MODAL PRIMITIVISM

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ABSTRACT OF THE DISSERTATION

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Modal primitivism is the view that there are modal features of the world which cannot be reduced to the non-modal. Theories which embrace primitive modality are often rejected for reasons of ideological simplicity: the fewer primitive notions a theory invokes, the better. Furthermore, modal primitivism is often associated with the view that *all* modal features of the world are irreducibly modal, which appears unsystematic and unexplanatory. As a result, many prefer *modal reductionism*.

This work is an articulation and defense of a modal primitivist theory of modality which requires minimal ideology and is systematic and explanatory. On this version of modal primitivism, only some modal features of the world are irreducibly modal—namely, *incompatibilities* between certain properties or relations. Other modal features of the world are reducible to a combination of primitive incompatibilities and the non-modal features of the world.

In chapter 1, I introduce various issues in the metaphysics of modality, giving appropriate background for what follows. My modal primitivist theory of modality is introduced in chapters 2 and 3. In chapter 2, I argue that a well-known modal reductionist

theory of modality is not as ideologically innocent as it's thought to be: modal primitivism has the upper hand with respect to primitive notions. I then introduce the primitive notion of incompatibility and show how this notion can be used to account for *de dicto* modality, which concerns purely qualitative modal claims. In chapter 3, I present a theory of *de re* modality, that which concerns modal claims involving particular individuals. Since on this theory the *de re* is reducible to the *de dicto*, it requires no more primitive modality than that which appears at the level of the *de dicto*. I end in chapter 4 by arguing against a rival modal primitivist theory, showing that the primitive notion that it countenances, *dispositionality*, cannot account for all modal claims.

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Chapter 1

Introduction

1.1 Possibility and Necessity

The world could have been otherwise than it is. There could have been flying penguins in the Sahara or Kennedy could have lost the U.S. election in 1960. On the other hand, there are respects in which the world couldn't have been different; violations of the principles of logic and mathematics, and perhaps even the laws of nature, are impossible. These claims about what's possible, necessary, or impossible are *modal* claims.

Our modal notions are interrelated in various ways. If *p* is possible, then it's not necessarily the case that not-*p*. If *p* is necessary, then it's not possibly the case that not-*p*, or rather, not-*p* is impossible. If *p* is contingent, then *p* is possible and not-*p* is possible. And so on.

There are different strengths of modality. What's conceptually possible is what's possible consistent with all conceptual truths. What's nomically possible is what's possible given the actual laws of nature. What's deontically possible is what's possible given the laws of morality. What's logically possible is what's possible given the principles of logic. And what's metaphysically possible, or so it is sometimes said, is what's possible full stop. This widest modality is the focus of this dissertation.

When it comes to metaphysical modality, there are two related questions: what is the range of possibilities and necessities, and what is it about the world in virtue of which

these are the possibilities and necessities? If we settle the 'in virtue of' question, then we presumably have a story of how to get from the world to the space of possibilities and necessities, in which case we have some idea of what these are. On the other hand, settling the 'in virtue of' question must be an affair guided (though not dictated) by our pre-theoretic intuitions about what's possible and necessary.

A theory of modality must say something in response to both questions. It also must be 'theoretically virtuous'. In general, my methodology is Lewisian in spirit. The best theory of metaphysical modality is that which does best overall with respect to the theoretical virtues, which include but are not limited to: systematicity, elegance, power, theoretical simplicity, and ontological parsimony. Accordingly, the task of finding such a theory will involve weighing the virtues of various candidate theories. As Lewis (1983b: x) writes,

> The reader in search of knock-down arguments in favor of my theories will go away disappointed. Whether or not it would be nice to knock disagreeing philosophers down by sheer force of argument, it cannot be done. Philosophical theories are never refuted conclusively. (Or hardly ever. Gödel and Gettier may have done it.) The theory survives its refutation—at a price. Argle has said what we accomplish in philosophical argument: we measure the price. Perhaps that is something we can settle more or less conclusively. But when all is said and done, and all the tricky arguments and distinctions and counterexamples have been discovered, presumably we will still face the question which prices are worth paying, which theories are on balance credible, which are the unacceptably counterintuitive consequences and which are the acceptably counterintuitive ones. On this question we may still differ. And if all is indeed said and done, there will be no hope of discovering still further arguments to settle our differences.

The last century has seen an immensely productive literature on modality. In the rest of this chapter, I will outline various positions that one might take concerning modality. Many of these choices are orthogonal to each other, including the two choices

discussed in the next two sections: possibilism versus actualism, reductionism versus primitivism.

The aim of this dissertation is to articulate and defend an actualist and primitivist theory of metaphysical modality. However, even among defenders of actualism and primitivism there is much disagreement. The discussion in this chapter will give the appropriate background for the rest of the dissertation.

1.2 Possibilism and Actualism

Here are two well-known rival positions in the debate over modality: possibilism and actualism. This slogan captures the spirit of *actualism*: 'Everything that exists is actual.' I will not tackle the debate over how to formulate actualism; see Bennett (2005) for discussion. For exposition I will instead contrast actualism with possibilism, on which merely possible objects exist as well.

Lewis's (1986) modal realism is the best-known version of possibilism.[1] According to his modal realism, there are worlds other than our own, spatiotemporally isolated from each other, worlds in which hedgehogs fly and donkeys talk and so on. Furthermore, these 'possible worlds' have just as much a claim to concrete existence as our world—each is actual from its own perspective, just as ours (also a possible world) is actual from our perspective. Possible worlds explain possibility by their mere existence via this reduction: it's possible that *p* if and only if there exists a possible world in which *p*. This provides an answer to the 'in virtue of' question.

[1] Other defenders of versions of possibilism include Bricker (1996) and (2001), McDaniel (2004) and Yagisawa (2010).

Lewis includes a 'principle of recombination' for determining the extent of possibilities. His principle is roughly this: for any part *x* of possible world *w*, and any part *y* of possible world *v*, there exists a possible world which contains only a duplicate of *x* and a duplicate of *y*. This is an answer to the first question a modal theory must address, that of the range of possibilities and necessities. Note that his answer to the second question, the 'in virtue of' question, is independent of the principle of recombination.

Actualists reject the existence of Lewisian worlds and anything else that lacks actuality. Many are motivated by the sheer extravagance of Lewis's pluriverse, and defend actualist theories that purport to do the same work. Defenders of actualism say that whatever explains possibility is actual. The actualist apparently has the upper hand with respect to our common sense beliefs. However, modal realism has various theoretical advantages. Possible worlds have figured widely in many different areas of philosophy. They have been used to analyze counterfactuals, propositions, properties, knowledge, and other notions of philosophical interest. Furthermore, modal realism provides an ontology for a 'possible worlds semantics' for quantified modal logic and hence, presumably, for modal talk. The actualist project is to propose an actualist theory that can do the theoretical work of modal realism's possible worlds.

1.3 Reductionism and Primitivism

Orthogonal to the possibilism-actualism division are the rival positions of reductionism and primitivism about modality. According to *modal reductionism*, all of modality may be reduced to the non-modal. I will not assume any particular theory about the nature of reduction; for our purposes, we can informally understand the project of

reduction as that of giving a 'metaphysical explanation' of the thing to be reduced. Lewis's modal realism is one way to be a reductionist about modality: to be possible just is to be the case in some possible world. Note that although possible worlds have the word 'possible' in their name, the entities themselves non-modally defined.

Some reductionists are actualists. For instance, Armstrong defends a combinatorialist theory of modality according to which (roughly speaking) what's possible is reducible to distributions of actually instantiated properties. This view is defended in Armstrong (1989) and Armstrong (1997). It is discussed in more detail in chapter 2.

Another actualist theory that is reductionist is essentialism, popularized by Fine (1994). On essentialism, modality is reducible to essence; what's necessary has its source in the essences of everything. This reverses the traditional definition of essence in terms of modality: what's essential to an individual is what it has necessarily. I won't say much about essentialism in the rest of the dissertation. I am sympathetic to certain parts of the theory; in particular, I think we can use the notion of essence to explain the relation between the non-fundamental and the fundamental, though this is not discussed in the dissertation. However, I am skeptical that essentialism can account for the problem cases I bring against combinatorialism in chapter 2.

Yet a third theory is modal fictionalism: what's possible is whatever is true according to the fiction of Lewis's modal realism. Modal fictionalism is defended in Rosen (1990).[2] It faces several objections, including the Brock/Rosen objection, articulated in Brock (1993) and Rosen (1993), and Hale's dilemma, articulated in Hale

[2] Armstrong's combinatorialism is another version of fictionalism, but as it doesn't look like Rosen's fictionalism, I've separated the two.

(1995). For other worries, see Nolan (1997). For a more recent defense of modal fictionalism, see Woodward (2008) and Woodward (2010).

Modal primitivists say that the modal cannot be completely reduced to the non-modal—even if we can give a theory of modality, some primitive modality will remain in that theory. The most well-known version of modal primitivism is a view which is sometimes called 'modalism'. According to modalism, all modal truths are primitively true. This view is defended most prominently in the Postcript to Prior and Fine (1977), Forbes (1989), and Peacocke (2002). A recent defender of modalism is deRosset; see deRosset (2009) and deRosset (Forthcoming).

However, there are other ways to be a modal primitivist. Among those I consider to be 'classic actualists', many are primitivists: Adams (1981) takes consistency as a primitive modal notion; Stalnaker (1976) takes as primitive the ways things could have been; and Plantinga (1976) endorses primitively possible states of affairs. Adams, Stalnaker, and Plantinga thus respectively take as the target of primitiveness sentences, world properties—that is, properties of entire universes—and states of affairs. While I am a modal primitivist, I am not a modal primitivist in any of these ways.

A primitivist may endorse a 'properties-focused' primitivism where the properties with the primitively modal features are less than universe-sized. On one sort of view, there are primitive modal connections between properties in the form of *incompatibilities*—this is the view I defend in chapter 2. A view like this is also defended by Jubien; see Jubien (2007) and Jubien (2009). Another sort of 'properties-focused' primitivism involves positing essentially dispositional properties as the source of all modality. To have such an essentially dispositional property is to have a certain modal

connection to other properties. In chapter 4, I argue that this view, called 'dispositionalism', cannot account for all of modality and requires supplementation.

1.4 An Interlude on Ideology and Ontology

At this point, it would be helpful to bring in some metaphysical tools introduced by Quine (1951), namely, the distinction between ontology and ideology. *Ontology* is what's 'in the world'; presumably, for many, ontology includes objects or individuals, properties, and relations. For our purposes, we may also consider ontology to be divided into the fundamental and the non-fundamental, though I won't take much of a stance in this dissertation on the nature of these.

Ideology concerns the primitive notions we use to describe what's 'in the world'. Primitive notions are those notions left unreduced or unexplained in a theory. A metaphysical primitive of one's ideology will presumably correspond to something in one's ontology. However, I wish to leave it open that ideology need not correspond to something 'entity-like' such as an object, property, or relation. To illustrate, consider modalism, the modal primitivist view according to which the modal truths are primitively true. The modal primitivist typically takes the modal operators '$\Diamond$' and '$\Box$' to be her primitive notions. However, she need not think that there is a fundamental possibility or necessity property in her ontology.

With this distinction in hand, we now have tools for weighing theories according to how ideological simple or ontologically parsimonious they are. Lewis's modal realism is particularly unparsimonious with respect to ontology—he introduces a whole pluriverse of concrete universes, multiplying many-fold what we thought there was only

one of. However, modal realism is relatively ideologically simple, since it requires no more primitive notions than we need to describe the non-modal. In contrast, versions of modal primitivism are worse off than modal realism with respect to ideology—modal primitivists accept some primitive modal notion or other that Lewis rejects, such as *incompatibility*, *dispositionality*, or just plain *possibility*. However, modal primitivists are typically actualists, and so avoid multiplying ontology. There thus seems to be a trade-off between ideological simplicity and ontological parsimony. As far as I know, no one has successfully proposed a precise method for weighing the trade-offs, but informal reasoning takes us part of the way.

Notice that the actualist who is a reductionist rather than a primitivist typically still needs primitive notions which the modal realist does not need. For instance, fictionalists endorse a primitive 'according to the fiction of' operator and essentialists endorse the primitive notion of *essence*. The combinatorialist appears to be an exception, though I argue in chapter 2 that this is not really the case.

1.5 Actualism: The Space of Views on Possible Worlds

Although actualists reject the existence of possible worlds, many still accept *ersatz (possible) worlds* which do the same or nearly the same theoretical work of Lewis's concrete universes. This section is a very brief overview of the sorts of positions actualists adopt.

A good place to start is with Lewis's thoughts on the matter. Lewis writes (1986: 136), '[t]he ersatzers say that instead of an incredible plurality of concrete worlds, we have one world only, and countless abstract entities representing ways that this world

might have been.' Lewis (1986) distinguishes three brands of ersatzism about possible worlds: linguistic, pictorial, and magical.

Linguistic ersatzism is the view that ersatz worlds are linguistic entities of some sort or other: in particular, they represent by description ways the universe could be. In chapter 3, I articulate and defend a particular version of linguistic ersatzism which withstands the objects that Lewis advances against it.

Pictorial ersatzism is the view that ersatz worlds are representations which represent possibilities in something like the way that pictures represent.

Magical ersatzism is the view that ersatz worlds aren't representations at all, or at least that they aren't representations in the way that linguistic or pictorial worlds are representations.

It is unclear where the views defended by Adams, Plantinga, and Stalnaker fall within this division. Adams and Plantinga endorse something like 'world stories'—which may be understood as propositions—or universe-sized states of affairs; Stalnaker endorses universe-sized world properties.

Another sort of ersatz view which doesn't appear to fall within Lewis's division is structuralism. Structuralists retain possible worlds talk but reduce ersatz worlds to whatever entities play a certain role in model-theoretic structures.[3] According to structuralism, any sufficiently large collection of existing objects constitutes a structure-relative plurality of worlds. As one defender, Gregory, writes (2006: 108), '[T]he combined efforts of linguists, logicians, and philosophers have made it reasonable to think that the roles which analyse modal concepts may be filled using structures which

[3] Sadly, the very appropriate term 'modal structuralism' has already been claimed by structuralists in the philosophy of mathematics. I will use the term 'structuralism' for structuralism about possible worlds specifically.

satisfy suitable purely structural constraints.' Structuralists of some stripe or other include Menzel (1990), Sider (2002), and deRosset (Forthcoming).

Finally, some actualists reject possible worlds talk altogether—namely, essentialists and dispositionalists. For a nice overview of theories of modality without possible worlds, see Vetter (2011).

1.6 Actualism: Issues in Semantics

In this section and the next, I discuss some issues in semantics for the actualist. Some of these issues won't be discussed later; however, actualism is frequently introduced alongside semantic considerations, so it would be useful to have a short discussion here. Of course, some of these issues will come up later, particularly in chapter 3.

I'll start with a general worry. Actualists struggle with finding an *intended model* for the right modal logic for our world: informally, that which gives an interpretation of the formal system that's *about* our world in exactly the right ways. The significance of the intended model is that it is often understood to be that which yields the truth conditions for sentences of the formal language in question. Of course, there is a wide gap between the formal language and natural language; however, we may still use the formal language to *describe* the world, even if we cannot speak it.

With non-modal talk, the actualist might say something like this: constants in the logic are names of actual objects, actual objects play the role of individuals in the domain of the formal system, and predicates correspond to properties in the world. However, actualism faces problems when it comes to modal talk. Actualists want to say that there is

an intended model for the right modal logic, but they have to construct this without recourse to merely possible objects. Thus, they have to account for the fact that the role of a 'possible world' or 'possible individual' cannot be filled by a merely possible world or merely possible individual. Ersatz possible worlds and ersatz possible individuals can do some of this work, but there are limits to what these can do.

For a quick introduction to one such problem, consider the possibility of a world containing qualitatively indiscernible individuals—for instance, consider a world of two-way eternal recurrence, such as one in which the entire history of the actual universe is eternally repeated.[4] On modal realism, there really is such a world, and in particular, there really exist an infinity of qualitatively indiscernible Napoleons. On linguistic ersatzism, there is only one description corresponding to each of these infinitely many individuals, since were the world actual, each Napoleon would be qualitatively indiscernible from the next. This problem is addressed in chapter 3.

There are other logical problems for actualist semantics as well. Consider that what version of quantified modal logic (QML) is the right logic for our world turns on considerations of what proof theory and semantics go together—that is, are sound and complete. Normal modal logics add to standard propositional logic the rule of necessitation and various axioms, depending on the system. I will assume some familiarity with normal modal logics, and in particular with the systems K, T, B, S4 and S5, where K is the simplest normal modal logic.

[4] This example appears in Lewis (1986).

Versions of QML add to a normal modal logic S the grammar and rules of inference of the lower predicate calculus with identity (LPC=). The simplest QML (SQML) is LPC=+K+BF, where BF is the so-called 'Barcan Formula':[5]

(BF) $\forall x \Box Fx \rightarrow \Box \forall x Fx$

In the semantics for SQML, there is only one 'fixed' domain of individuals and universal quantifiers range over all individuals. Let a model for SQML be an ordered triple <W,D,I>, where W is a nonempty set (the set of 'possible worlds'), D is a nonempty set (the domain of individuals), and I is the interpretation function, which assigns constants to individuals in D and predicates to *n*-tuples of individuals in D. There is also a valuation function $V_{M,g}$ which assigns, relative to a model M and a variable assignment g (which assigns individuals in the domain to variables), either 0 or 1 to formulas of the logic relative to $w \in W$. Intuitively, an assignment of 0 to a formula relative to a world indicates that the proposition that the formula expresses is false in that world, and an assignment of 1 indicates that the proposition is true.

This semantics is nice for the actualist; given that every possible world has the same domain and that the actual world is a possible world, every possible world must have the same domain as the actual world—hence, we don't have to posit merely possible objects for an adequate ontology for this system. The trade-off is that three actualistically problematic theorems are validated by the semantics. These are the Barcan Formula and two others, the Converse Barcan Formula and Necessary Existence:

[5] Although there are various formulations of SQML, I will follow that given by Linsky and Zalta (1994). BF is included in SQML, as it is only a theorem of LPC+B and LPC+S5.

(CBF) $\Box\forall xFx\rightarrow\forall x\Box Fx$

(NE) $\forall x\Box\exists y(y=x)$

Notice that the validity of the two formulas above does not even require as strong a logic as SQML. CBF is a theorem of LPC+K and NE is a theorem of LPC=+K.

The problems with these formulas are well known. Briefly, BF is problematic because, for instance, even if all things that actually exist are necessarily material (that is, we happen to live in a completely materialist world), it should not follow that everything that could exist is material. CBF is problematic because according to the semantics, everything in the actual world will exist necessarily since every possibly existing thing satisfies this predicate: $\exists y(y=x)$. And NE is problematic because it outright claims that everything actual exists necessarily.

Kripke's (1963) variable domain semantics gets around these problems by assigning each world in the semantics its own domain. A model on Kripke semantics is an ordered 5-tuple <W,R,D,Q,I> where W and D are as before, I is as before except that it's restricted to domains of particular worlds in assigning individuals to predicates relative to that world, R is a binary relation on W (namely, the 'accessibility relation') and Q is a function that assigns subsets of D to $w\in W$. The valuation function V is revised so that (i) R becomes relevant in evaluating modal formulas, and (ii) quantifiers range over only the individuals in the domain of the world in question.

BF, CBF, and NE are all invalidated on Kripke semantics. For BF, consider a model where everything that exists is F in all possible worlds, but in which it's possible

that an object that is non-actual is not F. It will thus be true that $\forall x \Box Fx$, but false that $\Box \forall x Fx$. Now suppose that in every possible world, everything in the domain of that world is F so that $\Box \forall x Fx$ is satisfied. Kripke semantics does not guarantee that everything actual exist in all possible worlds, so CBF fails. NE fails for the same reason.

Two new challenges arise. First, we need a new proof theory for the resulting logical system. Second, the actualist now has the problem that the domains of other possible worlds might include individuals not in the domain of the actual world. This takes us back to the problem noted at the beginning of this section about actualist problems with intended models. We *could* impose the requirement that domains of possible worlds must be subsets of the domain of the actual word, but doing so would validate CBF.

1.7 Actualism: Actualist Solutions to the Semantic Issues

In this section, I'll briefly consider specific actualist proposals regarding the semantic issues above. First, there is the view that the actualist can stick with SQML despite the apparent problems of BF, CBF, and NE. Second, there are the views of two philosophers who endorse some version of Kripke semantics: Plantinga and Adams.

Williamson (1992) and Linsky and Zalta (1994) argue that the actualist can accept a fixed domain semantics. (None of them claim to be actualists, though Linsky-Zalta offer their view on behalf of the actualist.) Recall that SQML is intuitively problematic because it requires that all actual objects exist in the domain of all other possible worlds, and hence necessarily exist. Williamson and Linksy-Zalta bite the bullet and say that all actual objects *do* necessarily exist. To minimize how counterintuitive this claim is, they

offer a new interpretation of the semantics: some objects are necessarily abstract, and some might be necessarily concrete, but many things are contingently concrete and many things are contingently nonconcrete. The latter category will include individuals like my possible sister; she exists in our world and instantiates the property of being concrete, but there are other worlds in which she is concrete.[6]

Hence, the objection against BF fails because it wouldn't be the case that from the fact that everything actual is necessarily material, necessarily everything in every possible world is material. Rather, from the fact that everything actually *concrete* is necessarily material, it unproblematically follows that necessarily everything *concrete* in every possible world is material. (Let F be the predicate 'is material if concrete.') CBF and NE are both unproblematic because everything does necessarily exist—but as Linksy and Zalta argue, this is not as radical as it seems.

Although this view appears to dissolve the problem with SQML, it appears to be a thinly disguised version of possibilism. See Bennett (2006) for further discussion. I will put aside the view and turn to those which adopt Kripke semantics and are apparently more in the spirit of actualism.

Plantinga (1976) solves the problems associated with Kripke semantics by claiming that *haecceities* of merely possible objects exist. For our purposes, the haecceity of a thing A is *the property of being A*, which is not reducible to the qualitative properties of A. This property picks out only one object: A. Plantinga claims that for any merely possible object, there exists a corresponding haecceity; for example, I don't have a sister, but there is at least one haecceity corresponding to my merely possible sister. Note that

[6] One difference between the views of Williamson and Linsky-Zalta is that Williamson does not think that noncreteness entails abstractness, while Linksy-Zalta apparently do. See Williamson (2002: 18).

haecceities are also referred to as *essences* (by Plantinga, at least), but for simplicity I will avoid this usage as it has unnecessary connotations. We might think that it is part or all of Socrates' essence to be a man, for instance, but *the property of being a man* does not uniquely pick out Socrates.

For Plantinga, possible worlds are maximal states of affairs, necessarily existing abstract entities which correspond to maximally consistent sets of propositions. Plantinga interprets the wide domain of Kripke semantics as consisting of all haecceities, whether of actual or merely possible objects. The domains of individual worlds do not include all haecceities, but only those which are understood to be instantiated at the world. Formulas of the logical language involving quantifiers are really concerned with the co-exemplifications of properties. For example, $\exists xFx$ is true if and only if there some haecceity is co-exemplified with *the property of being F* in the actual world. $\Diamond\exists xFx$ is true if and only if there's a possible world in which some haecceity is co-exemplified with *the property of being F*. The story is similar for other formulas, modal or non-modal. Plantinga can have these truth conditions because he thinks that haecceities exist necessarily, and hence exist in the actual world.

One objection to Plantinga's solution is that haecceities of merely possible objects are problematically parasitic on the existence of merely possible objects. This is similar to the objection against the actualist who adopts SQML. One might ask why it is that a haecceity of a thing can exist in a world in which the thing does not. We might think that the singleton set {Socrates} does not exist in worlds where Socrates does not—why should *the property of being Socrates* be privileged? Although there are other objections,

because of this Plantinga's view is metaphysically controversial and is not taken to be a knockdown actualist solution. See Linsky and Zalta (1994) for other objections.

Another route, which Adams (1981) takes, is to deny that there are haecceities of merely possible objects. Instead, we can do no better than to describe merely possible objects in terms of their qualitative properties and relations to actual individuals. If a merely possible object existed, it would have a haecceity; however, because we lack the proper access from our world, *we* cannot say that any specific non-actual haecceity exists according to other possible worlds. Here's what we can say on Adams' view: there could have been an *x* such that *x* is my merely possible sister and there could have been a *y* such that *y* is the haecceity of *x*. That is,

$$\Diamond(\exists x(S(x,j)\wedge\exists yH(y,x)))$$

Adams' possible worlds are, loosely speaking, sets of actually existing propositions that are maximal and consistent with respect to individuals that would exist were that world actual. (I say 'loosely' because Adams doesn't think that the things represented by such sets of propositions actually exist—thus, what I call Adams' 'possible worlds' are really his ersatz possible worlds. He calls them 'world stories'.) Propositions can be either 'true at' or 'true in' possible worlds. Those that are true at a possible world exist in the actual world but might not belong to the possible world; those that are true in a world belong to it as well. Intuitively, the difference turns on whether or not a proposition requires the existence of an entity that does not exist according to the

world in question. For instance, the proposition expressing that I could have had a sister is true at but not in some possible world.

