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A PUZZLE FOR MODAL REALISM

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Abstract

Modal realists face a puzzle. For modal realism to be justified, modal realists need to be able to give a successful reduction of modality. A simple argument, however, appears to show that the reduction they propose fails. In order to defend the claim that modal realism is justified, modal realists therefore need to either show that this argument fails, or show that modal realists can give another reduction of modality that is successful. I argue that modal realists cannot do either of these things and that, as a result, modal realism is unjustified and should be rejected.

1. The puzzle

Modal realists hold that there are multiple possible worlds and that possible worlds are certain concrete entities, such as spatiotemporally isolated universes.¹ They also hold that we and all our surroundings are part of one and only one of these worlds, a world which we might call ' α '. Modal realism is opposed to both abstractionist realism and eliminativism about possible worlds. Abstractionist realism about possible worlds (or abstractionism, for short) holds that there is at least one possible world and that possible worlds are abstract entities, such as sets, properties or states of affairs. Eliminativism about possible worlds, on the other hand, holds that there are no possible worlds, or, if there are possible worlds, there is only one possible world and it is the world we live in. Modal realists hold that, for any way a possible world might be, there is a possible world that is that way. As a result, they hold that there are possible

¹ Lewis (1986, Sect. 1.7) has forcefully argued that 'concrete' is ambiguous (although he also held that possible worlds are concrete according to modal realism on all of the disambiguations of 'concrete'). To avoid such ambiguity, I will take an abstract object to be something that is either a set, number, state of affairs, property, relation, operator, quantifier, proposition or expression type (where operators and quantifiers are the entities expressed by operator expressions and quantifier expressions, rather than the expressions themselves), and I will take a concrete object to be something that is not abstract. For simplicity, I am ignoring versions of modal realism that, like the version formulated in McDaniel (2004), allow concreta to be wholly located at multiple worlds or require that concreta only have properties like *being a blue swan* relative to worlds and not simpliciter. The puzzle posed for modal realism in this paper also applies to these other versions of modal realism.

worlds containing such things as blue swans, talking donkeys and flying pigs. They also endorse some form of recombination principle such as (RP).²

RP. For any individuals x and y , for any numbers m and n , provided there is a spacetime that can fit them, there is a possible world containing m duplicates of x and n duplicates of y .

Modal realists claim that we are justified in believing that there are multiple possible worlds because their postulation can do important theoretical work.³ For example, modal realists claim that the postulation of possible worlds enables a reduction in the number of notions needed to be taken as fundamental by enabling possible-worlds analyses of notions which would otherwise need to be taken as fundamental.⁴ The postulation of possible worlds, according to

² An individual will be taken to be an entity that does not have a non-empty set as a part. This definition of ‘individual’ is coextensive with Lewis’s definition in Lewis (1991), given his views expounded there. (Note that Lewis [1991] identifies the empty set with the mereological fusion of all individuals.) See (Lewis 1986, pp. 89–90) for Lewis’s discussion of the recombination principle.

³ While the orthodox view is that modal realism can be justified only on abductive grounds that appeal to parsimony and explanatory power, Bricker has expressed the hope that modal realism can be justified on non-abductive grounds by being supported by general metaphysical principles that “we can just see, on reflection” to be true using a “Cartesian faculty of rational insight” (Bricker 2008, p. 119), and he has sketched such grounds in (Bricker 2006, Sect. 2). Due to lack of space, the existence of a Bricker-type justification for modal realism cannot be evaluated here and I will assume the orthodox view that no such justification can be given. An argument in the vicinity of the kind of argument Bricker has in mind, however, is discussed (and rejected) in section 2 when I discuss the third kind of response to the contingency objection to QR modal realism.

⁴ Some notions are intuitively simpler than other notions. For example, the property of being a cube and the property of being red are both intuitively simpler than the property of being a red cube. A fundamental notion (as I am using ‘fundamental’) is a notion that is completely simple, where a notion (or aspect of reality) is either a state of affairs, property, relation, operator or quantifier. (A fundamental notion is a perfectly natural notion in Lewis’s terminology given the dominant use of that terminology in Lewis [1986], with this notion being extended to apply to operators and quantifiers as in Sider [2011]. See [Marshall 2012, Sect. 2–3] for discussion of Lewis’s different uses of ‘perfectly natural’.) Fundamentality, so understood, needs to be distinguished from mereological simplicity (which is the property of having no proper parts), the notion of being a foundational fact (which is the notion of being an explanatorily non-trivial fact that is not grounded or otherwise explained by some other fact), and the notion of being a constituent of a foundational fact.

modal realists, can therefore increase the ideological parsimony of one’s overall theory, where the ideological parsimony of a theory is roughly a measure of how few notions are taken as fundamental by the theory.⁵ Modal realists also claim that the postulation of possible worlds vindicates a number of explanatorily powerful theories, such as our best psychological, semantical and physical theories.⁶ They further claim that modal realism is superior to abstractionism, since, while the postulation of concrete possible worlds can do all the important work the postulation of abstract possible worlds can do, there is important work the postulation of concrete possible worlds can do that the postulation of abstract possible worlds cannot do. In particular, they claim that modal realists can, while abstractionists cannot, give a reduction of modality.⁷

A reduction of modality is roughly an account that shows that there are no irreducibly modal states of affairs, where a *state of affairs* is a way things are or a way things fail to be, and where an *irreducibly modal* state of affairs is a

⁵ This characterisation of ideological parsimony is only rough, since nominalist theories — theories that hold that there are no abstract objects — can differ in their degree of ideological parsimony, despite the fact that they all hold that there are no notions (since notions are abstract entities), and hence no fundamental notions. The characterisation also assumes logical atomism, which is the thesis that every notion can be fully analysed in terms of fundamental notions. For simplicity, I assume logical atomism in this paper.

⁶ See (Lewis 1986, Ch. 1) for how realist theories of possible worlds can vindicate psychological and semantical theories. The postulation of possible worlds can vindicate the commitment to possible states in statistical physics by identifying these states with either possible worlds or sets of possible worlds.

⁷ Modal realists have also claimed that modal realism has further advantages over abstractionism. In particular, they have claimed that: a) abstractionist theories are unable to represent all of the possibilities that they need to represent (Lewis 1986, Sect 3.2), b) abstractionist theories have mysterious and metaphysically problematic primitives (Lewis 1986, Sect. 3.4), and c) abstractionists need to take property-theoretic notions as fundamental that modal realists can offer set-theoretic reductions of. I will assume here that abstractionists can overcome the problems posed by (a) and (b), and that any advantage in ideological parsimony modal realists enjoy regarding property-theoretic notions is offset by abstractionists being able to provide property-theoretic reductions of set-theoretic notions, or is outweighed by the loss in ideological parsimony suffered by modal realists who endorse the no-reduction response discussed in footnote 20 to the puzzle posed in this paper. While it is widely held that abstractionists and eliminativists cannot give a successful reduction of modality, some philosophers have attempted to provide abstractionist- or eliminativist-friendly modal reductions, such as Armstrong (1989) and Sider (2011).

state of affairs that can be expressed by a modal statement that cannot also be expressed by a non-modal statement.⁸ To give a more precise characterisation of what a reduction of modality is, let ' $\phi =_{df} \psi$ ' abbreviate 'For it to be the case that ϕ is for it to be the case that ψ '. A reduction of modality can be understood to be an account T such that, for any modal statement ϕ , there is a non-modal statement ψ such that T entails ' $\phi =_{df} \psi$ '.⁹ A theory can be said to enable a reduction of modality iff a consistent completion of it entails a reduction of modality.¹⁰

A successful reduction of modality is a reduction of modality that has no serious negative epistemic features, such as being inconsistent, or being inconsistent with what is highly plausible. Everything else being equal, a theory that enables a successful reduction of modality is more likely to be true, since: i) everything else being equal, a consistent complete theory that entails a reduction of modality represents things as being simpler than a consistent complete theory that does not contain a reduction of modality, ii) everything else being equal, a consistent complete theory that represents things as being simpler is more likely to be true than a consistent complete theory that represents things as being more complicated, and iii) everything else being equal, a theory with

⁸ Cf. (Sider 2003, Sect. 2). 'State of affairs' (as I am using it) needs to be distinguished from 'proposition', where a proposition is understood to be an object of an assertion or a mental state such as a belief. For some philosophers, such as those that hold that propositions are states of affairs under modes of presentation, these entities are not identical to each other.

⁹ A statement is a sentence that either describes how things are or describes how things aren't. Every statement is therefore either true or false. A modal statement is a statement containing at least one modal expression, while a non-modal statement is a statement containing no modal expressions. The notion of entailment used here is a priori entailment, where T a priori entails S iff an ideal reasoner can determine the truth of ' $\neg T$ ' or ' S ' purely on the basis of non-abductive a priori reasoning. There are stronger notions of modal reductionism than that described above. If modal reductionism doesn't enable a modal reduction in the sense used here, however, it will not allow a reduction in any of these stronger senses either.

¹⁰ S is a completion of T iff S is a complete theory that entails T . The notions of consistency and completeness used here are a priori consistency and a priori completeness. T is a priori consistent iff T is not a priori inconsistent, and T is a priori inconsistent iff an ideal reasoner can determine T to be false purely on the basis of non-abductive a priori reasoning. T is complete iff, for any statement S , either T a priori entails S , T a priori entails ' $\neg S$ '.

more likely consistent completions is more likely to be true. That a theory enables a successful reduction of modality is therefore a point in favour of the theory.

Given ϕ and ψ both express states of affairs, it is at least prima facie plausible that ' $\phi =_{df} \psi$ ' is true iff ϕ and ψ describe things as being the same way, which is the case iff ϕ and ψ express the same states of affairs. In this paper, I assume that this account of ' $=_{df}$ ' is true, that there are states of affairs (as well as other abstracta), and that modal realists also endorse this account of ' $=_{df}$ ' and hold that there are states of affairs (as well as other abstracta).¹¹ Given this assumption, modal realists hold that their theory enables an account that reveals how any state of affairs that can be expressed by a modal statement can also be expressed by a non-modal statement, thereby revealing how there are no irreducibly modal states of affairs.

David Lewis, the most famous modal realist, argued that modal realism enables a reduction of modality by attempting to sketch a reduction of modality enabled by modal realism. One component of the reduction Lewis sketched concerns the modal predicate 'is a possible world'. Say that x is an L -world iff x is a maximally spatiotemporally interrelated individual: that is, iff x is an individual such that i) any two parts of x are spatiotemporally related to each other, and ii) anything that is spatiotemporally related to any part of x is itself part of x . According to Lewis's reduction, 'is a possible world' has analysis (W).¹²

¹¹ Given this account, ' $=_{df}$ ' is symmetric, so that, given Phosphorus is a planet $=_{df}$ Hesperus is a planet, Hesperus is a planet $=_{df}$ Phosphorus is a planet. Rosen has argued against this account of ' $=_{df}$ ' and put forward an alternative account on which ' $=_{df}$ ' is irreflexive and ' $\phi =_{df} \psi$ ' entails 'the state of affairs that ψ grounds the state of affairs that ϕ '. (See Rosen [2010] and Rosen [MS].) The simpler account of ' $=_{df}$ ' assumed here can be replaced with Rosen's account given relatively minor changes. For example, while the existence of analyses might not contribute to a reduction in the number of fundamental aspects of reality given Rosen's account of ' $=_{df}$ ', they still contribute to an increase in overall simplicity by contributing to a reduction in the number of foundational facts. For a defence of the simpler account of ' $\Gamma\phi =_{df} \psi\Gamma$ ', see Dorr (MSb).

¹² This is a simplification of Lewis's official account of 'possible world' in (Lewis 1986, Sect 1.6). Lewis's official account seems to be given by (A) and (B), where a particular is an entity that is not a property, and Lewis describes what he takes to be a system of relations that are analogous to spatiotemporal relations in (Lewis 1986,

W. x is a possible world =_{df} x is an L -world.

Since ' L -world' is a non-modal expression, it follows that, according to Lewis's reduction, any state of affairs expressed by a statement of the form ' a is a possible world' can also be expressed by a non-modal statement of the form ' a is an L -world'.

A second component of Lewis's sketched reduction concerns the modal expressions ' \diamond ' and ' \square ', where ' \diamond ' symbolises 'it is absolutely possible that' and ' \square ' symbolises 'it is absolutely necessary that'.¹³ Let ' W ' symbolise 'is an L -world', ' B ' symbolise 'is a blue swan', ' I ' symbolise 'is part of', and ' \exists ' express the unrestricted existential quantifier. According to Lewis's pro-

pp. 75–6).

- A. x is a *possible individual* =_{df} i) x is an individual, and ii) there is a system S of relations that are analogous to the system of spatiotemporal relations such that, for any particulars y and z that are part of x and wholly distinct from each other, y is related to z by S .
- B. x is a *possible world* =_{df} x is a possible individual that is not a proper part of any possible individual.

An arguably superior modal realist account of 'possible world' is given in Bricker (1996; 2008). The precise details of how a modal realist defines 'possible world' are not important for the purposes of this paper.

(W) is (roughly) Lewis's reduction of 'possible world' given he employs the notion of reduction described above. While it is arguably consistent with the textual evidence to interpret Lewis as employing such a notion of reduction, he does not clearly articulate what kind of reduction he is attempting to give in Lewis (1986) and elsewhere. If one thinks that Lewis did not employ this notion of reduction, one may take the above to be a Lewis-style reduction rather than Lewis's actual reduction. (W) should be regarded as being implicitly pre-fixed with ' $\square\forall x\square$ '. An analysis of a one-place predicate F is a statement of the form ' $\square\forall x\square(Fx \text{=}_{df} \phi)$ '. An analysis of a statement S is a statement of the form ' $\ulcorner S \text{=}_{df} T \urcorner$ '.

