The Varieties of (Relative) Modality

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Abstract

In "The Varieties of Necessity" Fine presents purported counterexamples to the view that a proposition is a naturally necessary truth if and only if it is logically necessary relative to or conditional upon the basic truths about the status and distribution of natural kinds, properties and relations. The aim of this paper is to defend the view that natural necessity is relative necessity, and the general idea that we can define other kinds of necessity as relative, against Fine's criticisms.

1 Introduction

In everyday life, as well as in the pursuit of philosophy, we more-or-less explicitly make use of a range of different notions of possibility and necessity. Not only the familiar kinds, such as logical, metaphysical and natural necessity, but arguably also a range of more subtlely distinguished kinds.[1] One plausible way to make sense of these different modalities, and how they relate to one another, is to treat them as *relative modalities*. For example, something is biologically necessary if it is necessary *relative to* general biological laws, or something is morally necessary if it is necessary *relative to* a certain moral code. It can already be seen that such a view incorporates some kind of fundamental necessity in terms of which we can give a relative account of other kinds: the necessity which is relativized to yield relative

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necessities.

The standard view of relative necessity takes the fundamental or absolute necessity to be logical necessity. So 'necessary relative to' is cashed out as 'follows logically from', and 'possible relative to' is cashed out as 'is logically compatible with'. So, for example, it is biologically necessary that p just when p follows logically from some biological laws. Such an account of relative necessity has been pursued by, among others, Smiley (1963).

> If we define OA as $L(T \supset A)$ then to assert OA is to assert that T strictly implies A or that A is necessary *relative* to T. Since the pattern of the definition is independent of the particular interpretation that may be put on T we can say that to the extent that the standard alethic modal systems embody the idea of absolute or logical necessity, the corresponding O-systems embody the idea of *relative necessity*—necessity relative to an arbitrary proposition or body of propositions. They should therefore be appropriate for the formalisation of any modal notion that can be analysed in terms of relative necessity. (Smiley, 1963: 113)

Humberstone (1981; 2004) raises certain logical problems for this simple standard formulation. It would be beside the point to discuss them in detail here, but I will be working with a formulation that avoids the problems.[2] In brief, added to the formulation of relative necessity in terms of logical implication, i.e.

> It is relatively necessary that p iff $\Box(\phi \to p)$

is an explicit statement of the assumption that there is a proposition, or conjunction of propositions, perhaps falling under a certain condition (being a conjunction of laws of nature, say).

It is Ψ-necessary that p iff $\exists\phi(\Psi\phi \land \Box(\phi \to p))$

The crucial idea at issue is that important kinds of necessity can be defined as relative, in terms of logical necessity and a certain class of propositions. One particular kind of necessity that might be given the relative treatment is natural necessity. It seems quite plausible to make statements like the following: natural necessity is a matter of following from the laws of nature, and natural possibility is a matter of being compatible with the laws of nature. Thus, it seems rather natural to give an account of natural necessity in terms of (logical) necessity relative to the laws of nature.[3]

The aim of this paper is to defend the relative necessity view against a certain kind of counterexample presented in Kit Fine's paper "The Varieties of Necessity" (Fine, 2005). The target of Fine's counterexamples is the view that a proposition is a naturally necessary truth if and only if it is logically necessary relative to or conditional on the basic truths about the status and distribution of natural kinds, properties and relations.

(NAT$\Box$) $\Box_{\text{nat}}p =_{\text{df.}} \exists\phi(N\phi \land \Box(\phi \to p))$

> where '$N\phi$' means 'ϕ is a conjunction of basic truths about the status and distribution of natural kinds, properties, and relations.'

I will argue that Fine depends upon an assumption about natural possibility which should be rejected. Moreover, even entering into the spirit of the examples presented, the best way to understand them involves, roughly speaking, different kinds of natural necessity, relative to distinct classes of propositions that are conjunctions of basic natural truths in different possible worlds. Hence Fine's purported counterexamples can be rejected.

A relative necessity view has the potential to clash with Fine's own view. Fine takes metaphysical necessity, natural necessity and normative necessity to be fundamental and incommensurable.

I shall argue that there are three main forms of necessity—the metaphysical, the natural and the normative—and that none of them is reducible to the others or to any other form of necessity. Thus what it is for a necessity or possibility of any of these forms to obtain does not consist in the obtaining of some other form or forms of necessity or possibility. (Fine, 2005: 235)

The claim that natural necessity (and potentially metaphysical and normative necessity too) can be defined in terms of logical necessity is in conflict with this. In this paper I argue that Fine's objections to this claim can be avoided, and thus the threat to Fine's view remains. As Fine remarks, 'necessity abounds' (Fine, 2005: 235). Fine argues that with this abundance comes diversity. The relative necessity view allows for similarity through diversity. Diversity is accounted for, not with incommensurable kinds of necessity, but with different classes of propositions to which necessities are relative. But diverse necessities remain of a kind—relative necessities—rather than fundamentally different and incommensurable. Fine's view faces the challenge to explain why natural, normative and metaphysical necessity appear to be the same kind of thing—necessity—in spite of their differences.

2 Preliminary Issues

A few preliminary comments are in order concerning Fine's target.

2.1 Basic truths about nature

On the view in question, natural necessity is to be understood as relative to 'the basic truths about natural kinds, properties and relations'. But what are these truths? They are supposed to be truths about the behaviour of those natural kinds, properties and relations that are contained in or

instantiated at a world, and how they interact at that world. For example, at the actual world properties such as mass and charge are instantiated, and so the relevant truths include basic truths about the status and distribution of mass and charge. For example, they interact in a particular way, such that certain particles with negative charge (electrons) have a smaller mass than other particles with positive charge (protons).

Suppose a particular table T has a mass of 12kg, and suppose that this is one of those basic truths, in this case about the distribution of mass. This would imply that it is naturally necessary that T has a mass of 12kg. But, taken on its own, this seems counterintuitive. Surely the table could have had slightly less mass? And if it had, would the natural possibilities and necessities of this world be different? One would think not. Such examples highlight that the right way to think of distribution is in terms of the overall distribution of a kind, property or relation, and how that distribution relates to other distributions of kinds, properties and relations. For example, the mass of T is part of an overall picture of the distribution of mass and other related properties.[4]

The idea is then that the naturally possible worlds relative to a given world will instantiate only those kinds, properties and relations instantiated at the given world, with appropriately similar patterns of distribution.[5] Worlds containing or instantiating alien kinds, where the basic truths about the status and distrubtion of natural kinds, properties and relations are different, are naturally inaccessible. Fine states the proposal thus.