To accommodate this distinction, Adams revises the model theory of QML to track truth at worlds. His interpretation is complicated by the fact that his possible worlds don't include, for every proposition *p*, either *p* or its negation not-*p*. Only propositions that are true in a world are included in this set; this in turn is a subset of the set of propositions true at the world. I will not go into details of Adams' semantics. The important thing to note is that on the new semantics, certain formulas that are valid on some or all normal modal logics are now invalidated: $\Diamond\Diamond p \leftrightarrow \sim\Box\sim p$, $p \rightarrow \Diamond p$, $\Box p \rightarrow \Box\Box p$, and $\Diamond p \rightarrow \Diamond \Box p$.

Adams gives up non-qualitative reference to merely possible objects in favor of a more complicated logic. If one finds this unacceptable, one will thus have a reason to reject Adams' view.

However, we might think that this is a necessary trade-off if we desire an ontologically innocent intended model for QML. If we bite Adams' bullet, we arguably gain an actualistically acceptable logic for modal talk.

Although I won't address all of the logical issues, in chapter 3 I will propose an alternate truth-conditional semantics for the actualist. The resulting actualist counterpart theory avoids commitment to non-actual individuals while doing all the truth conditional work necessary. Furthermore, it should have the same logic as Lewis's counterpart theory, so the actualist who adopts this view does not face any additional problems on account of her actualist beliefs.

1.8 Overview of the Remaining Chapters

I have now given some relevant background on the metaphysics of modality. In this section, I will describe the dissertation in a more continuous narrative.

In what follows, it will be useful to divide metaphysical modality into two kinds: *de dicto* modality and *de re* modality. *De dicto* modality attaches to sentences or the propositions expressed by sentences: 'It's possible that there exists a philosophical astronaut' or 'It's necessary that nothing is both odd and even.' In contrast, *de re* modality concerns particular individuals: 'Some astronaut is possibly a philosopher' or 'Every number is necessarily either odd or even.' The modal theorist may have separate theories for *de dicto* modality and *de re* modality. For instance, she may be a modal primitivist at the level of *de dicto* modality but not *de re* modality, or vice versa.

As noted above, my own modal theory is a version of modal primitivism. One main objection to modal primitivism is that it complicates our ideology because it requires primitive notions that modal reductionists can do without. I think this objection is misguided, since the modal reductionist typically needs her own primitive ideology. In chapter 2, I consider one rival to modal primitivism—*combinatorialism*—according to which the modal is reducible to the non-modal via combinatorial principles. The simplest combinatorial principle overgenerates possibilities in various cases. For instance, it predicts that an object can have two different masses or be two different distances from the same place. I show that to avoid these problems, the combinatorialist must revise her principle by adopting primitive notions of her own. I then introduce my version of modal

primitivism, *incompatibility primitivism*, on which there are primitive incompatibilities between certain properties and relations. Primitive incompatibilities provide the basis for a systematic theory of *de dicto* modality. The notion of incompatibility can also be used to analyze the notions the combinatorialist must adopt as primitive.

It still needs to be shown that modal primitivism—and in particular incompatibility primitivism—can handle *de re* modality. Many think that Socrates could have been an astronaut just in case he *is* an astronaut according to some possible world. In chapter 3, I defend an ersatz theory according to which possible worlds and their inhabitants are linguistic entities of a certain sort. Linguistic ersatzism faces two problems of descriptive power: the problem of indiscernibles and the problem of aliens. My solution—*linguistic counterpart theory*—is a version of counterpart theory, a view according to which how an individual is represented in different worlds depends on qualitative properties and relations that it instantiates. I outline a theory of the linguistic counterpart relation, avoiding some well-known problems. I also introduce a non-standard counterpart semantics which uses linguistic ersatz worlds and individuals to produce truth conditions for modal claims. Linguistic counterpart theory thus accommodates the idea that *de re* modality is to be explained in terms of qualitative properties and relations, while also answering the problems of descriptive power.

This theory of *de re* modality doesn't require any more primitive modality than that which appears in the theory of *de dicto* modality. The resulting picture is that primitive incompatibilities (and other second-order relations) between properties and relations form the basis for all of modality. They also provide the metaphysical basis for the many uses of modal notions in other areas of philosophy, such as natural language

semantics, logic, and epistemology. My project thus integrates modal primitivism for *de dicto* modality with counterpart theory for *de re* modality in a way that is ideologically elegant and that connects modal notions with the metaphysics of properties and relations.

It still remains to be shown that my version of modal primitivism is preferable to other versions. While I work with primitive incompatibilities between properties and relations, some other theorists appeal to primitive dispositional properties. In chapter 4, I address the most promising modal primitivist rival to my own view.

According to the best version of *dispositionalism*, a state of affairs is possible just in case it's the manifestation of some disposition. For example, it's possible that some glass breaks since the breaking of the glass is a manifestation of the glass's fragility. While such an explanation seems plausible in this case, attempts at generalization fail. I present challenges to dispositionalism based on the fact that while dispositions are local, diachronic, and gradable, certain possibilities are global, synchronic, or static. I argue that dispositionalism cannot account for these possibilities, at least not without unacceptable costs.

After presenting these problems, I suggest that the dispositionalist adopt the primitive notion of incompatibility, which results in a partial solution. However, retaining dispositions as an ultimate source of modal facts prevents such a theory from complete success. Meanwhile, I think that incompatibilities on their own may account for these problems. While I still owe a story about dispositionality on my own view, I take myself to have shown that dispositionalism is not a viable modal primitivist theory by the end of chapter 4.

There is still more work to be done. For instance, an account of the relation between the fundamental and the non-fundamental would fill out the story I give for *de dicto* modality, and thus for *de re* modality as well. However, this and other issues are not specific to the modality debate, so I leave them for another time.

Chapter 2

From Combinatorialism to Primitivism

2.1 Introduction

Consider this sentence: 'There could have been a talking donkey.' Is this sentence 'primitively' true? That is, is it immune to explanation in more basic terms? Probably not. Donkey truths can presumably be explained in terms of truths about arrangements of microscopic particles, or whatever are the basic elements of ideal physics. Still, this sentence asserts a *modal* claim: that it is *possible* that there is a talking donkey. We may grant that donkey possibilities can be explained in terms of microscopic possibilities and still ask: are sentences about microscopic possibilities primitively true? Are there any modal truths that are primitively true?

According to *modal primitivism*, there are modal truths whose explanations require the use of primitive modal terms. Many eschew primitivism in favor of reduction. One reason for rejecting primitivism stems from considerations of ideological simplicity, where ideology comprises the notions needed to state a theory. For example, Lewis (1986: 242) writes, 'Primitive modality is bad news, and more kinds are worse than fewer.' And Sider (2012: 267) writes, 'The good reason for opposing modal primitivism is simply: ideological economy.'

In this chapter, I argue against one reductive theory of modality in order to show the ideological cards aren't stacked against modal primitivism. According to *reductive combinatorialism*, defended most prominently by Armstrong (1989, 1997), we can reduce modal claims to non-modal claims via combinatorial principles of some sort. My aim in this chapter is to deflate the apparent advantage of reductive

combinatorialism over modal primitivism by showing that with respect to primitive notions, modal primitivists have the upper hand.

Note that modal primitivism is not in conflict with the use of combinatorial principles—such principles can be used to merely generate modal truths from other modal truths. However, the reductive combinatorialist thinks that recombination is in some way constitutive of modality, which the modal primitivist denies. The term 'combinatorialism' will be reserved for 'reductive combinatorialism' and the term 'primitivism' for 'modal primitivism' throughout this chapter. Note also that other objections have been raised against combinatorialism. Thomas (1996) and MacBride (1999) discuss the 'infused modalness' of properties in order to show that combinatorialism isn't really reductive. Lewis's (1986: 158-65) argument purportedly shows that combinatorialism undergenerates possibilities—in particular, it cannot account for all possibilities involving so-called 'alien' individuals or properties. I will grant that combinatorialism is properly reductive and set aside the problem of aliens. My focus is on the ideological commitments of combinatorialism given that it otherwise *overgenerates* possibilities.

2.2 Primitive Notions

Modal primitivism is sometimes thought of as the view that one of the modal operators ('□' or '◇') is a primitive notion. For example, Fine (1977: 117) writes on behalf of the modal primitivist, '(T)he possible exists as a *manner* in which things happen. It exists as a mode, not an object. In the proper language for expressing modal truths, the modal primitives will be adverbial (sentential connectives). . .'[1] But this is not the only way to be a modal primitivist. The notion of *essence* is plausibly a

[1] Similar sentiments are expressed in Lewis (1986: 13–14), Forbes (1989: 78), and Peacocke (2002: 486).

modal primitive; so are the notions of *power* and *disposition*.[2] What does it mean to accept a primitive notion? Primitive notions are those that are left unreduced in a theory; they constitute what Quine (1951) calls the 'ideology' of a theory. Since they are theory-relative, there can be notions that are primitive relative to one theory but not relative to another. For example, biologists might take the notion of *atom* as a theoretical primitive for their purposes, despite the fact that atoms can be further explained in physical terms.

Primitive notions must be distinguished from the things in the world to which they might 'correspond': objects, properties, relations, etc. Metaphysics is sometimes concerned with the *fundamental* structure of the world.[3] The *fundamental* objects, properties, or relations are those that do not depend on anything else. Given the widespread defence of fundamentality talk, these things will simply be assumed: (i) there are more or less fundamental objects, properties, and relations; (ii) the less fundamental are grounded in the more fundamental; (iii) the most plausible candidates for fundamental objects are whatever it is that physics posits as fundamental, be it particles, fields, waves, or spacetime points; and (iv) there is a fundamental level of objects, properties and relations. This last assumption is known as *well-foundedness*: grounding chains must always terminate. Well-foundedness leads to *completeness*, the thesis that the fundamental objects, properties and relations form a basis upon which all other objects, properties and relations supervene. The assumptions of well-

[2] In each of these cases, there is debate over whether the notion involves primitive modality. For contemporary discussions of essence, see Fine (1994, 1995), who rejects modal primitivism, Adams (1979, 1981), and Brody (1973). For discussion of dispositions or powers, see Bird (2006, 2007).
[3] For recent discussions of fundamentality, see Fine (2001), Rosen (2010), Schaffer (2009a, 2010a, 2010b), and Sider (2011).

foundedness and completeness will be dropped when my view is introduced in section 2.6, but combinatorialism runs smoother with them.[4]

The primitive notions of metaphysics (arguably) cannot be further reduced relative to *any* theory. Despite this, they might still fail to pick out fundamental objects, properties, or relations. The world may have a certain structure for which we must introduce primitive notions, but we may nonetheless reject the existence of corresponding fundamental entities for considerations of ontological parsimony. For example, the endorser of primitive modal operators need not think that the 'manners in which things happen' are fundamental properties.

The modal primitivist thinks that the metaphysical explanation of modal truths sometimes bottoms out in irreducibly modal features of the world. For example, the explanation of the truth of the sentence 'There could have been a talking donkey' might require the application of a primitive possibility operator to some sentence like 'There are microscopic particles such-and-such arranged in such-and-such a way.' Nolan (2002: 43) argues that we should adopt a broader conception of what makes a primitive modal: 'a theory which analysed modal operators in terms of possible worlds conceived of as *sui generis* abstracta would also count as being committed to modal primitives—the modal primitives being the worlds (and perhaps the "true according to" relation postulated as well).' The primitivist is one who requires more resources to explain the modal than what is already available to explain the non-modal.

However, we haven't addressed the question of what the target of analysis is in the first place; that is, what counts as 'modal'? As a working criterion, let's say that

[4] I will also assume that all fundamental properties and relations are categorical rather than dispositional. Dispositional properties (or relatedly, powers or potencies) are often modally characterized. The reductionist about modality denies that there are modal properties at the fundamental level, so out of charity to her, I ignore the possibility of such fundamental properties.

a modal primitive is a primitive notion that we understand in paradigmatic modal terms like 'can', 'must', and 'possible'. For a notion to be modal we need not have a conceptual *reduction* of the notion in modal terms—in many cases we can understand a notion, or understand how to apply it, without requiring reduction. Rather, the criterion requires that our grasp of the notion is through clearly modal notions. The notion of a possible world as *a way the world might have been* counts as a modal primitive since when characterizing worlds we use paradigmatically modal terms: they're ways the world *might* have been, or properties the world *could* have instantiated. But it doesn't matter whether we can judge every notion to be either modal or non-modal. As Cameron (2012: 17) points out, the real question is whether or not we are happy with the notions we've used.

Many are in fact *not* happy with primitive modal notions. This chapter focuses on the worry that a theory that adopts modal primitives lacks the theoretical virtue of simplicity. According to one principle of simplicity, more primitive notions are worse than fewer; what primitive ideology we can eliminate, we should. I will argue that although the primitivist accepts a primitive notion that the combinatorialist does not, the combinatorialist needs to adopt non-modal primitive notions that the primitivist doesn't need.

2.3 Combinatorialism

The intuitive idea behind combinatorialism is that what's possible can be reduced to recombinations of elements of a certain sort (e.g. objects with properties and relations). The motivations for such a view are tied up with anti-primitivist and

Humean sentiments.[5] My main target is the sort of combinatorialism advocated by Armstrong (1989, 1997), who was inspired by Skyrms (1981) and Wittgenstein (1921). Armstrong's (1989: 49) basic idea is this: 'In our Combinatorial Scheme, *all simple properties and relations are compossible*.'

Consider this formulation ('FR' for 'Fundamental Recombination') of Armstrong's principle, understood as constitutive of metaphysical possibility:

> (FR) Any pattern of instantiation of any fundamental properties and relations is metaphysically possible.[6,7]

It is easy to see why we need the qualification of fundamentality. If we permitted the recombination of any objects and properties or relations whatsoever—assuming an abundant property ontology—we would end up with 'possibilities' where there are square circles. Absolutely free recombination is not extensionally adequate.

My sympathies lie with the view that the fundamental properties and relations are not all modally independent of each other. Here's what each of the next two sections show: (i) given plausible candidates for fundamental properties or relations, FR has a problem of overgenerating possibilities, and (ii) the fix involves accepting primitive notions. The problems presented are familiar in the literature, but little attention has been paid to the ideological commitments involved in solving them.

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[5] I address anti-primitivist sentiments in section 2.10. The Humean intuitions are usually tied to this slogan: 'There are no necessary connections between distinct existences.'

[6] We may cash this out linguistically by saying that a pattern of instantiation is described by a sentence like this: There exist objects a,b, . . . fundamental properties P_1,P_2, . . . and fundamental relations R_1,R_2, . . . such that $P_1(a)$, $\sim P_2(a)$, $R_1(a,b)$, etc.

[7] Two things: first, Armstrong's talk of 'sparse universals' is replaced with talk of fundamental properties or relations, which shouldn't affect the discussion. Second, some modal claims like 'Necessarily 2+2=4' appear to concern abstracta. If abstract objects necessarily exist and necessarily have certain properties, then they will never fail to exist nor fail to have certain properties, and so cannot be the elements of recombination. Rather than try to incorporate issues concerning abstracta into our discussion, I'll set them aside.

Note that Lewis, a well-known defender of a principle of recombination, is not my main target. Lewis's (1986: 87–8) principle is roughly this: for any part *x* of possible world *w*, and any part *y* of possible world *v*, there exists a possible world which contains only a duplicate of *x* and a duplicate of *y*.[8] This principle can't be a reductive principle for anyone who doesn't also have a non-modal account of possible worlds; it only generates worlds from other worlds. Someone who accepts Lewis's principle but thinks that possible worlds are *sui generis* modal objects—that they are defined as entities that *could* exist—does not have a reductive theory of modality.

2.4 The Problem of Spatiotemporal Relations

There is a familiar distinction between intrinsic and extrinsic relations: intrinsic relations supervene on the intrinsic properties of their relata; extrinsic relations do not. The relation *is more massive than* is intrinsic, since we need not specify anything beyond the masses of the objects in question to determine whether the relation holds. On the other hand, whether spatiotemporal relations are instantiated appears to be independent of the intrinsic properties of their instantiating objects. Thus, we have reason to believe that spatiotemporal relations are extrinsic and so are good candidates for being fundamental relations. If they are fundamental relations, then by FR they are freely recombinable. However, spatiotemporal relations are *not* freely recombinable. In this section, arguments are presented for this claim given different assumptions about the nature of spacetime.

Let's start with the assumption of substantivalism, according to which spacetime points and regions (or whatever entities ideal physics identifies with

[8] Duplicates are brought in to avoid some of the issues with transworld identity. For specific formulations, see Nolan (1996: 239), Efird and Stoneham (2008: 485–490), and Divers and Melia (2002: 16).

spacetime) exist. On a common version of substantivalism, the fundamental spatiotemporal relations include relations like *is located at*, which hold between objects and regions of spacetime. We then have a straightforward argument to the failure of FR: FR entails that it's possible that some *x* is located at some *y*, even if *x* is not an object or *y* is not a region of spacetime. But this is not possible, so FR is false. Call this a case of 'relata mismatch'. To block this case, we apparently must require that the relata of *is located at* be respectively an object and a region. However, to require this is to posit a necessary connection between *is located at* and *is an object* or *is a region*; this is not a connection that the combinatorialist will want to leave primitive.

Suppose instead that relationism about spacetime is true—that is, that spacetime points do not exist, and spatiotemporal relations are nothing but relations between objects. On relationism, relations like *is located at*, if they exist at all, are non-fundamental. In their place, the relationist posits fundamental spatiotemporal relations that hold between objects, like *is five feet from*.[9] But if such distance relations are fundamental, then FR is false: according to FR, it's possible that *x* is five feet from *y* and that *x* is six feet from *y*. But this isn't possible. To block this purported possibility, we require a different necessary connection: a restriction on the instantiation of more than one distance-in-feet relation by a pair of objects. However, this isn't the only problem with distance relations. According to FR, it's possible that *x* is five feet from *y* and *y* is six feet from *z*, but *x* is twelve feet from *z*. This violates the triangle inequality, which states that (necessarily) for any three points *A*, *B* and *C*, the distance between *A* and *B* added to the distance between *B* and *C* must be at least

[9] I set aside worries about units of measurement and realism. I also ignore the view that *is five feet from* is fundamentally a relation between two objects and the number five, or even a relation between two objects, the number five, and some standard of measurement. This view does not help the combinatorialist, since it re-introduces the problem of relata mismatch.

as great as the distance between *A* and *C*. So again, FR is false. In fact, the triangle inequality is really only the tip of the geometrical iceberg. Analogous problems arise for quadruples, quintuples and so on as well; see Maudlin (2007: 89). The problem also arises in different forms depending on what one takes as her primitive geometrical notions—there will always be constraints that a geometry must satisfy. Call this the problem of 'metric constraints'.

Maudlin (2007: 87) suggests taking *path length* rather than *distance* as fundamental; distance may be defined as the minimal length of a continuous path from one point to another. We then get the triangle inequality for free: for any three points *A*, *B* and *C*, the minimal distance between *A* and *C* is as least as short as the distance between *A* and *B* added to the distance between *B* and *C*, since a path from *A* to *B* connected to a path from *B* to *C* is a path from *A* to *C*. However, going this route appears to require substantivalism, since it requires positing fundamental paths.

This last consideration isn't a problem for a different version of substantivalism, supersubstantivalism, which adds to the thesis that spacetime regions exist the thesis that objects *just are* spacetime regions. Given this, the supersubstantivalist can adopt Maudlin's strategy of taking path lengths to be fundamental, and is thus not faced with the problem of metric constraints. Furthermore, the supersubstantivalist is not faced with the problem of relata mismatch that arose for the ordinary substantivalist, since *is located at* is not fundamental. Still, this view doesn't provide an entirely satisfactory solution for the combinatorialist. The supersubstantivalist must take for granted that path lengths satisfy constraints *like* metric constraints—for example, that the sum of the lengths of paths between points *A* and *B*, and *B* and *C*, is the length of a path between *A* and *C* via *B*. Call these 'path length constraints'.

In response, the defender of supersubstantivalism and fundamental path length may try to appeal to analyticity: it's simply part of what we mean by 'path length' that it satisfies the principle. The relationist defender of fundamental distance may say something similar: it's simply what we *mean* by 'distance' that it satisfies the triangle inequality. But this strategy doesn't help either defender. Even if it were part of the meaning of these terms that such constraints were satisfied, we cannot preserve FR, for this principle says that *any* distribution of fundamental properties and relations is metaphysically possible.

The problems above arose on the assumption that location and distance relations are fundamental relations. If the combinatorialist denies this, she must offer in their place fundamental properties or relations that ground location and distance relations. However, other candidate notions discussed in the literature (like *between*, *overlap*, and *part*) seem just as vulnerable to some or other variant of these objections. Rather than attempt an exhaustive discussion of all candidate relations, I leave the burden on the combinatorialist.

I've noted that there appear to be necessary connections between certain fundamental properties or relations that violate FR. Rather than accept these necessary connections as primitive, the combinatorialist may opt to add to FR constraints on the distribution of certain fundamental properties and relations; where Π is a set of propositions,

> ($FR_{constraints}$) Any pattern of instantiation of any fundamental properties and relations that respect the principles in Π is metaphysically possible.

However, the principles in Π, so employed, play the role of necessities. FR is not properly reductive if it requires taking for granted a class of propositions that all possibilities must respect. Instead, the combinatorialist should use a primitive notion to constrain FR. For example, consider the combinatorialist who endorses relationism and fundamental distance relations. She may add to her ideology the notion of *metric appropriateness*, and revise FR so that any metric-appropriate distribution of fundamental properties and relations is metaphysically possible. *Metric appropriateness*, in turn, may be cashed out in terms of the metric principles that would have appeared in Π. These principles are not *primitive* necessities on this strategy, but the principles that illuminate the primitive notion of *metric appropriateness*. (Consider for analogy the view that *truth* is a primitive notion illuminated by recursive principles.) Similar considerations apply to fundamental path length, leading the combinatorialist to the primitive notion of *path length appropriateness*. Finally, the combinatorialist who endorses substantivalism and fundamental location relations may add to her ideology the notion of *relata appropriateness*, and revise FR so that any relata-appropriate distribution of fundamental properties and relations is metaphysically possible.

2.5 The Problem of Determinates

According to Lewis (1983a), natural properties explain objective similarity and dissimilarity in the world: the extent to which two objects resemble each other depends on the perfectly natural properties that they share. Arguably, the perfectly natural properties just are the fundamental properties. But a dilemma arises when we observe that many candidates for fundamentality are *determinates* of *determinables*. For example, the property *has mass* is a determinable whose determinates are specific

mass properties, like *has mass 1g* and *has mass 2g*.[10] (The term 'determinate' will usually designate 'absolute determinate', where absolute determinates are properties that are determinates of some determinable but do not themselves have any determinates.) Here's the dilemma for the combinatorialist. It seems that the determinable *mass* cannot be fundamental, if the fundamental is that which explains objective similarity and dissimilarity. Two objects that both have mass 1g are more similar to each other with respect to mass than to an object that has mass 2g. On the other hand, all three objects resemble each other in virtue of having the determinable *mass*. Thus, it seems that determinates account for fine-grained similarity relations. But once we take determinates to be the fundamental properties, the combinatorialist is in trouble. If an object instantiates *has mass 1g*, then it cannot also instantiate *has mass 2g*. Either one is not fundamental, severing the intimate connection between fundamentality and perfect naturalness, or FR is false.

Armstrong (1989: 78-9) proposes a solution: accept that only one such determinate is fundamental, and take the other determinates of that determinable to be grounded in recombinations of them. In the case of mass, for example, some determinate *has mass Xg* is the fundamental property. Call such a determinate a *minimal property*. If there are minimal mass properties, then an object which instantiates mass *Y*g does so in virtue of having parts that instantiate mass *X*g. The problem with combinatorialism is thus avoided: the reason that *has mass 1g* and *has mass 2g* are not co-instantiable is that they are both grounded in recombinations of the minimal mass *has mass Xg*, and their co-instantiation would require having different numbers of parts.[11]

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[10] Many of the same worries mentioned about distance in footnote 9 arise for mass as well.
[11] An exception is the case where the properties each have an infinite number of parts (Eddon 2007: 290).

