

# CAUSAL POWERS: A NEO-ARISTOTELIAN METAPHYSIC

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# Dedication

To Meaghan, whose power sustains me and whose love empowers me

# Acknowledgements

I am grateful for the help of many. My friends and family have supported me in intangible ways during the journey to completion. Special thanks and gratitude are due my wife, Meaghan, and children, Gregory and Emelia. In addition to their patience, love and support, they are a daily source of joy and rejuvenation.

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# Abstract

Causal powers, say, an electron's power to repel other electrons, are had in virtue of having properties. Electrons repel other electrons because they are negatively charged. One's views about causal powers are shaped by—and shape—one's views concerning properties, causation, laws of nature and modality. It is no surprise, then, that views about the nature of causal powers are generally embedded into larger, more systematic, metaphysical pictures of the world. This dissertation is an exploration of three systematic metaphysics, Neo-Humeanism, Nomicism and Neo-Aristotelianism. I raise problems for the first two and defend the third. A defense of a systematic metaphysics, I take it, involves appealing to pre-theoretical commitments or intuitions, and theoretical issues such as simplicity or explanatory power. While I think that Neo-Aristotelianism is the most intuitive of the available general metaphysical pictures of the world, these kinds of intuitions do not settle the matter. The most widely held of the alternative pictures, Neo-Humeanism, is accepted in great part because of its theoretical power. In contrast, a systematic Neo-Aristotelian metaphysic is, at best, nascent. The way forward for the Neo-Aristotelian, therefore, is a contribution to an ongoing research program, generating Neo-Aristotelian views of modality, causation and laws of nature from the Neo-Aristotelian understanding of causal powers. The central argument of this dissertation is that such views are defensible, and so the Neo-Aristotelian metaphysic ought to be accepted.

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# 1

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## Introduction

### 1.1 Causal Powers

The things around us in this world are powerful. They—and you and I, too—have the ability to bring things about, to make things occur. They have this ability because they have capacities, tendencies, dispositions, causal powers. For present purposes, I will treat each of these as roughly equivalent to a causal power, and a brief description of causal powers will suffice.

First, the having of a causal power is not inexplicable. Objects have causal powers in virtue of having certain properties. Electrons have the causal powers to repel other electrons and attract positively charged particles. They have these powers *in virtue of* being negatively charged.

Second, the exercise of a causal power involves causation. When an electron manifests or exercises its power to repel another electron, it (or some event of which it is a constituent) is at least part of the causal story for why the other electron was repelled.

Third, when objects exercise their causal powers, they do so in a law-like manner—or at least that's how things seem to be in the actual world. They do not act in a haphazard way, but rather in a way that exhibits patterns or regularities and is subject to generalizations.

(These generalizations may be of a *ceteris paribus* sort, but they are generalizations nevertheless.) Among those generalizations is that causal powers are associated with typical triggering conditions and manifestations. A negatively charged particle is typically triggered by being situated near another charged particle, and, if it is near a negatively charged particle, it will typically manifest its negative charge by repelling the other particle.

Fourth, the having of a causal power is not merely a fact about actuality. It has modal implications—implications dealing with possibility and necessity. To say that an electron is negatively charged is not merely to say something about what the electron is actually like; it is to say something about what the electron might, would, and must do. In fact, it seems that an object can have a causal power that it never actually manifests. An electron need never repel another electron in order to have the power to do so. Its charge, in this way, is importantly related to counterfactual conditionals. *If it were* situated near a negatively charged particle, *then it would* repel it with such-and-such force.

## 1.2 Three Views

The topic of causal powers, therefore, sits at the center of a nexus of fundamental issues in metaphysics. One's views about causal powers are shaped by—and shape—one's views concerning properties, causation, laws of nature and modality. It is no surprise, then, that views about the nature of causal powers are generally embedded into larger, more systematic, metaphysical pictures of the world.

### 1.2.1 Neo-Humeanism

According to the neo-Humean metaphysic, defended most prominently by David Lewis,<sup>1</sup> the world is simply a vast collection of particular, local matters of fact—it's just one damn thing after another. Necessary connections between distinct existences are, on this view,

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<sup>1</sup>See Lewis (1986a, 1994), for example.

anathema. “[A]nything can coexist with anything else... Likewise, anything can fail to coexist with anything else” (Lewis, 1986a, pp. 87-88). Local matters of fact may be connected to others, but only in a ‘loose and separate’ manner. The world is a mosaic of facts, and the connections between them—causal, nomic or modal—supervene on the patterns or regularities in that mosaic.