> We may then let the existence of natural properties or kinds be
> our guide to the natural possibilities for a given world, a possible
> world being a natural possibility relative to a given world if it
> contains only (or perhaps all and only)[6] those natural kinds that

exist in the world. A world of schmass, for example, will not be a natural possibility since the kind *schmass* does not actually exist; and, in general, any objects that behaved in a nomically irregular way within a given world would have to be of kinds that do not actually exist and hence would belong to a world that was not a natural possibility. (And, of course, once given the naturally possible worlds, we can define the natural necessities as those that hold in every such world). (Fine, 2005: 243)

Fine goes on to qualify that we do not need to be committed to the *existence* of kinds literally *contained in* a world, but rather that we need only talk of kinds *instantiated* in a world.

Thus we may say that a world is a natural possibility if it instantiates only those kinds that are actually instantiated and thereby side-step the issue of the conditions under which a univeral exists. (Fine, 2005: 243)[7]

Issues concerning the existence conditions of kinds and properties are thereby set to one side.

2.2 Triviality

In addition to counterexamples, Fine raises another kind of challenge to the relative necessity view. This is the objection that relative necessity comes cheap. Just as I can define natural necessity as relative to laws of nature, so I can define Argos necessity as relative to truths about items listed in the Argos catalogue.[8] So they are just the same sort of thing. But surely natural necessity is a more important kind of necessity than Argos necessity? Fine writes

Any true proposition whatever can be seen as necessary under the adoption of a suitable definition of relative necessity. Any proposition that I truly believe, for example, will be necessary relative to the conjunction of my true beliefs, and any proposition concerning the future will be necessary relative to the conjunction of all future truths. The problem therefore is to explain why the necessity that issues from the definition of natural necessity is not of this cheap and trivial sort. (Fine, 2005: 247)

Let us call those kinds of modality that seem unnatural and gerrymandered, *contrived modalities*, and the more familiar kinds (such as metaphysical, mathematical, natural, and normative necessity) *non-contrived modalities*. Fine marks the difference by allowing at least three fundamental kinds of (non-contrived) necessity, which are not to be understood in terms of any other kind: metaphysical, natural, and normative necessity. The relative modality view faces the challenge of accounting for a principled distinction between contrived and non-contrived modalities.[9]

A second, related, challenge is that these non-contrived modalities have a distinctive 'modal force' which is lost when they are treated as relative modalities.

One might wish to press the objection further and claim that no definition stated entirely in terms of metaphysical necessity could capture the peculiarly modal force of truths that are naturally necessary yet metaphysically contingent. Just as it has been supposed that there is a conceptual barrier between normative and non-normative concepts, so one might think that there is a conceptual barrier, not merely between modal and non-modal concepts, but also between different 'grades' of modality. (Fine,

2005: 247–8)

Fine seems to want to say that a naturally necessary truth, say, is necessary in a peculiar way that cannot be captured in terms of a relativization of another kind of necessity. He then goes further in suggesting that there might be a conceptual barrier between different fundamental kinds of (non-contrived) modality, making it impossible for us to be able to understand one in terms of another.

With respect to the first challenge, there are two points to be made in response. First, the objection, or at least a modified version of it, can be applied back to Fine's own account. Fine takes metaphysical necessities to be *de re* necessities true in virtue of the natures of things. Logical, conceptual and mathematical necessities are defined as restrictions on metaphysical necessity. E.g., conceptual necessities are those necessities true in virtue of the nature of concepts, where concepts are a sub-class of the class of all things. But, one might ask, why are some sub-classes, and the necessities to which they correspond, more important, less trivial, than some other classes? E.g., one might define Argos necessity as being true in virtue of the nature of things listed in the Argos catalogue. Why is conceptual necessity non-contrived, where Argos necessity appears to be contrived? One might respond that conceptual necessity, and indeed Argos necessity for that matter, is precisely not contrived because it is merely a restricted case of *metaphysical necessity*, which is not itself contrived. However, even granting this, some distinction needs to be drawn between contrived and non-contrived restrictions on metaphysical necessity. Let us call restrictions of a non-contrived modality which seem unnatural and gerrymandered *contrived restrictions*, and the more familiar restrictions (such as to concepts, or mathematical objects), *non-contrived restrictions*. One can now ask: why

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is the restriction to, e.g., concepts more important, less trivial, than, e.g., the restriction to things listed in the Argos catalogue? Even if the necessity implicated in Argos necessity is non-contrived, there is still something fishy about the restriction involved in this kind of necessity, as contrasted with that of conceptual necessity. Thus a modified form of the objection still applies to Fine's account. Fine's objection does not *prima facie* favour his own view over the relative necessity view.

Even so, the objection remains to be met. The second point is that the relative necessity view has a simple and natural way to differentiate contrived from non-contrived modalities. What is key is the propositions to which a kind of modality is relative. The status of a kind of modality as important, trivial, contrived or non-contrived is inherited from the status of the base class of propositions to which it is relative. The class of all and only those true propositions about things listed in the Argos catalogue is of limited interest and significance. The class of the laws of nature is rather more interesting and broader in its application. Fine has not given due attention to this extra part of the relative necessity view—that the view also includes reference to a particular class of propositions, and we can say something about this class. Of course, Fine can help himself to the same move: the status of a kind of modality, or the restriction through which it is defined, as important, trivial, contrived or non-contrived is inherited from the status of the kinds of things to which it is restricted. The class of all and only things listed in the Argos catalogue is less philosophically interesting and significant than the class of concepts.

This oversight is also what leads to the second challenge concerning modal force. Fine is correct to assert that we cannot expect to be able to define natural necessity "entirely in terms of" another kind of necessity. But

this is not the proposal under consideration. The proposal is to define natural necessity in terms of logical necessity *and a class of propositions about nature*. Fine might press the additional point, that the notions of necessity implicated in natural necessity and, say, logical necessity are separated by some conceptual barrier. I do not have space to address this point in detail here, beyond noting that it is also important to remember that different kinds of necessity have an awful lot in common. It does not seem plausible to me to posit some kind of conceptual incommensurability between natural and metaphysical (and thereby logical) necessity, because this makes it too difficult to explain why metaphysical necessity and natural necessity are such similar kinds of things, i.e. *necessities*.

2.3   Laws

The triviality worry can be extended in a different direction, concerning the necessity of laws. I sketched the view as claiming that natural necessity is (logical) necessity relative to the laws of nature. But Fine's target is the view that natural necessity is relative to basic truths about the status and distribution of natural kinds, properties and relations. The reason for Fine's formulation can be understood by taking note of another triviality objection he raises against the relative necessity view. Fine complains that, under such a view, we cannot make sense of the natural necessity of laws of nature themselves. The laws of nature count as trivally naturally necessary, given that they follow logically from themselves.