Still, this proposal has been rejected. For one thing, it faces technical problems addressed by Sider (2005) and Eddon (2007). Second, even if there is a minimal mass *X*g, why must *it* be minimal mass? If mass *X*g is the minimal mass, it must be at least the smallest *actually* instantiated mass, since all other masses are instantiated by the object's having parts that instantiate *X*g. Notice that this prohibits partless objects from having greater than minimal mass. Furthermore, given FR, mass *X*g must also be suited to ground all possibly instantiated masses—so mass *X*g must be the smallest *possibly* instantiated mass as well. *A priori* reasoning leads us to conclude that there is no smallest possibly instantiated mass, because for any mass, there seems to be no conceptual barrier to thinking that there can be a smaller mass. On the other hand, the combinatorialist might say that the claim that the smallest mass is the smallest possibly instantiated mass is an *a posteriori* necessity that we endorse for theoretical reasons. This isn't a position that science forces us to adopt—even if there turned out to be an actual smallest mass, the laws of nature might have been different, permitting a possibly smaller mass. The motivation for this position is the view that it's meant to support.

A natural alternative for the combinatorialist is to deny FR as formulated. She may instead reformulate her combinatorial principle so that it only allows recombinations of determinate properties and relations that fall under distinct determinables—that is, *determinably-distinct* properties and relations.[12] We may then reformulate FR:

> (FR*) Any pattern of instantiation of any determinably-distinct fundamental properties and relations is metaphysically possible.

[12] The terminology is from Saucedo (2011: 246): '$F_1,\ldots,F_n$ are determinably-distinct $=_{df}$ F_i is not a determinate of F_j, F_j is not a determinate of F_i, and there is no property or relation G such that both F_i and F_j are determinates of G (for any $i,j \in (1,n)$ with $i \neq j$).'

FR* prohibits one object from instantiating two determinate properties of the same determinable, or *n* objects from instantiating, in order, two determinate *n*-place relations of the same determinable.[13] (This takes care of the fact that two objects cannot instantiate both *is five feet from* and *is six feet from*.) To restrict her original principle, the combinatorialist must admit into her ideology the notions of determinate and determinable, or more succinctly, *co-determinacy*. She must apparently accept this notion as primitive, as analyses of the notions of *determinate* and *determinable* are notoriously modal-centric.

Recently, some have defended that determinables rather than determinates are fundamental; see Hawthorne (2006), Weatherson (2006) and Denby (2001). The basic picture is this: metaphysically, the fundamental properties are determinables like mass and charge, and the non-fundamental properties include *has mass 5g* and *is positively charged*. (Weatherson accepts quantities rather than properties as the fundamental kinds. This view doesn't differ much from the view of the property-fundamentalist who takes determinable properties to be the fundamental, but offers a non-standard account of property instantiation.) Objects have determinate properties by instantiating particular values of determinables—the extension of the determinate is the set of objects that instantiate the value with which it's associated. We can think of

[13] There remains a question of *which* determinables are relevant for determinable-distinctness. Saucedo (2011: 246, footnote 16) says that he is only concerned with first-order properties and relations, excluding second-order properties and relations like *is a property*. This is because 'some first-order properties or relations may count as being determinably-distinct even if you happen to believe that they are all determinates of second-order properties such as being a property, being a relation, being a property or a relation, etc.' However, it just seems wrong to say that *is red41* is a determinate of *is a property*; objects instantiate *is red41*, not properties. Still, there is a first-order property that all objects have: *has a property*. If *is red41* and *has mass 1g* were both determinates of *has a property*, then these would turn out to be not determinably-distinct; excluding second-order determinables does not help here. One way to get around this problem would be to follow Russell in drawing a distinction between predicative and impredicative properties: those that do not tacitly involve quantification over properties, and those that do. If we excluded impredicative properties as well, then *has a property* wouldn't be relevant to determinable-distinctness. However, there is some controversy over the distinction; see Feferman (2005). Furthermore, the same problem arises given *any* property that all objects have, some of which are plausibly predicative; candidates include *is an existent* and *is concrete*.

the 'values' in question as representatives of the ways the determinable can be instantiated—e.g. a value for every determinate shade of red, with respect to the determinable *red*, or a real number value with respect to the determinable *mass-in-grams*. However, ideologically we've replaced the notion of *instantiation* with *gradable instantiation*, which is represented as a function from objects to values of a fundamental determinable. This raises the question of *why* it is that an object can only gradably instantiate one value of a determinable, which leads to problems parallel to those presented in this section.

2.6 Incompatibility Primitivism: The Idea

Incompatibility primitivism is a modal primitivist view that starts with the idea that certain properties cannot be co-instantiated. The property *is a bachelor* is incompatible with the property *is married*, though it is compatible with the property *is male*. Some incompatibilities are primitive. Others are grounded in the primitive ones—for example, *is a rude bachelor* presumably is derivatively incompatible with *is married*. Let's start with the simplifying assumption that incompatibilities can only hold between two properties. (This will need to be generalized so that incompatibilities can hold between multiple properties and relations.) Let **Γ** be the set of pairs of primitively incompatible properties. **Γ** grounds a set **Δ** of pairs of derivatively incompatible properties.[14] The resulting account of possibility is this: any distribution of (abundant) properties over objects that respects **Δ** is metaphysically

[14] We could equally well take the primitive notion to be *compatibility*, but one primitive can do the work of two. Here are three derivative notions: *self-incompatibility* is the special case where P_i is incompatible with itself, P_i and P_j are *compatible* just in case it's not the case that they're incompatible, and P_i *entails* P_j just in case P_i and *not*-P_j are incompatible.

possible, where a distribution respects **Δ** just in case for all pairs of properties $\{P_i,P_j\} \in \mathbf{\Delta}$, no object instantiates both P_i and P_j.[15] This is a combinatorial principle of sorts.

Incompatibility primitivism is not committed to any particular account of the relation between the fundamental and the non-fundamental. (Note: neither is combinatorialism.) It is not committed to any account of what primitive incompatibilities there are either. Primitive incompatibilities need not be restricted to fundamental properties. Some, like Sider (2011: section 7.2), have the 'purity intuition'—for our purposes, this means they think that primitive modal notions cannot apply to the non-fundamental. For those that share the purity intuition, an accommodating account of incompatibility primitivism is provided in section 2.8.

It remains to be shown that the problems in sections 2.4 and 2.5 don't arise for the incompatibility primitivist. First, let's revisit the problem of determinates. Recall that if there are fundamental properties that are determinates, then the combinatorialist must adopt the restricted principle FR*. This in turn requires the ideology of *co-determinacy*. If this strategy succeeds for the combinatorialist, then the incompatibility primitivist may reduce this notion. Before showing how, notice that where the combinatorialist appeals to co-determinacy, the incompatibility primitivist has the resources to simply stipulate that certain fundamental properties are primitively incompatible with other fundamental properties. There's no further ground for their incompatibility. The incompatibility primitivist does not thereby have an *unsystematic* solution to the problem of determinates. She may say that although certain fundamental properties are primitively incompatible, they fall into a non-

[15] I endorse a different theory for *de re* possibilities—those concerning particular individuals—so we should read this principle as a sufficient condition for *de dicto* possibility.

fundamental determinate-determinable structure such that certain possibilities may be characterized, though not reduced, by FR*.[16]

Here's the idea. For FR* to be extensionally adequate, it must be the case that the fundamental properties can be grouped in such a way that any pair of fundamental properties that fall under the same determinable *cannot* be co-instantiated, but any pair of fundamental properties that *do not* fall under the same determinable *can* be co-instantiated. This may be mimicked on incompatibility primitivism by requiring that for any distinct fundamental properties Q_i, Q_j and Q_k, if Q_i and Q_j are primitively incompatible, and Q_j and Q_k are primitively incompatible, then Q_i and Q_k are primitively incompatible. Call this feature of the space of fundamental properties the *Euclidean property*. We can then form a partition Π of fundamental property space by grouping together all sets of fundamental properties that are mutually incompatible. Any pair of fundamental properties are determinates of the same determinable just in case they're grouped under the same cell of Π. This can be shown by appealing to the fact that relations that are reflexive, transitive and symmetric are equivalence relations. Let R be a relation that holds over fundamental properties Q_i and Q_j just in case $Q_i=Q_j$ or $\{Q_i,Q_j\}\in\mathbf{\Gamma}$. R is trivially reflexive and symmetric. If $\mathbf{\Gamma}$ has the Euclidean property, then it's transitive as well.[17]

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[16] The inspiration is the thought that co-determinates form a 'mutual detestation society', from Armstrong (1978: 112).

[17] We can also give a more direct proof. Let A be any set. Define a *relation** over A as any set of two-membered sets $\{a_i,a_j\}$ where $a_i,a_j\in A$ and $a_i\neq a_j$. Let a relation* C have the *Euclidean property* iff if $\{a,b\}\in C$ and $\{a,c\}\in C$, then $\{b,c\}\in C$. Where a partition of A is a set of pairwise disjoint subsets of A such that their union is A, and R is a relation* over A with the Euclidean property,

(*) R partitions A.

(*) should seem intuitive, but here's a proof. We want to show that there exists a partition of A into $A_i\subseteq A$ such that $A=\cup A_i$ and for any A_i and A_j in the partition, $A_i\cap A_j=\varnothing$. For any $a\in A$, let there be an $A_i\subseteq A$ be such that (i) $a\in A_i$, (ii) for all $b\in A$ where $b\neq a$, $b\in A_i$ iff $\{a,b\}\in R$, and (iii) there are no other elements in A_i. We want to show that for any $A_i,A_j\subseteq A$, either $A_i=A_j$ or $A_i\cap A_j=\varnothing$. Suppose $a\in A_i\cap A_j$. Suppose that for some $b\neq a$, $b\in A_i$ but $b\notin A_j$. If $b\in A_i$, then by clause (ii), $\{a,b\}\in R$; but then again by clause (ii), $b\in A_j$, a contradiction. So given that $a\in A_i\cap A_j$, if for any b, $b\in A_i$, then $b\in A_j$. So if A_i and A_j

This analysis of co-determinacy only works if the space of fundamental properties has the Euclidean property; we cannot partition the fundamental properties into a determinate-determinable structure if there are incompatible fundamental determinates that fall under different determinables. However, the combinatorialist herself must deny this possibility if FR* is to be extensionally adequate. It is a mark against her view if, say, *is red41* is determinably-distinct from yet incompatible with *has mass 5g*. Also notice that for FR* to succeed, there must be a way to distinguish fundamental and derivative co-determinates. The notion of *co-determinacy* sorts fundamental properties like *has mass 41g* into groups under determinables like *has mass*; it does not sort purported derivative determinates like *has mass 41g and is red42* into groups under derivative determinables like *has mass and is red*.

The other problems for the combinatorialist involved relations. The present account does not cover relations or for that matter, incompatibilities involving three or more properties. For these, we need a generalized version of incompatibility primitivism. The generalized version requires introducing technical notation; this is because we sometimes need to specify *how* properties or relations are incompatible. For example, we cannot simply talk about the incompatibility between *is located at* and *is not a region*; we need a way to say that *is not a region* cannot be instantiated by the second relatum of *is located at*.

The generalized version of incompatibility primitivism, introduced in the next section, uses the notion of a *variable listing* of a property or relation to represent the fact that properties and relations may be *coordinated*. The idea is that each property or

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share any element, they share them all and $A_i=A_j$. On the other hand, if they don't share any elements, they're disjoint. We've shown that R partitions A.

Now, let **FP** be the set of fundamental properties, and consider the primitive compatibilities that hold between fundamental properties. Define R as the set of pairs of these primitively incompatible fundamental properties; then we have by (*) that R partitions **FP**. Let each cell of the partition correspond to a determinable, and the members of the cell its determinates.

relation may be associated with an ordered tuple of variables—one variable for a property, *n* variables for a relation of arity *n*. If the relation *is located at* is associated with variable listing (*x,y*), and the relation *is not a region* is associated with variable listing (*y*), then *is located at* and *is not a region* are incompatible under variable listings ((*x,y*),(*y*)). This represents the fact that whatever goes into the right argument place of *is located at* cannot also have the property *is not a region*. The generalized version of incompatibility primitivism can also handle the other cases above. Recall the problem of metric constraints given relationism: the triangle inequality, among other geometric principles, cannot be violated. According to incompatibility primitivism, where $n+m<o$, the relations *is n feet from*, *is m feet from* and *is o feet from* are incompatible under variable listings ((*x,y*),(*y,z*),(*x,z*)).

The next two sections may safely be skipped by those uninterested in the generalized version of incompatibility primitivism (section 2.7) and the 'purity' version (section 2.8).

2.7 A More Careful Formulation

In our representation of incompatibilities between properties and relations, we want some way to represent the fact that the co-instantiation of properties and relations may be *coordinated*: that is, that properties and relations are only compatible given certain distributions. The idea of a *variable listing* aids in our linguistic representation of the *coordination* of properties and relations. For any property or relation *Q* of arity *n*, let $Q(v_1, \ldots, v_n)$ be *Q under variable listing* $(v_1, \ldots, v_n)$, where the v_i are any variables. For example, *has mass*(*x*) is *has mass* under variable listing (*x*), and *has mass-in-g greater than*(*x,y*) is *has mass-in-g greater than* under variable listing (*x,y*).

Now, consider a variadic *incompatibility relation* γ:

$$\gamma\left(Q_1(x_{1,1},\ldots,x_{1,m_1}),\ldots,Q_n(x_{n,1},\ldots,x_{n,m_n})\right)$$[18]

where the $(x_{i,1},\ldots,x_{i,m_i})$ are variable listings of each Q_i. Order does not matter for the relation γ, but it will be useful to use *n*-tuple notation rather than set notation for some of the definitions. Let's also stipulate that applications of γ are invariant under uniform substitutions of variables.

As an example of an incompatibility, the properties *has mass 5g*, *has mass 6g* and *has mass-in-g greater than* are incompatible under variable listings ((*x*),(*y*),(*x,y*)). That is:

γ(*has mass 5g*(*x*), *has mass 6g*(*y*), *has mass-in-g greater than*(*x,y*))

As with the simple view discussed in 2.6, let's distinguish between primitive and derivative incompatibilities. Let there be a set of *primitive incompatibilities* **Γ** with members of the form $Y=\{Q_1(x_{1,1},\ldots,x_{1,m_1}),\ldots,Q_n(x_{n,1},\ldots,x_{n,m_n})\}$, where $Y\in\mathbf{\Gamma}$ only if $\gamma\left(Q_1(x_{1,1},\ldots,x_{1,m_1}),\ldots,Q_n(x_{n,1},\ldots,x_{n,m_n})\right)$. **Γ** grounds a set **Δ** of derivative incompatibilities with members of the same form. Then any distribution of (abundant) properties over objects that respects **Δ** is metaphysically possible. This framework can accommodate specific metaphysical theses about primitive modality. For example, if someone thinks that the instantiation of a property or relation cannot

[18] We may read '$\gamma\left(Q_1(x_{1,1},\ldots,x_{1,m_1}),\ldots,Q_n(x_{n,1},\ldots,x_{n,m_n})\right)$' as '$Q_1,\ldots,Q_n$ are incompatible under variable listings $\left((x_{1,1},\ldots,x_{1,m_1}),\ldots,(x_{n,1},\ldots,x_{n,m_n})\right)$' or 'γ holds of (applies to) $Q_1,\ldots,Q_n$ under variable listings $\left((x_{1,1},\ldots,x_{1,m_1}),\ldots,(x_{n,1},\ldots,x_{n,m_n})\right)$.'

preclude or necessitate the instantiation of a property or relation by entirely distinct things, then she may add this requirement on **Γ**:

> (H) γ holds of some properties and relations under certain variable listings only if any variable appearing in a variable listing appears in at least one other.

Let's return to the other problems for the combinatorialist. Recall that if certain spatiotemporal relations are fundamental, then whether or not we endorse substantivalism or relationism about spacetime, FR fails. Consider the case of mismatched relata on substantivalism: *is located at* can only hold between an object–region pair. On incompatibility primitivism, this is ensured by positing an incompatibility relation between *is located at* and *is not an object* or *is not a region* under certain variable listings:

> γ(*is located at*(*x,y*), *is not an object*(*x*))
> γ(*is located at*(*x,y*), *is not a region*(*y*))

These will turn out to be derivative incompatibilities:

> γ(*is located at*(*x,y*), *is not an object*(*x*), *is not a region*(*y*))
> γ(*is located at*(*x,y*), *is an object*(*x*), *is not a region*(*y*))
> γ(*is located at*(*x,y*), *is not an object*(*x*), *is a region*(*y*))

Consider the problem of metric constraints on relationism: FR entails possible violations of the triangle inequality and other metric constraints. On incompatibility primitivism, for any distance-in-feet relation, it must be the case that if x is *n* feet from y and y is *m* feet from z, then if x is *o* feet from z, then *o* cannot be greater than the sum of *n* and *m*. This can be cashed out by positing primitive incompatibilities between *is n feet from*, *is m feet from* and *is o feet from*, for all *n*, *m*, and *o* such that $o>n+m$:

$\gamma(is\ n\ feet\ from(x,y), is\ m\ feet\ from(y,z), is\ o\ feet\ from(x,z))$

I had been assuming that the fundamental relation would be the two-placed relation *is five feet from* rather than the three-placed relation *is ___ feet from* which has as one relatum the number five. However, if we assume the three-placed relation is fundamental, the incompatibility primitivist may posit incompatibilities like this:

$\gamma(is\ feet\ from(x,w,y), is\ feet\ from(y,v,z), is\ feet\ from(x,u,z), is\ five(w), is\ six(v), is\ twelve(u))$[19]

2.8 Incompatibility Primitivism and 'Purity'

The version of incompatibility primitivism presented in sections 2.6 and 2.7 allows primitive incompatibilities between non-fundamental properties or relations. Someone who has the 'purity intuition' thinks that primitive incompatibilities can only hold between fundamental properties or relations. There are reasons to doubt this. For one thing, we may want to leave open the possibility of *gunky properties*:

[19] Incidentally, this framework addresses the worries that Turner (2010: 185–6) has about Jubien's view, discussed in section 2.9, which is very similar to mine.

properties grounded in other properties, all of which themselves are grounded in further properties and so on ad infinitum. Consider the possibility of *gunky worlds*: worlds in which every object has a proper part. Assuming that point-sized things cannot have parts, gunky worlds are point-less. Let *is located at region R* be a property of an object in a gunky world. Region *R* cannot be defined in terms of points, since there aren't any. If we do not want to take *is located at region R* as a fundamental property, then presumably we'll have to say that it is grounded in properties like *is located at region* R_{1a} and *is located at* R_{1b}, where R_{1a} and R_{1b} are intuitively two disjoint, covering proper parts of region *R*. Each of these is grounded in further gunky regions and so on. As long as gunky worlds are possible, it seems like gunky location properties are possible. And if so, then well-foundedness and completeness fail: the non-fundamental does not supervene on the fundamental.

We can easily accommodate the purity intuition by constraining the non-purity version of incompatibility primitivism: simply disallow primitive incompatibilities that involve the non-fundamental. However, this simple fix has consequences. To see this, consider *is located at* and *is not a region*, which are primitively incompatible under variable listings ((*x,y*),(*y*)) on the non-purity version. Negated properties like *is not a region* are usually taken to be non-fundamental. So on the purity version, this cannot be a primitive incompatibility. However, it's hard to see how it could even be a derivative incompatibility: the fundamental properties and relations involved, *is located at* and *is a region*, are not incompatible. What we want to say is that there are *entailment* relations between certain properties, like *is located at* and *is a region*. The notions of property incompatibility and property entailment are intimately related: if *P* entails *Q*, then *P* is incompatible with *not-Q*; and if *P* is incompatible with *Q*, then *P*

entails *not-Q*. However, whichever one we take as the primitive notion, we cannot have the other hold between fundamental properties, even as a derivative notion.

In response, the 'purity intuition' incompatibility primitivist might do one of these three things. First, she could insist that there are only primitive incompatibilities between fundamental properties and deny the purported entailments between fundamental properties, or vice versa. Second, she could add a primitive entailment relation between fundamental properties and relations. Third, she might say that *is located at* is primitively incompatible with all the fundamental properties that are not the property *is a region*. None of these are ideal. Here's another option: define one primitive to do the work for both. To avoid the extra apparatus associated with variable listings, let's restrict our attention to fundamental properties rather than relations (though the following account can be generalized). Let E be a primitive relation that holds between two (possibly empty} sets $\prod$ and $\sum$ of fundamental properties. Intuitively, we should think of E this way: if $\prod E \sum$, this means that no object can both (i) instantiate all the properties in $\prod$ and (ii) fail to instantiate all the properties in $\sum$. Then we may say that two fundamental properties P_i and P_j are *incompatible* just in case $\{P_i,P_j\} E \varnothing$, and P_i *entails* P_j just in case $\{P_i\} E \{P_j\}$. This account succeeds in grounding both incompatibilities and entailments between fundamental properties with just one primitive.

One disadvantage is that it's highly unintuitive as a characterization of the modal structure of the world. While we can easily understand the primitive modal notion *incompatible*, we only appear to be able to make sense of this new primitive in terms of modal locutions. However, this notion otherwise appears to be of the same kind as the others—it is no strong objection that our ordinary language intuitions are not satisfied. A more serious objection is that it is set-involving, especially as it allows

relations to the empty set. While the set apparatus may be construed as representational, one might worry that if the empty set represents *nothing*, then apparent instances of relations that hold between some properties and *nothing* are cases where the relation is not instantiated after all.

2.9 Objections to Primitive Incompatibility

Here are some worries about incompatibility primitivism. The first is that a mere list of primitive incompatibilities is unsystematic. However, we can formulate generalizations that are true given the list of incompatibilities. For example, the primitive incompatibilities concerning distance in feet license this generalization: for all objects x, y and z, and real numbers n, m and o, if x is n feet from y, y is m feet from z and x is o feet from z, then $n+m \geq o$. What this shows is that the systematicity is not a rock bottom feature of the world—it's grounded in the facts that are systematized.

A second worry is that primitive incompatibility cannot account for the rich structure of some classes of co-determinates—for example, mass properties form a metric space and among color properties some seem 'closer' than others. This worry is misplaced. I've only claimed to account for the basic *modal* structure of the world. Even if the incompatibility primitivist reduces co-determinacy, she hasn't yet committed to any claims about the non-modal relations that co-determinates stand in to each other. Some of these non-modal relations will in fact supervene on the incompatibility facts; just consider the generalization of distance facts mentioned in the last paragraph. On the other hand, some non-modal relations that hold between co-determinates will *not* supervene on incompatibility facts. If colors do not correspond

to a real number space, then the fact that red is 'closer' to orange than to green has nothing to do with modal facts about colors.

Third, there is the worry that the view doesn't allow for the nature of the relevant class of properties to ground the modal relations between them. On Jubien's view, for example, something about the intrinsic nature of properties like *is yellow* and *is colored* grounds an 'entailment' relation that holds between them. (Entailment and incompatibility are two sides of the same ideological coin: φ entails ψ iff φ and not-ψ are incompatible.) This view is very similar to the one presented here, save for the mention of intrinsic natures.

Jubien stresses that the properties *is yellow* and *is colored* have complex intrinsic natures that differ intrinsically. Nonetheless, he wants to remain agnostic on deeper metaphysical issues like the question of property constituency. Here's one reason for denying that entailment just is property constituency (2009: 93): 'The property of being a horse entails the property of not being a xylophone, but the latter property is surely not an intuitive constituent of the former (nor is the un-negated property). Being a horse and being a xylophone are nevertheless properties whose internal natures guarantee that anything that instantiates the former property also instantiates the negation of the latter.'

I don't deny that properties may differ intrinsically. There are complex issues having to do with the relation between the fundamental and the non-fundamental not yet addressed. For example, I haven't taken a stance on the relation between donkey facts and microscopic particle facts—are *is a donkey* and *is an arrangement of particles in such-and-such a way* primitively incompatible? When it comes to the relation between fundamental and non-fundamental properties or relations, I can agree with Jubien that incompatibility is grounded in intrinsic natures. But one may endorse

both primitive incompatibilities between fundamental properties and a different view about the relation between these and non-fundamental properties. One may say, for example, that the property *is a donkey* reduces to the property *is an arrangement of particles in such-and-such a way*. If the first property just is the second, then the fact that *is a donkey* is incompatible with *is a xylophone* will reduce to something about the incompatibility between properties involving arrangements of fundamental particles. (Though the view presented in 2.7 allows primitive incompatibility relations between fundamental and non-fundamental properties or relations, the view presented in 2.8 restricts this relation to the fundamental.) Note that the combinatorialist faces this question as well—FR and its variants only tell us what's metaphysically possible at the fundamental level, and are silent about non-fundamental properties.