¹³ The absolute notions of possibility and necessity need to be distinguished from epistemic and deontic notions of possibility and necessity, such as those expressed by 'For all I know it might be that' and 'It is morally permissible to make it the case that'. They also need to be distinguished from relative notions of (non-epistemic and non-deontic) possibility and necessity, such as nomological possibility and necessity and technological possibility and necessity. The relative notions of possibility and necessity can plausibly be defined in terms of absolute possibility and necessity. For example, nomological possibility can be analysed as follows: It is nomologically possible that $\varphi \text{=}_{df}$ it is absolutely possible that φ and the actual laws obtain.

posed reduction, at least on its most obvious interpretation, the modal statements ' $\diamond\exists Bx$ ' and ' $\square\exists Bx$ ' have analyses $(\diamond B)$ and $(\square B)$.¹⁴

$\diamond B$. $\diamond\exists xBx \text{=}_{df} \exists u\exists x(Wu \wedge Ixu \wedge Bx)$.

$\square B$. $\square\exists xBx \text{=}_{df} \forall u(Wu \supset \exists x(Ixu \wedge Bx))$.

Since the right-hand sides of $(\diamond B)$ and $(\square B)$ contain only non-modal expressions, the states of affairs expressed by the modal statements ' $\diamond\exists xBx$ ' and ' $\square\exists xBx$ ' can therefore also be expressed by non-modal statements according to Lewis's reduction.

The argument modal realists give for modal realism can now be stated as follows: (I) The best completions of realism about possible worlds are better (on either its modal realist or abstractionist varieties) than the best completions of eliminativism about possible worlds, since the best completions of realism about possible worlds are more ideologically parsimonious than the best completions of eliminativism about possible worlds, and since the best completions of realism about possible worlds, unlike the best completions of eliminativism about possible worlds, vindicate the truth of our best theories of psychology, semantics and physics. (II) The best completions of modal realism are better than the best completions of abstractionism, since a) the best completions of modal realism contain Lewis's reduction of modality while the best completions of abstractionism do not contain any reduction of modality, and since b) there are no important respects in which the best completions of modal realism are worse than the best completions of abstractionism. It follows from (I) that realism about possible worlds is justified, and it follows from the combination of (I) and (II) that modal realism is justified.¹⁵

Unfortunately for modal realism, there is good reason to think that Lewis's reduction of modality is not successful, and hence good reason to think that (II) is false and that the above argument for modal realism fails. In particular,

¹⁴ ' \wedge ' expresses conjunction, and ' \supset ' expresses the material conditional. An alternative interpretation of Lewis's account of possibility and necessity is discussed in footnote 42.

¹⁵ This argument has to be supplemented by the premise that modal realist, abstractionist and eliminativist theories exhaust the credible theories of possible worlds.

a simple argument shows that Lewis's reduction is false, given the uncontroversial empirical claim that there are no blue swans in α , and given the highly plausible modal theses and schemas (\Box -a), (NPB), ($\Box K$) and (Nec).¹⁶

\Box -a. If $\phi =_{df} \psi$, then $\Box(\phi \equiv \psi)$.

NPB. $\Box\Diamond\exists xBx$.

$\Box K$. If $\Box(\phi \equiv \psi)$ and $\Box\phi$, then $\Box\psi$.

Nec. If $\Box(\phi)$ and ' ψ ' is a logical consequence of ' ϕ ', then $\Box(\psi)$.

The argument is the following: Suppose for reductio that Lewis's reduction of modality is true, and hence that ($\Diamond B$) and ($\Box B$) are both true. (1) then follows from ($\Diamond B$) and (\Box -a).

1. $\Box(\Diamond\exists xBx \equiv \exists u\exists x(Wu \wedge Ixu \wedge Bx))$.

(2) follows from (1), (NPB) and ($\Box K$).

2. $\Box\exists u\exists x(Wu \wedge Ixu \wedge Bx)$.

Since ' $\exists xBx$ ' is a logical consequence of ' $\exists u\exists x(Wu \wedge Ixu \wedge Bx)$ ', (3) follows from (2) and (Nec).

3. $\Box\exists xBx$.

Lewis's reduction of modality therefore entails that it is necessary that there is a blue swan. This, by itself, may seem like a strong reason to reject Lewis's reduction. His reduction, however, has a further consequence that is arguably even more unacceptable. (4) follows from (3) and ($\Box B$).

¹⁶ (\Box -a) may need to be restricted so that ϕ and ψ do not contain rigidification devices such as 'actually'. ' \equiv ' symbolises material equivalence. By 'logical consequence' I mean logical consequence with respect to classical predicate logic. If someone thinks that we do not have strong grounds for thinking that there are no blue swans in α , then they can replace ' B ' throughout with some suitable predicate F for which they think we do have strong grounds for believing that, while ' $\Box\Diamond\exists xFx$ ' is true, F applies to nothing in α , such as, for example, the predicate 'is a solid uranium sphere with a diameter of one trillion kilometers'.

4. $\forall u(Wu \supset \exists x(Ixu \wedge Bx))$.

(4), however, is false, since there are no blue swans in α . Hence, by reductio, it follows that Lewis's reduction of modality is false.

($\Box K$) and (Nec) both appear to be obviously true. (NPB) is also highly plausible, since it is hard to see how things could be such that, if things were that way, it would be impossible for there to be a blue swan.¹⁷ Finally, (\Box -a) is also highly plausible. (\Box -a) is arguably presupposed by the widespread practice in philosophy of evaluating proposed analyses by considering possible cases

¹⁷ For a modal realist to successfully respond to the above argument against Lewis's reduction by rejecting (NPB), she would need to both: i) describe conditions which are credibly such that, had those conditions obtained, it would have been impossible for there to be a blue swan, and ii) accomplish (i) in a way that does not allow a successful reformulated version of the argument against Lewis's reduction. To illustrate the difficulty of (ii), suppose a modal realist accomplishes (i) by endorsing (C) and claiming that, due to (C), it would have been impossible for there to be a blue swan had it been the case that there were no blue things and no swans.

C. $\Box(\Diamond\exists xBx \equiv \exists x\exists y(x \text{ is blue} \wedge y \text{ is a swan}))$.

Given the natural extension of Lewis's reduction to ' $\Box(\exists x\exists y(x \text{ is blue and } y \text{ is a swan}) \supset \exists xBx)$ ' given by ($\Box BS$), such a modal realist would then face the following reformulated version of the argument against Lewis's reduction, whose premises are (C), ($\Box K^\#$) (which is just as plausible as ($\Box K$)), (Nec), (\Box -a) and the fact that, while there are swans and blue things in α , there are no blue swans in α .

$\Box BS$. $\Box(\exists x\exists y(x \text{ is blue and } y \text{ is a swan}) \supset \exists xBx) =_{df} \forall u(Wu \supset (\exists x\exists y(Ixu \wedge Iyu \wedge x \text{ is blue} \wedge y \text{ is a swan}) \supset \exists x(Ixu \wedge Bx)))$.

$\Box K^\#$. If $\Box(\phi \equiv \psi)$ and $\Box\phi$, then $\Box(\psi)$.

The reformulated argument is the following: Suppose, for reductio, that Lewis's reduction is true, and hence that ($\Diamond B$) and ($\Box BS$) are both true. It follows from ($\Diamond B$) and (\Box -a) that: a) $\Box(\Diamond\exists xBx \equiv \exists u\exists x(Wu \wedge Ixu \wedge Bx))$. It follows from (a), (C) and ($\Box K^\#$) that: b) $\Box(\exists x\exists y(x \text{ is blue} \wedge y \text{ is a swan}) \equiv \exists u\exists x(Wu \wedge Ixu \wedge Bx))$. Since ' $\exists x\exists y(x \text{ is blue} \wedge y \text{ is a swan}) \supset \exists xBx$ ' is a logical consequence of ' $\exists x\exists y(x \text{ is blue} \wedge y \text{ is a swan}) \equiv \exists u\exists x(Wu \wedge Ixu \wedge Bx)$ ', it then follows from (b) and (Nec) that: c) $\Box(\exists x\exists y(x \text{ is blue} \wedge y \text{ is a swan}) \supset \exists xBx)$. It then follows from (c) and ($\Box BS$) that: d) $\forall u(Wu \supset (\exists x\exists y(Ixu \wedge Iyu \wedge x \text{ is blue} \wedge y \text{ is a swan}) \supset \exists x(Ixu \wedge Bx)))$. (d), however, is false, since it falsely entails that there is a blue swan in α , given the fact that there are blue things and swans in α . Hence, by reductio, Lewis's reduction fails.

rather than only actual cases. It is widely taken to be true, for example, that, if it is possible for John to justifiably truly believe that snow is white without knowing that snow is white, then the following analysis is false: For it to be the case that John knows that snow is white is for it to be the case that John justifiably truly believes that snow is white. A powerful argument for $(\Box\text{-a})$ is the following: If ‘ ϕ ’ and ‘ ψ ’ represent things as being the same, which they do if $\phi =_{\text{df}} \psi$, then things couldn’t be as ‘ ϕ ’ represents them as being unless they were also how ‘ ψ ’ represents them as being, and things couldn’t be as ‘ ψ ’ represents them as being unless they were also how ‘ ϕ ’ represents them as being. Hence, if $\phi =_{\text{df}} \psi$, then $\Box(\phi \equiv \psi)$. Hence $(\Box\text{-a})$ is valid.¹⁸

Modal realism therefore faces the following problem: In order to be justified, modal realists need to be able to give a successful reduction of modality. The above argument, however, appears to show that the reduction modal realists propose is not successful. In order to defend the claim that modal realism is justified, modal realists therefore need to either show that the above argument fails or show that modal realists can give an alternative reduction of modality that is successful. It is not clear, however, whether modal realists can do either of these things.

Call this problem *the puzzle*, and call the above argument against Lewis’s reduction of modality *the puzzle argument*.¹⁹ In section 2, I will first formulate

¹⁸ This argument can be more precisely formulated so that its premises are the instances of the schemas: i) If $\chi =_{\text{df}} \zeta$, then ‘ $\chi \equiv \zeta$ ’ represents things as being such that $\zeta \equiv \zeta$; ii) $\Box(\zeta \equiv \zeta)$; and iii) If ‘ χ ’ represents things as being such that ζ , and $\Box\zeta$, then $\Box\chi$. Suppose ‘ $\phi =_{\text{df}} \psi$ ’ is true for some sentences ϕ and ψ . It then follows from (i) that ‘ $\phi \equiv \psi$ ’ represents things as being such that $\psi \equiv \psi$ is true. Since, by (ii), ‘ $\Box(\psi \equiv \psi)$ ’ is true, it then follows from (iii) that ‘ $\Box(\phi \equiv \psi)$ ’ is true. Hence, ‘If $\phi =_{\text{df}} \psi$, then $\Box(\phi \equiv \psi)$ ’ is true, just as $(\Box\text{-a})$ claims.

¹⁹ Other papers that discuss puzzles in the vicinity of the puzzle posed here for modal realism are Parsons (2012) (a draft of which was first put on his website in 2005), Dorr (MSa), Noonan (2014), Divers (2014) and Jago (MS). Parsons (2012) was prompted by a discussion about the present paper, while Divers (2014) is a response to Noonan (2014). Dorr and Noonan in effect defend versions of the QR response discussed in section 2, while Divers defends a version of the ambiguity response discussed in section 3. Parsons rejects the need for modal realism to enable a reduction of modality but does not explain how modal realism is meant to be justified in the absence of such a reduction. (See footnote 20 for further discussion of this kind of response.) Jago (MS) criticises a number of modal realist attempts to provide a reduction of modality.

what I take to be the best response to the puzzle available to modal realists, which involves replacing Lewis’s reduction of modality with an alternative reduction, before arguing that this response fails. In sections 3 and 4, I will then discuss two other responses to the puzzle, the first of which claims that ‘ \Box ’ and ‘ \Diamond ’ are ambiguous, and the second of which claims that modal realists should be eliminativists about modality. I will argue that both these responses also fail. On the basis of these failures, I will conclude that modal realism is not justified and should be rejected.²⁰

Divers (1999) discusses the following distinct, though related, problem for Lewis’s reduction: It is natural to extend Lewis’s account of modality so that it endorses $(\Diamond W)$.

$$\Diamond W. \Diamond\exists x\exists y((x \neq y) \wedge Wx \wedge Wy) =_{\text{df}} \exists u\exists x\exists y(Wu \wedge Ixu \wedge Iyu \wedge (x \neq y) \wedge Wx \wedge Wy).$$

Since no L -world contains two L -worlds, it follows from $(\Diamond W)$ that ‘ $\Diamond\exists x\exists y((x \neq y) \wedge Wx \wedge Wy)$ ’ is false. Given the highly plausible principle (T), however, it follows from this that ‘ $\exists x\exists y((x \neq y) \wedge Wx \wedge Wy)$ ’ is also false, which conflicts with modal realism.

$$T. \phi \supset \Diamond\phi.$$

Lewis’s account can be modified so that it avoids Divers’s problem by replacing ‘ W ’ with ‘ $W^\#$ ’, which symbolises ‘is a fusion of L -worlds’. This modification, however, does not avoid the puzzle argument. Another response to Divers’s problem has in effect been suggested by (Hudson 1997, Sect. 2) who claims that modal realists should reject (T) and hold that some true propositions are necessary falsehoods (though no actually true propositions are necessary falsehoods).