> The general problem is that a definition of natural necessity as
> a form of relative necessity will tend to make the necessity of
> the propositions with respect to which the necessity is relative a
> trivial or insubstantial matter; yet we are inclined to think that

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the necessity attaching to the laws and the like is not of this
trivial sort. (Fine, 2005: 247)

I have already suggested how we can explain why natural necessity is not cheap or trivial in terms of the status of the propositions to which it is relative. But another point that is brought out is that the propositions to which natural necessity is relative will themselves be naturally necessary in virtue of following from themselves. But shouldn't they have a more distinctive modal status than this?

At this point it is important to note that there are two broad projects to which this definition of natural necessity as relative might be put, one reductive, one non-reductive. The more ambitious, reductive project involves the claim that natural necessity is *nothing more than* logical necessity relative to certain key propositions. A less ambitious, but nevertheless legitimate project rejects the pursuit of a *reductive* account of natural necessity, but retains the claim that natural necessity is importantly *relative*, in contrast to absolute necessity. We can define absolute necessity as follows: it is absolutely necessary that p if and only if there is no (alethic) sense of possibility according to which it is possible that $\neg p$.[10] There is an accompanying definition of merely relative necessities as those that are not absolute. Natural necessity is not absolute, according to this definition, because there is a perfectly good sense of possibility, namely logical possibility, according to which any strictly natural necessity might have been false.[11] One may then explore the use of a relative necessity formulation to capture this contrast between natural necessity and absolute necessity. The non-reductivist need not claim in doing so that the necessity attaching to natural necessities is reducible to logical necessity relative to basic truths about the natural world. They can retain both the relativist claim, and the claim that natural necessity is of a

distinctive and *sui generis* kind which cannot be reduced to other kinds of necessity.[12]

The non-reductivist, then, does not fall foul of Fine's concern here. But the reductivist also has a way to respond to the worry. The lesson to be learned here is that, if natural necessity is to be given a reductivist analysis in terms of the laws of nature, then of course we cannot define the laws of nature in terms of their being naturally necessary—natural necessity can't be what is *definitive* of a law of nature. There are many candidate views of laws of nature that would allow us to define what a law of nature is independent of its modality. For example, according to Lewis's best system account, a law of nature is part of our best deductive system of nature (Lewis, 1973).[13] Or one may be a primitivist about laws, and not define them in any other terms, let alone modal terms (see e.g. Maudlin (2007)). Even if one holds the view that laws are distinctively *necessary*, most prominent in the literature is the view that the laws of nature are *metaphysically* necessary (see e.g. Shoemaker (1980; 1998)). There is no *prima facie* reason to think that being naturally necessary is an importantly distinctive feature of a law of nature. Most accounts of what it is to be a law of nature take some other feature or features to be crucial, be they non-modal, or modal in another sense.[14]

But perhaps this is missing Fine's point. However we define a law of nature, even if it is no part of the definition that it be necessary in some way, we still think of laws of nature as being necessary in a non-trivial way.[15] At this point, the reductive relative necessity view needs to take a stand. Yes, the notions of a law of nature and natural necessity are closely related, but this is because we are inclined to understand natural necessity in terms of laws of nature *and not the other way around*. There

is something important about the laws of nature, which is why we value a kind of necessity which is relative to them. As such, natural necessity is not trivial. The reductive relative necessity view must (and can) reject the idea that the natural necessity which thereby attaches to laws of nature is any more special than this.

Ultimately, Fine frames his target view in terms of necessity relative to 'basic truths about the status and distribution of natural kinds, properties and relations'. The underlying idea must be that either these are laws of nature, or that they give rise to laws of nature in the relative necessities for which they provide the basis. For the purposes of argument I will suppose that these basic truths are laws of nature. I will leave open what it is that makes them laws of nature, but I have made reference to some possible accounts above. In describing the general behaviour of natural kinds, properties and relations, they look like good candidates for laws of nature.

3 Fine's Purported Counterexamples

Recall, the view at issue is (NAT□):

(NAT□) $\Box_{\mathrm{nat}}p =_{\mathrm{df.}} \exists \phi (N\phi \wedge \Box(\phi \to p))$

> where '$N\phi$' means 'ϕ is a conjunction of basic truths about the status and distribution of natural kinds, properties, and relations.'

Fine sets up two examples intended to demonstrate circumstances according to which two possible worlds differ merely as to what is a natural necessity/possibility, and *not* as to the status and distribution of natural kinds, properties and relations. Therefore, the latter does not adequately determine the natural necessities and possibilities.

The first example concerns worlds W_N and W_M. W_N is a metaphysically possible world that is subject to Newtonian laws of nature (e.g. the inverse square law), containing mass. W_M is a metaphysically possible world that is subject to different laws of nature, call them Schmewtonian laws (say, the inverse cube law), containing schmass. Neither set of natural laws demands that there be anything, therefore there are two further metaphysically possible worlds, V_N and V_M, which are empty, such that V_N is a natural possibility for W_N, and V_M is a natural possibility for W_M. Natural necessity validates the S4 axiom,[16] so as V_N is a natural possibility for W_N, V_N verifies the natural necessities for W_N (if it is naturally necessary that p at W_N, then it is naturally necessary that p at V_N). Likewise, as V_M is a natural possibility for W_M, V_M verifies the natural necessities for W_M. In terms of the status and distribution of their natural kinds, properties and relations, V_N and V_M are completely alike; they are both empty. However, they differ in terms of their natural necessities, and hence also their natural possibilities. Therefore, worlds V_N and V_M are an example of two worlds which differ merely as to what is a natural necessity (see Fine (2005: 244–5)). To give Fine's example: given that V_N verifies the natural necessities for W_N, and that it is naturally necessary at W_N that there is no schmass, it is naturally necessary at V_N that there is no schmass. And given that there is schmass at W_M, it is naturally possible at V_M that there be schmass. So V_N and V_M differ particularly over whether it is naturally possible for there to be schmass; for the former it is not, for the latter it is.

Does this all this turn on some worlds being empty? No. Fine introduces his second counterexample to address this concern. This example concerns worlds W_D and W_E. W_D is a metaphysically possible world in which mind-body dualism and epiphenomenalism are both true. W_D contains mental$_D$

and physical$_D$ events, which are 'each subject to their own laws, but with no nomological interaction between them' (Fine, 2005: 245). W_E is also a metaphysically possible world in which mind-body dualism and epiphenomenalism are both true. Its physical events are subject to the same laws as W_D, i.e. it contains physical$_D$ events, but its mental events, mental$_E$ events, are subject to different laws from those governing mental$_D$ events. Neither set of natural laws for the two worlds demand that there exist any minds or mental events, therefore there are two further metaphysically possible worlds, V_D and V_E, which are mind-free, i.e. they contain no mental events. V_D is a natural possibility for W_D, and so verifies the natural necessities for W_D. V_E is a natural possibility for W_E, and so verifies the natural necessities for W_E. In terms of the status and distribution of their natural kinds, properties and relations, V_D and V_E are completely alike; they contain only physical$_D$ things. However, they differ in terms of their natural necessities, and hence also their natural possibilities. Therefore, worlds V_D and V_E are an example of two worlds which differ merely as to what is a natural necessity/possibility.