There still remains the question of whether or not the incompatibilities between fundamental properties or relations are grounded in their intrinsic natures. First of all, differing intrinsically doesn't imply having a *complex* intrinsic nature. We may say that *has mass 5g* and *has mass 6g* differ intrinsically without committing ourselves to the claim that their natures are complex. There's no interesting sense of *nature* that can do that job better than taking the modal relations as primitive. If the properties in question (like mass properties) are fundamental, then natures cannot themselves be properties that ground the fundamental properties. On the other hand, natures are sometimes cashed out in terms of higher-order properties, so that the nature of *has mass 5g* would be a higher-order property had by *has mass 5g*. It seems to me no more explanatory to say that some higher-order properties (we-know-not-what) of mass properties ground the fact that mass determinates aren't co-instantiable, than to say that the fact that they're not co-instantiable is grounded in a primitive

incompatibility relation.[20] In any case, on such a view we are left with a further question of the relation between the fundamental properties and their natures—do fundamental properties ground natures? Are natures themselves fundamental? Inviting these questions is undesirable and avoidable: let there be no difference between the properties themselves and their 'intrinsic natures'.[21]

2.10 Weighing Ideology

Let's take stock. In section 2.4, I argued that the combinatorialist must adopt some primitive or other to avoid problems of spatiotemporal relations. If she endorses fundamental location, then she must adopt a notion like *relata appropriateness*; if she endorses fundamental distance or path, she requires the notion of *metric appropriateness* or *path length appropriateness*. In section 2.5, I argued that the combinatorialist must also adopt the primitive notion of *co-determinacy* in order to avoid the problem of determinates. The combinatorialist thus requires two primitive notions in order to avoid overgenerating possibilities. In contrast, the incompatibility primitivist has one notion that does all of the work.

So much for ideological simplicity. However, this is not the end of the story. In section 2.2, another consideration for theory comparison was mentioned: are we happy with the notions the theory takes as primitive? Some might concede ideological superiority to the incompatibility primitivist with respect to the *number* of primitive notions, yet object that there is something especially problematic about primitive *modal* notions: modal notions are 'spooky'. However, it is difficult to cash out this spookiness worry. It cannot be a mere epistemological concern—modality seems no

[20] Officially, Jubien takes no position about the 'ultimate nature of property entailment'.
[21] There are other views in the vicinity about what constitutes the 'nature' of fundamental properties, like essence views and potency views. These deserve separate discussion.

more worse off in this respect than sets, numbers, or even *co-determinacy*. Rather, the worry has something to do with the kind of notion that is being taken as primitive.

Here is the best attempt I've found at pinpointing the intuition that modality isn't the right sort of thing to include in fundamental metaphysics. Sider (2003: 185) writes, 'Accepting necessity or possibility as a primitive feature of reality would be like accepting tensed facts as primitive, or accepting dispositions as primitive, or accepting counterfactuals as primitive. While some are willing to make these posits, others seek to reduce "hypothetical" notions to "categorical" notions—notions which are in a sense "self-contained" and do not "point beyond themselves" as the hypothetical notions do.' Elsewhere, Sider (2001: 41) writes, 'Categorical properties involve what objects are actually like, whereas hypothetical properties 'point beyond' their instances.' Merricks (2007: chapter 6, section III) also expresses suspicion, in the case of tense, with past- or future-directed properties like *futurely is sitting*.

That there is such a distinction and that modal and tense properties fall on one side of it is not itself an objection to modal primitives. Cameron (2011: 58–9) offers a proposal for *why* such properties in the tense case seem suspicious: they tell us nothing about how the instantiating object presently is, intrinsically. This seems bad for the presentist, the usual defender of tensed properties, who believes that only the present time exists. This thought can be extended to the case of modal properties like *possibly is sitting*; the analogous worry is that such a property, if irreducible, tells us nothing about how an object *actually* is, intrinsically.

However, this criterion will count certain non-tensed and non-modal properties as hypothetical rather than categorical: for example, that an object instantiates the property *is within 5 feet of an electron* tells us nothing about how the object is intrinsically (except perhaps that it can stand in spatiotemporal relations),

and surely what information it does give us 'points beyond' the object. Cameron's criterion also fails to count certain tensed and modal properties as hypothetical, given plausible assumptions. Consider the property *is possibly an electron*. If the only sorts of things that *can* be electrons are electrons, then we can infer from an object's having this property that it is actually an electron.

As formulated, this criterion doesn't cover the case of relations. Here's a suggestion: a categorical relation is a relation that tells us something about how its relata actually are, intrinsically, where this means that we either know something about the intrinsic natures of the relata individually or that we know something about the intrinsic relations that hold between them. (Recall that intrinsic relations supervene on the intrinsic properties of their relata.) However, *incompatibility*, *co-determinacy*, *relata appropriateness* and *metric/path length appropriateness* seem to stand or fall together with respect to this generalized criterion. For example, *co-determinacy* does not seem to entail an intrinsic relation—all it tells us is that its bearers stand in the same relation to a determinable. It is arguable that if two objects are co-determinates, then something about their intrinsic natures makes them co-determinates. However, nothing prevents us from extending the same reasoning to incompatible objects: if two objects are incompatible, then something about their intrinsic natures makes them incompatible.[22]

There is nothing to this spookiness intuition after all. The best attempt to spell out the worry with the kind of primitive the modal primitivist adopts does not distinguish her primitives from the combinatorialist's primitives. If anything, the intuition should be that modal notions are *more* appropriate for being primitive notions than the combinatorialist's notions. Modal notions appear everywhere, both in

[22] Thanks to an anonymous referee for suggesting that *co-determinacy* doesn't fare any better with Cameron's criterion than *incompatibility*.

everyday discourse and in scientific reasoning. *Incompatibility* in particular is easily understood and doesn't seem amenable to conceptual reduction. Of course, these aren't arguments for its being a *metaphysical* primitive, but they count for something when we're asking what kinds of notions are acceptable as primitives. *Co-determinacy*, on the other hand, is a notion whose characteristic features just are: co-determinates cannot be co-instantiated and are determinates of a common determinable.

Combinatorialism thus does not enjoy an ideological advantage over incompatibility primitivism with respect to primitive notions—ideologically, the latter has the upper hand. But this is no trivial conclusion. Commitment to modal primitivism is often used as a *reductio* of other views. I've shown that a main reason for rejecting modal primitivism in favor of combinatorialism, ideological simplicity, is misplaced. Another aim was to present a systematic primitivism. These were just first steps towards developing a complete primitivist theory. There are other steps to take, like examining other reductive theories of modality to see how they fare ideologically. However, combinatorialism strikes me as the reductive theory—Lewis's aside—that is most thought of as enjoying an ideological advantage. After all, other theories of modality (reductive or not) are well-known for accepting primitive notions, like *essence*, *power*, or an *according to the fiction of* operator. Arguing against the ideological advantage of combinatorialism goes a long way towards defending the relative ideological innocence of modal primitivism.

Chapter 3

Linguistic Counterpart Theory

3.1 Introduction

There are two different ways of talking about other possibilities. First, we may use explicitly modal locutions like ‘might’, ‘must’, and ‘could’. Restricting our attention to the standard modal operators, ‘possibly’ and ‘necessarily’, we may say, ‘Possibly, there is a flying hedgehog.’ Another way to talk about other possibilities involves talk of possible worlds. On this way of speaking, we don’t need modal locutions, since we can directly describe the inhabitants of other universes. For example, we may say, ‘In some possible world, there is a flying hedgehog.’

There seems to be a systematic correlation between these two sorts of statements, as characterized by the so-called ‘Leibnizian biconditionals’:

⌜Possibly P⌝ is true iff ⌜In some possible world, P⌝ is true.

⌜Necessarily P⌝ is true iff ⌜In every possible world, P⌝ is true.

However, apart from this correlation, the Leibnizian biconditionals don’t tell us very much. Consider the sentence ‘Possibly, Karen has a brother who is a doctor.’ Translated into worlds talk, this becomes ‘In some possible world, Karen has a brother who is a doctor.’ But what are possible worlds? What does it mean for Karen, an actual individual, to exist in a possible world? And for that matter, what does it mean for Karen

to have a brother who exists in a possible world, given that she doesn't actually have a brother?

According to *modal realists* like David Lewis, possible worlds are like our universe in kind. Likewise, possible individuals like Karen's brother inhabit some other world just as we inhabit ours.[1] These Lewisian possible worlds—one of which is the actual world—all exist in the unqualified sense of *exist*, but are spatiotemporally isolated from each other. There is a Lewisian world for each way the universe could have been, qualitatively speaking. When it comes to purely qualitative possibilities, it is easy to see how the Leibnizian biconditionals interact with modal realism: if it's possible that there exists a flying hedgehog, then there exists a Lewisian world in which some flesh-and-blood hedgehog flies. Things get trickier when it comes to possibilities involving particular individuals like Karen. Since each Lewisian world is spatiotemporally independent of the others, Lewisian individuals are 'worldbound': no individual inhabits more than one world. Fortunately for Lewis, inhabiting a world and existing according to a world are two different things. For the latter, we require a theory of transworld representation—a theory of when it is that an individual that exists according to one world exists according to another. Lewis's preferred theory of transworld representation is *counterpart theory*, according to which Karen exists according to another possible world just in case she has a counterpart who inhabits that world.[2]

Lewis's modal realism and counterpart theory together form a powerful modal theory. Nonetheless, his ontology is a hard pill to swallow. Among those who deny modal realism are *modal actualists*, who insist that everything actually exists. There are

[1] See Lewis (1986) for the best explanation of this view.
[2] Counterpart theory is developed in Lewis (1968) and Lewis (1986). More details of counterpart theory will be given in section 3.3.

no other possible worlds. Fortunately, the actualist is free to retain the benefits of possible worlds talk so along as she is able to find ersatz substitutes among the actual. Ersatz possible worlds have thus been defined as states of affairs, stories, sets of sentences or propositions, and properties.[3]

I will defend a particular actualist theory of ersatz worlds: *linguistic ersatzism*. According to linguistic ersatzism, although there are no other possible worlds, a similar theoretical role can be played by descriptions of ways a universe could have been: there could have been a flying hedgehog just in case some ersatz world describes the existence of a flying hedgehog. There are ersatz individuals as well; these are descriptions of ways an individual could have been. Since ersatz individuals 'encode' the relations that a represented individual stands in to the rest of her universe, ersatz individuals are, like Lewisian individuals, 'worldbound'.[4] Fortunately, counterpart theory and modal realism are independent. The actualist is free to combine her ersatzism about possible worlds with counterpart theory as a theory of transworld representation; the resulting view is *linguistic counterpart theory*.

Lewis contends that any substitutes for his pluriverse of concreta are, despite initial appearances, theoretically inadequate (1986: 141): 'On balance, I think ersatzism is somewhat worse off than the genuine modal realism that I favour. Paradise on the cheap, like the famous free lunch, is not to be had.' Nonetheless, he concedes that linguistic counterpart theory is the most promising actualist rival to modal realism, save for two objections.[5] My primary aim is to defend linguistic counterpart theory against these

[3] See Adams (1974), Plantinga (1974), and Stalnaker (1976), though there are many more. Some actualists reject talk of possible worlds, but I'll only be concerned with ersatz theories.
[4] Keep in mind throughout that representation is intensional.
[5] These are noted in Lewis (1986: 237-9).

objections, showing that it fares at least as well as Lewis's theory. In fact, it does better, since the actualist may retain the benefits of counterpart theory without the burden of Lewis's ontology.

Here's the plan for the chapter. In section 3.2, I more carefully introduce linguistic ersatzism. In section 3.3, I discuss the issue of transworld representation, which results in the proposal of linguistic counterpart theory. In sections 3.4 and 3.5, I give Lewis's two objections to linguistic counterpart theory, responding to the first straight away. Then in section 3.6, I introduce a non-standard counterpart semantics which addresses the second objection. I end in section 3.7 by discussing the upshot of linguistic counterpart theory, including its various benefits.

Note that this chapter isn't directly concerned with natural language semantics or logic.[6] Part of the defense of linguistic counterpart theory involves giving a theory of truth conditions for modal claims, but the sort of truth conditions with which I'm concerned are of the metaphysical variety. That is, for the purposes of this chapter, I will care about truth conditions only insofar as they perspicuously represent the metaphysical structure of modal reality.[7]

3.2 Linguistic Ersatz Worlds and Individuals

The *linguistic ersatzer* (or simply 'ersatzer') says that ersatz worlds are sentences of some already-interpreted non-modal language—that is, a language which already has

[6] Thus, it's not about the Fara and Williamson (2005) objections to counterpart theory given the introduction of an actuality operator. However, see the appendix for a short discussion of how to integrate a solution in the literature into the theory presented here.

[7] There may be more than one way of understanding what it is to give a theory of metaphysical truth conditions. See Sider (2012) for one discussion of the matter. I prefer to leave the thought at the intuitive level.

truth conditions.[8] Ersatz worlds are thus representational in the way that languages in general are representational. In broad strokes, the idea is that this language is used to describe each of the ways that our world could have been. We then use these 'ersatz worlds' to provide truth conditions for sentences of a modal language. Since the non-modal language is interpreted and contains no modal vocabulary, we thereby show how to generate truth conditions for the modal portion of a modal extension of that language given the truth conditions for the non-modal portion.

The *worldmaking language* in question cannot be a natural language, on pain of expressive impoverishment. It needs to at least be rich enough to describe all the non-modal features of this universe. Thus, let the worldmaking language **L** be infinitary and *Lagadonian*, where a Lagadonian language is one in which each property or relation serves as its own predicate.[9] Let's also stipulate that we have the usual Boolean connectives and quantifiers and that we have an abundant property ontology, ignoring vagueness. The target language is a *modal language*, one which has the resources to express claims like 'Possibly, there is a talking donkey.' We may take this modal language to be **L**◇, the language that's just like **L** but is infinitary and includes modal operators: '◇' ('possibly') or '□' ('necessarily'). In the rest of this chapter, I will focus on '◇' alone, since '◇' and '□' are interdefinable.

Thus equipped, the ersatzer may say that *ersatz possible worlds* are maximal consistent sentences of **L** in canonical form, where a sentence S is (i) *maximal* just in case for each sentence of **L**, either it or its negation is entailed by S, (ii) *consistent* just in case S could be true, and (iii) in *canonical form* just in case it is the existential closure of

[8] Defenders of linguistic ersatzism include Roy (1995), Melia (2001), Heller (1998), and Sider (2002).
[9] See Lewis (1986: 145). Problems concerning cardinality are discussed in Bricker (1987) and Roy (1995). Since cardinality issues arise for just about everyone, I won't address them here.

a series of conjunctions of literals and a 'that's all there is in the world' clause.[10] For instance, one ersatz world might look like this:

$$\exists x \exists y \ldots (\sim Fx \wedge Fy \wedge Rxy \wedge \ldots \wedge \ldots \ldots \wedge x \neq y \wedge \ldots)$$[11]

This may be read: 'There exists some x, some y…such that x is not F, y is F, x Rs y … and x is not y …' As usual, x, y, etc. are variables, and F, G, etc. are predicates.

Ersatz worlds are stipulated to be in canonical form for mere convenience. Maximality is required so that every ersatz world 'decides' the truth or falsity of every non-modal sentence.[12] Consistency is required so that no ersatz world allows contradictions. (I will return to a point on consistency momentarily.)

Each ersatz world represents an entire universe that could have existed, or a way the actual universe could have been. One such ersatz world is 'the actual world': It represents the actual universe accurately. We may also define *ersatz individuals*, which represent individuals that could have existed, or ways that actual individuals could have been. Ersatz individuals are open formulas that are free with respect to one variable. They are the result of removing one existential quantifier from an ersatz world. They thus encode the relations that the represented individual stands in to the entire world (rather than just their intrinsic properties) so that we may distinguish intrinsically indiscernible individuals in a world. (A problem concerning individuals that are extrinsically

[10] This characterization of worlds differs slightly from the version presented by Lewis, according to which worlds are maximal consistent *sets* of sentences, but this difference will not matter.

[11] The reader should mentally insert a 'that's all there is in the world' clause into each ersatz representative discussed in this chapter, which might look like this: '$\forall t(t=t \rightarrow (t=x \vee t=y \vee \ldots))$'. Also, literals that are identity claims ('$\alpha=\beta$') are banned. This is for mere convenience, since the appearance of an identity claim would tell us that there is redundancy somewhere among the variables.

[12] If maximality fails, we may still hope to do the same work with sets of partial descriptions; since the evaluation formulas are finite, we don't need infinitely long sentences.

indiscernible as well is discussed in section 3.5.) One ersatz individual might look like this:

$\exists y\ldots (\sim Fx \wedge Fy \wedge Rxy \wedge \ldots \wedge \ldots \ldots \wedge x \neq y \wedge \ldots)$

This open formula is just like the sentence above but with '$\exists x$' removed. It may be read: 'x is such that there exists some y…such that x is not F, y is F, x Rs y … and x is not y …'

Notice that just as there are ersatz individuals corresponding to merely possible individuals, there are ersatz individuals corresponding to actual individuals as well. The appropriate representative for each actual individual is an open formula describing that individual's properties and relations to the rest of the world. So far, I have not addressed the issue of names in **L** and **L**$\Diamond$. Names were, in fact, banned from these languages. How then are we to evaluate sentences such as 'Possibly, Karen has a brother who is a doctor'? While I won't address the issue of names in much detail, notice that if we were to introduce names of individuals into our evaluation language **L**$\Diamond$, we could assign as their semantic values the ersatz individuals corresponding to them. Following the Lagadonian scheme, these names would be Lagadonian names: each actual individual would serve as its own name. There would not be names for non-actual individuals, which is as it should be. This does not mean that actual individuals like Karen are 'really' descriptions of an individual's properties and relations to the world. Instead, the resulting picture is that what matters to the *modal* properties of individuals like Karen are the non-modal

properties and relations that she instantiates. This idea will be further discussed in section 3.7.

Let's return to consistency. Consistency, left unreduced, is a modal notion. Fortunately, many actualists aren't after a reduction of modality. Adams (1981) explicitly takes consistency as a primitive modal notion. Other actualists locate primitive modality elsewhere: Stalnaker (1976) takes as primitive the ways things could have been and Plantinga (1976) endorses primitively possible states of affairs. My own view (Forthcoming) is that there are primitive incompatibilities between certain properties and relations. And some actualists do want a reductive theory of modality: for instance, Armstrong (1989, 1997) proposes a combinatorialist theory.[13] Any of these may form the basis of a reductive account of consistency. Linguistic ersatzism is thus neutral on the question of reductionism versus primitivism about modality. What it provides is a basis for reducing the *de re* modal truths to the *de dicto* truths.[14] Note that since the worldmaking language only has access to the qualitative properties, what the linguistic ersatzer effectively does when she helps herself to consistency is presuppose an account of *de dicto* modality—that is, of the purely qualitative modal truths.

I have been saying that the worldmaking language is 'non-modal', but now I may be a little more careful. By 'non-modal', I mean only that the worldmaking language does not include the modal operators. Given our discussion of consistency, it should now be clear that there might be elements of the modal in the predicates of the worldmaking

[13] For an overview of reductive theories of modality, see Sider (2003).

[14] *De dicto* modal truths, such as 'There could have been a flying hedgehog,' are those in which possibility or necessity is predicated of a sentence (or proposition) that doesn't concern particular individuals. The possibility of a flying hedgehog does not require that some actual thing have the modal property of being a flying hedgehog. In contrast, *de re* modal truths, such as 'Karen could have had a brother,' are those in which possibility or necessity is predicated of particular individuals. Some modal truths don't fall neatly into either category, e.g. if they involve more than one modal operator. These can be accounted for by the clauses defined in section 3.6.

language. For instance, it might be the case that *causation* or *dispositionality* are modal notions. However, these should be treated by the modal theorist's theory of *de dicto* modality. The primary focus here will be on *de re* modality.

I've now introduced ersatz possible worlds and individuals, which are linguistic representations of other possible worlds and individuals. Let's pause to appreciate the intuitive motivation behind this picture. The linguistic ersatzer says, basically, that it's possible that there is a flying hedgehog just in case there is some maximal consistent description of a universe in which there is a flying hedgehog. That is, what's possible comes down to whatever the actualist thinks about consistency, and thus of *de dicto* modality. This should seem like promising start.

3.3 Linguistic Counterpart Theory

The next step is to add a theory of transworld representation for individuals: that is, a theory of when it is that an individual which exists according to one world exists according to another. Actualism is typically associated with *transworld identity*, which is sometimes characterized as the thesis that some individuals exist in more than one world. However, actualists don't really think there are other worlds, only representations of them and their inhabitants. Transworld identity is more accurately characterized as the thesis that individuals are represented as existing according to more than one world in virtue of having the same representative in more than one world. However, linguistic ersatzism

runs into problems when paired with transworld identity.[15] To illustrate, consider the following sentence and its regimentation in **L**$\Diamond$:

(1_S) In some possible world, Karen has a brother who is a doctor who in some possible world is a clown.

(1_R) $\Diamond\exists x(Bkx \wedge Dx \wedge \Diamond Cx)$

1 involves (loosely speaking) attributing a *de re* modal property to an individual which doesn't actually exist, namely, Karen's merely possible brother. Intuitively, 1 is true iff there is a possible world—call it 'w_1'—according to which Karen has a brother who is a doctor who could have been a clown.[16] Intuitively, this is the case iff there is an ersatz world 'w_2' according to which the brother in w_1 is a clown in w_2. However, pretending that one cannot both be a doctor and a clown, the ersatz individual that represents Karen's brother in w_1 is distinct from the ersatz individual that represents Karen's brother in w_2.

We can put the problem another way by showing that 1 is predicted to be false given transworld identity, linguistic ersatzism, and a fairly standard theory of truth conditions: Kripke semantics. The now-familiar Kripke semantics relativizes truth to

[15] I noted above that we could add Lagadonian names to **L**—if we were to do this, then actual individuals would be represented as existing according to more than one world in virtue of being named in more than one world. Nonetheless, this strategy would not work for non-actual individuals, which don't have Lagadonian names.

[16] Keep in mind that ersatz worlds don't contain modal vocabulary, so strictly speaking w_1 does not describe Karen's brother as possibly being a clown. Precise truth-conditional clauses will be considered starting in section 3.4, but they aren't necessary here.

worlds and adds a clause for the modal portion of the language.[17] Suppressing the accessibility relation, here's what (a simplified version of) Kripke semantics says about quantified and modal clauses: where w and v are worlds and φ is a formula of **L**◇,

(K∃) ∃αφ is true at w iff for some u in the domain of w, φ is true of u at w.

(K◇) ◇φ is true at w iff there exists some world v such that φ is true at v.

Note that the domain we associate with each ersatz world is populated by ersatz individuals, as we've replaced actual individuals with ersatz representatives. Normally, a predicate is satisfied by or true of an individual just in case the individual instantiates the property denoted by the predicate. However, an ersatz individual doesn't itself have the properties that it represents an individual as instantiating. We must instead interpret a predicate Π as being satisfied by an ersatz individual x at a world w just in case Πα appears as a conjunct of x.[18]

Returning to 1, here is (informally) what Kripke semantics gives as its truth conditions. First, applying K◇ and K∃, 1 is true at a world w just in case there exists some world—call it 'w_1'—such that for some u in the domain of w_1, Bkx ∧ Dx ∧ ◇Cx is true of u. Applying K◇ again, the right conjunct, ◇Cx, is true of u at w_1 just in case there exists some world—call it 'w_2'—such that Cx is true of u at w_2. Putting these together, we (informally) get: 1 is true at w just in case for some worlds w_1 and w_2, some

[17] This framework was introduced by Kripke (1963). 'Kripke semantics' may refer to a model-theoretic semantics, which concerns logic rather than truth conditions, or the theory of truth conditions that results from considering the 'intended model' of the logic. I am only concerned with truth conditions.

[18] More carefully: let predicate Π of arity n be true of a tuple $<u_1,\ldots,u_n>$ at world w iff (1) $\Pi\alpha_1\ldots\alpha_n$ appears as a conjunct in w, and (2) for each u_i, u_i is the individual formula with one free variable α_i such that w is the result of prefixing u_i with the quantifier $\exists\alpha_i$.

u in the domains of w_1 and w_2, u is Karen's brother at w_1, u is a doctor at w_1, and u is a clown at w_2.[19] However, again pretending that one cannot both be a doctor and a clown, the same ersatz individual cannot encode both being a doctor and being a clown.

Notice that Lewis also faces this problem given the assumptions of transworld identity, modal realism, and Kripke semantics. His solution is to reject transworld identity—and correspondingly, Kripke semantics—in favor of counterpart theory as a theory of transworld representation. On counterpart theory, Karen possibly has a brother in this world in virtue of having a counterpart who has a brother in some other world. Thus, according to that world, Karen exists and has a brother. What makes another individual her counterpart is tied to similarity on Lewis's theory: Karen's counterpart in a world is the individual most similar to her in the relevant respects in that world. In general, similarity is a context-sensitive matter, since we care about different respects of similarity in different contexts. Pal—the portrayer of Lassie—and Rin Tin Tin are more similar to each other than Lyndon Johnson's dog Blanco in respect of being actors, but Pal is more similar to Blanco than Rin Tin Tin in respect of being a collie. Although there are many counterpart relations, only one is relevant in a context (ignoring vagueness).