²⁰ Another response a modal realist might adopt, which might be called the no-reduction response, is to deny that modal realists need to give a reduction of modality in order to be justified. Such a modal realist might accept the premises of the puzzle argument ($(\Box K)$, (Nec), $(\Box\text{-a})$, (NPB) and ‘There are no blue swans in α ’), reject $(\Diamond B)$ and $(\Box B)$, and instead endorse a modification of $(\Box B)$ and $(\Diamond B)$ that replaces ‘ $=_{\text{df}}$ ’ with the material biconditional ‘ \equiv ’ (and replaces ‘ W ’ with ‘ $W^\#$ ’ as suggested in footnote 19 to avoid Divers’ problem). Such a modal realist can also reject modal claims like ‘ $\Box\exists xBx$ ’, the commitment to which raises significant problems for the responses discussed in section 2 and 3. As made clear above, one serious problem with this response is that a modal realist who adopts it loses the key advantage modal realism is meant to have over its rivals: that of enabling a reduction of modality. A modal realist who adopts this response also loses a great number of other advantages modal realism is widely thought to *share* with abstractionist theories over eliminativism about possible worlds, such as being able to analyse counterfactuals, modal

Before discussing these responses, it is important to appreciate that the puzzle argument does not apply to all attempts to analyse modality in terms of possible worlds. One account the argument does not apply to, for example, is

comparativity and supervenience in terms of (at most) a single modal notion. Given these deficiencies, the no-reduction response is very unappealing.

The difficulty no-reduction modal realists have in providing analyses of modal notions can be illustrated by seeing how modal realists who adopt the no-reduction response are unable to endorse Lewis's analysis of counterfactuality. According to Lewis's account of counterfactuals, the counterfactual operator expression 'Were it the case that ... then it would be the case that' expresses different counterfactual operators in different contexts, each corresponding to a different comparative similarity relation. Let ' $\square \rightarrow$ ' express one of these counterfactual operators, let ' \leq ' express its corresponding comparative similarity relation, and let ' $x \leq_z y$ ' symbolise ' x is at least as similar to z as y is' under this comparative similarity relation. When suitably disambiguated, and when restricted to the case where ' ϕ ' and ' ψ ' are non-modal statements expressing qualitative states of affairs, Lewis's account of ' $\phi \square \rightarrow \psi$ ' (modified in order to accord with the modification made to ($\diamond B$) and ($\square B$) above) is given by ($\square \rightarrow$), where 'at' restricts all implicit and explicit quantification within its scope to parts of (the referent of) ' u '. (For 'qualitative' see footnote 27, and for Lewis's analysis of counterfactuality see [Lewis 1973b, pp. 48–9].)

$$\square \rightarrow. \phi \square \rightarrow \psi =_{\text{df}} \neg \exists u (W^{\#}u \wedge (\text{at } u, \phi)) \vee \exists u [W^{\#}u \wedge (\text{at } u, \phi) \wedge \forall v [(W^{\#}v \wedge (v \leq_{\alpha} u)) \supset (\text{at } v, \phi \supset \psi)]]].$$

Let ' T ' symbolise 'is a four-sided triangle'. Given (\square -a), (Nec), ($\square K$) and ' $\square \neg (\exists x Bx \square \rightarrow \exists x T x)$ ', it can be shown that ($\square \rightarrow$) entails ' $\square \exists x Bx$ '. The proof is the following: ($1^{\square \rightarrow}$) follows from ($\square \rightarrow$) and (\square -a).

$$1^{\square \rightarrow}. \square [(\exists z Bz \square \rightarrow \exists z Tz) \equiv [\neg \exists u (W^{\#}u \wedge (\text{at } u, \exists z Bz)) \vee \exists u [W^{\#}u \wedge (\text{at } u, \exists z Bz) \wedge \forall v [(W^{\#}v \wedge (v \leq_{\alpha} u)) \supset (\text{at } v, \exists z Bz \supset \exists z Tz)]]]]].$$

Since ' $\square \neg \phi \equiv \neg \psi$ ' is a logical consequence of ' $\phi \equiv \psi$ ', ' $\square (\neg \phi \equiv \neg \psi)$ ' follows from ' $\square (\phi \equiv \psi)$ ' and (Nec). Hence ($2^{\square \rightarrow}$) follows from ($1^{\square \rightarrow}$), (Nec), ($\square K$) and ' $\square \neg (\exists x Bx \square \rightarrow \exists x T x)$ '.

$$2^{\square \rightarrow}. \square \neg [\neg \exists u (W^{\#}u \wedge (\text{at } u, \exists z Bz)) \vee \exists u [W^{\#}u \wedge (\text{at } u, \exists z Bz) \wedge \forall v [(W^{\#}v \wedge (v \leq_{\alpha} u)) \supset (\text{at } v, \exists z Bz \supset \exists z Tz)]]].$$

' $\square \exists x Bx$ ' follows from ($2^{\square \rightarrow}$) and (Nec), since, given the definition of 'at', ' $\exists x Bx$ ' is a logical consequence of ' $\neg [\neg \exists u (W^{\#}u \wedge (\text{at } u, \exists z Bz)) \vee \exists u [W^{\#}u \wedge (\text{at } u, \exists z Bz) \wedge \forall v [(W^{\#}v \wedge (v \leq_{\alpha} u)) \supset (\text{at } v, \exists z Bz \supset \exists z Tz)]]]$ '. Since no-reduction modal realists reject ' $\square \exists x Bx$ '; accept (\square -a), (Nec) and ($\square K$); and should accept ' $\square \neg (\exists x Bx \square \rightarrow \exists x T x)$ ', they must therefore reject ($\square \rightarrow$).

the abstractionist account of Alvin Plantinga. According to Plantinga, possible worlds are states of affairs of a certain type, where for Plantinga states of affairs are abstract necessarily existing entities. For any states of affairs s and s^* , we have the following definitions: i) s includes s^* iff it is not possible that (s obtains and s^* does not obtain); ii) s precludes s^* iff it is not possible that (s obtains and s^* obtains); iii) s is maximal iff, for any state of affairs s^* , either s includes s^* or s precludes s^* ; and iv) s is possible iff it is possible that s obtains. Let ' W^P ' symbolise 'is a maximal possible state of affairs' and ' O ' symbolise 'obtains'. Plantinga, in effect, endorses ($\diamond^P B$) and ($\square^P B$), together with the claim that 'is a possible world' expresses the same property as 'is a maximal possible state of affairs'.

$$\diamond^P B. \diamond \exists x Bx =_{\text{df}} \exists u [W^P u \wedge \square (Ou \supset \exists x Bx)].$$

$$\square^P B. \square \exists x Bx =_{\text{df}} \forall u [W^P u \supset \square (Ou \supset \exists x Bx)].$$

If we attempt to apply the puzzle argument to Plantinga's account, we can derive analogues of the first two lines of the argument by first deriving (1^P) from Plantinga's account and (\square -a), and then deriving (2^P) from (1^P), (NPB) and ($\square K$).

$$1^P. \square (\diamond \exists x Bx \equiv \exists u (W^P u \wedge \square (Ou \supset \exists x Bx))).$$

$$2^P. \square \exists u (W^P u \wedge \square (Ou \supset \exists x Bx)).$$

Unlike in the argument against Lewis's reduction, however, it is not possible to derive ' $\square \exists x Bx$ ' from (2^P) using (Nec) or any other uncontroversial premise. The puzzle argument therefore does not threaten Plantinga's account of modality.²¹

²¹ While the puzzle argument does not pose a problem for Plantinga's account, it does pose a problem for certain other abstractionist accounts of possible worlds. In particular, it poses a problem for abstractionist accounts that, unlike Plantinga's account, hold that possible worlds exist merely contingently. To see why, consider an account of modality that is the same as Plantinga's except for holding that each possible world only contingently exists. On such an account, we can still derive (2^P). However, (2^P) is presumably false on such an account, since, if each possible world exists only contingently, it is presumably not necessary that there be a possible world such that, necessarily, had it obtained, there would have been a blue swan. The account

In addition to appreciating that the puzzle argument does not threaten all possible-worlds analyses of modality, it is also important to appreciate that the puzzle has a significance that goes beyond the philosophy of possible worlds. In particular, it is important to appreciate that the puzzle also applies to the highly popular temporal analogue of modal realism, four-dimensionalism.²² According to four-dimensionalists, times are three-dimensional slices of a four-dimensional object called spacetime. Let ‘*S*’ symbolise ‘It either was, is or will be the case that’, ‘*A*’ symbolise ‘It has always been and will always be the case that’, ‘*D*’ symbolise ‘is a dinosaur’, and ‘*T*’ symbolise ‘is a complete time slice’. Four-dimensionalists typically endorse the analyses (*SD*) and (*AD*), which are temporal analogues of ($\diamond B$) and ($\square B$).

SD. $S \exists x D x =_{df} \exists u \exists x (T u \wedge I x u \wedge D x)$.

AD. $A \exists x D x =_{df} \forall u (T u \supset \exists x (I x u \wedge D x))$.

An analogue of the puzzle argument, however, shows that the combination of (*AD*) and (*SD*) fails, given the highly plausible (*A-a*), (*ASD*), (*AK*) and (*Alw*) (which are the temporal analogues of (\square -a), (*NPB*), ($\square K$) and (*Nec*)), and the empirical fact that there is no dinosaur located in t^* (where t^* is the time slice we are currently located at according to the four-dimensionalists).²³

A-a. If $\phi =_{df} \psi$, then $A(\phi \equiv \psi)$.

ASD. $AS \exists x D x$.

AK. If $A(\phi \equiv \psi)$ and $A\phi$, then $A\psi$.

therefore conflicts with the same highly plausible modal principles that Lewis’s reduction conflicts with.

²² The puzzle also applies to (eternalist) three-dimensionalism, as well as to the modal analogue of (eternalist) three-dimensionalism. See (Sider 2001, Ch. 3) for three-dimensionalism, and see McDaniel (2004) for the modal analogue of three-dimensionalism.

²³ The analogue argument is obtained from the original puzzle argument by replacing ‘ \diamond ’ with ‘*S*’, ‘ \square ’ with ‘*A*’, ‘*B*’ with ‘*D*’, ‘ α ’ with ‘ t^* ’, ($\square K$) with (*AK*), (*Nec*) with (*Alw*), (\square -a) with (*A-a*), and (*NPB*) with (*ASD*). As in the case of (\square -a), (*A-a*) may need to be restricted so that ϕ and ψ do not contain rigidification devices such as ‘now’ and ‘presently’.

Alw. If $A\phi$ and ‘ ψ ’ is a logical consequence of ‘ ϕ ’, then $A\psi$.

Due to limitations of space, I will focus on the puzzle facing modal realism, rather than the analogous puzzle facing four-dimensionalism. It is important to keep in mind the temporal analogue of the puzzle facing modal realism, however, since modal realists and four-dimensionalists have analogous responses available to them to these puzzles and these responses face analogous problems. If, as I will argue here, modal realists cannot adequately respond to the puzzle facing them, there is therefore reason to suspect that four-dimensionalists cannot adequately respond to the puzzle facing them either.

2. The quantifier restriction response

A natural way for a modal realist to respond to the puzzle described in section 1 is to accept the premises of the puzzle argument (namely ($\square K$), (*Nec*), (\square -a), (*NPB*) and ‘There are no blue swans in α ’), accept the conclusion of the puzzle argument (that Lewis’s reduction of modality is false), and seek an alternative reduction of modality that avoids the puzzle argument. A natural attempt at providing such an alternative reduction is to replace the unrestricted quantifier expression ‘ $\exists x$ ’ on the left-hand sides of ($\diamond B$) and ($\square B$) with the restricted quantifier expression ‘ $(\exists x|I x \alpha)$ ’, where ‘ $(\exists x|I x \alpha)$ ’ symbolises ‘for some x such that x is part of α ’.²⁴ According to this response, which we may call the quantifier restriction response (or the QR response, for short), while at least one of ($\diamond B$) and ($\square B$) is false, ($\diamond^* B$) and ($\square^* B$) are both true.

$\diamond^* B$. $\diamond(\exists x|I x \alpha) B x =_{df} \exists u \exists x (W u \wedge I x u \wedge B x)$.

$\square^* B$. $\square(\exists x|I x \alpha) B x =_{df} \forall u (W u \supset \exists x (I x u \wedge B x))$.

Given ($\diamond^* B$), it is not the state of affairs of there possibly being a blue swan, but instead the state of affairs of there possibly being a blue swan *that is part of* α , that is identical to the state of affairs of there being an *L*-world containing a blue swan. Similarly, given ($\square^* B$), it is not the state of affairs of there necessarily being a blue swan, but instead the state of affairs of there necessarily being a

²⁴ More generally, ‘ $(\exists x|F x)$ ’ symbolises ‘For some x such that $F x$ ’. Any statement of the form ‘ $(\exists x|F x) G x$ ’ is necessarily equivalent to ‘ $\exists x (F x \wedge G x)$ ’.

blue swan *that is part of* α , that is identical to the state of affairs that every L -world contains a blue swan.

The combination of (\diamond^*B) and (\Box^*B) does not fall victim to any variant of the puzzle argument. To see why, suppose we accept (NPB*), which is an analogue of (NPB).

NPB*. $\Box(\exists x|Ix\alpha)Bx$.