> By the same line of reasoning as before, V_D and V_E will differ on what is a natural possibility (for the mentalistic part of the world), even though there is no difference in the 'status' or distribution of their natural properties. (Fine, 2005: 245)

Do the examples generalize? Fine presents a direct challenge to the view that natural necessity is relative necessity. However, it should be noted that if the challenge can be generalized to other purported kinds of relative necessity, then these counterexamples will threaten a relative necessity project more widely.

The important features of Fine's line of reasoning are that (a) natural necessity validates S4, and (b) the relevant truths (to which natural necessity is relative) do not require there to exist anything governed by those laws (even in the second case, the world is not empty, but the mental laws have no mental events to govern). So we can generalize to relative necessities which (a) validate S4 and (b) are relative to the kinds of propositions which do not require the things they are about to exist. These will typically be universal statements, for example something of the form 'All Fs are Gs', which can be trivially true when there are no Fs. With this restriction in place, we can formulate more purported counterexamples.

Take any kind of relative necessity, call it Ψ-necessity. And let us suppose that (a) Ψ-necessity validates S4 and (b) Ψ-necessity is relative to the Ψ-truths, where the Ψ-truths can be true even if there are no Ψs. I.e.

$(\Psi\Box)$ $\Box_\Psi p =_{\text{df.}} \exists\phi(\Psi\phi \wedge \Box(\phi \to p))$

where '$\Psi\phi$' means 'ϕ is a conjunction of (universal)Ψ-truths.'

Suppose that the Ψ-truths differ across worlds. Then consider two worlds W_X and W_Y. W_X is a metaphysically possible world that is subject to a certain set of Ψ-truths, X. W_Y is a metaphysically possible world that is subject to a different set of Ψ-truths, Y. Neither set of Ψ-truths demands that there be anything, therefore there are two further metaphysically possible worlds, V_X and V_Y, which are empty of Ψs. V_X is a natural possibility for W_X, and so verifies the Ψ-necessities for W_X. V_Y is a Ψ-possibility for W_Y, and so verifies the Ψ-necessities for W_Y. In terms of their Ψ-truths, V_X and V_Y are completely alike; they are both empty. However, they differ in terms of their Ψ-necessities, and hence also their Ψ-possibilities. Therefore, worlds V_X and V_Y are an example of two worlds which differ merely as to what is a Ψ-necessity. The examples generalise to what might be thought

of as 'law-like' cases—cases of necessity relative to universal propositions about a subject matter.

Note that the generalisation is restricted to S4 law-like modalities. This has the potential to threaten a relative necessity account of any (at least) S4 necessity, and so should give the relative necessity theorist some pause for thought. However, note that this is only a threat insofar as there are indeed S4 necessities which are candidates for a relative necessity treatment. It is highly plausible that, on the proposed relative treatment, very few necessities will satisfy S4. Take, for example, chemical necessity. One might think this plausibly validates the S4 axiom (e.g., any world chemically-accessible from a chemically-accessible world, should be directly chemically-accessible). However, cashed out in terms of relative necessity, the claim is rather, for some chemically necessary p, that it follows from laws of chemistry that it follows from laws of chemistry that p. I.e.

$$\exists\phi(C\phi \wedge \Box(\phi \rightarrow p)) \rightarrow \exists\psi(C\psi \wedge \Box(\psi \rightarrow \exists\phi(C\phi \wedge \Box(\phi \rightarrow p))))$$

In order to defend this kind of S4 principle, the relative necessity theorist needs to tell a story about why the laws of chemistry should imply truths about what they imply, namely, that there are laws of chemistry that imply p (and similarly for other cases). It seems unlikely that a relative necessity operator, thus understood, will admit of sensible iteration. Likewise for natural necessity: it seems implausible that the laws of nature themselves imply truths explicitly about what the laws of nature imply. The key assumption of Fine's counterexamples is therefore open to rejection. However, I want to argue the stronger point that, even granting the kind of iteration that would allow for kinds of relative necessity validating the S4 axiom, we can show that Fine's counterexamples fail.

4 Responding to the counterexamples.

4.1 Are natural possibilities transferrable?

Fine's arguments depend upon showing that there must be two worlds, alike in the status and distribution of natural kinds, properties and relations (both *empty* of relevant kinds), but distinct in their natural necessities and possibilities. The nub of my response is to show that there is no reason to posit two worlds. The only reason for positing two worlds is the apparent contradiction between its being naturally necessary that there be no schmass, and naturally possible that there be schmass. But I intend to show that the contradiction can be avoided, and thus that the case can be resolved with only one empty world.[17] Hence, there is no case of worlds differing only as to their natural necessities and possibilities.

The claim made regarding the Newtonian world W_N is that its natural necessities and possibilities carry over to a naturally accessible empty world, call it V_*. I.e. if in the Newtonian world it is naturally necessary that p, then in the empty world it is also naturally necessary that p. Cashed out in the relative modality formulation, this means that if $\exists \phi(N\phi \wedge \Box(\phi \to p))$ is true at W_N, then $\exists \phi(N\phi \wedge \Box(\phi \to p))$ is true at empty world V_*.

In particular, it is claimed that it is naturally necessary at W_N that there is no schmass. Let us call the proposition that there is schmass "s". It follows from the above that

(1) $\exists \phi(N\phi \wedge \Box(\phi \to \neg s))$ is true at empty world V_*.

The claim made regarding the Schmewtonian world W_M is that its natural necessities and possibilities carry over to a naturally accessible empty world. More specifically, if a kind (schmass) is instantiated at W_M, then the instantiation of the kind (there being schmass) is a natural possibility at worlds

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naturally accessible from W_M. Let us suppose that the same empty world V_* is accessible from W_M. After all, V_* instantiates only kinds instantiated in W_M in virtue of instantiating no kinds at all. It is claimed that as it is true at W_M that there is schmass, it would be 'bizarre in the extreme' to claim that it is not naturally possible at V_* for there to be schmass. So

(2) $\neg\exists\phi(N\phi \wedge \Box(\phi \rightarrow \neg s))$ is true at empty world V_*.

But (1) and (2) are in obvious contradiction.