Counterpart theory is thought to have various benefits. For instance, the context-sensitivity of the counterpart relation helps account for the purported inconstancy of our *de re* modal intuitions. According to those who endorse inconstancy, what modal properties we attribute to an individual depends on context. The question of whether Karen could have been taller, or an angel, or born to different parents, has different answers depending on which features of Karen are salient given what we care about. This

[19] I'm making the simplifying assumption that only individuals in the domain of a world can satisfy predicates at that world.

seems to be the case even if we focus on metaphysical modality and not other strengths of modality. Counterpart theory thus provides solutions for various puzzles of material constitution: the statue cannot survive squashing but the lump of clay can, despite the fact that the statue is identical to the lump of clay. The attribution of incompatible modal properties in different contexts is explained by whether we're concerned with the statue or with the lump of clay.

To see how counterpart theory avoids the problems with transworld identity, note that a counterpart theorist would typically endorse a version of counterpart semantics instead of Kripke semantics. Standard counterpart semantics adds a counterpart relation CPT to Kripke semantics and replaces K$\Diamond$ with something like this:

(C$\Diamond$) $\Diamond\varphi$ is true at w iff for the relevant individuals $u_1,\ldots,u_n$ in the domain of w, there exists some world v such that for some $u^*_1,\ldots,u^*_n$ in the domain of v, CPT(u_i,u^*_i) for all i, and φ is true of the $u^*_1,\ldots,u^*_n$ at v.

When assessing 1, we want there to be an individual in w_1 who is a doctor who has a *counterpart* in w_2 is a clown. This counterpart may be a distinct individual. Thus, our new semantics will intuitively predict 1 to be true, as desired.

Returning to linguistic ersatzism, the obvious suggestion is to borrow from Lewis: let's pair linguistic ersatzism with a version of counterpart theory, with the resulting theory being *linguistic counterpart theory*.[20] On linguistic counterpart theory, an ersatz individual is represented as existing in another ersatz world in virtue of having a

[20] Other advocates of variations on linguistic counterpart theory include Heller (1998) and Sider (2002). Stalnaker (1986) defends an actualist counterpart theory but does not defend linguistic ersatzism, although he has indicated that he does not consider ersatzism incompatible with his view.

linguistic counterpart at that world. Thus, given a standard counterpart semantics, 1 is predicted to be true.[21]

Linguistic counterpart theory will be the focus of the remainder of this chapter. In particular, I will consider Lewis's two objections to linguistic counterpart theory in turn, showing how they each may be surmounted.

Before moving on, it'd be useful to consider an alternative to linguistic counterpart theory which has enticed some: deny that sentences like 1 are true—it couldn't have been the case that Karen had a brother who was a doctor who could have been a clown. (Remember, 1 is 'In some possible world, Karen has a brother who is a doctor who in some possible world is a clown.') If so, then there is no need to reject transworld identity. However, 1 *looks* true; what's going on? Here's how Bennett explains it (2005: 317):

> There are no *de re* modal claims about things that do not actually exist. There *would* be *de re* modal truths about George W.'s son if he existed, but there aren't any as matters actually stand. As matters actually stand, that is, it is possible for George W. Bush to have a son who is a bookie, it is possible for him to have a son who is a janitor, and it is possible in general for bookies to instead be janitors—and that is all. In a world in which George W. Bush *does* have a bookie for a son, however, it is possible for that very son to be a janitor. That world contains

[21] Here is another reason to replace actual individuals with their ersatz representatives. If the semantic value of the name 'Karen' is an ersatz individual, then the counterpart relations that ersatz Karen stands in will supervene on the same sorts of facts that determine when it is the case that non-actual ersatz individuals stand in counterpart relations.

possibilities *de re* that this world does not; at that world, there are true, singular modal propositions that actually neither exist nor are true.

If the view being expressed here is simply that things that don't exist don't have properties, any actualist should readily agree. But given that Bennett makes this claim in the course of discussing sentences like 1, the view seems to be stronger: namely, the view is that modal claims involving quantification into a modal context—of which 1 is an instance—are not true. Thus, 1 is either defective or false. If 1 is defective, then it attempts to express a proposition, but fails to do so because it requires singular reference to a non-actual object. If 1 is false, then 1 successfully expresses a proposition, but is false.

However, this general strategy of denying the truth of 1 doesn't work. First of all, there are sentences of the same apparent form as 1 that aren't defective and are true, such as 'Karen could have had a sister who was a doctor who could have been a clown.' Since Karen actually has a sister who's a doctor, then she of course could have had a sister who's a doctor. And since this sister could have been a clown, then it's possible for Karen to have a sister who's a doctor who could have been a clown. For more data, consider these sentences:

(2_S) Karen could have had a brother who was a doctor who could have been a non-clown.

(2_R) $\Diamond\exists x(Bkx \wedge Dx \wedge \Diamond\sim Cx)$

(3_S) Necessarily, everything is such that it could have not existed.

(3_R) $\Box\forall x\Diamond\sim\exists y\ y=x$

(4_S) Necessarily, any bookie could have been a janitor.

(4_R) $\Box\forall x(Bx\rightarrow\Diamond Jx)$

If the problem is quantifying in, then these are also defective or false—but they are plausibly true. Consider 2: It doesn't seem like the ersatzer needs to deny the truth of 2. 2 seems true in virtue of the existence of a single ersatz world in which Karen has a brother who is a doctor but not also a clown. Consider 3: if you deny the existence of abstracta and God, you might think that it's true that necessarily, everything exists contingently. Finally, consider 4: this presumably licenses Bennett's claim that in general, it's possible for bookies to be janitors (which presumably is necessarily the case). So Bennett's own view requires a true modal claim that involves quantifying into a modal context.

Even granting that these sentences are in fact all defective or false, they're still *intuitively* true, and this needs explaining. Returning to 1, one such explanation is that the sentence that is true is not 1, but some sentence in the vicinity that we confuse with 1. The natural suggestion for the sentence that is confused is something like:

(5_S) Karen could have had a brother who was a doctor, and it would have been the case, had he existed, that he could have been a clown.

This new sentence appears to involve a counterfactual claim. What is the relation between this new sentence 5 and our original sentence 1? How are we to regiment 5?

The obvious way to regiment this sentence involves appealing to the counterfactual conditional. Consider this regimentation:

(5_R) $\Diamond\exists x\,(Bkx \wedge Dx) \wedge [\exists x\,(Bkx \wedge Dx) \mathrel{\Box\!\!\rightarrow} \Diamond Cx]$

5_R appears to say: 'Possibly, Karen had a brother and had it been the case that Karen had a brother who was a doctor, it would have been the case that he could have been a clown. It gets pretty close. However, it doesn't solve our original problem. Consider just the right conjunct of 5_R: $\exists x\,(Bkx \wedge Dx) \mathrel{\Box\!\!\rightarrow} \Diamond Cx$. Lewis-Stalnaker semantics for counterfactuals tells us to evaluate the clause after $\mathrel{\Box\!\!\rightarrow}$ by looking at the nearest world or worlds in which the clause before $\mathrel{\Box\!\!\rightarrow}$ is true.[22] So what it tells us is that is that $\exists x\,(Bkx \wedge Dx) \mathrel{\Box\!\!\rightarrow} \Diamond Cx$ is true iff in the closest world in which Karen has a brother who is a doctor, that brother is possibly a clown. But we cannot evaluate whether that brother is possibly a clown without being able to identify him in other possible worlds; the issue of analyzing transworld identity is pushed back a step and not eliminated. The other option is to deny Lewis-Stalnaker semantics. However, to do this, the ersatzer must either provide an alternate semantics for counterfactuals that does not require tracking non-actual individuals across worlds, or take the counterfactual locution as a primitive. These are not in principle unacceptable options, but at present, they are unattractive.

[22] See Lewis (1973) and Stalnaker (1968).

I will assume, then, that any successful theory will predict 1 to be true rather than false. The natural move is to deny transworld identity. On linguistic counterpart theory, transworld identity is instead tracked by a linguistic counterpart relation that holds between ersatz individuals. The individual represented by Karen's ersatz brother in w_1 could have been a doctor just in case Karen's ersatz brother in w_1 has a counterpart in another world that represents an individual who is a doctor in that world.

3.4 Analyzing the Linguistic Counterpart Relation

We now have enough theory in place to move on to Lewis's first objection to linguistic counterpart theory. Start with the observation that Lewis's counterpart relation is not intended as a primitive relation; it can be explained in terms of similarity:[23]

(P1) y in world v is a Lewisian counterpart of x in world w in a context where properties $Z_1 \ldots Z_n$ are relevant iff y is the most $Z_1 \ldots Z_n$-similar to x among all individuals in v.

This analysis makes explicit that the relevant similarity relation is determined by context. Since the story might be more complicated in the end, we should understand (P1) as a working principle.

[23] Of course, the counterpart relation need not be tied to similarity; see Heller (2005) for arguments that the counterpart relation should be divorced from similarity. A modal realist might instead identify the counterpart relation with identity, resulting in an austere necessitarianism given modal realism without overlap. This maneuver divests her of a tidy explanation of inconstancy, but it is permissible. In general, we should be careful to separate counterpart theory from the various Lewisian theses with which it is often bundled, such as anti-essentialism and haecceitism. I am not assuming anti-essentialism below, but I am assuming anti-haecceitism. For discussion, see Lewis (1986: chapter 4).

The first objection to linguistic counterpart theory is that while Lewis's counterpart relation need not be taken as primitive, the linguistic counterpart relation must be taken as primitive. Why would this claim, if true, constitute an objection to linguistic counterpart theory? According to a principle of theoretical simplicity, all other things equal the fewer primitives that a theory is committed to, the better. If Lewis's theory can do without a notion that another theory must take as primitive, then his theory has the advantage with respect to primitive notions. The charge is that while Lewis's counterpart relation is analyzed in terms of similarity, the linguistic counterpart theorist cannot do the same. To see why, consider a straightforward copy of (P1):

(P2) y in world v is a linguistic counterpart of x in world w in a context where properties $Z_1 \ldots Z_n$ are relevant iff y is the most $Z_1 \ldots Z_n$-similar to x among all individuals in v.

The problem with this analysis is that the individuals represented by x and y are ersatz individuals rather than concrete. The ways in which two ersatz individuals are similar or dissimilar do not track the similarity or dissimilarity of the individuals they represent. For instance, any two open formulas share the property of being abstract, but the entities such formulas represent are nearly always non-abstract. It's *their* properties that should be compared for similarity. This suggests a revision of (P2) which directly appeals to the similarity of the represented individuals, were they to exist:

(P3) y in world v is a linguistic counterpart of x in world w in a context where properties $Z_1 \ldots Z_n$ are relevant iff were the individuals represented by x and y ('x*' and 'y*' respectively) actual, then y* would be the most $Z_1 \ldots Z_n$-similar to x* among all individuals represented in v.

Unfortunately, this will not do either. Ersatz individuals describe the represented individual's relations to the rest of her universe. As such, if x and y represent individuals in different worlds, they cannot both be actualized.[24]

Instead of trying to fix the analysis again, I suggest a different route. Lewis's objection only works on the assumption that an explanation of counterparthood must take the form of a biconditional with *is a counterpart of* on one side and *similarity* on the other. This is an assumption that Lewis and several of his interlocutors (arguably) accept. Nonetheless, we can reject it. *Similarity* is presumably not itself a primitive notion; like Lewisian counterparthood, it can be explained in terms of more primitive notions. There are many different ways that properties and relations can explain similarity. For example, Lewis (1968) thinks that there are more or less natural properties and that the sharing of the natural properties makes for objective similarity. Thus, in a context where naturalness is relevant—e.g. the metaphysics seminar room—what determines counterparthood is the sharing of natural properties. Or suppose that we're concerned with whether or not two individuals are psychologically similar. In this context, what determines counterparthood is the sharing of mental properties. We may impose more general restrictions on what counts for similarity as well, depending on our metaphysical scruples. For example,

[24] These and other arguments appear in Lewis (1986: 237-8), Sider (2002: 303, Manuscript), and Brogaard (2006: 88-90).

suppose some principle of essentiality of species is true: 'If some individual is of species x, then necessarily, if that individual exists, it's of species x.' In this case, even if Karen is more similar to a statue in a human-less world than anything else in that world, she does not exist according to that world.

The strategy is to use these observations to skip the middleman—to produce a recipe for generating a biconditional where the right hand side contains terms that are more primitive than *is a linguistic counterpart of*. To do this, first consider:

(P4) y in v is the most $Z_1 \ldots Z_n$-similar to x in w among all individuals in v iff y and x stand in the φ-relation with respect to properties $Z_1 \ldots Z_n$.

What the φ-relation is depends on what the Lewisian thinks makes for similarity with respect to a set of properties. The simplest view is that the more properties that y and x share among $Z_1 \ldots Z_n$, the more $Z_1 \ldots Z_n$-similar they are. In this case, the φ-relation would be the relation of sharing the most properties out of $Z_1 \ldots Z_n$ among all the individuals in v. However, I will leave the exact relation undefined, since the story might be more complicated.

We now have the means by which to evaluate the similarity of the individuals represented by the ersatz individuals, since ersatz individuals just are representations of the properties and relations that an individual would instantiate if actualized. The properties and relations shared by the individuals represented may be compared by comparing the conjuncts in their ersatz representatives. We thus get an analysis like this:

(P5) y in world v is a linguistic counterpart of x in world w in a context where properties $Z_1 \ldots Z_n$ are relevant iff y and x stand in the φ*-relation with respect to properties $Z_1 \ldots Z_n$.

The φ*-relation is like the φ-relation except where properties $Z_1 \ldots Z_n$ are mentioned in the φ-relation, the φ*-relation makes use of the predicates corresponding to $Z_1 \ldots Z_n$. As a toy example, if the φ-relation were *shares all the properties among* $Z_1 \ldots Z_n$, then the φ*-relation would be *shares all the same literals as conjuncts with respect to the predicates denoting* $Z_1 \ldots Z_n$. Since our worldmaking language is interpreted in the Lagadonian manner, there is no barrier to picking out the relevant predicates by purely syntactic means.

3.5 The Problem of Indiscernibles

The second objection that Lewis advances against linguistic counterpart theory is that it doesn't escape one of his problems of descriptive power, which concerns the possibility of qualitatively indiscernible individuals.[25] Consider a world in which two or more individuals have all the same properties and stand in all the same relations, like Max Black's (1954) two-sphere world: a symmetric world in which there exist only two qualitatively indiscernible spheres of uniform composition. These spheres have all the same qualitative properties, like *being made of iron* and *being such-and-such distance*

[25] Lewis concedes that his other problem of descriptive power, the problem of 'aliens', is avoided on linguistic counterpart theory. Note: I have not said anything about whether we should also be linguistic counterpart theorists about *properties* as well. The motivation for doing so is that it seems like 'alien' properties are possible as well—that is, properties which do not actually exist. We might therefore turn to second-order logic, making all the same moves as in the case of individuals, but also inheriting all of the baggage of second-order logic. This is the strategy pursued by Heller (1998). My own inclination is to deny the possibility of alien properties—however, I understand why some may want to admit them.

from a sphere with such-and-such properties. Since the world is entirely symmetric, there is only one ersatz sphere to represent two distinct spheres. To see why, recall that the ersatzer does not have a Lagadonian name for any non-actual individual. At best, she may describe such individuals and properties in terms of their relations to other individuals.[26] Pretending that predicate S encodes all the properties instantiated by one sphere including its relations to the rest of the universe, the Max Black world looks like this: '$\exists x \exists y(Sx \wedge Sy \wedge x \neq y)$'. One sphere is represented by '$\exists y(Sx \wedge Sy \wedge x \neq y)$' and the other sphere is represented by '$\exists x(Sx \wedge Sy \wedge x \neq y)$'. Although these open formulas differ syntactically, they are not different descriptions. We only have one ersatz sphere to represent two.

However, this isn't itself an objection. When we're dealing with theoretical or semi-theoretical terms, our intuitions about *how many* carry little weight. There is only a problem if the impoverishment of ersatz spheres leads to an impoverishment of possibilities—that is, if one ersatz sphere cannot do the modal work of two. One reading of the objection is that it concerns singular reference. That is, the linguistic ersatzer only has the means by which to singularly refer to one of the indiscernible individuals, not both.[27] But this cannot be the problem, since the actualist should flatly reject that we can singularly refer to non-actual individuals. (For that matter, the defender of modal realism shouldn't allow singular reference to individuals in other worlds.)

The problem should instead be understood as a problem about truth conditions. Here's an outline of an argument that one ersatz sphere cannot do the truth-conditional work of two: (i) Given only one ersatz sphere and a fairly standard theory of truth conditions, it is not possible for there to be two qualitatively indiscernible spheres. (ii)

[26] There is an analogous problem for properties, though I will focus on the individuals version of the problem.
[27] See Divers (2002: 84-5).

But such a world is possible.[28] (iii) Therefore, either the semantic theory must be rejected, or ersatzism requires more than one ersatz sphere in the Max Black world.

Let's look at the first premise. Recall from section 3.3 these clauses of Kripke semantics:

(K∃) ∃αφ is true at w iff for some u in the domain of w, φ is true of u at w.

(K◇) ◇φ is true at w iff there exists some world v such that φ is true at v.

The problem of indiscernibles arises when we encounter sentences like this:

(6_S) Possibly, there exist two qualitatively indiscernible spheres.

(6_R) $\Diamond\exists x\exists y(Sx \wedge Sy \wedge x\neq y)$

(Again, pretend that the predicate S encodes all the properties and relations instantiated by one sphere in the Max Black world.)

By K◇, 6 is true just in case $\exists x\exists y(Sx \wedge Sy \wedge x\neq y)$ is true at some world—namely, the Max Black world. By K∃, we see that this is true at the Max Black world—call it 'm'—iff the formula '$Sx \wedge Sy \wedge x\neq y$' is true of two distinct individuals u_1 and u_2 in the domain of m. But according to ersatzism, we only have one such ersatz individual. Thus, 6 is false rather than true.

[28] Some deny this, but this maneuver is usually tied to accepting the identity of indiscernibles: no distinct things can have all the same properties. I am assuming that the identity of indiscernibles is false, at least when restricted to qualitative properties. If the identity of indiscernibles is in fact true, then the problem of indiscernibles doesn't arise—but so much the better for linguistic counterpart theory.

The move to a standard counterpart semantics does not solve this problem. Recall that counterpart semantics adds to Kripke semantics a counterpart relation CPT that holds between individuals in different worlds, and it replaces K◇ with something like this clause:

(C◇) ◇φ is true at w iff for the relevant individuals $u_1,\ldots,u_n$ in the domain of w, there exists some world v such that for some $u^*_1,\ldots,u^*_n$ in the domain of v, $CPT(u_i,u^*_i)$ for all i, and φ is true of the $u^*_1,\ldots,u^*_n$ at v.

This revised clause doesn't help with 6, since the '◇' in 6_R doesn't have any free variables in its scope. We may furthermore observe the undesirable effects of C◇ using a sentence that involves quantifying in:

(7_S) There is a thing and another thing such that they could have each been one of two qualitatively indiscernible spheres.

(7_R) $\exists x \exists y \Diamond (Sx \wedge Sy \wedge x \neq y)$

We want 7 to come out true at some world—for example, a world just like the Max Black world except there exists a third thing located closer to one sphere than the other. Call this world 'n'. Each of the spheres in n could have been one of the spheres in the Max Black world. But as with 6, we do not have enough ersatz individuals in the Max Black world m to make 7 come out true at world n. In particular, C◇ tells us that 7 is true at n iff for individuals u_1 and u_2 in n, there exists a counterpart u^*_1 of u_1 and

counterpart u^*_2 of u_2 in some world such that u^*_1 and u^*_2 satisfy '$Sx \wedge Sy \wedge x \neq y$'. But once again, there aren't two such individuals in any world. Where indiscernible individuals are concerned, ersatzism does not have the resources to provide more than one ersatz representative.

3.6 Semantics for Linguistic Counterpart Theory

Recall that ersatz individuals are, informally speaking, descriptions like: 'x is spiny and round and such that there exists two spheres…' We have been implicitly assuming that these descriptions play the same theoretical role purportedly occupied by Lewisian individuals. That is, we have been thinking of them as complete descriptions of *particular* individuals. But they aren't complete descriptions of particular individuals. They're complete descriptions of ways an individual could be, qualitatively speaking. This difference is significant. If ersatz individuals represented particular individuals, we *would* require two in order to satisfy the truth conditions for 6. But why think that the possibility that there are two particular Max Black spheres requires the actual existence of two particular things?

We should instead think of ersatz individuals as representations of large property complexes such as *the property of being spiny and airborne and such that there exists two spheres*…[29] More generally, think of ersatz worlds and individuals as representations of n-place qualitative properties, where ersatz worlds are 0-place properties and ersatz individuals are 1-place properties. In addition to ersatz worlds and individuals, we can also define ersatz pairs, triples, and so on; these represent 2-place properties, 3-place

[29] McMichael (1983a, 1983b) proposed that we think of these properties as qualitative roles for individuals.

properties, and so on. [30] (From here on, I will use 'property' instead of 'relation'.) Here is the significance of switching to property talk. Clearly, many ordinary properties, such as *being round*, can be multiply instantiated. Also, clearly, many maximal properties cannot be multiply instantiated. [31] But in some cases, the instantiation of a maximal property requires multiple instantiation—e.g., the property of being one of two indiscernible spheres. Thus, the following fact is in a sense 'encoded' in the property itself: were this property to be instantiated, there *would* exist two indiscernible spheres. Ersatz individuals are thus representations of the actually existing properties in virtue of the possible existence of two indiscernible spheres is possible.

Kripke and standard counterpart semantics assume the existence of representatives for particular non-actual individuals, and thus are not the right tools by which to derive correct conditions. The semantics introduced in this section, *LCT semantics*, defines a new role for ersatz individuals. Ordinarily, one of the jobs of individuals in a theory of truth conditions is to satisfy predicates. On LCT semantics, ersatz individuals 'entail' predicates, or rather, atomic formulas of the form 'Πα'. This notion of entailment is not ordinary first-order logical entailment, since logical entailment only holds between sentences rather than open formulas. It holds only between ersatz worlds, individuals, pairs, etc. in the first argument place, and formulas of $\mathbf{L}\Diamond$ in the

[30] Russell (Forthcoming) draws attention to the following complication: Hazen (1979: 328-9) makes the point (accepted by Lewis (1986: 233-4)) that some possibilities are joint possibilities for more than one individual. The upshot is that although c is a counterpart of a and d is a counterpart of b, <c,d> may not be a joint possibility for <a,b>. In order to account for this complication, we may introduce a joint counterpart relation that holds between ersatz pairs, triples, and so on. This requires revising the presented semantics so that sentences are evaluated relative to a 'counterpart link' between two ersatz worlds in terms of which we may define the joint counterpart relation. I will stick to the simpler idea of individual counterparts in the main text for ease of presentation.

[31] Maximality should be understood along the lines of the maximality of sentences: a property P is maximal just in case for every property Q, Q or its negation is necessitated by P. That is, any things that instantiate P must also instantiate either Q or its negation.

second argument place. Call it *LCT-entailment*. LCT-entailment may be informally characterized as the relation that holds between two representations of properties just in case the first is a maximal consistent property, and any things that instantiate the first property must instantiate the second (where this second property may be non-modal or modal). Informally, LCT-entailment corresponds to a *necessitation* relation between properties.

This previews the response to the problem of indiscernibles. Consider the Max Black sentence, 6, which was: 'There could have been two qualitatively indiscernible spheres.' The truth conditions for this sentence at a world are that some ersatz pair of individuals LCT-entails the formula representing the 2-place property of being qualitatively indiscernible spheres (namely, '$Sx \wedge Sy \wedge Rxy \wedge x \neq y$'). This represents the fact that there exists a maximal consistent property such that any things that instantiate it must also instantiate the property of being two indiscernible spheres. Likewise, consider the second Max Black sentence, 7, which was: 'There is a thing and another thing such that they could have each been one of two qualitatively indiscernible spheres.' The truth conditions for this sentence at a world are that some ersatz pair of individuals, which are linguistic counterparts of some individuals in the evaluation world, LCT-entails the formula representing the 2-place property of being qualitatively indiscernible spheres (namely, '$Sx \wedge Sy \wedge x \neq y$').

This picture meshes well with the story that has been told so far. On linguistic counterpart theory, what's possible for an individual depends on (i) the large complex property it instantiates and (ii) the relation between this property and other large complex properties, as tracked by the linguistic counterpart relation between ersatz individuals.