We can derive (1*) from (\diamond^*B) and $(\Box\text{-a})$; then derive (2*) from (1*), (NPB*) and $(\Box K)$; and then derive (3*) from (2*) and (Nec).

1*. $\Box(\diamond(\exists x|Ix\alpha)Bx \equiv \exists u\exists x(Wu \wedge Ixu \wedge Bx))$.

2*. $\Box\exists u\exists x(Wu \wedge Ixu \wedge Bx)$.

3*. $\Box\exists xBx$.

However, we cannot use (\Box^*B) to derive from (3*) the false result that all L -worlds contain a blue swan. The combination of (\diamond^*B) and (\Box^*B) , then, unlike the combination of $(\diamond B)$ and $(\Box B)$, does not entail that there is a blue swan in α .

Call a modal realist who adopts this response to the puzzle a QR modal realist, and call the account such a modal realist endorses by adopting this response QR modal realism.²⁵ Since a QR modal realist rejects the combination of $(\diamond B)$ and $(\Box B)$, she needs to give a new account of what non-modal statements express the states of affairs expressed by ' $\diamond\exists xBx$ ' and ' $\Box\exists xBx$ ' in order to provide a general reduction of modality. To determine what account she should give, it is useful to note that (7) and (8) follow from (5), (6), (\diamond^*B) , (\Box^*B) , $(\Box K)$, (Nec), $(\Box\text{-a})$, (NPB) and (NPB*).²⁶

5. $\Box\exists xBx \supset \Box\Box\exists xBx$.

6. $(\Box\phi \wedge \Box\psi) \supset \Box(\phi \equiv \psi)$.

7. $\Box(\diamond\exists xBx \equiv \exists xBx)$.

8. $\Box(\Box\exists xBx \equiv \exists xBx)$.

Given a QR modal realist endorses (NPB*), she should plausibly endorse (7) and (8), since (5) and (6) are highly plausible, and since QR modal realists accept (\diamond^*B) , (\Box^*B) , $(\Box K)$, (Nec), $(\Box\text{-a})$ and (NPB). Given she endorses (7) and (8), and hence holds that ' $\diamond\exists xBx$ ', ' $\Box\exists xBx$ ' and ' $\exists xBx$ ' express necessarily equivalent states of affairs, it is then natural for her to go further and claim that they express the same state of affairs, and so endorse the analyses $(Q\diamond^*B)$ and $(Q\Box^*B)$.

$Q\diamond^*B$. $\diamond\exists xBx =_{df} \exists xBx$.

$Q\Box^*B$. $\Box\exists xBx =_{df} \exists xBx$.

I will assume that QR modal realists do this.

In order to make it plausible that modal realism enables a reduction of modality, a QR modal realist also needs to give a more general account of which non-modal statements express the same states of affairs as which modal statements than that provided by (\diamond^*B) , (\Box^*B) , $(Q\diamond^*B)$ and $(Q\Box^*B)$. (\diamond^*B) , (\Box^*B) , $(Q\diamond^*B)$ and $(Q\Box^*B)$ suggest a picture of modality according to which qualitative states of affairs, such as the state of affairs of there being a blue swan, either necessarily obtain or necessarily fail to obtain, while non-qualitative states of affairs, such as the state of affairs of there being a blue swan in α , may contingently obtain or contingently fail to obtain.²⁷ A natural generali-

²⁵ Dorr (MSa) and Noonan (2014) have also independently formulated versions of QR modal realism. Both Dorr and Noonan think modal realists should endorse this version of modal realism.

²⁶ It was shown above that (3*) follows from (\diamond^*B) , $(\Box\text{-a})$, (NPB*), $(\Box K)$ and (Nec). Since (7) follows from (NPB), (3*) and (6); (7) follows from (\diamond^*B) , $(\Box\text{-a})$, (NPB*), $(\Box K)$, (Nec) and (6). Since ' $\Box\exists xBx$ ' follows from (3*) and (5); and (8) follows from ' $\Box\exists xBx$ ', (3*) and (6); (8) follows from (\diamond^*B) , $(\Box\text{-a})$, (NPB*), $(\Box K)$, (Nec), (5) and (6).

²⁷ In light of this, QR modal realism might instead be called worldly qualitative necessitarianism. A qualitative state of affairs is intuitively a state of affairs that does not involve any particular things (though it might involve things in general), while a non-qualitative state of affairs is intuitively a state of affairs that involves at least one particular thing. A qualitative property or relation is similarly intuitively a property or relation that does not involve any particular things, whereas a non-qualitative property or relation is a property or relation that involves at least one particular thing. Examples of qualitative properties include *being a blue swan* and *being next to a tin*, while examples of non-qualitative properties include *being identical to Obama* and

sation of $(Q\Diamond^*B)$ and $(Q\Box^*B)$ that accords with this picture is given by the schemas $(Q\Diamond^*)$ and $(Q\Box^*)$, where ϕ can be replaced by any statement expressing a qualitative state of affairs.

$$Q\Diamond^*. \Diamond\phi =_{df} \phi.$$

$$Q\Box^*. \Box\phi =_{df} \phi.$$

Natural generalisations of (\Diamond^*B) and (\Box^*B) that accord with this picture, on the other hand, can be obtained by appealing to some version of counterpart theory. For example, a QR modal realist might adopt the simple version of counterpart theory given by the schemas (\Diamond^*) and (\Box^*) .²⁸

being an admirer of both Kripke and Joan of Arc.

²⁸ According to standard versions of counterpart theory, co-referring names can be associated with different counterpart relations. This allows modal sentences differing in only co-referring names to differ in truth value. The simple version of counterpart theory described above faces serious problems in treating ‘actually’, as do the versions of counterpart theory put forward, for example, in Lewis (1968; 1971), Forbes (1982; 1990), Ramachandran (1989) and Sider (MS). (For discussion, see Hazen (1979) and Fara & Williamson (2005).) A (restricted) version of counterpart theory that avoids these problems is the following: Define a counterpart relation to be any precisification (in any context) of ‘is similar enough to’. Define a representational function f to be a function that maps each counterpart relation to a permutation on the set of individuals. Define Id^* to be the function that maps each counterpart relation to the identity function on the set of individuals. Say that a representational function f is possible relative to a representational function f' iff, for any individuals x and y , for any counterpart relation c , $[f(c)](x)$ stands in c to $[f'(c)](y)$. Define L' to be a first-order language containing ‘ \neg ’, ‘ \wedge ’, ‘ \exists ’ (symbolising ‘for some individual’), ‘Actually’, ‘ \Diamond ’, names of individuals, variables, and predicates expressing fundamental properties and relations. Suppose each of the names and variables in L' is associated with a counterpart relation, and let ‘ $C(t)$ ’ refer to the counterpart relation associated with t . Define a two-place function expression ‘Trans’ (which takes as arguments terms referring to formulas in L' in its first place and terms referring to representational functions in its second place) so that it satisfies: a) $Trans(\ulcorner F(t_1, \dots, t_n) \urcorner, f) = \ulcorner F([f(C(t_1))]t_1, \dots, [f(C(t_n))]t_n) \urcorner$; b) $Trans(\ulcorner \neg\phi \urcorner, f) = \ulcorner \neg Trans(\phi, f) \urcorner$; c) $Trans(\ulcorner \phi \wedge \psi \urcorner, f) = \ulcorner Trans(\phi, f) \wedge Trans(\psi, f) \urcorner$; d) $Trans(\ulcorner \exists^*v\phi \urcorner, f) = \ulcorner \exists^*v Trans(\phi, f) \urcorner$; e) $Trans(\ulcorner \Diamond\phi \urcorner, f) = \ulcorner \exists g(g \text{ is a representational function, } g \text{ is possible relative to } f, \text{ and } Trans(\phi, g) \urcorner$; and f) $Trans(\ulcorner \text{Actually, } \phi \urcorner, f) = Trans(\phi, Id^*)$. The counterpart theoretic analysis of any formula ϕ in L' is then the formula $Trans(\phi, Id^*)$. This version of counterpart theory entails actualism, where actualism is the thesis that, for any existing thing x , x actually exists. The account can be modified to be made compatible with Lewis’s non-actualist indexical account of ‘actually’ outlined in (Lewis 1986, Sect. 1.9).

$$\Diamond^*. \Diamond Fa_1 \dots a_n =_{df} \exists z_1 \dots \exists z_n (C_{a_1} z_1 a_1 \wedge \dots \wedge C_{a_n} z_n a_n \wedge Fz_1 \dots z_n).$$

$$\Box^*. \Box Fa_1 \dots a_n =_{df} \forall z_1 \dots \forall z_n ((C_{a_1} z_1 a_1 \wedge \dots \wedge C_{a_n} z_n a_n) \supset Fz_1 \dots z_n).$$

In (\Diamond^*) and (\Box^*) , ‘ F ’ can be replaced by any n -place predicate that expresses an n -place qualitative property or relation; ‘ a_1 ’, ‘ a_2 ’, ‘ a_n ’ can be replaced by any names m_1, \dots, m_n ; ‘ z_1 ’, ‘ z_2 ’, ‘ z_n ’ can be replaced by distinct variables v_1, \dots, v_n which are associated with the same counterpart relations as m_1, \dots, m_n respectively; and ‘ C_{a_1} ’, ‘ C_{a_2} ’, ‘ C_{a_n} ’ can be replaced with predicates expressing the counterpart relations associated with m_1, \dots, m_n respectively. (\Diamond^*) and (\Box^*) can be regarded as reducing to $(Q\Diamond^*)$ and $(Q\Box^*)$ in the case where $n = 0$.²⁹

The big problem with the QR response is that QR modal realism is incompatible with a large number of highly plausible modal propositions.³⁰ For ex-

²⁹ A QR modal realist who endorses (\Diamond^*) and (\Box^*) , and who also endorses (\Diamond^*B) , (\Box^*B) , $(Q\Diamond^*B)$ and $(Q\Box^*B)$, needs to show that the former include the latter as special cases, or at least that they are consistent with each other. Since ‘ $\exists xBx$ ’ expresses a qualitative state of affairs, it is easy to see that $(Q\Diamond^*B)$ and $(Q\Box^*B)$ are instances of $(Q\Diamond^*)$ and $(Q\Box^*)$. How (\Diamond^*B) and (\Box^*B) relate to (\Diamond^*) and (\Box^*) , however, is less straightforward to determine. Given ‘ a ’ is associated with a counterpart relation that necessarily relates each L -world to all and only the L -worlds, (\Diamond^*) and (\Box^*) entail that ‘ $\Diamond(\exists x[Ix\alpha]Bx)$ ’ is necessarily equivalent to ‘ $\exists u\exists x(Wu \wedge Ixu \wedge Bx)$ ’, and that ‘ $\Box(\exists x[Ix\alpha]Bx)$ ’ is necessarily equivalent to ‘ $\forall u(Wu \supset \exists(Ixu \wedge Bx))$ ’. Given necessarily equivalent states of affairs are identical, (\Diamond^*B) and (\Box^*B) are therefore entailed by (\Diamond^*) and (\Box^*) . Given a more fine-grain theory of states of affairs according to which necessarily equivalent states of affairs can be distinct from each other, however, there is no reason to think that (\Diamond^*) and (\Box^*) entail, or are even compatible with, (\Diamond^*B) and (\Box^*B) . As a result, given a more fine-grain theory of states of affairs, a QR modal realist should plausibly hold that (\Diamond^*B) and (\Box^*B) are only approximately true, and should hold that it is the relevant instances of (\Diamond^*) and (\Box^*) that are strictly true. That is, instead of endorsing (\Diamond^*B) and (\Box^*B) , QR modal realists should instead endorse $(\Diamond^*B\alpha)$ and $(\Box^*B\alpha)$, where ‘ C_α ’ expresses a counterpart relation that necessarily relates each L -world to all and only the L -worlds.

$$\Diamond^*B\alpha. \Diamond(\exists x[Ix\alpha]Bx) =_{df} \exists u(C_\alpha u\alpha \wedge \exists x(Ixu \wedge Bx)).$$

$$\Box^*B\alpha. \Box(\exists x[Ix\alpha]Bx) =_{df} \forall u(C_\alpha u\alpha \supset \exists x(Ixu \wedge Bx)).$$

³⁰ Since L -worlds plausibly deserve to be called worlds (in at least one ordinary sense of ‘world’), L -worlds plausibly deserve to be called possible worlds in the sense of ‘possible’ on which anything that is an F is a possible F . There is another sense of ‘possible world’, however, on which, given QR modal realism, L -worlds arguably do not play enough of the required role to count as being possible worlds since they do

ample, since QR modal realists hold that there is a blue swan, $(Q\Box^*)$ commits them to (3).

3. $\Box\exists xBx$. (Necessarily, there is a blue swan.)

(3), however, is highly implausible, since, even if there are blue swans as modal realists claim, surely there might have been no such entities. The claim that it is necessary that there is a blue swan somewhere in the pluriverse of L -worlds (given there is in fact a blue swan in this pluriverse) is *prima facie* no more plausible than the claim that it is necessary that there is an alien creature somewhere in our universe (given there is in fact an alien creature somewhere in our universe). Even if there are alien creatures on some planet in our universe, it is surely merely contingent that there are such creatures. Similarly, even if there are blue swans in some L -world in the pluriverse, it is surely merely contingent that there are such swans. Hence, it is highly plausible that, contra QR modal realism, it is not necessary that there is a blue swan.

Since QR modal realists hold that there are multiple L -worlds, $(Q\Box^*)$ also commits them to the truth of (9).