There are two lines of response that can be made to this purported coun-terexample. The first is to directly attack Fine's assumption that the natural truths of a world w will carry over to determine the natural possibilities for a naturally accessible world w'. Fine explicitly allows that, in the relevant case, because the empty world is naturally accessible from world W_M, then if it is true that p at W_M then it is naturally possible that p at the empty world. This is not in general a principle of S4. Fine writes

> Since the world W_M [the Schmewtonian world] contains schmass, we may safely assume that it is a natural possibility in the empty world V_M that there be schmass; for it would be bizarre in the extreme to suppose that the non-existence of any bodies some-how precluded the possibility of there being schmass. [Then in footnote:] Alternatively, we could appeal to the assumption that natural necessity was subject to the S5 axiom, $A \rightarrow \Box\Diamond A$, though nothing so strong is required in this particular case. (Fine, 2005: 244)

If we suppose that natural necessity is subject to the S4 axiom but not the S5 axiom ('nothing so strong is required'), then that means that we should expect some cases where the distinctive S5 axiom fails.[18] Consider

the axiom: $A \rightarrow \Box \Diamond A$. If it is not valid for natural necessity, then there will be at least one case where a proposition A is true at a world w but it is not true at w that $\Box \Diamond A$. This will be the case if there is some world w' naturally accessible from w such that it is not true that $\Diamond A$ at w', i.e. there is no world w'' accessible from w' at which it is true that A.[19]

The claim that natural necessity validates S4 but not S5 requires that there be instances of such cases. Fine claims that it would be bizarre if a world's being empty precluded the natural possibility of there being schmass. But forgetting for a moment that the empty world is accessible from the Schmewtonian world: what worlds should we expect to be naturally accessible from V_*? If we take Fine at his word that natural accessibility is to be understood in terms of instantiation of kinds, such that a world w' is naturally accessible from a world w if and only if w' instantiates only kinds instantiated at w, then one would expect only empty worlds to be accessible from an empty world. I.e. if *no* kinds are instantiated at V_*, worlds instantiating only kinds instantiated at V_* will also instantiate no kinds. So it is not bizarre after all that a world's being empty should preclude certain natural possibilities. What *would* be bizarre is if natural possibilities about schmass could be determined by a world with no schmass. We thereby also have a case of the failure of S5: s is true at W_M, V_* is accessible from W_M, but there are no worlds accessible from V_* at which s is true.

If Fine cannot infer that at the empty world it is naturally possible that there be schmass, then his counterexample immediately fails. There is no reason to suppose that $\neg \exists \phi (N\phi \wedge \Box(\phi \rightarrow \neg s))$ is true at empty world V_*. Indeed, given that we already have reason to think that $\exists \phi (N\phi \wedge \Box(\phi \rightarrow \neg s))$ is true at empty world V_*, there is all the more reason to reject the claim of natural possibility.

But perhaps all this shows is that this account of natural accessibility, in terms of instantiation of natural kinds, can't possibly be the correct understanding of natural accessibility. So to properly respond to Fine we need to replace this with a more plausible natural accessibility relation. Talk of instantiation of kinds was supposed to get at laws of nature. So perhaps we will do better if we talk about laws of nature directly. What is important for natural accessibility is not so much what kinds are instantiated at a world, but rather whether the laws of nature hold at that world.[20] One way to ensure that they hold is to ensure that there are no alien kinds instantiated at the world. So perhaps we should work with an account of natural accessibility as follows: world w' is naturally accessible from w if and only if the laws of nature of w hold (are true) at w'. Or perhaps even stronger: world w' is naturally accessible from w if and only if the laws of nature of w are laws of nature at w'.

Suppose we opt for the weaker account, that world w' is naturally accessible from w if and only if the laws of nature of w hold (are true) at w'. Assuming both Newtonian laws and Schmewtonian laws are vacuously true at the empty world, then we can get as far as V_* being naturally accessible from W_N and from W_M. What worlds are accessible from V_*, however, will now be determined by the laws of nature at V_*. Plausibly, if the laws of nature of a world concern the natural kinds, properties and relations at a world, then there are no laws of nature at V_*, given that there are no instantiated kinds at V_*. This would mean that all worlds would be (trivially) naturally accessible from V_*: all the laws of nature of V_* will be true at any world, in virtue of there being no such laws. In particular, worlds containing schmass will be accessible, and hence it will be naturally possible at V_* for there to be schmass. This allows for Fine's claim, that the natural

possibilities of W_M carry over to V_*.

The problem is that this account of natural accessibility will also prevent us from accepting the claim that the natural *necessities* of W_M (and indeed W_N) carry over to an empty world, i.e. that if it is naturally necessary that p at W_M, then it is naturally necessary that p at V_*, in accordance with the S4 axiom. If all worlds are naturally accessible from V_*, then this will include worlds at which the natural necessities of W_M, and those of W_N, are false.[21] So Fine's claim about the transferrability of natural possibilities to the empty world is saved only at the cost of losing his claim about the transferrability of natural necessities.[22]

What about the stronger account: that a world w' is naturally accessible from w if and only if the laws of nature of w are laws of nature at w'? The claim that V_* is naturally accessible from W_M would then require that the laws of nature of W_M are also laws of nature at V_*. If there are no laws of nature at V_*, then this condition immediately fails: plausibly, there are no laws of nature at V_*, let alone those of W_M.

One might respond on Fine's behalf with the claim that, after all, natural necessity validates S5 as well as S4. With this extra assumption, the natural possibilities of a world w will indeed transfer to all of its naturally accessible worlds. And in particular, the natural possibility of there being schmass will transfer to the empty world. However, this is hardly an innocuous assumption. At the very least, it would require a defence of the view that natural necessity validates an S5 modal logic, whilst remaining distinct from logical and metaphysical necessity. This would also give the relative necessity theorist a particularly simple response to Fine's criticism: deny S5 for natural necessity. If this argument against an account of natural necessity as relative depends crucially on the assumption of S5 for natural

necessity, as I have argued, then it takes on an assumption not included in the target view, and therefore fails.

4.2   Two kinds of natural necessity

There is another kind of response, which takes more account of the kinds of claims that might be implicated in the purported counterexamples. We can frame Fine's counterexamples in terms of the question: if nothing had existed, would it still have been naturally necessary (possible) that p? Or, if there had been no minds, would it still have been naturally necessary (possible) that p? These are questions that we might ask about relative necessities, such as natural necessities, and as such we need to assure ourselves that there are coherent answers to be given within the relative necessity framework.

In ordinary non-modal contexts claims of natural necessity will draw on the actual basic natural truths. I.e. if it is naturally necessary that p, then the ϕ relative to which p is necessary is a conjunction of actual basic natural truths. So, when we consider what the natural necessities would have been had things been different, there is a kind of claim which, unlike those above, refers back to the *actual* basic natural truths. The question is not simply, had things been different, would there have been some basic natural truths which implied p? Rather, we want to know: if things had been different, would the *same* truths have been the basic natural truths, hence making p necessary in the same way, relative to the same truths?