LCT-entailment aids in specifying truth conditions by (i) telling us when to move from a representation of one large property complex to another (its counterpart), and (ii) getting us from representations of large complex properties to the properties they necessitate. The resulting picture is that what's possible and necessary depends ultimately on facts about properties and the relations between them.

In what follows, I will give a more detailed presentation of the view, modulo the issue of names.[32] I consider the presented view to be an instance of a more general framework, since there are various semantic choice points that the framework is neutral on. These choice points also arise in standard counterpart semantics: what constraints, if any, should we impose on the linguistic counterpart relation? Should '$\Diamond$' be given the *serious actualist* interpretation or not? (That is, can individuals have properties in worlds in which they don't exist?) For exposition, I will make various choices, but keep in mind that they correspond to choice points.

Languages

The worldmaking language is **L**, as specified in section 3.2, and the evaluation language is **L**$\Diamond$.

[32] Since we are assimilating the representation of actual individuals to the representation of merely possible individuals, our worldmaking language lacks names. However, we may evaluate names in our target modal language by associating each name with an ersatz individual in the designated actual world. What counterparts these individuals have is determined in the way noted at the end of section 3.3. Here we face a choice point: do we allow names to refer to ersatz individuals in other worlds as well? On one strategy, each of these counterparts is associated with the name in different worlds (though it is not automatically the case that counterparts of counterparts are associated with the name). On another, the name is not associated with the counterparts; rather, the job of evaluating name when they occur within the scope of a modal operator is done by the modal operator itself. For discussion of the various difficulties associated with names on counterpart semantics, see Russell (Forthcoming).

Definition of worlds and individuals

Ersatz worlds are maximal and consistent sentences of **L** (that lack names) in canonical form. Since there are many equivalent maximal and consistent sentences, one sentence from each equivalence class is arbitrarily privileged; it alone counts as a *world* for the purposes of our semantics. This adds the complication of committing to the axiom of choice but simplifies the formalism. (It is possible to reformulate the semantics below so that worlds are equivalence classes of such sentences rather than arbitrary privileged sentences among such classes. Anyone who rejects choice should think of the formalism below as a presentational simplification.)

Privileged ersatz worlds yield privileged ersatz individuals. Let an *individual* be any ersatz individual associated with a world. We may now introduce notation for worlds and individuals. If w is a world, then w(α) designates an individual associated with w for every variable α that appears in w. For example, w(α) is the sentence just like w minus the quantifier ∃α. Similarly, w(β) is the formula just like w minus the quantifier ∃β. This notation may be extended to cover the removal of multiple quantifiers at once: w(α,β). These are *pairs of individuals*, *triples of individuals*, and so on. Note: the removal of quantifiers is not ordered. Finally, let 'w(…)' abbreviate any formula of the form 'w' or 'w(α_1,$\alpha_{2,\ldots}$)' for any number of variables in the parentheses.

Definition of CPT

Let there be a relation CPT that holds between individuals w(α) and v(β) just in case v(β) is a linguistic counterpart of w(α).

We may add syntactic constraints if desired, such as that each individual must have a counterpart in every world or that it must have at most one counterpart in every world.

Definition of R

Let there be a binary 'accessibility' relation R that holds between worlds.

Definition of a variable function

Let V be the set of variables. A function p is a variable function iff p maps V to V.

Variable functions are needed because of the fact that worlds are arbitrarily privileged world sentences among equivalence classes of world sentences. A world of the form '…∃α…(… ∧ … ∧ Fα ∧ …)' should LCT-entail the sentence '∃βFβ', even if 'Fβ' never appears among the conjuncts. Variable functions 'align' the variables in question so that we get the right results.

Definition of truth at a world

LCT-entailment is symbolized as '$\Vdash$'. For all formulas φ, all worlds w, φ is true at w iff for all variable functions p, $w \Vdash_p \varphi$.

Truth at world is truth at a world relative to all variable functions for the same reason that on standard Kripke semantics, truth at a world is truth at a world relative to all variable assignments. Because of the way the clauses for non-atomic formulas are set up, the particular variable assignment appealed to when evaluating a sentence won't matter in the end.

Definition of LCT-entailment $\Vdash_p$

In what follows, '$\models$' should be interpreted as model-theoretic entailment in ordinary first-order predicate logic with identity, with some qualifications to be specified shortly. First, for the case of atomic formulas of the form '$\Pi\alpha_1\ldots\alpha_n$' and '$\alpha_i=\alpha_j$',

(V1) $w(\ldots) \Vdash_p \Pi\alpha_1\ldots\alpha_n$ iff $w(\ldots) \models \Pi p\alpha_1\ldots p\alpha_n$

(V2) $w(\ldots) \Vdash_p \alpha=\alpha$

As advertised, V1 and V2 capture the idea that in some sense, truth at a world is just entailment by the world. There is one hitch; it is odd to talk about entailment between atomic formulas (or any open formulas for that matter)—entailments usually hold between sentences. Thus, interpret '$w(\ldots) \models \varphi$' in this way: In all models of first-order logic with identity (**FOL=**), for all variable assignments g, if $w(\ldots)$ is true relative to g then φ is true relative to g. For example, $\exists x(\sim Fx \wedge Fy \wedge x\neq y) \Vdash Fy$ iff for all LPC= models m and all g, $\exists x(\sim Fx \wedge Fy \wedge x\neq y) \models_{m,g} Fy$.[33]

V3 and V4 are familiar:

(V3) $w(\ldots) \Vdash_p \sim\varphi$ iff not $w(\ldots) \Vdash_p \varphi$

[33] The reader might remember that identity statements are banned in the canonical form of ersatz worlds. Thus, the only identity statements that will be LCT-entailed will be in the form '$\alpha=\alpha$'. The truth conditions for atomic clausesd of the form '$\Pi\alpha_1\ldots\alpha_n$' could equally well have been defined so that $\Vdash$ holds between an ersatz formula and an atomic formula iff the atomic formula appears as a conjunct of the ersatz formula. So, V1 and V2 may be replaced with these clauses:

(V1*) $w(\ldots) \Vdash_p \Pi\alpha_1\ldots\alpha_n$ iff $\Pi p\alpha_1\ldots p\alpha_n$ is a conjunct of $w(\ldots)$
(V2*) For all $w(\ldots)$, and for all terms α, $w(\ldots) \Vdash_p \alpha=\alpha$

The clause V2* is defined the way it is because of the ban on identity statements in worlds and individuals.

(V4) $w(\ldots) \Vdash_p \varphi \wedge \psi$ iff $w(\ldots) \Vdash_p \varphi$ and $w(\ldots) \Vdash_p \psi$[34]

Next:

(V5) $w(p\beta_i,\ldots) \Vdash_p \exists\alpha\varphi$ iff for some α-variant q of p, $w(q\beta_i,\ldots,q\alpha) \Vdash_q \varphi$[35]

To illustrate, consider the formula $\exists z\exists t(Fz \wedge \sim Ft)$. This is true at a world w iff for all variable functions p, $w \Vdash_p \exists z\exists t(Fz \wedge \sim Ft)$. By two applications of V5, this holds iff for some z-and-t-variant q of p, $w(qz,qt) \Vdash_q Fz \wedge \sim Ft$. By V4, V3, and V1, this holds iff $w(qz,qt) \models Fqz$ but not $w(qz,qt) \models Fqt$. Note that the variables 'z' and 't' need never appear in w for this to hold; it suffices that appropriate variables that do appear in w can be picked out by a variable function.

Finally, where the α_i are the free variables in φ,

(V6) $w(p\alpha_1\ldots p\alpha_n,\ldots) \Vdash_p \Diamond\varphi[\alpha_1\ldots\alpha_n]$ iff for some v such that Rwv, some $\alpha_1\ldots\alpha_n$-variant q of p such that $CPTw(p\alpha_i)v(q\alpha_i)$ (for all $i\in[1,n]$), $v(q\alpha_1\ldots q\alpha_n,\ldots) \Vdash_q \varphi[\alpha_1\ldots\alpha_n]$[36]

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[34] The other Boolean connectives can be defined in terms of these.

[35] As usual, ∀ is the dual of ∃.

[36] As usual, □ is the dual of ◇. As mentioned, there is a choice of whether to interpret ◇ in the 'serious actualist' way or not. Serious actualism is the thesis that objects only have properties in worlds in which they exist. The following clause takes this into account:

(V6*) $w(\alpha_1\ldots\alpha_n,\ldots) \Vdash \Box\varphi[\alpha_1\ldots\alpha_n]$ iff for some v, if there exist $v(\alpha_1),\ldots,v(\alpha_n)$ such that such that $CPTw(\alpha_i)v(\alpha_i)$ (for all $i\in[1,n]$), then $v(\alpha_1\ldots\alpha_n,\ldots) \Vdash \varphi[\alpha_1\ldots\alpha_n]$

To illustrate, consider the formula $\exists y \Diamond Fy$. This is true at a world w iff for all variable functions p, $w \Vdash_p \exists y \Diamond Fy$. By V5, this holds iff for some y-variant q of p, $w(qy) \Vdash_q \Diamond Fy$. By V6, this holds iff for some world v such that Rwv, some y-variant r of q such that CPTw(qy)v(ry), $v(ry) \Vdash_r Fy$. By V1, this holds iff $v(qy) \models Fqy$. Intuitively, this means that something y in w is possibly F just in case some maximal consistent property appropriately similar to the maximal consistent property instantiated by y contains the property of being F.

The Max Black Sentences

Let's return to our original problem case, the sentence 6. Its truth conditions are unpacked in this manner:

$\Diamond \exists x \exists y (Sx \wedge Sy \wedge x \neq y)$ is true at w iff for all variable functions p,

$w \Vdash_p \Diamond \exists x \exists y (Sx \wedge Sy \wedge x \neq y)$, def

iff for some v such that Rwv, $v \Vdash_p \exists x \exists y (Sx \wedge Sy \wedge x \neq y)$, V6

iff for some v such that Rwv, some x-variant q of p,

$v(qx) \Vdash_q \exists y (Sx \wedge Sy \wedge x \neq y)$, V5

iff for some v such that Rwv, some y-variant r of q,

$v(rx,ry) \Vdash_r Sx \wedge Sy \wedge x \neq y$, V5

iff for some v such that Rwv, some x-and-y-variant r of p,

$v(rx,ry) \Vdash_r Sx$ and $v(rx,ry) \Vdash_r Sy$ and not $v(rx,ry) \Vdash_r x=y$, V4,V3

iff for some v such that Rwv, some x-and-y-variant r of p,

$v(rx,ry) \models Srx$ and $v(rx,ry) \models Sry$ and not $v(rx,ry) \models rx=ry$. V1,V2

This semantics also generates the right results for sentences like 7 involving quantifying in:

$\exists x \exists y \Diamond (Sx \wedge Sy \wedge x \neq y)$ is true at w iff for all variable functions p,

$w \Vdash_p \exists x \exists y \Diamond (Sx \wedge Sy \wedge x \neq y)$, def

iff for some x-variant q of p, $w(qx) \Vdash_q \exists y \Diamond (Sx \wedge Sy \wedge x \neq y)$ V5

iff for some y-variant r of q, $w(rx,ry) \Vdash_r \Diamond (Sx \wedge Sy \wedge x \neq y)$, V5

iff for some v such that Rwv and some x-and-y-variant n of r such that

CPTw(rx)v(nx) and CPTw(ry)v(ny), $v(nx,ny) \Vdash_n Sx \wedge Sy \wedge x \neq y$, V6

iff for some v such that Rwv and some x-and-y-variant n of r such that

CPTw(rx)v(nx) and CPTw(ry)v(ny), $v(nx,ny) \Vdash_n Sx$ and

$v(nx,ny) \Vdash_n Sy$ and not $v(nx,ny) \Vdash_n x=y$, V4,V3

iff for some v such that Rwv and some x-and-y-variant n of r such that

CPTw(rx)v(nx) and CPTw(ry)v(ny), $v(nx,ny) \models Snx$ and

$v(nx,ny) \models Sny$ and not $v(nx,ny) \Vdash_n x=y$. V1, V2

This concludes the exposition of LCT semantics. Though the focus has been on truth, there are morals to be drawn in the realm of metaphysics. For example, the demand that an ersatz representative uniquely represents a particular non-actual individual is a red herring, since we don't need to represent an individual's satisfying a predicate in the Tarskian manner. The world itself, and every ersatz individual (pair,

etc.) at that world, encodes facts about every other individual at that world. The task is merely to construct a semantics that may extract this information.[37]

3.7 Why Linguistic Counterpart Theory?

I have now answered the two objections that Lewis advances against linguistic counterpart theory. For the actualist who endorses counterpart theory, this is good news. She can retain all the benefits of counterpart theory while avoiding Lewis's pluriverse of concrete worlds.

As a bonus, her counterpart theory fares better than Lewis's on the so-called 'Humphrey objection', inasmuch as it has any weight. Consider the *de re* modal claim, 'Humphrey might have won the election.' On Lewis's view, this is true just in case Humphrey has a counterpart in some world who does win the election. Kripke (1972: 45 note 13) objects, '…Humphrey could not care less whether someone *else*, no matter how much resembling him, would have been victorious in another possible world.' This is a charge of irrelevance: the wrong sort of thing figures in the explanation of why Humphrey could have won. Some other concrete individual, no matter how similar to Humphrey, cannot account for why Humphrey himself could have won.[38] There is an analogous objection to linguistic counterpart theory: some maximal qualitative property cannot account for why Humphrey could have won.

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[37] It should be intuitively true that a simple model theory for LCT semantics can offer the same validities as a model theory for standard counterpart semantics, given that both can accommodate different choices of constraints on the counterpart relation and different truth conditions for $\Diamond$. Any potential logical issues with the logic of LCT may be assimilated to discussion of the logic of Lewisian counterpart semantics.

[38] For a discussion of objections of irrelevance against Lewisian counterpart theory, see chapter 8, section 1 of Divers (2002).

Lewis's response to the original Humphrey objection applies here: the modal fact *is* about Humphrey himself. The appeal to a distinct individual does not override Humphrey's own involvement in the analysis—the distinct individual only matters insofar as he is similar to the man himself. Likewise, the linguistic counterpart theorist replies that the maximal qualitative property only matters insofar as it stands in the right second-order relation to the maximal qualitative property that Humphrey himself instantiates. Nonetheless, for one who is still tempted by the Humphrey objection, the linguistic counterpart theorist has the intuitive advantage over Lewis. The linguistic counterpart theorist need not ever appeal to a distinct individual but only a property that Humphrey himself could have instantiated. This is certainly relevant to Humphrey himself.[39]

Menzel advances a more sophisticated version of the Humphrey objection which appears to be a special problem for the linguistic counterpart theorist. Against McMichael's view (which is similar to linguistic counterpart theory in the relevant respects), Menzel (1990: 15) writes: 'McMichael suggests that we alter our understanding of what it is to say that an individual might have had a certain property. Thus, on his semantics, that Kripke might have been a carpenter is not ultimately a fact about *that* guy, *Kripke*, at least not directly. Rather it is a fact about the "maximal" purely qualitative property, or *role* that Kripke alone in fact exemplifies, viz., that some role "accessible" to Kripke's role includes the property of being a carpenter. This move abandons strong

[39] Merricks (2003) also advances a line of Humphrey objections to actualist versions of counterpart theory. However, his objections only target counterpart-theoretic reductions of all of modality, and I have not claimed reduction as a goal. The motivation was the apparent usefulness of the Leibnizian biconditionals and the resulting need for an actualist theory of worlds. A worlds-based theory of modality may be useful, even if non-reductive; see deRosset (Forthcoming).

intuitions about *de re* modality and the semantics of names, and so, for my tastes anyways, is also unpalatable.'[40]

The response here is that linguistic counterpart theory is only concerned with truth conditions for modal claims such as 'Possibly, Humphrey wins the election' and not with truth conditions for non-modal claims. It *presupposes* the truth conditions for non-modal claims. When we fix an ersatz individual as the semantic value of 'Humphrey' in LCT semantics, we've moved to the task of evaluating Humphrey's modal features by comparing the maximal qualitative property he instantiates with appropriately similar maximal qualitative properties. In fact, the move to property talk nicely reinforces the point made in the last section that there is no 'particularity' of non-actual individuals. There is only the general fact that an individual with such-and-such properties exists—but fortunately, *only* these properties are relevant to the modal properties of any particular individual that might instantiate them. The supposed 'particularity' of an non-actual individual does not contribute to the modal facts, but neither does the actual 'particularity' of Humphrey.

The benefit of linguistic counterpart theory is that it provides a framework for representing and systematizing the modal facts, given the plausible assumption that possibilities for individuals are determined by the properties they instantiate. Karen does not as a matter of brute possibility bear the property of possibly having a brother. She has that property because of certain other properties that she instantiates, and because of facts

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[40] McMichael (1983b) offers a nonstandard semantics for actualism which makes critical use of *roles*, which are the large complex properties I have been informally discussing. I am very much in sympathy with his metaphysical views. However, his semantic theory differs slightly from the one presented here. First, McMichael's account comes bundled with a theory of properties and relations and the property-entailment relations in which they stand. In contrast, I take for granted the notion of sentential consistency in order to remain neutral on *de dicto* modality. Second, although I stipulated for philosophical reasons that actual individuals are to be represented by ersatz individuals, my theory has the flexibility to easily allow actual individuals to represent themselves; McMichael's does not.

about *those* properties. Presumably, the relevant properties and facts fit this story: (i) Karen is a philosopher and political researcher who collects watches and musical instruments, etc., and was born to Audrey and Ken in such-and-such conditions, etc., and Audrey and Ken had another daughter but not a son, etc.; (ii) many of the properties involved are consistent with other properties that yield that Karen has a brother; and (iii) enough properties concerning the identity of Karen, Audrey, and Ken are preserved in the consistent story.

This is not a trivial result. Consider for comparison Plantinga's (1974) theory of modality, which appeals to *haecceities*: essences of individuals such as *being identical to Karen*. Plantinga is not in the business of reducing modality. However, his framework tells us *something* about possibilities for individuals. On Plantinga's semantics, for some predicate Π and some name α, $\Diamond\Pi\alpha$ is true just in case the property expressed by Π and the haecceity denoted by α are possibly co-instantiated. Thus, possibilities for individuals are determined in part by the co-instantiability of haecceities and qualitative properties. Likewise, linguistic counterpart theory tells us that what the possibilities for individuals are is determined by the consistency of qualitative properties, and by the relations between properties that are relevant for similarity. Assuming that the actualist does not want to be committed to haecceities of non-actual individuals, linguistic counterpart theory should be very attractive. Given similar metaphysical scruples, she should also prefer this view to those views advocated by Williamson (2002) and Linsky and Zalta (1994), on which every individual that exists necessarily exists.

Furthermore, linguistic counterpart theory is preferable to certain varieties of linguistic ersatzism that endorse transworld identity rather than counterpart theory for

transworld representation. These views avoid the problem of indiscernibles not by revising the standard semantics, but by replacing ersatz individuals with 'arbitrary' representatives. Both Roy (1995) and Melia (2001) endorse views on which extra arbitrary *names* are added to our worldmaking language. Roy writes (1995: 228): 'I think these objections can be blocked by appeal to arbitrary names as place-holders for non-actual individuals…let us shift to a [language] L_2 where, say, the pair of the letter 'N' and any thing is a name for that thing, and the pair of 'n' and any thing is a name for an "extra" individual.' What Roy does is alter our Lagadonian language **L** to a language $\mathbf{L_2}$ which is 'pseudo-Lagadonian': an actual individual *a* is named by the ordered pair <N,*a*>, and some non-actual individual is named by the ordered pair <n,a>, where the pairing of the ersatz name with the non-actual individual is arbitrary as well. *These* ersatz individuals are not worldbound, since there is no descriptive connection between the ersatz individual and the individual it represents.[41] (This view should really be paired with a substitutional semantics rather than a Tarskian semantics in order to take advantage of the plenitude of names. In proceeding, let's pretend that the ersatz substitutes function not as names, but as ersatz individuals, in order to preserve the continuity of this discussion.)

Plausibly, this sort of theory produces correct truth conditions. But there are better and worse theories of truth conditions when it comes to perspicuous representation of metaphysical reality. The linguistic counterpart theorist agrees that there could have been two qualitatively indiscernible spheres. She thinks that this possibility holds in virtue of

[41] Melia (2001: 24) accepts the letter of Roy's view, though not the justification. He is dissatisfied with the use of arbitrary names as 'empty singular terms' for the actualist. He instead proposes that we understand the names *not* as representing particular individuals, but instead as representing that there are such-and-such individuals, and they exist in both this world and that, and so on. Heller (1998) is a linguistic ersatzer who is a counterpart theorist, but like Roy and Melia, he goes the way of arbitrary representatives.

the fact that certain distributions of properties are consistent (given whatever theory of consistency she endorses) and when evaluating for *de re* possibility the task is simply to navigate to the appropriate consistent distribution. Given LCT semantics, we can get correct truth conditions without positing arbitrary representatives; so why take the extra step?

These considerations lead to what I consider to be a very sensible thought: there is no deep question of what ersatz possible worlds and individuals are. The main issue is a practical one: which entities are more useful for the purposes of a theory of truth conditions? Identifying ersatz worlds and individuals with linguistic entities is thus a practical move; the idea is to take advantage of an already-interpreted non-modal language. The resulting theory perspicuously represents the dependence of truth conditions for modal vocabulary on the truth conditions for non-modal vocabulary. Thus, ersatz worlds and individuals as defined here are particularly well-suited to play the role of possible worlds in the Leibnizian biconditionals.[42]

Let's review the big picture. We started with the assumption that there is some independent theory of the *de dicto* modal truths. The theory of the *de re* on the table is that what's possible for an individual depends on relations between the properties it instantiates and other properties—in particular, the relations that make for similarity between the individuals that respectively instantiate the properties. The challenge for the actualist is to construct a theory of ersatz worlds and individuals that can represent this

[42] Sider (2002) also defends a version of linguistic ersatzism. He starts by giving a semantics for a language without modal locutions but which quantifies over possible worlds. This language forms the basis for an *ersatz pluriverse*: a description of possible worlds space. The disadvantage of this view is that the base language is now a language that includes worlds. This is not *obviously* bad; however, the original idea behind linguistic ersatzism was that we could start with an interpreted non-modal language, and with this alone get everything we need to give truth conditions to sentences of a modal language. Sider's view, since it starts with an uninterpreted worlds language, loses this intuitive advantage. (In any case, it's plausible that his aim is simply different from mine.)

dependence. To do this, the linguistic counterpart theorist first uses the *de dicto* modal truths to construct linguistic ersatz worlds and individuals. She then defines a linguistic counterpart relation which avoids Lewis's objections. Finally, she constructs a counterpart semantics that generates truth conditions which reflect this dependence. I have not argued for the viability of counterpart theory in general. Furthermore, there are technical and philosophical problems that remain to be solved; but these aren't problems that target linguistic counterpart theory alone.

Appendix

Actuality is a useful notion. With it, we can make claims that we could not without it—for instance, that there could have been something that does not actually exist. However, counterpart semantics notoriously faces problems with the introduction of an actuality operator @ into a modal language, which in this case is $\mathbf{L}\Diamond$. The @ operator maps takes the individuals denoted by the terms in its scope and maps them to their counterparts in the actual world. Given that an individual can have multiple counterparts in a world, the counterpart theorist apparently get the wrong truth conditions for various sentences containing '@'.

There are two approaches to the semantics of @. First, we may give it a 'universal' interpretation. Focusing on the simplest case, where Π is a predicate and α is a variable, $@\Pi\alpha$ is true of an individual iff Π is true of all of its counterparts in the actual world $w_{@}$. More generally, where $\varphi(\alpha)$ is a formula and α is a term occurring freely in φ, $@\varphi(\alpha)$ is true of an individual iff φ is true of all of its counterparts in $w_{@}$. Second, we

may give it an 'existential' interpretation: @φ(α) is true of an individual iff φ is true of at least one of its counterparts in $w_@$.

Problems arise given either interpretation. The following four cases were introduced by Hazen (1979) (A1, A2), Fara and Williamson (2005) (A3), and Sider (2006) (A4).

Suppose that Xena, who is always happy, and Yvonne, who is sometimes unhappy, are twins in the actual world. As each of them could have been an only child, there is a possible world in which there is an only child, Zoe, very much like both Xena and Yvonne (and equally so). Xena and Yvonne each have Zoe as a counterpart, and Zoe has each of Xena and Yvonne as a counterpart. Now, consider this sentence (where 'F' is interpreted as the predicate 'is always happy'):

(A1) $\Diamond\exists x(@\exists y\ y=x \wedge \sim@Fx \wedge \sim@\sim Fx)$

A1 should be false, since it says that it's possible that someone who actually exists is both not actually always happy and not actually *not* always happy. On the universal interpretation, since Fx is true of Xena but not of Yvonne and ~Fx is true of Yvonne but not Xena, ~@Fx and ~@~Fx are true of Zoe. Thus, A1 is true.