9. $\Box\exists x\exists y((x \neq y) \wedge Wx \wedge Wy)$. (Necessarily, there are multiple L -worlds.)

(9), however, is also highly implausible. While it is plausibly possible for there to be multiple L -worlds, it is surely not necessary that there are such entities. The claim that it is necessary that there are multiple L -worlds is *prima facie* no more plausible than the claim that it is necessary that there are multiple planets in our universe. Just as it is surely contingent whether our universe has more

not play the distinctive role of possible worlds in the QR modal realist analysis of possibility and necessity. If QR modal realists are unable to identify possible worlds (in this second sense) with L -worlds, however, it is not clear what entities in their ontology they can identify them with, apart from perhaps the pluriverse itself. Given it is this second sense on which modal realism holds that there are multiple possible worlds, however, if QR modal realism is incompatible with there being multiple such entities, then QR modal realists will have to reject modal realism. The best response to this problem might be for QR modal realists to simply admit that their view isn't, strictly speaking, a version of modal realism, although it is a very close variant of modal realism that modal realists should find appealing, and it is a view that is in no respect inferior to a version of strict modal realism.

than one planet, it is surely contingent whether the pluriverse has more than one L -world. Hence, it is highly plausible that, contra QR modal realism, it is not necessary that there are multiple L -worlds.

More generally, QR modal realists claim that the qualitative nature of the pluriverse is necessarily fixed: that is, they hold that the pluriverse couldn't have been qualitatively any different from how it in fact is. *Prima facie*, however, this claim is no more plausible than the claim that our universe could not have been qualitatively different from how it in fact is. Nor is it any more plausible than the claim that the pluriverse couldn't have been different from how it in fact is in any respect at all, including in non-qualitative respects. Since these latter claims are surely false, the former claim is surely false also.

QR modal realists therefore face what we might call *the contingency objection*: QR modal realism is surely false since it is incompatible with a number of highly plausible modal propositions, such as those expressed by (10), (11) and the more general proposition that how things qualitatively are is a contingent matter.

10. $\Diamond\neg\exists xBx$.

11. $\Diamond\neg\exists x\exists y((x \neq y) \wedge Wx \wedge Wy)$.

There are three kinds of responses a QR modal realist might make to the contingency objection. First, they might accept that when we evaluate the propositions expressed by (10) and (11) our modal reasoning (at least initially) results in the confident judgement that they are true. They might argue, however, that further reflection shows that this reasoning is defective and that we have no good reason to think that (10) and (11) are true. Second, they might accept that (10) and (11) have a high degree of plausibility, but claim that this plausibility is outweighed by the advantage modal realism has in parsimony over rival theories of possible worlds that allow for the truth of these sentences.³¹ Finally, they might accept both that (10) and (11) are highly plau-

³¹ A proposition may be plausible, but fail to be *overall* plausible, or plausible *all things considered*. A proposition is plausible if it is intrinsically plausible, or if it is plausible given certain other propositions we have good reason to believe, or it is plausible given certain perceptual, introspective or memory states we are in. A

sible, and that parsimony considerations cannot outweigh this plausibility, but claim that other considerations do outweigh it. I will consider each of these responses in turn and argue that none of them are successful.

A QR modal realist who adopts the first kind of response to the contingency objection endorses (12).

12. Our modal reasoning when applied to (10) and (11) is defective and does not provide us with a good reason for thinking that (10) and (11) are true.

One way a QR modal realist might attempt to justify (12) is by claiming that *all* our modal reasoning is defective, and that, as a result, none of our modal reasoning provides any good reason for believing the results of that reasoning. A problem with this attempt to justify (12) is that it would seem hard to justify such a blanket rejection of our modal reasoning. This is especially so since some of our modal reasoning, such as the modal reasoning that results in the judgement that necessarily any triangle has three sides, would appear to be as secure as any instance of our reasoning (whether it be modal or non-modal). Unless a QR modal realist can provide a compelling reason to think that such reasoning is in fact defective, this first attempt at justifying (12) should be rejected.³²

A second way a QR modal realist might attempt to justify (12) is by claiming that the modal claims expressed by (10) and (11) only appear true as a result of us confusing them with other claims that are true. For example, a QR modal realist might claim that (10) only seems true because we confuse the proposition that there might have been no blue swans (which is the proposi-

tion expressed by (10)) with the proposition that there might have been no blue swans *that are in α* . If this is the case, then there is no reason to think that (10) is true or has a high degree of plausibility, and hence we have no reason to think that the credibility of QR modal realism is damaged by its rejection of (10) and its endorsement of (3).

Let p_B be the proposition that there might have been no blue swans, and let p_B^* be the proposition that there might have been no blue swans in α . p_B appears to be true even after sustained reflection, and even after the possibility that one is confusing p_B with p_B^* is brought to one's attention. Moreover, at least in my case, when I reflect on whether I am confusing p_B with p_B^* when it seems to me that p_B is true, it introspectively seems to me that I am not so confusing them. Given this is true for others who have carefully considered the matter, QR modal realists who adopt the first response to the contingency objection need to claim that p_B only seems true to such people due to them confusing p_B with p_B^* , despite it seeming to them that they aren't making such an error. In order to undermine the plausibility of a proposition that on careful reflection seems true, however, it is not sufficient to merely claim (without providing any evidence for that claim) that the proposition only seems true because we confuse it with some other proposition that is true. After all, if this tactic were sufficient, it could be used to undermine the plausibility of any proposition at all, which would lead to radical scepticism. In order to undermine the claim that p_B has a high degree of plausibility, it is therefore not sufficient to simply claim (without providing any evidence for that claim) that p_B only appears true because we confuse it with p_B^* when considering whether it is true. There appears to be no reason, however, to think that we confuse p_B with p_B^* when we evaluate p_B . Indeed, not only does there appear to be no reason to think that we confuse p_B with p_B^* when we evaluate p_B , there is reason to think that we don't so confuse these propositions. While we sometimes confuse propositions when we reason, we are typically able to detect that we are doing this when the possibility that we might be doing it is brought to our attention. Since this is not the case for p_B , at least for those who carefully evaluate p_B in the way described above, we have good reason to deny that p_B only appears true because we confuse it with p_B^* . The same is true for the other modal claims that appear true but are incompatible with QR modal realism.

proposition p may be plausible without being overall plausible, since the considerations in favour of p might be outweighed by the considerations against p . Since plausibility is a notion of broadly epistemic probability, as opposed to physical probability, what is plausible needs to be relativised to a subject or an evidential state.

³² A QR modal realist might perhaps attempt to give such a reason by giving a debunking argument against the reliability of our modal reasoning along the lines of debunking arguments against our moral reasoning. Due to limitations of space, the prospects of such an argument cannot be investigated here. QR modal realists who embrace scepticism about all our modal beliefs also face similar problems to those faced by eliminativists about modality discussed in section 4, such as being unable to test the analyses they propose using the method of possible cases.

A QR modal realist might attempt to respond to this problem by appealing to modal restrictivism. Modal restrictivism is the view that non-philosophers (and philosophers when not doing ontology) typically tacitly restrict their domain of quantification to at most parts of α .³³ According to modal restrictivism, for example, a biologist uttering ‘There are no blue swans’ typically expresses the proposition that there are no blue swans *in α* , rather than the proposition that there are no blue swans at all. Similarly, according to modal restrictivism, a biologist uttering ‘There might have been no swans’ typically expresses the proposition that there might have been no swans *in α* , rather than the proposition that there might have been no swans at all. A QR modal realist who adopts modal restrictivism might claim that the fact we confuse p_B with p_B^* when evaluating whether p_B is true is introspectively inaccessible to us, and hence is not something we can uncover by introspectively considering the possibility that we are confusing p_B with p_B^* . They might then argue that there is good reason to believe that we so confuse p_B with p_B^* because we often confuse propositions that are expressed by the same sentence in different contexts (as p_B and p_B^* are, according to modal restrictivists), and that this error is introspectively inaccessible to us because ‘There could have been no blue swans’ expresses p_B only in unusual and highly theoretical contexts.³⁴

³³ At least when talking of individuals.

³⁴ While defending the QR response, Noonan claims that modal realists can diminish the conflict between QR modal realism and common sense by claiming that “the commonsense man” asserts the restricted claim that there might have been no snakes in α when he utters ‘There might have been no snakes’ (Noonan 2014, pp. 857–8). Noonan, however, rejects modal restrictivism, writing “[W]hen the man in the street says that there are no talking donkeys he does not merely mean that there are none locally, that is, none spatiotemporally related to him, he means that there are none simpliciter, otherwise he should greet the modal realist’s contrary contention with a yawn of indifference rather than an incredulous stare” (Noonan 2014, p. 855). Noonan also appears to claim that the commonsense man asserts that there might have been (unrestrictedly) talking donkeys when he utters ‘There might have been talking donkeys’ (Noonan 2014, p. 857). Given this mix of views, it is not clear why the commonsense man would talk restrictedly when uttering sentences like ‘There might have been no snakes’ when he doesn’t talk so restrictedly when he utters sentences like ‘There are no talking donkeys’ and ‘There might have been talking donkeys’.

This argument that we confuse p_B with p_B^* is very weak, even if we grant the highly controversial thesis of modal restrictivism.³⁵ First, natural language is full of context-dependent expressions, and we are typically highly skilled at using such expressions without confusing the propositions they express in different contexts. The fact that ‘There might have been no blue swans’ is context-dependent therefore provides no reason to think that we are making the above kind of error. Secondly, we are ordinarily highly skilled at understanding and reasoning with propositions we have not encountered before (such as the proposition that Obama does not have four right knees), as well as understanding and reasoning with propositions only expressed by sentences in highly theoretical contexts (such as when engaging in pure mathematics). As a result, the fact that it is unusual to encounter p_B , and the fact that it is encountered only in highly theoretical contexts (even if these are facts), provides no reason to think that we confuse p_B with p_B^* . Thirdly, even though in rare cases we might confuse propositions when considering the truth of a proposition that is only expressed by a context-dependent expression in unusual and theoretical contexts, the fact that the proposition is encountered only in such contexts provides no reason to

³⁵ Korman 2008 has persuasively rebutted a number of arguments for endorsing ordinary object restrictivism (where ordinary object restrictivism is the view that ordinary folk restrict their quantification to rule out strange fusions such as the fusion of a feather with the Eiffel Tower), and Korman’s rebuttals apply with equal force to analogous arguments for modal restrictivism. Modal restrictivism receives some support from the fact that we are often willing to utter a sentence like ‘There are many monsters we used to fear as children that we no longer believe in’ in one context, while also willing to utter ‘There are no monsters’ in a different context. This data supports restrictivism since restrictivists can explain our willingness to utter these sentences by claiming i) that the first sentence (in the relevant context) is used to assert the proposition that there are monsters we used to fear as children that we no longer believe in, ii) that the second sentence (in the relevant context) is used to assert the proposition that there are no monsters in α , and iii) that these propositions are compatible with each other. As (Korman 2008, Fn. 10) points out, however, this data does not provide decisive support for modal restrictivism, since there are alternative explanations for the data that don’t require restrictivism. For example, our uses of the two sentences might be held to be incompatible with each other, and our willingness to assert them in different contexts might be explained in terms of different philosophical considerations being salient to us in different contexts, where these different philosophical considerations point towards incompatible conclusions. There are also non-restrictivist accounts of what the two sentences express on their relevant uses which render them compatible with each other.

think that this confusion should be introspectively inaccessible to us. The fact that p_B is only expressed by a context-dependent expression in unusual and theoretical contexts therefore provides no reason to think that we confuse p_B with p_B^* in a way that is introspectively inaccessible to us. Modal restrictivism therefore provides no support for the claim that p_B only seems true because we confuse it with p_B^* .³⁶ In light of this fact, this second attempt to justify (12) appears to be as unsuccessful as the first. Unless a better justification of (12) can be found, the first kind of response to the contingency objection therefore appears to be unsuccessful.

The second kind of response to the contingency objection accepts that modal claims like those expressed by (10) and (11) have a high degree of plausibility, but argues that, despite this plausibility, QR modal realists are still justified in rejecting them on parsimony grounds. QR modal realism is plausibly more ideologically parsimonious than the best abstractionist theories, since the best completions of abstractionism contain at least one fundamental notion the best completions of QR modal realism do not contain: in particular, they in-

clude at least one fundamental modal notion such as possibility. Granting that QR modal realism is more parsimonious than its best abstractionist rivals in this way, a QR modal realist might attempt to respond to the contingency objection by claiming that this advantage in parsimony contributes more to the overall theoretical virtue of QR modal realism than its incompatibility with plausible modal claims, such as those expressed by (10) and (11), subtracts from it. If this is the case, then QR modal realists can conclude that, despite its rejection of (10) and (11), QR modal realism has greater overall theoretical virtue than its abstractionist rivals, and is therefore more likely to be true than them.

Parsimony considerations are widely taken to be able to justify one theory over another theory if the two theories are otherwise equally good. A QR modal realist who adopts the second kind of response to the contingency objection, however, needs to go beyond this common view and claim that parsimony considerations can justify QR modal realism over its abstractionist rivals, even though there are important respects in which QR modal realism is *worse* than its rivals. In particular, a QR modal realist needs to endorse (13), and it is difficult to see how (13) can be justified.

13. The theoretical virtue gained by QR modal realism having less fundamental notions than its best abstractionist rivals outweighs the theoretical virtue lost by it being incompatible with (10) and (11) and other similar plausible modal statements.

