is true, the other is false as we seem to distinguish between the truth and the falsity of the conditionals in such a way that we assume something to be the case and wonder what would and would not follow from that. Without the modification of modal realism by means of the

[10] For Lewis' account of counterfactuals, see Lewis (1973). Being aware of the limitations of his account, he writes: "[t]here is at least some justification for the decision to make a 'would' counterfactual with an impossible antecedent to come out true. Confronted by an antecedent that is not really an entertainable supposition, one may react by saying that , with a shrug: if that were so, anything you like would be true" (Lewis, 1973, p. 24). For unintuitive consequences of the claim, see Mares (1997).

extension of it, however, the problems seem unsolvable. So is the argument from utility.

What about the indispensability argument? Could we extend the argument so as to demonstrate the indispensability of impossible entities? In any case, if we accept the need for impossible worlds and impossible individuals in the best theory of modal phenomena, parity of reasoning only support the extension of possibilists' ontology by concrete impossibilia. Moreover, if Priest is right in claiming that any of the main theories concerning the nature of possible worlds can be applied equally to impossible worlds (cf. Priest, 1997, pp. 580–581), indispensability arguments from concrete impossibilia would be the following:

1. We ought to have ontological commitments to all and only those entities that are indispensable to our best scientific theories.
2. Platonic Mathemata are indispensable to our best scientific theories.

C1. We ought to have ontological commitment to Platonic Mathemata

3. If indispensability argument is valid in the case of mathematics, it should be applied to metaphysics as well.
4. We ought to have ontological commitments to all and only those entities that are indispensable to our best metaphysical theory.
5. The existence of Lewis' possibilia is indispensable to our *best* metaphysical theory of the nature of possible worlds.

C2. We ought to have ontological commitments to Lewis' possibilia.

6. If Lewis' argument is valid in the case of concrete possible worlds, then it can be applied, mutatis mutandis, in the case of impossible worlds as well.

Therefore

C3. We ought to have ontological commitments to concrete impossibilia.

To even strengthen the point, there is one more way how to motivate (extended) modal realism from modal realists' point of view. Namely, in (Lewis, 1986) Lewis justifies his ontology by drawing a line between two kinds of truth, the actual truth and truth *simpliciter*. That means that the proposition

a. There is no beer

is true when looking into the empty fridge, although false, when we widen the scope of our quantification beyond the empty fridge. Analogously,

b. There are unicorns

is false when the actual world is considered, but when considered *simpliciter*, it's true (recall, that according to modal realism any possible individual really exist in some possible world). Surely, unicorns do not exist provided that we take the actual world into the account. We thus get the truth of

(A) *Actually P if and only if* (unrestrictedly) P

as well as

(N) *Necessarily* P *if and only* if (unrestrictedly) P.

But, as everyday discourse indicates, impossibilia are objects of beliefs, counterfactuals with impossible antecedents are not all trivially true, there are different impossible properties and propositions etc.[11] And if that is so, why do not accept (A) while deny (N). Since they are equivalent when possible worlds are at issue, they are quite distinct when it comes to impossibilia. To borrow an example from Kiourti (2009):

i. Necessarily the Law of Non-Contradiction holds if and only if the Law of Non-Contradiction holds when quantifying over possibilia,

can still be true, although, when dealing with impossible situations,

j. Necessarily the Law of Non-Contradiction holds if and only if the Law of Non-Contradiction holds when quantifying over possibilia and impossibilia

would become false.

6. Conclusion

Let me summarize the argument in the following table:

[11] Moreover, impossibilia are objects of logical arguments in a sense that when one argues that 'Necessarily, impossibilia do not exist', it is in fact claimed that necessarily something does not exist (cf. Routley, 1980, p. 83).