Suppose instead that we interpret @ existentially. Consider this sentence:

(A2) $\Diamond\exists x(@\exists y\ y=x \wedge @Fx \wedge @\sim Fx)$

A2 should be false, since it says that it's possible that someone who actually exists is actually happy and actually not happy. But on the existential interpretation, since Fx is true of Xena and ~Fx is true of Yvonne, @Fx and @~Fx are true of Zoe and hence A2 is true.

Another sort of problem case arises for either the universal or existential interpretation of @, given the possibility that a possible individual such as Zoe may have no counterparts in the actual world. In that case, this sentence is true:

(A3) $\Diamond\exists x(@Fx \leftrightarrow @\sim Fx)$

Finally, suppose that Xena has Zoe as a counterpart, but Zoe only has Yvonne as a counterpart in the actual world. Then this sentence is true given either the universal or existential interpretation of @:

(A4) $\exists x(Fx \wedge \Diamond @\sim Fx)$

Since both the universal and existential interpretations of @ lead to problems, the solution must lie elsewhere.

Recently, Jeffrey Russell (Forthcoming) has proposed a solution. The idea is to introduce a mechanism by which to trace individuals via counterpart relations back to the actual world: Sentences are true not only relative to worlds in a model, but relative to a 'representation relation', which is a two-place relation between individuals in some world and individuals in the actual world. To get the idea behind the representation relation we

require the notion of a 'counterpart link', where for objects $u_1...u_n$ and $t_1\ldots t_n$ in worlds w and v respectively, $t_1\ldots t_n$ are jointly counterparts for $u_1...u_n$ only if for some w-v counterpart link S, $Su_1t_1\ldots Su_nt_n$. A representation relation is any composition of counterpart links.

We've now replaced the counterpart relation with the joint counterpart relation (or more basically, the counterpart link). The representation relation is used (in the course of evaluating a formula) to keep track of what individuals in the actual world ($w_@$) an individual in some possible world is 'tethered' to via a series of counterpart links. This prevents us from considering multiple counterparts of the same individual at the same time, blocking the problematic moves associated with A1, A2, and A4.[43]

Russell's solution may be implemented for LCT in the following way. Alter the clauses for $\Vdash$ so that it holds relative to variable function f and a representation relation R. The clauses V1–V5 remain unchanged except for this addition. Clause V6 is replaced with this:

(V6') $w(p\alpha_1\ldots p\alpha_n,...) \Vdash_{p,R} \Diamond\varphi[\alpha_1,\ldots,\alpha_n]$ iff for some v, some w-v counterpart link S, some $\alpha_1\ldots\alpha_n$-variant q of p such that $Sw(p\alpha_i)v(q\alpha_i)$ (for all $i\in[1,n]$), $v(q\alpha_1\ldots q\alpha_n,...) \Vdash_{q,S\circ R} \varphi[\alpha_1\ldots\alpha_n]$.

R is a representation relation composed of counterpart links from $w_@$ to w, and S is a link from w to v; S○R is the composition of S and R, where (S○R)*ab* iff for some *c*, S*ac* and R*cb*. We then alter our definition of truth in a world so that for any φ, $w \Vdash \varphi$ iff for all p,

[43] Recall that A3 was '$\Diamond\exists x(@Fx \leftrightarrow @\sim Fx)$', which is apparently the claim that it's possible that something is actually F iff it's actually not-F. Russell notes that it is intuitively right to think this is true so long as it's possible that something exists which doesn't actually exist.

$w \Vdash_{p,=@} \varphi$, where $=@$ is a $w_@$-$w_@$ counterpart link between every individual in the actual world and itself. Finally, we add a clause for @:

(V7) $w \Vdash_{p,R} @\varphi[\alpha_1 \ldots \alpha_n]$ iff for some $\beta_1 \ldots \beta_n$ such that $Rw_@(\beta_i)w(p\alpha)$, some q such that $q\alpha_i=\beta_i$ (for all $i \in [1,n]$), $w_@ \Vdash_{q,=@} \varphi[\beta_1 \ldots \beta_n]$.

As far as I know, no counterpart semantics currently addresses all logical difficulties. See Russell (Forthcoming) for discussion of the logical upshot of various moves, including this one.

This solution incidentally delivers a verdict on another issue: the question of contingent identity. Apparent cases of contingent identity arise when an individual is one world is allowed two counterparts in another world, thus verifying this sentence: $\exists x \exists y(x=y \wedge \Diamond x \neq y)$. But when we add in the structure of representation relations, formulas are only evaluated relative to one representation relation at a time. Russell argues that the necessity of identity and distinctness, below, is equivalent to the claim that every counterpart link is one-to one:

$\Box \forall x \forall y(\Diamond x=y \rightarrow \Box x=y)$

I am happy with both claims. Although contingent identity has been defended as a solution for cases like the puzzle of the statue and the lump of clay, endorsers of Russell's solution may still appeal to the existence of multiple counterparts for those

puzzles without having to deny the necessity of identity and distinctness; see also Stalnaker (1986).

Chapter 4

The Modal Limits of Dispositionalism

Among the features of the physical world are apparently dispositional features. A glass, when dropped onto a concrete surface, is disposed to break. A lump of soft clay is disposed to alter its shape when pressure is exerted in the right ways. In the absence of any other charged particles, an electron is disposed to move away from other electrons. These claims appear regularly in our ordinary and scientific discourse. Some think that certain features of our world are *essentially* dispositional—that is, they cannot be reduced to the non-dispositional. If this is the case, then certain features of our world are fundamentally modal, contra reductionist theories of metaphysical modality. It is a short step from here to the view—called 'dispositionalism'—that *all* modal features of the world may be accounted for in terms of its dispositional features. The task of this chapter is to survey the prospects for dispositionalism. The findings will be mixed: while dispositions help account for modal features of the world that are local, diachronic, or gradable, they aren't appropriate when it comes to certain modal features of the world that are global, synchronic, or static. I'll end by suggesting a partial solution for the dispositionalist.

4.1 Dispositions, Conditionals, and Properties

Dispositions are often associated with (counterfactual) conditionals of a certain form: 'If x were to S, x would M', where S is a predicate corresponding to a stimulus and

M is a predicate corresponding to a manifestation.[1] For instance, the disposition to repel electrons may be associated with the conditional, 'If x were to be near an electron, x would move away.' Likewise, fragility may be associated with the conditional, 'If x were to be dropped onto concrete, x would break.' Some dispositions, like fragility, appear to be associated with multiple conditionals: fragility may be manifested under different stimulus conditions, as a fragile glass would still break if thrown against a wall rather than dropped onto concrete. Although there may be disagreement about which conditionals correspond to the term 'fragility', we may individuate dispositions by their manifestation conditions—the relevant disposition in this case is the disposition to break.[2]

The association between dispositions and conditionals is characterized by the 'Simple Conditional Analysis':

(SCA) Object x is disposed to M iff if x were to S, x would M.[3]

SCA has been resisted on the grounds that there are cases in which the disposition is present and the stimulus condition is met, but the manifestation does not obtain. One case involves so-called *finks*. Consider our fragile glass. Suppose that at the moment the glass hits the concrete, a wizard waves her wand, shielding the intrinsic structure of the glass from the impact. The stimulus condition is met but the manifestation does not

[1] For future reference: the *manifestation* of a dispositional property is the state of affairs of an object's meeting the manifestation conditions. The form of the conditional considered here is a simplification. There may be states of affairs involving multiple objects, and in which the objects that meet the stimulus conditions differ from the objects that meet the manifestation conditions. I am not using 'state of affairs' in any ontologically weighty sense.

[2] There is in fact a debate over which dispositions are associated with which conditionals. See Manley and Wasserman (2008) and follow-ups from Bonevac, Dever, and Sosa (2011), Choi (2011), Vetter (2011), and Manley and Wasserman (2011).

[3] SCA was proposed by Lewis (1997). It should be understood as a time-indexed principle.

obtain. Or consider the case of so-called *masks*. Suppose that at the moment just before the glass hits the concrete, the wizard simply 'disappears' the concrete and replaces it with a cushion. Again, the stimulus condition is met but the manifestation does not obtain. Finks and masks (and other sorts of interferers) provide evidence that the counterfactual conditionals don't always hold. In response, many revisions of SCA have been proposed, and correspondingly so have many new counterexamples.[4]

We do not need to settle this debate here, since the view to be considered does not require a reduction of dispositions. What underlie dispositions are not conditionals, but dispositional properties.[5] Dispositional properties may be instantiated without ever manifesting, much less manifesting under the stimulus conditions specified by conditionals—they are real properties of the objects that instantiate them. As such, the conditionals serve merely as a guide to their stimulus-manifestation conditions. However, we may continue to individuate both dispositions and the dispositional properties that underlie them according to their manifestation conditions.[6]

Dispositional essentialism is the view that some properties are essentially dispositional.[7] For instance, if the property of having negative charge is an essentially dispositional property, then it essentially disposes its bearer to move away from other negatively charged objects; any property that does not play this role is thereby not the property of having negative charge. In contrast, categorical properties are properties that

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[4] Cases of finks are introduced in Martin (1994); cases of masks (or 'antidotes') are introduced in Johnston (1992) and Bird (1998). For a recent summary of objections based on interferers, see Manley and Wasserman (2008). For a discussion of the analysis of dispositions, see Mumford (1998).
[5] For our purposes, properties may be understood as either immanent universals or tropes.
[6] Though some prefer to distinguish *dispositions* from *dispositional properties*, I will make the simplifying assumption that they go together.
[7] Defenders of dispositional essentialism include Ellis (2001), Mumford (2004) and Bird (2005, 2007).

are not essentially dispositional.[8] It is sometimes said that categorical properties, unlike dispositional properties, 'float free' of their causal roles—categorical properties can be freely recombined whereas dispositional properties cannot. (Some of the assumptions involved in this characterization of categorical properties will be challenged in section 4.7.)

In what follows, I will assume dispositional essentialism: there are some essentially dispositional properties. This view is often bundled with the view that there are essentially dispositional *fundamental* properties, where the fundamental properties are those that appear at the 'bottom layer of reality'—they are instantiated by fundamental entities such as electrons, or fermions, or whatever it is that ideal physics declares to be fundamental.[9] The non-fundamental properties, which are typically properties of macroscopic objects, depend upon the fundamental properties. We may start by assuming that there are non-fundamental dispositional properties which are essentially dispositional. That is, although non-fundamental properties such as the property of breaking are ontologically dependent upon fundamental properties, their dispositional characters are irreducibly dispositional; there is no analysis of *breaking* solely in terms of the non-dispositional.[10]

Many dispositional essentialists happen to be *dispositional monists* as well: they believe all fundamental properties are essentially dispositional rather than categorical.[11] I

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[8] I am assuming a clean division between dispositional and categorical properties. For skeptical discussion, see Mellor (1974).
[9] Not everyone agrees; see Schaffer (2009b).
[10] In contrast, a rival view might say that there are essentially dispositional fundamental properties, but no essentially dispositional non-fundamental properties (in which case, fragility is not essentially dispositional).
[11] A view closely related to dispositional monism was first proposed by Shoemaker (1980). Other dispositional monists include Mumford (2004) and Bird (2005, 2007). Dispositional essentialists who aren't dispositional monists include Ellis and Lierse (1994), Ellis (2001), and Heil (2003).

will not assume dispositional monism; the defender of essentially dispositional properties need not ban categorical properties from her total theory.

4.2 Criteria for a Dispositionalist Theory of Modality

Dispositional properties are modal properties of a certain sort, as evidenced by the fact that we understand them in terms of the conditions that they *could* manifest. Defenders of essentially dispositional properties are accordingly *modal primitivists* of a certain stripe, as they accept modal features of the world that cannot be reduced to the non-modal.[12] *Dispositionalism* is the stronger view that the modal can be fully accounted for using just the non-modal resources of the actual universe and a bit of primitive modality in the form of essentially dispositional properties.[13] The motivation is theoretical simplicity: why multiply primitive modal notions when one will do? After all, defenders accept essentially dispositional properties into their ontology anyways for independent reasons.

The main task of this chapter is to assess the viability of dispositionalism. In order to do so, we should be clear on what criteria a successful dispositionalist theory must satisfy.

1. In accordance with the motivation of theoretical simplicity, we have the first criterion: *No more primitive modal notions are introduced*. As Borghini and Williams (2008: 33) note, 'as far as we are concerned, dispositions are something we need in our ontology *anyway*, and we are not alone. A well-

[12] For example, see Molnar (2003: 200), Borghini and Williams (2008: 33), and Jacobs (2010: 233).
[13] This view is suggested (whether or not developed) by Borghini and Williams (2008), Contessa (2008), Ellis (2001), Jacobs (2010), Molnar (2003), Mumford (2004), and Vetter (Forthcoming a).

rounded account of worldly phenomena that does not include dispositions (or disposition-like entities) is bound to fail. And if that is the case, why bother going outside that framework to deal with possibility, if the dispositions can deal with it themselves?'

2. Dispositionalists are typically *actualists*: they believe that everything that exists actually exists. A successful actualist theory should not require the existence of any non-actual objects. This is the second criterion: *Actualism is not violated*.

3. In the spirit of actualism, dispositionalism should not require the existence of uninstantiated properties.[14] Defenders tend to agree with Armstrong that in order for a property to exist, it must be actually instantiated—or at least, that every fundamental property that exists is actually instantiated.[15] We may think that although no actual object both is square and has mass $1.8986x10^{27}$kg, the property of being square and having mass $1.8986x10^{27}$kg exists in virtue of the existence and instantiation of the property of being square and of the property of having mass $1.8986x10^{27}$kg.[16] So this is the third criterion: *The only fundamental properties that exist are actually instantiated, and the only*

[14] There may be disagreement over whether the existence of uninstantiated properties would violate actualism. In fact, I don't think it does. However, many dispositionalist happen to assume the instantiation principle, so I include it here.
[15] Armstrong discusses this in his (1989: 75-82). For agreement, see Borghini and Williams (2008: 29) and Jacobs (2010: 236).
[16] These may in turn exist in virtue of more fundamental properties, depending on your view of quantities.

non-fundamental properties that exist are those that depend solely upon fundamental properties that are actually instantiated.

4. Dispositionalism should nonetheless predict the possibility of an actually non-existent object's existing or of an actually uninstantiated property's being instantiated. If a modal theory fails to predict the possibility of some such state of affairs, then so much the worse for the theory. (Although I won't presuppose any particular account of the nature of states of affairs, let's assume that (i) they are abundant and (ii) some do not obtain. The second assumption does not violate actualism any more than the actual existence of false propositions does.) This is, of course, a defeasible requirement, since metaphysical theorizing often involves weighing the virtues of a theory against its disadvantages. Thus, we have the fourth criterion: *All other things equal, possibilities and necessities that we would accept pre-theorizing are predicted*. I will focus on possibilities and necessities concerning concrete objects, and will not demand that the dispositionalist account for logical or analytic necessities.

5. The fifth and last criterion concerns explanatory power. A theory of modality should provide a convincing story of how it is that the source of possibility it posits yields the possibilities it thereby countenances. For instance, this would be an unacceptable principle: 'All states of affairs that are disposed to exist are possible.' We may concede that there are essentially dispositional

properties without accepting just any proposal for how these connect up to possibilities. Thus, the fifth criterion is this: *The theory is explanatorily powerful*. This criterion is in a sense a check on the fourth criterion, as it prevents the dispositionalist from simply asserting that all pre-theoretic possibilities and necessities are in fact predicted on her theory, even if this is not plausibly the case.

4.3 Dispositionalism

Our understanding of a dispositional property comes through our grasp of its connection to its manifestation. This connection is weaker than that of necessity, but stronger than that of possibility. On the one hand, an instantiated dispositional property does not of necessity manifest: a fragile glass can span its entire career without ever breaking (say, if it's melted instead).[17] On the other hand, it isn't *merely* possible that the fragile glass breaks. The glass is in some sense more likely to break; it has a *tendency* towards its manifestation. As Vetter (Forthcoming b: 17) puts it, the strength of modality involved in dispositional properties is that of 'easy possibility'.[18]

The strength of modality involved in dispositionality is not an easy notion to cash out. However, to account for possibility, the dispositionalist need not give a full account of dispositionality. It is enough for her to say that whatever is tended towards is thereby possible. Of course, the story will end up being more complicated than this, since we want to ensure that all possibilities are predicted, as per the fourth criterion. Furthermore, we want to ensure that the dispositionalist isn't given license to simply declare that every

[17] See Schrenk (2010) for an argument against the reduction of dispositions to necessity.
[18] Anjum and Mumford (2011) make an analogy with normativity and intentionality, and Schrenk (2010) makes an analogy with Newtonian force.

possibility is in fact predicted by her theory; as per the fifth criterion, the theory must be explanatorily powerful.

I'll start by looking at two closely-related approaches to a dispositionalist theory of possibility. The first is defended by Vetter (Forthcoming a: 14): 'It is possible that *p* if and only if something has (or some things have) an iterated potentiality for it to be the case that *p*.' Vetter theorizes in terms of *potentialities* rather than *dispositions*, where potentialities form a broader class that also includes *abilities*, *powers*, and other such notions. For our purposes, we may continue to talk only about dispositions. The important feature of dispositions is that they have a primitive modal connection to their manifestations located somewhere between possibility and necessity. Since this is the important feature of potentialities as well, everything I will say about dispositionalism also applies to *potentialism*. For our purposes, we may consider this to be Vetter's principle:

(P) State of affairs S is possible iff some things have iterated dispositional properties $d_1,\ldots,d_n$, which have as their manifestation a state of affairs which includes S.

P is formulated in terms of the manifestation of some dispositional properties: not only can a single dispositional property manifest, *some* dispositional properties can manifest. For instance, imagine that a magnetic ball is falling, but that it's falling slower than it would if there weren't a magnet above attracting it. The state of affairs of the ball's falling at that speed is the result of both its weight and its magnetism. Or consider a

baking soda-and-vinegar volcano. The state of affairs of the volcano's erupting is a result of the dispositions of both the baking soda and of the vinegar.[19]

The 'iterated' part of P also requires explanation. Sometimes the manifestation of an instantiated dispositional property *would* lead to the instantiation of some other dispositional property, which in turn if manifested *would* lead to the instantiation of some other dispositional property, and so on. For instance, if the fragile glass were to be dropped onto a hard surface, then it would break into shards of glass, which might then be disposed to scratch the surface. The glass's fragility is thus an iterated disposition: it is a disposition for a disposition that the surface is scratched. The actual existence of the shards of glass is not required, so the second criterion is respected: Actualism is not violated.[20] Furthermore, the existence of the dispositional properties that the shards of glass would instantiate, were they to exist, is also not required, so the third criterion is respected: Only actually instantiated properties exist.

Acceptance of iterated dispositional properties allows for the prediction of many more possibilities than if the dispositionalist were restricted to non-iterated dispositional properties. So long as the dispositional properties that aren't actually instantiated are 'anchored' in dispositional properties that are actually instantiated, the manifestations they are associated with are thereby possible, no matter how remote. This helps ward off an objection to P based on the fourth criterion: All other things equal, possibilities and necessities that we would accept pre-theoretically are predicted. In particular, P appears

[19] Step 1: Make a volcano base. Step 2: Fill the crater with warm water and just a dash of dishwashing liquid, baking soda, and red food dye. Step 3: Add vinegar, and watch it erupt!

[20] We're supposing that the shards of glass do not exist if the glass never breaks. If one thinks they do exist as mereological parts of the glass, then we may construct a similar example involving, say, grandchildren that some individual never has.

to predict the possibility of alien individuals and alien properties: individuals and properties that could exist but do not.

This is a good start. However, P seems to fall short on the fifth criterion, which concerns explanatory power; it doesn't seem to say enough. Consider the conjunctive possibility that a glass breaks and a lump of clay is molded. Surely we can ground the possibility of conjunctive states of affairs in their conjuncts. This thought is captured in a group of principles endorsed by Borghini and Williams (2008). With some modifications, the principles are:

(PA) An atomic state of affairs S is possible iff some things have iterated dispositional properties $d_1,\ldots,d_n$, which have as their manifestation a state of affairs which includes S.

(PC) Where state of affairs S is a conjunction of states of affairs $S_1,\ldots,S_n$: $S_1\&\ldots\&S_n$ is possible iff S_1 is possible … and S_n is possible and $S_1,\ldots,S_n$ are compossible (that is, the existence of any of the $S_1,\ldots,S_n$ does not prevent the existence of any of the other of the $S_1,\ldots,S_n$).[21]

(PD) Where state of affairs S is a disjunction of states of affairs $S_1,\ldots,S_n$: $S_1\vee\ldots\vee S_n$ is possible iff S_1 is possible, … , or S_n is possible.

[21] The appeal to *compossibility* is immediately worrisome—left unreduced, compossibility is a primitive modal notion, which violates the first criterion. I'll talk about this more in section 4.5.

Principles PA, PC, and PD respectively cover atomic, conjunctive, and disjunctive states of affairs. Given that PA, PC, and PD, do better with respect to the fifth criterion than P alone, I will associate dispositionalism with this cluster of principles instead.[22]

In the next three sections, I will discuss the shortcomings of dispositionalism. In particular, I will examine three respects in which dispositions aren't like some possibilities. Dispositions are *local*, *diachronic*, and *gradable*, whereas some possibilities are *global*, *synchronic*, or *static*. Of course, these differences alone aren't reasons to reject dispositionalism. They are problematic only if the local cannot account for the global, the diachronic cannot account for the synchronic, or the gradable cannot account for the static. I will look at specific problem cases that appear to show just this.

4.4 The Local and the Global

Dispositions are local possibilities: they are possibilities for particular individuals. For instance, the possibility that the glass breaks has its basis in the glass's fragility, its disposition to break. Locality is considered a virtue by some modal theorists. For comparison, consider a nearby view, Fine's (1994) *essentialism*, according to which essence is prior to modality. This contradicts the typical definition of essence in terms of modality: an object x has property F essentially just in case necessarily, x has F.[23] As Fine argues, reducing essence to modality gets things the wrong way around—for one

[22] Borghini and Williams also include a principle for 'existential states of affairs', which (mirroring the wording used for PA, PC, and PD) is: 'A state of affairs X is possible iff some things have iterated dispositional properties $d_1,\ldots,d_n$, which have as their manifestation a state of affairs which includes X.' I confess that I don't know what they mean by this, nor do they mention existential states of affairs again in the paper. They do consider negative states of affairs later on, though they don't provide a principle for the possibility of negative states of affairs.

[23] Or alternatively: an object x has property P essentially just in case necessarily, whenever x exists, x has P.

thing, there are properties that every individual has necessarily but which are not essential properties of any individual, such as *being such that 2+2=4*. The details of essentialism are not important here. Its significance is that it reverses the direction of explanation so that instead of explaining essence in terms of modality, we take essence as primitive and explain modality in terms of it. Thus, what's necessary is that which holds in virtue of all essences.

There are parallels between Fine's essentialism and dispositionalism. Dispositionality, like essence, is a local matter. And like Fine, dispositionalists seek to explain all of metaphysical modality in terms of it. However, while some possibilities are local, such as the possibility that a particular glass breaks, other possibilities are global: they concern the entire universe. (The line between a 'local' and a 'global' possibility is vague, but it won't matter for our purposes how well we can draw this line.) Dispositionalism runs into problems trying to account for certain global possibilities. This thought has arisen elsewhere. In a separate discussion, Cameron (2008a: 273) writes that (a view much like) dispositionalism is unable to account for 'the possibility of there being different global laws of nature, or in general possibilities concerning how the world could have been globally.' Many dispositionalists bite the bullet with respect to the laws of nature: they say that the actual laws of nature are metaphysically necessary.[24] I'll grant for the sake of argument that this is the case. Nonetheless, there are other global possibilities that dispositionalism cannot account for—namely, certain negative and universal possibilities. The problems with negative and universal possibilities that I will discuss should be familiar territory for some, as they mirror (to a large extent) the debate

[24] See Bird (2007), Ellis (2001), Shoemaker (1980), and Vetter (Forthcoming a: 24-6).

over 'truthmakers' for negative and universal states of affairs.[25] I will come back to truthmakers momentarily.

Let's start by considering two negative possibilities any modal theory should account for. First, under normal conditions, a glass won't break when placed stably on a table—so possibly, the glass doesn't break. Second, possibly, JFK was not shot.