One difficulty in justifying (13) is that any argument for (13) will be credible only if each of its premises is at least as plausible as the claims the argument is being used to reject, such as those expressed by (10) and (11). In order to provide a credible argument for (13), therefore, QR modal realists need to give an argument whose premises are at least as plausible as (10) and (11), and this appears difficult to do, given, as is admitted by the current response to the contingency objection, (10) and (11) both have a high degree of plausibility. A second difficulty in justifying (13) is that a credible argument for it will need to avoid making it too easy for an advantage in parsimony to outweigh the plausibility of claims whose plausibility derives from considerations other than parsimony, such as claims that are intrinsically plausible, claims that are plausible given other propositions we have good reason to believe, and claims

³⁶ A QR modal realist might offer a variant of the first response to the contingency objection which appeals to Lewis's account of 'actual'. According to Lewis's account: i) as uttered by someone in an L -world w , 'actual' applies to an individual x iff x is part of w , and ii) there is a non-rigid sense of 'actual' on which it is true to say of what is actual that it might not have been actual, as well as a rigid sense of 'actual' on which it is not true to say of what is actual that it might not have been actual. (See [Lewis 1986, Sect. 1.9].) Instead of claiming that we confuse p_B with p_B^* , a QR modal realist might claim that the reason why p_B appears true is that we confuse it with the true $p_B^\#$, where $p_B^\#$ is the proposition that there might have been no actual blue swans, where 'actual' is used in its non-rigid sense. Such a QR modal realist might go on to claim that the reason we confuse p_B with $p_B^\#$ is that, even after reflection, we are unable to distinguish p_B from $p_B^\#$ since we are unable to distinguish the property of being (or perhaps the property of existing) from the property of being actual. One problem with this response is that, if it is a fact that we cannot distinguish the property of being actual from the property of being (or the property of existing), then this fact provides reason to think that the reason why they aren't distinguishable is that they are identical (or at least necessarily equivalent), which is incompatible with Lewis's account of 'actual'. Another problem with this response is that we arguably can distinguish p_B and $p_B^\#$, at least in the sense that we can refrain from endorsing 'There might be no actual blue swans' (at least for the sake of argument), while reasoning perfectly competently with 'There might be no blue swans'. The fact that 'There might be no blue swans' still seems true when we do this suggests that p_B doesn't seem true as a result of us confusing it with $p_B^\#$.

having an immediate justification based on perception, introspection or memory. The reason for this is that, if an argument for (13) makes it too easy for an advantage in parsimony to outweigh such claims, then the argument risks having the absurd consequence that the best theory relative to our evidence is the maximally simple theory that holds that there is nothing. A third difficulty in justifying (13) is that a priori inconsistent theories arguably cannot be parsimonious, since such theories fail to coherently represent reality as being a certain way, and hence fail to represent reality as being simple, as opposed to being complicated. If a priori inconsistent theories cannot be parsimonious, however, it is unclear whether QR modal realism has any advantage in parsimony that can outweigh its incompatibility with (10) and (11), since its incompatibility with these sentences will then be a reason to think that QR modal realism is not a priori consistent and hence not parsimonious. Unless a QR modal realist can devise an argument for (13) that overcomes these difficulties, the QR modal realist's claim that she is justified in rejecting (10) and (11) on parsimony grounds will be unjustified.

It is useful to note that there are good reasons to think that parsimony considerations can play a role in theory choice even when the competing theories aren't equally good in all other respects. Consider the following (idealised) case involving an experiment testing a theory T_1 : Suppose that T_1 and T_2 are incompatible theories whose disjunction is known (with certainty) to be true. Suppose T_1 and T_2 are initially both compatible with the evidence, and that the probability of T_1 being true is $19/20$ due to its great parsimony, while the probability of T_2 is $1/20$. Suppose an experiment is carried out that measures a quantity that has two possible values: Good and Bad. Suppose also that (due to the possibility of human error) the probability that the result of the experiment is accurate is $9/10$ and the probability that the result of the experiment is inaccurate is $1/10$. Suppose also that whether the result of the experiment is accurate or not is probabilistically independent of which value the measured quantity has. Suppose further that T_1 is incompatible with the measured quantity being Bad, while T_2 is incompatible with the measured quantity being Good. Finally, suppose that the experiment gives the result that the quantity is Bad. Standard probabilistic reasoning can then be used to show that, relative to our updated evidence (which includes the result of this experiment), the probability of T_1

will reduce from $19/20$ to $19/28$.³⁷ Hence, after the result of the experiment is known, T_1 will still be more likely true than not true, despite the fact that its only advantage over its rival is parsimony and (since it is incompatible with the results of an experiment while its rival isn't) there is an important respect in which its rival is better than it. The existence of this case suggests that parsimony considerations can do more than merely break ties in theory choice.

While the above case plausibly shows that parsimony can do more than merely break ties between otherwise equally good theories, the case provides little support for QR modal realists trying to overcome the contingency objection. The right course of action in the case of the experiment would be to check to see if any mistakes were made in doing the experiment and, if necessary, redo the experiment. If no mistakes come to light, and repeated experiments come up with the same results, then we should reject T_1 , no matter how parsimonious T_1 is.³⁸ This suggests that in the modal reasoning case, if, on extended reflection, no mistakes can be detected, and repeated deployments of our modal reasoning give the same results, then these results should be accepted and QR modal realism should be rejected.³⁹

³⁷ Before the result of the experiment is known, the probability that T_1 is true and the result of the experiment is inaccurate is $19/20 \times 1/10$, and the probability that T_1 is false and the result of the experiment is accurate is $1/20 \times 9/10$. (Relative to the original evidence, the truth of T_1 and the accuracy of the experiment are probabilistically independent since: i) the value of the measured quantity and the accuracy of the experiment are probabilistically independent, and ii) the value of the measured quantity necessitates the truth value of T_1 .) Hence, relative to the original evidence, the probability of T_1 being true, conditional on either T_1 being true and the result of the experiment being inaccurate or T_1 being false and the result of the experiment being accurate, is $(19/20 \times 1/10)/(19/20 \times 1/10 + 1/20 \times 9/10) = 19/28$. After the result of the experiment is known, since the result of the experiment is incompatible with T_1 , it is known that either T_1 is true and the result of the experiment is inaccurate or T_1 is false and the result of the experiment is accurate. Hence, after the result of the experiment is known, the probability of T_1 being true is $19/28$.

³⁸ I am assuming that all auxiliary theories relevant to the experiment are built into T_1 itself so an error in the experiment will have to be due to human error.

³⁹ Although it concerns abductive considerations that don't uncontroversially reduce to considerations of parsimony, the following mathematical case is another useful case to consider: We arguably have strong inductive grounds for holding that Goldbach's conjecture is true, since it has been determined to hold of the many instances of it that have been tested. If someone did a calculation which gave the result that Gold-

The third way a QR modal realist might attempt to respond to the contingency objection is to argue that, while (10) and (11) have a high degree of plausibility, QR modal realists are free to reject them since they conflict with other highly plausible claims. To illustrate this approach, I will discuss one argument of this type. I will argue that the argument fails and conclude that, in the absence of any better argument of this type, this third type of response to the contingency objection also fails.

In order to respond to the contingency objection, a QR modal realist might claim that (14), (15) and (16) are each highly plausible.

14. $\Box(Faa \supset \exists xx((xx = aa) \wedge Fxx))$. (Necessarily, if *aas* are *F*, then there are some things that are *aas* and are *F*.)
 15. $\Box(\text{Blue swans exist or blue swans do not exist})$.
 16. $\Box(\text{If blue swans exist, then there are blue swans})$.
- She might then point out that (17) is an instance of (14), and that (17) entails (18), since, necessarily, if there are some things that are blue swans that do not exist, then there are blue swans.
17. $\Box(\text{If blue swans do not exist, then there are some things that are blue swans and do not exist})$.
 18. $\Box(\text{If blue swans do not exist, then there are blue swans})$.

Since (15), (16) and (18) entail (3), she might then conclude that, despite its plausibility, a QR modal realist is free to reject (10) since it is incompatible with the at least equally plausible (14–16).

The problem with this argument is that the argument for the necessity of blue swans it relies on over-generates: it cannot be sound, since, if it were sound, then similar arguments with clearly false conclusions would also be sound. For example, if this argument for the necessity of blue swans were

bach's conjecture fails to hold for a certain previously untested instance, it might still be rational to hold that Goldbach's conjecture is more likely true than false, due to the possibility of error in doing the calculation. If repeated calculations give the same result, however, it would then become rational to reject Goldbach's conjecture.

sound, then the following argument (whose premises are analogues of (15), (16) and (17)) for the necessity of visible monsters under my bed would also be sound:

- $\Box(\text{Either visible monsters under my bed exist or visible monsters under my bed do not exist})$
 - $\Box(\text{If visible monsters under my bed exist, then there are visible monsters under my bed})$
 - $\Box(\text{If visible monsters under my bed do not exist, then there are some things that are visible monsters under my bed and do not exist})$
-
- $\Box(\text{There are visible monsters under my bed})$

Since this argument for the necessity of visible monsters under my bed is not sound (since there are no visible monsters under my bed), the above argument for the necessity of blue swans is not sound either.

A QR modal realist might attempt to respond to this objection by attempting to give a motivated explanation for why the above argument for the necessity of blue swans is sound when the very similar argument for the necessity of visible monsters under my bed is not sound.⁴⁰ In the absence of such an explanation, however, the above argument for the necessity of blue swans must be regarded with extreme suspicion and therefore cannot act as a counterbalance to the plausibility of (10).⁴¹ Hence, without such an explanation, this last attempt to

⁴⁰ The above argument for the necessity of blue swans is similar to arguments that have been given for Meinongianism that also face over-generation objections, where Meinongianism is the thesis that some things do not exist. (See, for example, Reicher [2014], Parsons [1980], Zalta [1988] and Crane [2013].) Meinongians have offered replies to these objections, but, as far as I know, these replies either have serious problems or cannot be applied to defend the above argument (or both).

⁴¹ Given these arguments are unsound, why are they unsound? A plausible answer is that, despite its initial plausibility, the instances of (PP) are false: the fact that visible monsters under my bed don't exist doesn't entail that there are things that are visible monsters under my bed that don't exist, nor does the fact that blue swans don't exist entail that there are things that are blue swans that don't exist. Another possible answer is that sentences of the form '*aas* are *F*' fail to express states of affairs when there are no *aas*. If this is correct, then, if there are no blue swans, 'Blue swans do not exist' fails to be true, since it fails to express a state of affairs.

respond to the contingency objection also fails.

3. The ambiguity response

A modal realist might claim that (3) is ambiguous since ‘ \square ’ is ambiguous. She might then claim that, while adequately responding to the puzzle forces a modal realist to accept that there is a true reading of (3), this is not a problem, since this reading is not the reading on which (3) is plausibly false. She might also make a similar claim about (9).

$$3. \square \exists x Bx.$$

$$9. \square \exists x \exists y ((x \neq y) \wedge Wx \wedge Wy).$$

One way a modal realist might develop this response is to claim that ‘ \diamond ’ and ‘ \square ’ (and hence also ‘absolutely possibly’ and ‘absolutely necessarily’, which they symbolise) are both ambiguous, with each having both an “ordinary” reading and an “extraordinary” reading. A modal realist who adopts this response might then claim that ($\diamond B$) and ($\square B$) are true when ‘ \diamond ’ and ‘ \square ’ have their ordinary readings, while ($\diamond^e B$) and ($\square^e B$) are true when ‘ \diamond ’ and ‘ \square ’ have their extraordinary readings.⁴²

$$\diamond B. \diamond \exists x Bx =_{df} \exists u \exists x (Wu \wedge Ixu \wedge Bx).$$

$$\square B. \square \exists x Bx =_{df} \forall u (Wu \supset \exists x (Ixu \wedge Bx)).$$

⁴² More generally, according to this response: i) (\diamond) and (\square) are both true when ‘ \diamond ’ and ‘ \square ’ have their ordinary readings and ϕ is a non-modal statement expressing a qualitative state of affairs, and where (as in footnote 20) ‘ $\underline{at} u$ ’ restricts all implicit and explicit quantification within its scope to parts of (the referent of) ‘ u ’; and ii) (\diamond^e) and (\square^e) are true when ‘ \diamond ’ and ‘ \square ’ have their extraordinary readings where ϕ is any statement.

$$\underline{\diamond}. \underline{\diamond} \phi =_{df} \exists u (Wu \wedge (\underline{at} u, \phi)).$$

$$\underline{\square}. \underline{\square} \phi =_{df} \forall u (Wu \supset (\underline{at} u, \phi)).$$

$$\diamond^e. \diamond \phi =_{df} \exists u (Wu \wedge \phi).$$

$$\square^e. \square \phi =_{df} \forall u (Wu \supset \phi).$$

$$\diamond^e B. \diamond \exists x Bx =_{df} \exists u (Wu \wedge \exists x Bx).$$

$$\square^e B. \square \exists x Bx =_{df} \forall u (Wu \supset \exists x Bx).$$

A modal realist who adopts this response might further claim that the extraordinary readings of ‘ \diamond ’ and ‘ \square ’ are the readings that ‘possibly’ and ‘necessarily’ typically have in discussions of modal metaphysics when the people involved in the discussion are explicitly considering the whole pluriverse, whereas the ordinary readings of ‘ \diamond ’ and ‘ \square ’ are the readings that ‘possibly’ and ‘necessarily’ typically have in other contexts (except when ‘possibly’ and ‘necessarily’ are being used to express an epistemic modality, or a relative non-epistemic modality like physical possibility or technological possibility). For example, such a modal realist might claim that the ordinary readings of ‘ \diamond ’ and ‘ \square ’ are the readings of ‘possibly’ and ‘necessarily’ that are typically employed in philosophical discussions outside modal metaphysics, such as in the debate over whether philosophical zombies are possible and the debate over whether free will is compatible with determinism. Call this response to the puzzle the ambiguity response, call a modal realist who adopts this response an ambiguity modal realist, and call the version of modal realism endorsed by an ambiguity modal realist ambiguity modal realism.⁴³

⁴³ A modal realist might want to claim that ‘absolutely possibly’ and ‘absolutely necessarily’ are context-dependent rather than ambiguous. Ambiguity modal realism is essentially the version of modal realism Divers [2014] thinks a modal realist should adopt. (Menzies & Pettit [1994] also seem to favour this version of modal realism.) Divers’s preferred version of modal realism differs slightly from the version of ambiguity modal realism formulated above, since he holds that ‘ \diamond ’ and ‘ \square ’ have a redundancy analysis on their extraordinary reading on which ‘ $\diamond \phi =_{df} \phi$ ’ and ‘ $\square \phi =_{df} \phi$ ’ are both true for any statement ϕ .