A	B	C
(Stage I): Mathematical platitudes	(Stage I*): Pre-theoretical opinions (about the possible)	(Stage I**): Pre-theoretical opinions (about the impossible)
(Stage II): Indispensability of mathemata for the best scientific theories	(Stage II*): Indispensability of entities postulated by the best modal metaphysical theory	(Stage II**): Indispensability of entities postulated by the best modal metaphysical theory
(Stage III): Philosophical disputes about the nature of mathemata	(Stage III*): Philosophical disputes about the nature of possible worlds	(Stage III**): Philosophical disputes about the nature of impossible worlds
(Stage IV): Mathematical Platonism	(Stage IV*): Modal realism	(Stage IV**): Extended modal realism

Stage (I) represents the basic mathematical truths like 2+2=4. Now, as Quine's and Shapiro's arguments suggest, the truths are about something, to wit, mathemata which, in order to play any role in truths of science, must exist. Recall that one who does not accepts any truths in science will not accept the move from Stage (I) to the Stage (II). Stage (III) represents philosophical disputes about what the nature of mathemata is. Finally, Stage (IV) is one particular theory of the nature of numbers, namely Mathematical Platonism.

Importantly, the move from Stage (II) to Stage (III) is controversial. What is the best philosophical systematization of mathematical knowledge must be decided somehow, but what exactly are the criteria of success of any philosophical theory is disputable. Recall, that what Lewis is looking for is such a theory that combines a) the best balance of conservativeness and economy in pre-theoretical opinions and metaphysical postulates, respectively, b) preserves all (or almost all) of our modal pre-theoretical modal opinions and c) when compared with different theories, its positive results overweigh the results of its competitors.

Now, having the column (A) complete, let proceed to the right. Namely, Stage (I*) represents our pre-theoretical opinions about what possibility is and what possibility there is.[12] Again, what pre-theoretical opinions about the possible there are is a tricky question. Since hard cases make bad theories, the best way how to outline the opinions is the following: pre-theoretical opinions

[12] That those questions are distinct, see Cameron (2012).

are those claims that we believe to be true and any theory (of modality) should accommodate.

Premises (3) and (4) put into contrast the practices of scientists and metaphysicians and are the most controversial assumptions of the whole argument.[13] Although I did not approach the question here in details, it is of the most importance to provide such an account of metaphysical methodology that would sustain the argument as well as describe the very practice of metaphysicians correctly.[14] Surely, we have some candidates for criteria to be fulfilled in order for a theory not to be dismissed at the very beginning. What criteria those are is open question.

The move from Stage (II*) to Stage (III*) only copies the move from Stage (II) to Stage (III) and is based on the indispensable existence of entities playing an important role in the most successful philosophical analysis (of modality). What entities those are – and whether those are concrete possible individuals – is, again, decided by the success of the best theory systematizing modal phenomena.[15]

By way of methodology, it is indisputable that the whole argument can plausibly be read as having a conditional form. Namely, it relies on highly controversial assumptions concerning the indispensability argument in the philosophy of mathematics, a feasibility of Mathematical Platonism, some grasp of methodology in metaphysics, its similarity to scientific practices, validity and last but not least the success of modal realism in philosophical analysis. Any assumption, for sure, deserves an extensive account on its own. One can thus read every stage of the argument as modus ponens as well as modus tollens. And I will be happy for a reader to choose.

To conclude, if (im)possible worlds are understood as other 'remote planets', no causal acquaintance with them is permissible. However, as the paper tried to show, such a limitation does not protect (extended) modal realist in defending the view. Surely, the analogy between modal metaphysics and mathematics concerning the existence of their subject matters must be approximated carefully as various ambiguities are around. As controversial as it

[13] Due to comments by anonymous referee I admit that in order to be as precise as possible, I should say that if the indispensability arguments in the philosophy of mathematics are ontological, their counterparts in the philosophy of modality are ontological too.

[14] For an interesting contribution to the debate between the methodology of science and methodology of metaphysics, see French & McKenzie (2011).

[15] I leave for a reader to finish the exposition of the table in the case of column (C).

seems, though, the basic idea behind the indispensability argument in mathematics is not fundamentally different from the idea behind indispensability argument in metaphysics, and both of them should be taken seriously.

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