Borghini and Williams do not offer a principle stating the conditions under which a negative state of affairs ~S is possible. It is not obvious what such conditions would be. We cannot simply negate the right hand side of PA, for these conditions would tell us when it is that a state of affairs S is *not* possible, not when it is that ~S *is* possible. Here is my suggestion:

(PN) Where ~S is a negative state of affairs: ~S is possible iff S conflicts with some possible state of affairs S*.[26]

To illustrate, let's apply PN to our two cases. First, consider the state of affairs of the glass's not breaking (~S): according to PN, this is possible just in case the state of affairs of the glass's breaking (S) conflicts with a possible state of affairs (S*). Presumably, this possible state of affairs is the glass's remaining stably placed on the table, and by PA, this is possible just in case it's the manifestation of some dispositional properties. The reason for appealing to a conflicting state of affairs is the fifth criterion: explanatory power. While the glass does not break when it remains stably placed on a

[25] For instance, see Russell (1985) and Armstrong (1997). For a nice overview of problems with truthmakers, see Rodriguez-Pereyra (2006).

[26] For now, I am ignoring the fact that *conflicts with* appears to be a modal relation between states of affairs. Let's assume temporarily that some non-modal analysis of *conflicts with* can be given. I will express some skepticism in section 4.5.

table, it does not dance, fly, or sing either. However, we need not associate the relevant dispositional property of the glass with all of these states of affairs as its characteristic manifestations. The primitive modal features of an essentially dispositional property are not many-fold. Rather, it suffices to associate the dispositional property of the glass with a positive state of affairs which conflicts with other states of affairs, and let the resulting negative possibilities be derivative. This is what PN does.[27]

Next consider the state of affairs of JFK's not being shot (~S). According to PN, this negative state of affairs is possible just in case the state of affairs of JFK's being shot (S) conflicts with some possible state of affairs (S*). The story here will be more complicated than in the glass case. Start with the observation that a whole series of events must occur in order for JFK to be shot, requiring the instantiation of many properties. Now suppose that Lee Harvey Oswald were prevented from ascending to the sixth floor of the Texas School Book Depository. JFK would consequently not have been shot. The state of affairs of JFK's being shot presumably conflicts with the state of affairs which is the manifestation of the dispositional properties involved in this alternate history.

All seems well so far. However, certain negative possibilities are more problematic. A special class of negative possibilities involves the possibility that an actually existing contingent object, like a particular glass, does not exist.[28] By PN, the glass's existing (S) conflicts with some possible state of affairs (S*). Presumably, this state of affairs S* is included in the manifestation of some dispositional properties. We need to tell a convincing story of what the state of affairs S* is in this case and what these

[27] We should implicitly understand PN as a time-indexed principle, so that a glass that remains stably placed on the table *at time t* does not break *at time t*.
[28] There is a relevant exchange in which Cameron (2008a) argues against dispositions-based truthmakers for 'It is possible that none of the actual contingent beings existed' and Contessa (2008) argues in favor. The cases I discuss tell on this possibility.

dispositional properties are. S* cannot be just any state of affairs which does not include the existence of a glass, for such a state of affairs may simply be silent on whether or not a glass exists. Furthermore, S* cannot just be the state of affairs of the glass's not existing, for this is the state of affairs whose possibility is at issue. So how could S* be a state of affairs which conflicts with the existence of a particular glass, without simply being the state of affairs of that particular glass's not existing?

One strategy is to say that S* is a *totality state of affairs*—informally, a state of affairs which is 'universe-sized'—and that S* does not include the existence of the particular glass in question.[29] Presumably, S* is a highly complex state of affairs such as the state of affairs of x's being F, y's being G, z's being H, x's standing in R to y, and so on. However, none of these included states of affairs—which are all positive states of affairs of something's being a certain way—conflict with the existence of the particular glass. In order for S* to *conflict* with the existence of the particular glass, S* must include some sort of 'that's all' component; that is, S* must include the state of affairs of there being nothing more in the universe. But this is a negative existential state of affairs, and negative existential possibilities were what we were trying to account for in the first place. To explain the possibility of the state of affairs of there being nothing more in the universe, we'd have to find a possible state of affairs which conflicted with the state of affairs of there being something more in the universe. Explanation runs out again.

The dispositionalist may say that the 'that's all' component is not a negative state of affairs, but a universal one: the state of affairs of everything's being either x or y or z, etc. However, in order for a universal state of affairs to figure in the possibility conditions

[29] Discussion of this strategy in the nearby truthmakers debate may be found in Merricks (2007: 39-67), and in follow-ups in Cameron (2008b) and Merricks (2008). As far as I know, its current form originates in Armstrong (1997).

for a negative state of affairs, we must have independent possibility conditions for universal states of affairs. It's difficult to see what these would be. A universal state of affairs cannot merely be reduced to states of affairs involving particular objects, for nothing about the existence of some objects rules out the existence of one more object. We may be able to get possibility conditions for *existential* state of affairs in terms of the possibility of states of affairs involving particular individuals. However, it is well-known that 'Everything is F' is equivalent to 'There isn't something that is not F', the latter of which is the negation of an existential claim. The problem of negative possibilities and the problem of universal possibilities are thus two sides of the same coin.

To clarify, this worry applies only to certain negative possibilities and certain universal possibilities. The relevant negative states of affairs are those which assert the non-existence of an object. I take it that there is no problem with negative states of affairs which assert that a particular object lacks a property, since these may be accounted for by PN. Note that I have been focusing on cases involving the non-existence of *particular* objects, but the arguments above also apply to states of affairs involving, for instance, the non-existence of some glass or other. The relevant universal states of affairs are what are sometimes called 'accidental generalizations' and so do not hold of necessity. For instance, the state of affairs of all swans being black is an accidental generalization. I am happy to concede that the possibility of certain non-accidental generalizations may be accounted for on dispositionalism, such as the state of affairs of all fragile things being disposed to break.

As noted above, these are not new problems in the context of the debate over *truthmakers*: entities which suffice for the truth of a sentence or proposition. If

truthmaker maximalism holds, then every truth has a truthmaker. But the truthmaker maximalist then has problems with negative truths and universal truths which parallel the problems facing the dispositionalist, as described. This should come as no surprise. After all, the dispositionalist can be construed as a certain sort of truthmaker theorist, one who believes that the truthmakers for modal truths are actually instantiated dispositional properties.[30] However, while the non-dispositionalist truthmaker theorist may simply opt to reject truthmaker maximalism, the dispositionalist may not do the same. That is, she cannot simply say that not all modal truths have dispositional truthmakers, for her theory just is that all modality can be accounted for in terms of the dispositional features of the world.

I have been assuming that a totality state of affairs is a non-atomic state of affairs. Suppose the dispositionalist says that totality states of affairs are *atomic* states of affairs. In this case, by PA, some things have iterated dispositional properties which have as their manifestation the totality state of affairs. This totality state of affairs would be something like the state of the affairs of things x, y, z, etc. being all and only the things that there are. This manifestation would be grounded in a disposition of the things x, y, z, etc., namely, the disposition to be all and only the things that there are. (The stimulus conditions would be that there are no more things.)[31] The dispositionalist is certainly free to posit such a disposition, but I find it *ad hoc*. Furthermore, it appears to run afoul of the fifth criterion, explanatory power.

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[30] The dispositionalist need not be a truthmaker theorist: there are various ways to explain the connection between states of affairs and the dispositions which figure in their possibility conditions. For instance, the dispositionalist may appeal to *grounding* or *metaphysical semantics*.

[31] Thanks for Ross Cameron for suggesting this formulation of the problem.

Here is another attempt to deal with the problem. I have been assuming thus far that nothing less than a totality state of affairs could account for the possibility that some particular glass does not exist, on the grounds that anything less would not conflict with the existence of the glass. However, there is another option available to the dispositionalist. She may say that there are essential features of the glass that must be present in any state of affairs that does not conflict with its existence, and thus that there are lesser states of affairs which conflict with the existence of the glass. For instance, she may accept some Kripkean principle of origin essentialism: for the glass to be the particular glass it is, it must have the right origin history—it must be made from particular materials in a particular way. For a state of affairs to conflict with the glass's existence, it need only include the start, but not the end, of the process that leads to that glass. This is much less than a totality state of affairs. However, this strategy is in tension with the first criterion for a succession dispositionalist theory, which is that no more primitive modality is introduced. The requirement that the glass is essentially associated with a particular origin is a modal requirement. Furthermore, this strategy does not help with negative existential possibilities such as the state of affairs of there not being a glass.

Here is one final attempt on behalf of the dispositionalist. Perhaps the dispositionalist may distinguish between atomic and non-atomic negative states of affairs, where atomic negative states of affairs are those of the form ~S, where S is an atomic positive state of affairs. She may then accept PN for non-atomic negative states of affairs, and PA for atomic negative states of affairs. The idea is that there are dispositions to manifest negative characteristics: brittleness might be described as the disposition to not

break. However, this move would not help with the glass's not existing—I take it that there are no dispositions to not exist.

I conclude, then, that the dispositionalist runs into problems accounting for both negative and universal possibilities. These problems are primarily associated with the fact that nothing less than the entire universe will do for grounding such possibilities, but dispositions are limited when it comes to claims about the entire universe. The moral is that dispositions are too local to account for the global.

4.5 The Diachronic and the Synchronic

Dispositions are in a sense *diachronic*, since they're typically characterized in terms of causation, a diachronic process. The instantiation of a dispositional property has implications for what comes next, not for what is the case now (loosely speaking). But sometimes there are *synchronic* possibilities, where what's possible isn't a matter of what comes before; it has to do with the properties involved in the states of affairs and their relations to *each other*, not to properties that are instantiated temporally prior.

Consider, for instance, the state of affairs of a glass's having a mass of 5g. The dispositionalist, applying PA, says that this state of affairs is possible just in case some things have iterated dispositional properties which have as their manifestation a state of affairs which includes a glass's having a mass of 5g. To fill out the story, we may imagine a causal process which leads to the formation of such a glass. However, surely such a glass could have existed *ex nihilo*. There is no inherent contradiction in the idea that such a glass exists at the beginning of the universe, or that it appears out of thin air. Consider, then, the possibility that a glass's having a mass of 5g comes into existence *ex*

nihilo, or that it always exists in a universe which has no beginning. Neither of these states of affairs is adequately explained by PA.

There is also tension between the diachronic and the synchronic when it comes to conjunctive states of affairs. Consider the state of affairs of a glass's having both a mass of 5g and a mass of 6g. This state of affairs is not possible. Since it is a conjunctive state of affairs, the dispositionalist looks to PC for an explanation of its impossibility:

(PC) Where state of affairs S is a conjunction of states of affairs $S_1,\ldots,S_n$: $S_1\&\ldots\&S_n$ is possible iff S_1 is possible … and S_n is possible and $S_1,\ldots,S_n$ are compossible (that is, the existence of any of the $S_1,\ldots,S_n$ does not prevent the existence of any of the other of the $S_1,\ldots,S_n$).

PC invokes the notion of *compossibility*, which if left unreduced would be a primitive modal notion, and would thus violate the first criterion, that no more primitive modality is introduced. An explanation of compossibility is provided: $S_1,\ldots,S_n$ are compossible just in case 'the existence of any of the $S_1,\ldots,S_n$ does not prevent the existence of any of the other of the $S_1,\ldots,S_n$'. Of course, the worry is now transferred to the use of the idea of a state of affair's *preventing* the existence of another state of affairs. Even if *prevention* is not a modal notion, it is certainly not something that should be left unexplained. In fact, it sounds like a causal notion: the handcuffs prevent the burglar's escape—they caused her not to escape.

Returning to our glass case, PC says that the state of affairs of a glass's having both a mass of 5g and a mass of 6g is possible just in case the glass's having a mass of 5g

is possible, the glass's having a mass of 6g is possible, and they're compossible—that is, neither state of affairs prevents the existence of the other. If we cash out compossibility in terms of prevention, then PC rules that these states of affairs *are* compossible, as neither causes the other not to be. This is the wrong result. The problem is that whether these states of affairs are compossible should not be a matter of what came before. Without an adequate non-modal explanation of compossibility, the dispositionalist cannot reduce synchronic possibility to diachronic possibility.[32]

Finally, this tension is also found in the principle that I proposed on behalf of the dispositionalist for negative possibilities:

(PN) Where ~S is a negative state of affairs: ~S is possible iff S conflicts with some possible state of affairs S*.

PN provides a recursive principle for the possibility of negative states of affairs at the cost of invoking the notion of a state of affair *conflicting* with another state of affairs. Our example was of the state of affairs of a glass's not breaking (~S). PN tells us that the glass does not break in virtue of there being a possible state of affairs which conflicts with its breaking—for instance, the state of affairs of the glass's remaining stably placed on the table. This latter possibility is independently accounted for by the principle for atomic states of affairs, PA, so there is no circularity. However, we are left with an unexplained notion of one state of affairs *conflicting* with another.

[32] There are similar cases as well. Consider the state of affairs of a glass's being five feet from a vase, and the state of affairs of that glass's being six feet from the vase.

Is this an irreducibly modal notion? In section 4.4, I assumed for charity's sake (see footnote 26) that a reduction could be given, but let's take a closer look now. The two relevant states of affairs are that of the glass's breaking and of the glass's remaining stably placed on the table. In virtue of what do these conflict? We could give a non-modal explanation if these were contradictory properties of the glass, such as having a mass of 5g and not having a mass of 5g. But they are not. An adequate non-modal explanation might take the form of some theory of property constituency, but the burden is on the dispositionalist to give such a theory. I do not see this being easily done. After all, the property of breaking is not 'about' the property of remaining stably placed on the table, any more than it is 'about' the property of being a ceramic vase. But nonetheless, it can be co-instantiated with the latter and cannot be co-instantiated with the former.

Suppose that the dispositionalist appeals to the distinction between the fundamental and the non-fundamental, which was briefly explained in section 4.2. The idea here would be that the property of breaking and the property of remaining stably placed on the table are non-fundamental properties; when we look at the fundamental properties upon which they depend, their conflicting can be explained. I don't know exactly how this story is supposed to go. But even if we just focus on fundamental properties, we have plausible cases where two fundamental properties are not co-instantiable, but where we don't have a non-modal explanation of this—for instance, the property of having a mass of 5g and the property of having a mass of 6g. This takes us back to the discussion at the start of the section, and to the observation that there are modal connections between states of affairs that are purely a synchronic matter; the dispositionalist cannot straightforwardly reduce the synchronic to the diachronic.

4.6 The Gradable and the Static

Finally, we come to the third respect of difference: dispositions are *gradable* whereas some possibilities are *static*. Dispositions seem to come in degrees: a fragile glass may be more disposed to break than a fragile ceramic vase, and a fragile object is more likely to break than a non-fragile object, period. This seems right, as dispositional properties are frequently characterized as *tendencies* of the objects that instantiate them. The state of affairs of a glass's breaking may accordingly be said to be 'more possible' than the state of affairs of a ceramic vase's breaking, and the state of affairs of a glass's breaking may be said to be 'easily possible'. (Recall from above that Vetter calls the strength of modality involved in dispositions 'easy possibility'; I am following her usage here.) On the other hand, we can also talk about possibilities without grading them: the state of affairs of a glass's breaking is simply possible. We thus have two ways to classify states of affairs: as '(statically) possible' or as 'easily possible' (with 'more possible than' entering the picture when we compare states of affairs).

These are not exclusive categories—any easily possible state of affairs is thereby possible. This is not to say that we may give a reduction of gradable possibility in terms of static possibility. Following Vetter (Forthcoming b: 18), there are two models on which to attempt such a reduction: 'One is *closeness*: it is *more possible* that *p* than it is that *q* just in case *p* holds in a world that is closer to some contextually determined ideal than any world in which *q* holds. The second option is *proportion*: it is *more possible* that *p* than it is that *q* just in case there are more (relevant) worlds where *p* holds than there

are (relevant) worlds where *q* holds.'[33] We may modify these accounts to tell on easy possibility. On the closeness model, a state of affairs S is *easily possible* just in case S obtains in a close possible world, where closeness is contextually determined. On the proportion model, a state of affairs S is easily possible just in case S holds in a suitable proportion of possible worlds.

Vetter (Forthcoming a) argues against each of these accounts. Against the closeness model, she cites the problem of 'accidental closeness', as developed by Manley and Wasserman (2008). Suppose we take two intrinsically similar glasses, and place one on a table edge above concrete and the other in a closed cupboard above a soft carpet. A possible world in which the first glass falls is closer than one in which the second falls—but this doesn't have to do with their fragility. Since they're intrinsically similar, they should be equally fragile. We may modify this case to tell on easy possibility: suppose a fragile glass is stored in a safe place where it has little chance of being disturbed. This glass does not break in any close possible world, but it is still fragile. Against the proportion model, Vetter notes that it isn't sensitive to the right worlds in the right ways. The degree of a possibility of the fragile vase's breaking is not matter of simply comparing worlds in which the vase breaks to worlds in which it does not—presumably, since there are many more worlds in which the glass does not break, the proportion of breaking-worlds is low. It is difficult to see how we could come up with a theory of what the right proportion is for various dispositions.[34]

The dispositionalist rejects the reduction of possibility to possibility, and thus of easy dispositions to static possibility. However, she endorses the reduction of possibility

[33] The main possible worlds theories of counterfactuals are defended in Lewis (1973) and Stalnaker (1968). We will not need the details to get the idea.
[34] See also Vetter (Manuscript).

to dispositionality, and so requires an account of static possibility in terms of dispositionality, or easy possibility. She gets part of this account for free: as noted, every easy possibility is a static possibility. However, she still needs to show that *all* static possibilities are reducible to easy possibilities.

Why *should* all static possibilities be reducible to easy possibilities? A fair coin could land heads 100,000 times. A fair coin could land on its edge 100,000 times. In fact, it is consistent with quantum mechanics that a fair coin falls through the table and onto the floor 100,000 times. And it is consistent with standard Newtownian mechanics that the following is possible: If a smoker puffs in the corner of a room, the smoke particles leaving her cigarette are expected to slowly to diffuse until they are spread evenly about the room, but instead they could collect in a small ball by the opposite wall. These possible states of affairs certainly do not seem easily possible.

The dispositionalist may reply that a reduction of possibilities to easy possibility need not entail that all possibilities just are easy possibilities. The reduction may be more complicated. For instance, we may appeal to the division between the fundamental and the non-fundamental. While the state of affairs of the smoke particles' collecting in a ball is unlikely, each of the individual movements of the smoke particles is independently likely, since they are manifestations of the dispositions of the smoke particles. Assuming that the smoke particles are individually more fundamental than their plurality, this gives us a story of how an unlikely possibility reduces to some easy possibilities upon which it depends.

However, I think the dispositionalist who adopts this move faces a dilemma. Presumably, either determinism or quantum indeterminism holds (by the best current

scientific theories). If determinism holds, then there are no essentially dispositional fundamental properties. Fundamental particles would move of necessity, rather than mere disposition. (Remember that a tenet of dispositionalism is that it is a primitive modal feature of the world located somewhere between possibility and necessity—if we assimilate it to necessity, then it is not dispositionalism but a form of necessitarianism.) On the other hand, if quantum indeterminism holds, then we can re-generate the problematic cases for fundamental particles.

In any case, I think the burden falls on the dispositionalist to explain why we should believe that all possibilities can be reduced to easy possibilities. The 'iterated' part of PA is meant to account for some of this. Very unfamiliar states of affairs may be anchored in actually instantiated dispositional properties just so long as we can get to them eventually: that is, just in case there is a disposition for a disposition for … such that the remote state of affairs is a manifestation of that disposition. But I think that the dispositionalist will be hard-pressed to account for them all.

There is an option left for the dispositionalist: the nuclear option. She may deny that these purported possibilities really are possibilities. In defense of the nuclear option, Borghini and Williams write (2008: 37):

> Let us start by pointing out that speaking of the possibilities we 'need' is very odd indeed. This implies that we know what is metaphysically possible, and that it is the task of an ontologically motivated account like dispositionalism to provide the truthmakers for that set of possibilities. This puts the cart before the horse. The dispositional properties provide the grounds for what possibilities there are; any

> state of affairs not grounded in the actual dispositional properties is not metaphysically possible. The set of actual dispositional properties determines the space of what is metaphysically possible, not the reverse.

Vetter also endorses the nuclear option to some extent; see Vetter (Forthcoming a: 24-6).[35]

There is something right in this. We don't want our metaphysical theories to be enslaved by our intuitions about what's possible or not. On the other hand, this attitude is one that may be adopted by *any* theory of modality, no matter how implausible. It cannot be the whole story. Rather, the thought is that the few purported possibilities that the correct theory cannot account for are (i) not obviously possible for independent reasons, and (ii) outweighed by the overall effectiveness of the theory in accounting for other things (be it other possibilities, or non-modal data). The fourth criterion for a successful dispositionalist theory of modality allows our intuitions to be outweighed. However, these cases are rejected by the dispositionalist only because they are counterexamples to her theory, so we should be suspicious of the nuclear option.

4.7 Where to Turn Next

I have argued that while dispositionalism seems well-suited to account for possibilities that are local, diachronic, and gradable, it cannot account for certain possibilities which are global, synchronic, or static. This does not mean that we should reject the existence of essentially dispositional properties. Rather, it suggests that one

[35] For the nuclear option in the context of truthmakers, see Contessa (2008).

who accepts essentially dispositional properties needs something more to fill out her modal theory. Namely, she needs something better-suited to account for the global, the synchronic, and the static. I will propose a partial solution that takes care of these to varying degrees of success.

There is a modal primitivist view, sometimes called 'modalism', according to which all possibilities are primitively possible. The dispositionalist need not jump to this extreme. There are many ways to be a modal primitivist. I suggest elsewhere that the modal theorist should adopt as primitive the notion of *incompatibility* between properties. For instance, the properties of having a mass of 5g and having a mass of 6g are primitively incompatible on this view. How does incompatibility fit into our picture of dispositional versus categorical properties? As noted in section 4.2, essentially dispositional properties are typically characterized as those with a certain kind of modal import; that is, essentially dispositional properties are those whose bearers essentially play a particular nomic role. In contrast, essentially categorical properties are sometimes said to 'float free', or to be freely recombinable. But this is a misleading characterization. Categorical properties can have modal import—and thus fail to be freely recombinable—without being essentially dispositional.

The proposal is that the dispositionalist adopts not only dispositionality as a primitive modal feature of the world, but also incompatibility. Incompatibility is local, synchronic, and static. Hence it can at least help where dispositionality falls short with respect to the synchronic and the statics. Consider our discussion of problematic synchronic states of affairs, such as the impossible state of affairs of a particular glass's having both a mass of 5g and a mass of 6g. On this picture, the impossibility of this state

of affairs is reduced to the fact that the state of affairs of the glass's having a mass of 6g conflicts with the state of affairs of the glass's having a mass of 6g. This in turn is accounted for in terms of the incompatibility between the property of having mass 5g and the property of having mass 6g. Consider next the problems involving static possibilities which are not easily possible. The possibility that the coin lands heads 10,000 times does not only trace back to the disposition of the coin; it also has roots in the fact that there is no incompatibility involved in such a state of affairs.[36] There is no need to reduce possibility to easy possibility.

Global possibilities, such as the possibility that a particular glass does not exist, are trickier. If the dispositionalist accepts PN, then she still needs to find a possible state of affairs which (i) conflicts with the state of affairs of a glass's existing, and (ii) has plausible independent possibility conditions. The same worries appear to arise. (Incompatibilities *will* help explain the notion of *conflicting*, as noted in the previous paragraph.) If the dispositionalist were to reject PN, that would be a different matter. Recall that PN was motivated by the fifth criterion, explanatory power. To illustrate, suppose that we're considering the possibility of the negation of some very complicated non-atomic state of affairs, such as the state of affairs of not being either green or red or purple or such that if 2+2=4, then the sky is green, etc. We don't want to say that there is a disposition to manifest this highly complicated state of affairs; rather, we should be able to explain it by appeal to a smaller state of affairs. So the dispositionalist may reject PN, but she ought to replace it with an equally powerful principle. Here's one suggestion for the dispositionalist who accepts primitive incompatibilities: she may reject PN in favor of

[36] One might wonder, do we need primitive dispositionality at all? I am sympathetic to this thought, but the focus of this section is on what the dispositionalist should believe.

the principle that a negative state of affairs is possible just in case it violates no incompatibilities. This principle requires only primitive incompatibility and the resources of logic to explain *violation*. The problem is that it does not mention dispositions at all, and so would not be appealing to the dispositionalist who thought that the primary source of all modality is ultimately dispositional.

Global possibilities aside, this proposal helps address some of the objections to dispositionalism. Its downside is that it requires violating the first criterion for a successful dispositionalist theory of modality: no more primitive modality is introduced. This may be too great a cost for the dispositionalist. But I think that this is the easiest criterion to sacrifice. The dispositionalist already accepts some primitive modality, which many others reject on principle. My proposal is that she accepts just one more primitive modal notion. This requires reformulating her principles to accommodate this extra source of modality; I admit I don't know how this would be done.

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