Divers appears to suggest that modal realists should endorse an alternative version of modal realism in Divers (1999; 2002), although he disowns this interpretation of his previous work in Divers (2014). According to this alternative version of modal realism: i) if φ expresses a state of affairs s that is not intrinsically about any L -world (and so is a “trans-world state of affairs”), then ‘ $\diamond \varphi =_{df} \varphi$ ’ and ‘ $\square \varphi =_{df} \varphi$ ’ are true; whereas ii) if φ expresses a state of affairs that is intrinsically about an L -world (and hence is an “intra-world” state of affairs), then ‘ $\diamond \varphi$ ’ and ‘ $\square \varphi$ ’ are given an analysis along the lines of the counterpart theory of Lewis (1968; 1971). This version of modal realism faces the following problem: Suppose that ‘ a ’ refers to a pyramid in α and is associated with a counterpart relation that relates the referent of ‘ a ’ to a non-pyramid. Suppose that ‘ b ’ refers to something in a different L -world

It is not immediately clear how the ambiguity response is meant to resolve the puzzle, since the puzzle argument can be reformulated so that it poses the following dilemma for ambiguity modal realists: Suppose in the current context we ask an ambiguity modal realist what it is for it to be the case that $\diamond\exists xBx$ and what it is for it to be the case that $\square\exists xBx$. Depending on what reading she thinks ‘ \diamond ’ and ‘ \square ’ have in the current context, she will answer this question by either uttering $(\diamond B)$ and $(\square B)$, or uttering $(\diamond^e B)$ and $(\square^e B)$. If she utters $(\diamond B)$ and $(\square B)$, then we can once again give the original puzzle argument to establish the conclusion that her answer is false, since it has the false consequence that there is a blue swan in α . If, on the other hand, she utters $(\diamond^e B)$ and $(\square^e B)$, we can run the following version of the puzzle argument to show that her answer commits her to the truth of ‘ $\square\exists xBx$ ’ in the current context:

- 1e. $\square(\diamond\exists xBx \equiv \exists u\exists x(Wu \wedge Bx))$ [$\diamond B^e$, \square -a]
 2e. $\square\exists u\exists x(Wu \wedge Bx)$ [1e, NPB, $\square K$]
 3e. $\square\exists xBx$ [2e, Nec]

We can then re-run the argument of section 2 to show that ‘ $\square\exists xBx$ ’, as used in the current context, is false (or at least highly implausible). Hence, we can conclude that, whichever answer an ambiguity modal realist gives, she answers falsely (or at least implausibly).

Call this version of the puzzle argument the dilemma argument. In order to respond to this argument, an ambiguity modal realist will presumably say, not only that ‘ \diamond ’ and ‘ \square ’ are ambiguous, but also that we easily confuse or equivocate

over their readings, which makes the dilemma argument seem sound when in fact it is not sound. Since the dilemma argument still seems sound after reflection and after we are made aware of the possibility that ‘ \diamond ’ and ‘ \square ’ might be ambiguous, however, an ambiguity modal realist would appear to also need to claim that we aren’t introspectively able to distinguish when we are using ‘ \diamond ’ and ‘ \square ’ (or ‘absolutely possibly’ and ‘absolutely necessarily’) with their ordinary readings and when we are using them with their extraordinary readings, and that this is why we easily confuse them and equivocate with respect to them. Given we are introspectively blind to the different readings of ‘ \diamond ’ and ‘ \square ’, and thus susceptible to confusing them and equivocating with respect to them, an ambiguity modal realist can conclude that the dilemma argument should not be taken as undermining or refuting the ambiguity response.

An ambiguity modal realist who adopts this response to the dilemma argument faces the following serious problem: The plausibility of an argument cannot be rationally undermined by postulating an ambiguity there is no reason for believing in other than it allows a defence of the view that is being attacked by the argument. Such a manoeuvre cannot work, since, if it could work, it could be used to rationally undermine any argument whatsoever, which would be absurd. An ambiguity modal realist therefore needs to provide an appropriately independent justification for the ambiguity she postulates (as well as good reasons to think that we are subject to equivocation or confusion with respect to this ambiguity when judging the dilemma argument to be cogent). There does not appear, however, to be any such justification. One standard piece of evidence for a word being ambiguous, for example, is the existence of two phonetically identical sentence tokens that plausibly differ in truth value, that both contain the word, and whose difference in truth value can be explained by the postulated ambiguity and cannot be uncontroversially explained in some other manner. As far as I know, however, in the case of ‘ \diamond ’ and ‘ \square ’ (as well as in the case of ‘possibly’ and ‘necessarily’ where these are used to mean ‘absolutely possibly’ and ‘absolutely necessarily’), there are no such sentence tokens. Other tests for ambiguity, such as the conjunction reduction test, the ellipsis test and the contradiction test, also appear unable to detect the postulated ambiguity.

than a . Suppose also that ‘ P ’ symbolises ‘is a pyramid’ while ‘ R ’ symbolises ‘is spatiotemporally related to’. Then, since ‘ $\neg Pa$ ’ expresses an intra-world state of affairs while ‘ $Pa \wedge \neg Rab$ ’ expresses a trans-world state of affairs, this account entails (D) and (E), where ‘ C_a ’ expresses the counterpart relation associated with ‘ a ’.

- D. $\diamond\neg Pa =_{df} \exists u\exists x(Wu \wedge C_axa \wedge Ixu \wedge \neg Px)$.
 E. $\square(Pa \wedge \neg Rab) =_{df} Pa \wedge \neg Rab$.

Hence, on this account, ‘ $\diamond\neg Pa$ ’ and ‘ $\square(Pa \wedge \neg Rab)$ ’ are both true. Since these statements are incompatible with each other, the account therefore fails.

lated ambiguity.⁴⁴ Unless ambiguity modal realists can provide appropriately independent evidence for the ambiguity they postulate, then, the ambiguity response should be rejected.⁴⁵

An ambiguity modal realist might claim that the following argument provides the required appropriately independent justification for ‘ \diamond ’ and ‘ \square ’ being ambiguous and having distinct ordinary and extraordinary readings:⁴⁶ The considerations in favour of modal realism (namely, its ability to increase ideo-

⁴⁴ See (Sennet 2015, Sect. 4) for these tests. (Parsons 2012, Fn. 8) uses the conjunction reduction test to test the kind of ambiguity postulated by the ambiguity response.

⁴⁵ No linguist, as far as I know, has postulated an ambiguity along the lines postulated by ambiguity modal realists, which provides further reason to think that there is no justification for believing in the postulated ambiguity that is appropriately independent of modal realism. The postulated ambiguity is also not supported by generic accounts of possibility in terms of possible worlds, since standard abstractionist accounts of possible worlds provide no reason to expect that ‘ \diamond ’ and ‘ \square ’ are ambiguous and have a reading on which ‘ $\diamond\phi$ ’ and ‘ $\square\phi$ ’ are necessarily equivalent to ϕ .

⁴⁶ (Divers 2014, p. 869) might be taken as giving the following argument for the existence of the postulated ambiguity given modal realism: (1) (Absolutely necessarily ϕ) =_{df} (ϕ is true in all of modal space). (2) If modal realism is true, then modal space is the plurality of L -worlds. Hence: (3) If modal realism is true, then (absolutely necessarily ϕ) =_{df} (ϕ is true in all the L -worlds). (4) ‘ ϕ is true in all the L -worlds’ is ambiguous since it can be understood as meaning ‘For each L -world w , ϕ is true in w ’, or it can be understood as meaning ‘ ϕ is true in the mereological sum of all the L -worlds’. Given modal realism, in the former sense ‘There is a blue swan’ is not true in all L -worlds, while in the latter sense ‘There is a blue swan’ is true in all the L -worlds. Hence: (5) Given modal realism, ‘absolutely necessarily’ is ambiguous. (6) ‘Absolutely possibly’ is also ambiguous given modal realism by the same kind of reasoning.

One problem with Divers’s argument (so interpreted) is that, even granting that ‘is true in all the L -worlds’ is ambiguous, we have been given no reason to think that ‘is true in all of modal space’ is also ambiguous and has the same readings as ‘is true in all possible worlds’. A second problem is that, even granting that ‘is true in all modal space’ does have the same readings as ‘is true in all L -worlds’, we have been given no reason to think ‘Absolutely necessarily ϕ ’ is ambiguous and has the same readings as ‘is true in all of modal space’. A third problem is that, at best, the argument shows that ‘ \diamond ’ and ‘ \square ’ are ambiguous if modal realism is true. But this does not entail that the postulated ambiguity has a justification that is appropriately independent of modal realism. For comparison, ‘ \diamond ’ and ‘ \square ’ are ambiguous if ambiguous modal realism is true, but this clearly does not entail that the postulated ambiguity has a justification that is appropriately independent from ambiguity realism.

logical parsimony and vindicate our best semantic, psychological and physical theories) are also considerations in favour of the analyses of (19) and (20).

19. $\diamond\exists xBx$ =_{df} for some L -world w , at w , there is a blue swan.

20. $\square\exists xBx$ =_{df} for any L -world w , at w , there is a blue swan.

The right-hand sides of (19) and (20) have multiple readings, since ‘at’ has multiple readings. On one reading of ‘at’ (which may be called the restricting reading of ‘at’), ‘at w , ϕ ’ means ‘inside w , ϕ ’, or ‘among the parts of w , ϕ ’. Given this reading of ‘at’, the right-hand side of (19) means ‘For some L -world w , there is a blue swan that is part of w ’ while the right-hand side of (20) means ‘For any L -world w , there is a blue swan that is part of w ’. On the other reading of ‘at’ (which may be called the non-restricting reading of ‘at’), ‘at w , ϕ ’ roughly means ‘from the point of view of w , ϕ ’, or ‘it would be true to say that ϕ if one was in location w ’. ‘At w , there is a blue swan’ is true on this reading of ‘at’, iff, looking out on the pluriverse from the location of w , there is a blue swan; which is true iff there is a blue swan. Hence, given ‘at’ has its non-restricting reading, the right-hand side of (19) says that there is an L -world such that there is a blue swan, while the right-hand side of (20) says that every L -world is such that there is a blue swan. Since the right-hand sides of (19) and (20) have two readings corresponding to the two different readings of ‘at’, the left-hand sides of (19) and (20) also have two readings corresponding to two different readings of ‘ \diamond ’ and ‘ \square ’. Hence ‘ \diamond ’ and ‘ \square ’ are both ambiguous, with each having distinct ordinary and extraordinary readings.

An ambiguity modal realist who gives this response claims that the ambiguity she postulates isn’t only motivated by the need to defend modal realism from the puzzle argument but is also independently justified by the considerations that justify modal realism. In other words, she claims that parsimony and explanatory considerations in favour of modal realism also support the existence of the postulated ambiguity, and that a modal realist would be justified in believing in the postulated ambiguity even in the absence of the puzzle argument and the problems it raises. According to her, the postulated ambiguity in ‘ \diamond ’ and ‘ \square ’ is therefore appropriately independently justified and a modal realist can appeal to it in order to defend modal realism from the puzzle argument.

In evaluating this claim, one might question whether ‘at’ is ambiguous in the manner claimed above, or whether the parsimony considerations that support modal realism can justify the belief that an apparently conclusive argument is unsound. Even granting that these questions can be answered in the manner the above response requires, however, it is clear that the ambiguity postulated by ambiguity modal realists is not appropriately independently justified by the considerations supporting modal realism. This can be seen as follows: Define univocal modal realism to be the same as ambiguity modal realism except that it holds that ‘ \diamond ’ and ‘ \square ’ (and ‘absolutely possibly’ and ‘absolutely necessarily’) each have only one reading and that this one reading is the ordinary reading.⁴⁷ Univocal modal realism and ambiguity modal realism are equally ideologically parsimonious and appear equally able to vindicate our best semantic, psychological and physical theories.⁴⁸ Hence the considerations that support modal realism do not support modal realism over univocal modal realism, and hence do not provide any reason by themselves for thinking that ‘ \diamond ’ and ‘ \square ’ are ambiguous, rather than univocal. Relatedly, given the right-hand sides of (19) and (20) are ambiguous since ‘at’ has both a restricting and non-restricting reading, the considerations in favour of modal realism do not support (21) over (22).