The core line of argument in this section is simply to point out that, if these kinds of questions refer back to those propositions that are the basic natural truths in a particular world, then as different questions refer back to *different worlds*, they are implicitly defining *different kinds of necessity* in

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terms of being relative to *different propositions.* Speaking from the Newtonian world, I will be asking, if things had been different, would the necessities defined in terms of *these Newtonian law propositions* be the same? Speaking from the Schmewtonian world, I would be asking, if things has been different, would the necessities defined in terms of *those Schmewtonian law propositions* be the same? In essence, two different, non-conflicting kinds of natural necessity—'Newtonian necessity' and 'Schmewtonian necessity'—are at issue, not conflicting claims about one kind of necessity.

Let's work through the argument in more detail. For simplicity's sake, let us suppose that our actual world is the Newtonian world W_N. Then, for example, the claim that 'had things been such that q (such that no bodies existed), it would still have been naturally necessary that p' might be rendered as

(3) $\exists\phi((N\phi \wedge \Box(\phi \rightarrow p)) \wedge \Box(q \rightarrow (N\phi \wedge \Box(\phi \rightarrow p))))$ is true at W_N.[23]

I.e., there is a conjunction of basic natural truths ϕ which implies p, and if things had been such that q, ϕ would still have been a conjunction of basic natural truths and would still imply p. This captures what we intend when we wonder if the same propositions would have been necessary *in the same way.* The question is not just, would the same propositions have been strictly implied by the same propositions (that's a matter of logical necessity), but whether the same propositions would have been basic natural truths as well.

Suppose we grant Fine the controversial assumption that the Schmewtonian world W_M's natural truths determine the natural possibilities of a world in which no kinds are instantiated, i.e. the empty naturally accessible world. And suppose that it is true at W_M that $\neg p$. Suppose also that the same truths would have been basic natural truths had things been such that q (such that no schmodies existed).[24] Then

(4) $\neg \exists \phi (N\phi \wedge \Box(\phi \rightarrow p))$ is true at W_M.[25]

There are some basic natural truths at W_M, i.e. $\exists \phi N\phi$ is true at W_M, so it follows that

(5) $\exists \phi (N\phi \wedge \neg \Box(\phi \rightarrow p))$ is true at W_M.[26]

If the same truths would have been basic natural truths had things been such that q, then

(6) $\exists \phi ((N\phi \wedge \neg \Box(\phi \rightarrow p)) \wedge \Box(q \rightarrow (N\phi \wedge \neg \Box(\phi \rightarrow p))))$ is true at W_M.

Prima facie, it now looks like we can generate a contradiction. At both W_N and W_M claims of unrestricted necessity have been made, such that at an arbitrary world w the following should both be true:

(7) $\forall w : \quad q \rightarrow (N\phi \wedge \Box(\phi \rightarrow p))$ is true at w

(8) $\forall w : \quad q \rightarrow (N\phi \wedge \neg \Box(\phi \rightarrow p))$ is true at w

This leads fairly swiftly to a contradiction where w is the empty world V_* (where it is true that q).

(9) $\Box(\phi \rightarrow p) \wedge \neg \Box(\phi \rightarrow p)$ is true at V_*.

But wait. The formulae (7) (8) and (9) are importantly ill-formed. They contain unbound variables.

Let's go back and reconsider how we got to (9). (3) and (6) entail (3a) and (6a) respectively.

(3a) $\exists \phi \Box(q \rightarrow (N\phi \wedge \Box(\phi \rightarrow p)))$ is true at W_N.

(6a) $\exists \phi \Box(q \rightarrow (N\phi \wedge \neg \Box(\phi \rightarrow p)))$ is true at W_M.

It follows from (3a) and (6a) that

(3b) $\square(q \to (N\phi_1 \wedge \square(\phi_1 \to p)))$ is true at W_N for some particular ϕ_1.

(6b) $\square(q \to (N\phi_2 \wedge \neg\square(\phi_2 \to p)))$ is true at W_M for some particular ϕ_2.

From these it follows that the following are both true in all worlds, and in particular in the empty world V_*.

(3*) $q \to (N\phi_1 \wedge \square(\phi_1 \to p))$

(6*) $q \to (N\phi_2 \wedge \neg\square(\phi_2 \to p))$

Since q is just the proposition that the world is empty (instaniates no kinds), the following will be true.

(9*) $N\phi_1 \wedge \square(\phi_1 \to p) \wedge N\phi_2 \wedge \neg\square(\phi_2 \to p)$ is true at V_*.

which entails, amongst other things,

(10) $\square(\phi_1 \to p) \wedge \neg\square(\phi_2 \to p)$ is true at V_*.

(10) is not contradictory at all. It is just that p is necessary relative to some truths, and not necessary relative to some other truths. In effect, there are two kinds of natural necessity verified at V_*, which we might call 'Newtonian necessity' and 'Schmewtonian necessity', each defined relative to different propositions, i.e. ϕ_1 and ϕ_2. Moreover, one can make sense of the claim, at V_*, that it is naturally possible that $\neg p$ relative to the basic natural truths of W_M, but it still isn't true at V_* that $\neg\exists\phi(N\phi \wedge \square(\phi \to p))$ because of ϕ_1: ϕ_1 is a basic natural truth and strictly implies p. So strictly speaking it isn't naturally possible that $\neg p$ at V_*. But, as we saw above, that is what one would expect.

(9*) also entails

(11) $N\phi_1 \wedge N\phi_2$ is true at V_*.

Is this defensible? It amounts, roughly speaking, to the claim that the basic natural truths of the Newtonian world and the basic natural truths of the Schmewtonian world can all be basic natural truths together. In order to defend the relative necessity view from Fine, it is not necessary to defend (11). The present line of thought is an attempt to give Fine's examples as good a run for their money as possible, and still show that no contradiction arises. One might agree that, in virtue of being compatible with nothing existing, the propositions ϕ_1 and ϕ_2 are both true at V_*, whilst denying that it makes sense for them both to count as basic truths about the natural kinds, properties and relations at V_*. For example, given that no kinds are instantiated at V_*, it might seem strange that the basic truths about the natural world of V_* include truths about the behaviour of mass and/or schmass. That said, if certain general propositions about the behaviour of things such as mass, charge and force are true at V_*, one might claim that these propositions are still more fundamental than, say, general propositions about the behaviour of things such as tables and chairs. Hence, one might allow for (11). Either way, nothing like Fine's counterexample remains.[27]

Finally, it will be true at V_* both that $N\phi_1 \wedge \Box(\phi_1 \rightarrow p)$ and that $N\phi_2 \wedge \neg\Box(\phi_2 \rightarrow p)$. We can existentially generalise from these to conclude that it is true at V_* both that $\exists\psi(N\psi \wedge \Box(\psi \rightarrow p))$, i.e. it is naturally necessary that p, and that $\exists\psi(N\psi \wedge \neg\Box(\psi \rightarrow p))$. But crucially we have nothing from which to infer that it is true at V_* that $\neg\exists\psi(N\psi \wedge \Box(\psi \rightarrow p))$, i.e. that it is naturally possible that $\neg p$. I.e. whilst (1) is true, (2) is not true.