21. Each of the left-hand sides of (19) and (20) has two readings, and, for each reading of the right-hand sides of (19) and (20), there is a reading of the left-hand sides of (19) and (20) on which (19) and (20) are both true.
22. Each of the left-hand sides of (19) and (20) has only one reading, and each of the right-hand sides of (19) and (20) has only one reading on which (19) and (20) are true.

⁴⁷ Univocal modal realism endorses ($\diamond B$) and ($\square B$) for this one reading of ‘ \diamond ’ and ‘ \square ’, and more generally (\square) and (\diamond), where ϕ is any non-modal statement expressing a qualitative state of affairs. (See footnote 42.)

⁴⁸ The theoretical work described in (Lewis 1986, Ch. 1), for example, can be done by both univocal modal realism and ambiguity modal realism, and hence this work provides no reason to prefer ambiguity modal realism over univocal modal realism. I am ignoring the possibility that one or both of these theories are a priori inconsistent and that a priori inconsistent theories don’t have a well-defined degree of ideological parsimony.

Hence, in the absence of the puzzle argument, a modal realist would have no reason to endorse ambiguity modal realism over univocal modal realism. The justification for the ambiguity postulated by ambiguity modal realists is therefore not appropriately independent, and ambiguity modal realism is not justified.⁴⁹

4. Worldly modal eliminativism

According to the final response to the puzzle I will discuss, a modal realist should keep the non-modal ontology of modal realism but give up the letter of modal realism by embracing eliminativism about modality, where eliminativism about modality is the view that there are no modal aspects of reality.⁵⁰ A

⁴⁹ Lewis may be interpreted as endorsing a variant of the ambiguity response, which we may call the sophisticated ambiguity response to distinguish it from the simple ambiguity response discussed above. Lewis held that, if ϕ expresses a quantificational state of affairs, ‘at w , ϕ ’ has multiple readings depending on whether ‘at w ’ is interpreted as restricting all the implicit and explicit quantification within its scope, some of this quantification, or none of this quantification (Lewis 1986, pp. 5–6, p. 124). He therefore held that the right-hand sides of (P) and (N) have multiple readings if ϕ expresses a quantificational state of affairs, even when ϕ has only a single reading.

P. $\diamond\phi =_{df}$ for some L -world w , at w , ϕ .

N. $\square\phi =_{df}$ for any L -world w , at w , ϕ .

Lewis can be interpreted as holding that each of these interpretations corresponds to an interpretation of the left-hand sides of (P) and (N) on which (P) and (N) are true. On the account that results from this interpretation, ‘ $\diamond\exists xBx$ ’ has two readings (just as on the simple ambiguity response): one on which it expresses the state of affairs that, for some L -world w , there is a blue swan that is part of w , and one on which it expresses the state of affairs that, for some L -world w , there is a blue swan. While a modal realist who adopts this account can give the same kind of response to the puzzle as a modal realist who adopts the simple ambiguity response, this response also shares its faults. In particular, there appears to be no appropriately independent evidence that the sophisticated ambiguity thesis is true, and without some such evidence the plausibility of the puzzle argument cannot be rationally undermined by the claim that the sophisticated ambiguity account is true and that we find the puzzle argument plausible only due to equivocating over or confusing the readings postulated by the account.

⁵⁰ This definition of eliminativism about modality is only rough, since nominalist theories can differ in whether they endorse eliminativism about modality. For discussions

modal realist who adopts this response retains her belief in a vast multitude of *L*-worlds generated by some version of the recombination principle. Instead of analysing modal notions such as possibility and necessity in terms of this ontology, however, she claims there are no modal notions, since modal expressions are defective and fail to express anything. As a result, she avoids the puzzle argument, since she endorses no reduction of modality and endorses none of the premises of the puzzle argument that contain modal vocabulary. In place of the rejected modal notions, such a modal realist puts forward replacement notions defined in terms of her ontology of *L*-worlds, which, she claims, can do all the important theoretical work the eliminated modal notions were meant to do. For example, in place of the notions expressed by ‘possibly’ and ‘necessarily’, which she rejects, she offers the notions expressed by ‘*L*-possibly’ and ‘*L*-necessarily’, which she might, for example, claim satisfy (23) and (24), where ϕ is any non-modal statement not containing the introduced ‘*L*-possibly’ and ‘*L*-necessarily’.

23. *L*-possibly, $\phi =_{df} \exists u(Wu \wedge (at u, \phi))$.

24. *L*-necessarily, $\phi =_{df} \forall u(Wu \supset (at u, \phi))$.

Finally, a modal realist who adopts this response claims that the postulation of multiple *L*-worlds given eliminativism about modality can do all the work they are meant to do given modal realism, apart from that pertaining to modality, which is no longer needed given eliminativism about modality. For example, she claims that she can give the same analyses of propertyhood, causation and mental content in terms of *L*-worlds that standard modal realists give.⁵¹ The theory she adopts is also no less ideologically parsimonious than modal realism with respect to modality, since, as the theory does not hold that there are any modal notions, it does not hold that there are any fundamental modal notions. As a result of this, this theory, which we may call multiple *L*-world eliminativism about possible worlds (or worldly modal eliminativism, for short) appears to be just as ideologically parsimonious and explanatorily powerful

of eliminativism about modality, see Blackburn (1987) and (Forbes 1985, Ch. 9).

⁵¹ For such analyses, see Lewis (1973a) and (Lewis 1986, Ch. 1).

as modal realism. Call this response to the puzzle the worldly modal eliminativist response, and call a modal realist who adopts it a worldly modal eliminativist.⁵²

According to worldly modal eliminativism, any sentence containing modal vocabulary fails to express a state of affairs and hence fails to be true. Modal realists who adopt this response must therefore, strictly speaking, reject modal realism, since they cannot endorse (25), as it contains the modal expression ‘possible’.

25. There are multiple possible worlds.

The theory they endorse in place of modal realism, however, is very similar to modal realism, and so adopting it might be highly attractive to modal realists if it allows a successful response to the puzzle.

While worldly modal eliminativism appears to have a number of virtues, it has two serious problems. One problem is that philosophers who embrace it need to show that their ability to articulate and justify their belief in multiple *L*-worlds isn’t undermined by their rejection of modal notions and modal reasoning, and it is not clear whether they can do this. One difficulty such eliminativists face is formulating a sufficiently strong, precise and well-motivated version of the recombination principle.⁵³ While modal realists also face this challenge, the need to provide such a recombination principle is greater for worldly modal eliminativists, since, unlike modal realists, worldly modal elim-

⁵² A related response to the puzzle holds that, while it makes sense to make modal claims about concrete things in α , it does not make sense to make modal claims about concrete things not in α or to make modal claims that quantify over concrete things not in α (as, for instance, (1) does). The problem with this response is that such claims (like those expressed by ‘Had I gone swimming today there would (still) have been multiple *L*-worlds’ and ‘There might have been multiple *L*-worlds’) seem to make just as much as sense as modal claims about concrete objects that are part of α . Moreover there seems to be no reason to think that such claims don’t make sense apart from the desire to defend Lewis’s modal reduction from an argument that seems to refute it.

⁵³ The version of the recombination principle given by (RP) in section 1, for example, needs to be modified so that: i) it no longer contains the modal expression ‘can’, ii) it contains an account of what spacetimes there are, and iii) it contains an account of what kind of pattern of instantiation through the plurality of *L*-worlds fundamental relations have.

inativists cannot employ modal notions to articulate their account of what kinds of *L*-worlds there are, and hence are much more reliant on being able to formulate an adequate version of the recombination principle. The resources worldly modal eliminativists are able to use to formulate and motivate such a principle are also less than those of modal realists, since, while modal realists are able to test different versions of the recombination principle by evaluating their modal consequences when combined with their analysis of modality, worldly modal eliminativists are unable to do this. Worldly modal eliminativists also have fewer resources to motivate the analyses of non-modal notions they offer. Modal realists can, for example, motivate their analysis of causation in terms of *L*-worlds by arguing for an analysis of causation in terms of counterfactuals, an analysis of counterfactuals in terms of possible worlds, and the analysis of possible worlds as *L*-worlds, and show that the analysis of causation in terms of *L*-worlds is a consequence of these individually well-motivated analyses.⁵⁴ Modal realists can similarly motivate their analysis of mental content in terms of *L*-worlds by arguing that it is a consequence of the analysis of possible worlds as *L*-worlds and the attractive idea that contents distinguish between possibilities that accord with them and those that do not. Worldly modal eliminativists, in contrast, cannot do either of these things, since they reject all of these intermediary analyses due to their rejection of all modal notions. Finally, worldly modal eliminativists are unable to use the method of possible cases (which relies on $(\Box-a)$) to test the analyses they put forward and are unable to use counterfactual tests on the adequacy of the explanations they offer. The ability of worldly modal eliminativists to test the analyses and explanations they put forward as evidence of the virtues of their theory therefore appears to be much diminished.

The second and arguably more serious problem with worldly modal eliminativism is its sheer implausibility. Worldly modal eliminativism has one important advantage over versions of modal realism, such as QR modal realism, that don't eliminate modality but do hold that some of our strong modal opinions are false. The advantage is that worldly modal eliminativists do not have to explain why some strong modal opinions — such as the opinion that there

might have been no blue swans — are false, while other strong modal opinions — such as the opinion that I might have gone swimming today — are true and presumably justified. Worldly modal eliminativists do not have to face this explanatory burden, since they think that all modal opinions are defective and hence untrue.⁵⁵ The advantage of avoiding this explanatory burden, however, is arguably more than made up for by the cost of rejecting the truth of all modal sentences. Worldly modal eliminativists, for example, have to claim that (26–28) all fail to be true.⁵⁶

26. I could have gone swimming today.

27. There might have been no blue swans.

28. Necessarily, every triangle has three sides.

It is hard to accept, however, that each of these sentences is untrue. Indeed, it is *prima facie* harder to believe that all such sentences fail to be true than it is to believe that it is only sentences like (27) that fail to be true, which is what QR modal realism, for example, is committed to.

It is important to note that, at least by itself, the increase in ideological parsimony obtained by eliminating modality is not sufficient to justify its elimination. If, on the contrary, it were sufficient to justify such an elimination, parsimony considerations could presumably be used to justify the elimination of every notion, which would be absurd. In order for a modal eliminativist to justify eliminating modality, therefore, further reasons need to be given for thinking that modal sentences fail to express states of affairs than merely those concerning ideological parsimony. Moreover, since modal concepts, such as

⁵⁴ This is what Lewis in effect does in (Lewis 1986, Ch. 1).

⁵⁵ Worldly modal eliminativists, however, still face the burden of needing to explain why such opinions seem true and non-defective.

⁵⁶ A variant of worldly modal eliminativism holds that it is only when used in the current kind of philosophical context that modal vocabulary is defective and fails to express anything. This variant needs to hold only that (26–28) are all untrue as used in the current philosophical context. However, this seems little better than holding that they are untrue in all contexts, since they all certainly seem true in the current context and proponents of this variant view would need to explain why our more reflective modal judgements are defective while our less reflective modal judgements are, on the whole, true.

those of possibility and necessity, appear to be in good working order (or at least they seem to be as much in good working order as pretty much any concept we employ), such further reasons need to be very strong. As far as I know, however, there are no such reasons.⁵⁷

A worldly modal eliminativist might try to argue that modal concepts give rise to paradoxes in the way the concept of truth arguably does, and argue that this provides a good reason for thinking that modality should be eliminated.⁵⁸ Given, as is widely believed, Quine's arguments for the incoherence of modality fail, however, the prospects of such an argument do not seem strong.⁵⁹ Alternatively, a worldly modal eliminativist might argue that the difficulty in explaining how we know modal facts provides a reason to eliminate modality. However, it is not obvious that the difficulty of explaining our modal knowledge is any worse than the difficulty of explaining other types of knowledge we have, such as our knowledge of the external world or our knowledge of the future, so it would be rash to jump to eliminating modality on the basis of these difficulties. While one cannot rule out a worldly modal eliminativist coming up with strong reasons to think that modal concepts and expressions are defective and fail to express any modal notions, the burden is on them to come up with such reasons. Until they do so, we should reject worldly modal eliminativism.

5. Conclusion

I have argued that modal realists face a puzzle: while modal realists need to give a reduction of modality in order for modal realism to be justified, a simple argument appears to show that the reduction they give fails. I have considered several responses a modal realist might give to this puzzle and have argued that they each have serious problems and should be rejected. Given this is the

case, and given modal realists cannot come up with better responses than those considered here, modal realism should be rejected.⁶⁰

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⁵⁷ Some philosophers have held that 'absolutely possibly' and 'absolutely necessarily' are vague. (See, for example, Forbes (1985) and (Lewis 1986, Sect. 4).) If these expressions are vague, and vagueness is a kind of defectiveness, then these modal expressions are defective, but not in a way that supports worldly modal eliminativism.

⁵⁸ See Scharp (2007).

⁵⁹ See (Quine 1960, pp. 195–200). For a critique of Quine's arguments, see, for example, (Melia 2003, Ch. 3).

⁶⁰ This paper was first presented at the 2003 Australasian Association of Philosophy Conference in Adelaide, and then subsequently at the Australian National University, the University of Melbourne, Lingnan University, and the 2013 Modal Metaphysics: Issues on the (Im)possible Conference in Bratislava. The paper greatly benefited from discussions with (amongst others) Peter Roeper, Martin Smith, Daniel Nolan, Josh Parsons, David Chalmers, Jonathan Schaffer, David Ripley, Jennifer Nado, Max Deutsch, and audiences at the above talks.

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