In summary, to avoid Fine's counterexamples, we simply need to deny S5 for natural necessity, without having to deny S4 (even though the claim that natural necessity validates S4 may be implausible for reasons discussed

above). Fine may find instances of the failure of S5 bizarre, but we should expect to find such cases if S5 is indeed not valid for natural necessity. Moreover, we can also alleviate the force of the purported counterexamples by showing that often claims made about natural necessity in modal contexts are intended to "refer back" to the basic natural truths of the actual world: we want to know if *they* would still be basic natural truths, and hence if the same propositions would be (naturally) necessary relative to *them*. In such cases we can show how there is no contradiction to be yielded. We have cases of different propositions being necessary relative to different basic natural truths, but no troublesome conflict with natural possibilities.

4.3 Looming Contradiction?

One might worry about the following case. Suppose that it is Newtonianly necessary that p and Schmewtonianly necessary that $\neg p$. On the assumption that the empty world V_* verifies both the Newtonian necessities and the Schmewtonian necessities, and the factivity of natural necessities in general, both p and $\neg p$ will be true at V_*, which is impossible.

This would be troublesome indeed, however, one cannot plausibly expect such a case to genuinely occur. Recall, these natural necessities are intended to be defined in terms of the status and distribution of natural kinds, properties and relations. If you have different kinds of things—e.g. schmasses rather than masses—not only will you have different natural necessities, but your necessities will concern different things, e.g., Newtonian necessity tells us about the behaviour of bodies and mass, whereas Schmewtonian necessity tells us about the behaviour of schmodies and schmass (see Fine (2005: 243)). So, e.g., even if it is Newtonianly necessary that mass is F, and Schmewtonianly necessary that schmass is not F, in V_* this will

not lead to a case of $p \& \neg p$ ($Fa \& \neg Fa$) but only to a case of $Fa \& \neg Fb$ ($p \& \neg q$). What we want (or indeed not) is the two necessities to yield a flat-out contradiction.

What we really need is two worlds containing the same natural kinds etc., but where, according to two purportedly conflicting kinds of natural necessity, they behave differently. But in such cases it will always be debatable whether they really are the same natural kinds, given that the identity of a kind appears to be tied to its (nomic) behaviour: '[I]n general, any objects that behaved in a nomically irregular way within a given world would have to be of kinds that do not actually exist.' (Fine, 2005: 243).

A variant on this worry goes as follows.[28] What if we think of aliently different kinds in terms of the properties they do not share? Recall, there is mass, but no schmass, at W_N, and schmass, but no mass, at W_M, where mass does not obey an inverse cube law, but schmass does. The following would then seem to be implied:

(**No F**$_N$) It is Newtonianly necessary that there is no property F such that anything which has F obeys an inverse cube law.

(**F**$_M$) It is Schmewtonianly necessary that there is a property F such that anything which has F obeys an inverse cube law.

Empty world V_* is supposed to verify both kinds of necessity. At first glance there is no clash here: they are different kinds of necessity, relative to different classes of propositions. However, given that natural necessities are factive, the following will both be true at V_*:

(**No F**) There is no property F such that anything which has F obeys an inverse cube law.

(F) There is a property F such that anything which has F obeys an inverse cube law.

Contradiction.

Let us look again at the crucial inferences. It is clear to see how we yield (F_M) and (F). First, at the alien world it is the case that anything with schmass obeys an inverse cube law:

($\forall$ICL) $\forall x(x$ has schmass $\supset x$ obeys an inverse cube law$)$

It seems plausible that it then follows that there is a property such that anything which has it obeys an inverse cube law:

($\exists$ICL) $\exists F \forall x(Fx \supset x$ obeys an inverse cube law$)$

($\forall$ICL) is Schmewtonianly necessary, where Schmewtonian necessity is of the generic kind natural necessity. The logical consequences of something which is naturally necessary will themselves be naturally necessary. Therefore, ($\exists$ICL) is also Schmewtonianly necessary. So at empty world V_* it is both Schmewtonianly necessary and, by factivity, *true* that $\exists F \forall x(Fx \supset x$ obeys an inverse cube law$)$.[29]

What is more puzzling is how we could yield (No F). Working backwards, it is supposed to follow from its being Newtonianly necessary (at V_*) that there is no property F such that anything which has F obeys an inverse cube law. This in turn is supposed to follow from it being Newtonianly necessary that there is no schmass, and the claim that anything which has schmass obeys the inverse cube law.[30] So, if it is Newtonianly necessary that nothing has schmass, then it should also be Newtonianly necessary that nothing has a property F such that anything which has F obeys the inverse cube law. The difficulty is now with the step from this claim about nothing having a property F, to *there being no such property.* This extra step requires the

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extra premise that if nothing has a property F at a world, then there is no such property F at the world. We can reject this view, and thereby block the final step. This would give us the following result.

(No Fs$_N$) It is Newtonianly necessary that nothing is F (where F is a property such that anything which has F obeys an inverse cube law).

(F$_M$) It is Schmewtonianly necessary that there is a property F such that anything which has F obeys an inverse cube law.

By the same reasoning as above, the following will both be true at V_*:

(No Fs) Nothing is F (where F is a property such that anything which has F obeys an inverse cube law).

(F) There is a property F such that anything which has F obeys an inverse cube law.

(No Fs) and (F) are compatible. It can be true (indeed Schmewtonianly necessarily true) that there be a property F, yet also true that nothing has the property. One would certainly expect (No Fs) to be true at V_*, after all, it is supposed to be an empty world.

One problem with this response is that it appears to be committed to a particular Platonic view of the existence of properties, namely, that properties can exist at a world uninstantiated. The relative necessity advocate may not wish to make this commitment just in endorsing a view about relative necessity. Furthermore, the response no longer fully engages with Fine's challenge, given that Fine sets up his counterexamples allowing for difference in opinion on just this point (Fine, 2005: 243). However, one can still respond with or without the additional commitment.

Suppose one holds the contrary (Aristotelian) view that if a property is not instantiated at a world then the property does not exist at that world.

V_* is by stipulation empty. So there are no Fs. So (F) is false. Even if (No F) is true, it is no longer implicated in contradiction at V_*. If it truly is Schmewtonianly necessary that there be a property F, but also metaphysically necessary that if there is a property F then there be Fs, then it is just false that an empty world such as V_* is a Schmewtonian possibility for W_M. The counterexample is thus dissolved. Alternatively, if one rejects the Aristotelian commitment, then a property need not be instantiated at a world in order for it to exist at that world, and so the response above stands.

5 Conclusion

In summary, it looked like Fine (2005) had two solid counterexamples against the rather intuitive view that certain kinds of possibility and necessity, such as natural necessity, might be defined in terms of logical necessity, relative to certain kinds of propositions, such as basic truths about the status and distribution of natural kinds, properties and relations. I have argued that, on a proper understanding of the workings of the relative necessity view, the counterexamples fail. The relative necessity view is safe from this line of attack, and Fine must look for other ways to motivate and defend his view that there are several fundamental and incommensurable kinds of necessity.[31]

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Notes

[1]See Kratzer (1977); Lewis (1979); Lycan (1994).

[2]See Hale and Leech ms. for a discussion of and solution to Humberstone's challenges.

[3]Note that lots of different ideas can be packed into the content of 'Ψ'. For example,

some classes of propositions will all be true (e.g. laws of nature), and some not (e.g. statements of a moral code that isn't always adhered to). This will affect the modal logical principles to which a kind of relative necessity will conform. E.g. a true class of proposition will entail truths (T), but not a class of propositions containing some falsehoods.

[4]Thank you to an anonymous referee for drawing attention to this point.

[5]It might be a good idea to add an additional caveat to allow for cases where it seems plausible that a world v is naturally possible relative to w, even though v instantiates some extra kind, e.g. a missing shade of blue which is perfectly compatible with natural kinds, properties and relations in w, but just happens not to be instantiated there—as a matter of fact, nothing is that precise shade of blue, but it is plausibly naturally possible that something could have been. Fine does not add this detail, so I won't complicate things further by doing so here. But note that such a caveat would need to be carefully drawn to rule in good cases (e.g. the missing shade of blue), but rule out genuinely alien kinds.

[6]Fine cannot mean 'all', because this would undermine his counterexamples which rely crucially on there being naturally possible worlds with fewer kinds, even empty worlds containing nothing at all.

[7]The caveat in footnote 5 should also apply here.

[8]The Argos catalogue presents a notably wide range of goods for sale: www.argos.co.uk.

[9]See Rosen (2006) for a similar objection. He goes further in denying that what I am calling contrived necessities are necessities at all.

[10]See Hale (1996).

[11]I stress that this holds for *strictly* natural necessities, because of course it won't be true for any natural necessities that are also logical necessities.

[12]See Hale (2013), chapter 4, for a discussion of different ways to formally capture a distinction between relative and absolute necessity. Note that none of them make any explicit commitment to an ontological reductive claim, rather only claims about the logical relations between kinds of necessity. Hence the point here: that a claim of relative necessity need not be taken as reductive claim about the nature of a kind of relative necessity, but only a claim about how it contrasts with absolute necessity.

[13]Arguably the notion of a deductive system draws on a notion of logical necessity, but this is not a notion of necessity that the relative necessity view is trying to define in other terms.

[14]See Carroll (2012) for a more comprehensive summary.

[15]Similarly, Fine argues that essence cannot be defined in terms of modality, even though essential truths are always necessary truths. Thank you to an anonymous referee for making this point.

[16]See Fine (2005) footnote 17.

[17]By 'empty world' I mean a world empty of the kinds relevant to each counterexample. So, for example, the first purported counterexample is a world empty of anything instantiating natural kinds, properties or relations. In particular, it is a world empty of bodies (and schmodies), i.e. empty of things with mass (or schmass). But, if one likes, it can contain existent non-instantiated kinds. For example, it makes no difference whether or not the uninstantiated kind *body* exists. In the second example, the 'empty' world is empty of mental events.

[18]The S5 axiom is usually expressed as '$\Diamond A \to \Box \Diamond A$'. The axiom mentioned by Fine, '$A \to \Box \Diamond A$', is usually known as the B axiom (for 'Brouwer'). But as S5 is axiomatizable as KT4B, Fine uses the B axiom as representative of S5 here. Thank you to an anonymous referee for clarifying this.

[19]This clearly constitutes a failure of symmetry for the accessibility relation, given that A is true at w.

[20]Note that an implication of this is that we don't expect, e.g., Newtonian laws to be vacuously true at a Schmewtonian world. If Newtonian laws, and laws of nature in general, were of a form such as 'If anything has mass, then it ϕs', then they will be vacuously true at worlds empty of mass, including the Schmewtonian world and the empty world. However, if laws of nature are supposed to directly describe the behaviour of everything, then they would still be vacuously true in the empty world—the world in which no kinds at all are instantiated—but they would not be true in worlds instantiating alien kinds which conflict with the laws.

[21]Unless these natural necessities collapse into absolute necessity, in which case the game is up anyway.

[22](NAT$\Box$) claims that it is naturally necessary that p just when *there is* a conjunction of basic truths about the status and distribution of natural kinds, properties, and relations which implies p. If there are no such truths at V_*, then any claim of natural necessity at V_* will be false. I discuss whether we can defend the claim that there are basic natural truths at V_* below.

[23]I am here using a strict conditional to capture the 'had ... would' conditional. I'm

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not concerned here with issues of closest worlds.

[24]This is another controversial assumption. The argument of this section is intended to show that, even if we grant Fine these questionable assumptions, we can still avoid the counterexamples.

[25]This is an instance of the general schema for relative possibility, $\neg\exists\phi(\Psi\phi\wedge\Box(\phi\rightarrow\neg p))$ where 'Ψ' is replaced by 'N', 'p' is replaced by '$\neg p$', and the resulting formula '$\neg\neg p$' is simplified to 'p'.

[26](4) is equivalent to $\forall\phi(N\phi\rightarrow\neg\Box(\phi\rightarrow p))$, which in combination with $\exists\phi N\phi$ yields (5).

[27]Earlier I based an argument on the plausible view that there are no laws of nature at V_*. But even if one allows that (11) is true, one still can't yield the natural accessibility of a world with schmass, and hence the natural possibility of schmass. This is because, even if the basic natural truths of W_M are basic natural truths at V_*, *so are the basic natural truths of W_N*. So even if the truth of $N\phi_2$ at V_* ensures that V_* is naturally accessible from W_M, the truth of $N\phi_1$ at V_* prevents worlds containing schmass, such as W_M, from being naturally accessible from V_*.

[28]Thank you to an anonymous referee for suggesting this example.

[29]This is not uncontroversial. If one genuinely takes (2) to be a logical consequence of (1), then the argument thus far goes through. However, one might deny that this this a case of logical consequence, depending on one's views about logic in general and second order logic in particular. If the inference is denied, then the objection stops here.

[30]It is also assumed that schmass is the only property the having of which implies obeying the inverse cube law. Otherwise even if nothing has schmass, it might be that things have another property, that of having schmuss, which implies that they obey an inverse cube law.

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