It is, nevertheless, true on this view that objects have causal powers. What is the truthmaker? What chunk of the world or fact about it makes it true that objects have causal powers? The properties are too impoverished intrinsically, on this view, to do this work. After all, since the neo-Humean picture rejects necessary connections between distinct existences, the properties that are embedded in certain kinds of regularities might have been embedded in spatio-temporal distributions with radically different sorts of regularities. In fact it is the regularity, not the property, that is doing most of the truthmaking work. But it’s not just the regularities of this world. Suppose that an object that has property  $P_1$  thereby has the power to bring about an instantiation of  $P_2$ . As we noted above, an object can have a causal power that it never exercises.  $P_1$ , perhaps, is never actually followed by  $P_2$  because objects that have  $P_1$  never encounter the triggering condition. There are, of course, other possible worlds where objects with  $P_1$  do encounter the triggering condition, in some of which  $P_2$  follows regularly and in others it does not. (Or at any rate, there are such worlds *according to the Neo-Humean*.) Objects with  $P_1$  are *in fact* embedded in a world with certain regularities. If objects with  $P_1$  have the power to bring about  $P_2$ , as we have supposed, that’s because those worlds where  $P_1$  encounters its triggering condition and  $P_2$  follows share the relevant regularities with the actual world.

**Neo-Humeanism:** Objects have causal powers in virtue of having properties that are embedded in the right sort of regularities, both in this world and in other similar possible worlds.

### 1.2.2 Nomicism

A second view, Nomicism, defended by David Armstrong among others,<sup>2</sup> thinks that the Neo-Humean's regularities are not robust enough to do the work set out for them. Regularities, even those shared by many possible worlds, can seem like massive coincidences. That  $P_1$  is regularly followed by  $P_2$  seems to many to be just the sort of thing that requires explanation, but there's nothing built into the structure of the world, on the Neo-Humean view, that *makes*  $P_2$ s follow  $P_1$ s. The Nomicist builds this structure into the world by postulating a relation of nomic necessitation, a genuine universal that links particular matters of fact together in a way that no Neo-Humean connection does.

According to one strand of Nomicism, building such structure into the world does not require necessary connections between distinct existences because the necessitation relation holds contingently. (The necessitation relation, on this view, is not full fledged necessity-with-a-capital-N, but rather some weaker, as yet unspecified, sense of necessity.) The mistake of the Neo-Humean, according to the Contingent Nomicist, is not that they deny necessary connections between distinct existences, but that they mistakenly took regularities to be a strong enough glue to bind the world together. The necessitation relation does that. And because in this world the relation links, say,  $P_1$  to  $P_2$ , but in other possible worlds it links, say,  $P_1$  to  $P_3$ , there are no necessary connections between distinct existences.

**Contingent Nomicism:** Objects have causal powers in virtue of having properties that are related to other properties by the nomic necessitation relation, a genuine universal that holds contingently.

On a different strand of Nomicism, the Neo-Humean was mistaken both in thinking that regularities could do the work required of them and in denying necessary connections between distinct existences. A contingent relation of necessitation, no matter how genuine, couldn't do the work such relations are supposed to do, according to Necessary Nomicism.

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<sup>2</sup>See Dretske (1977), Tooley (1977), and Armstrong (1983), for example.

On this view, properties are, *of necessity*, bound up with other properties by the necessitation relation. What grounds this necessity? Just as Nomicism can be broken up into Contingent Nomicism and Necessary Nomicism, so Necessary Nomicism can be broken into two views depending on the source of, or what grounds, the necessity of the necessitation relation. On one view, the necessity of the necessitation relation is not determined by anything outside itself, including the properties it relates. The source of necessity lies, rather, in the nature of the necessitation relation itself. Because the source of necessity is external to the properties, I shall call this view External Necessary Nomicism.

**External Necessary Nomicism:** Objects have causal powers in virtue of having properties that are related to other properties by the nomic necessitation relation, a genuine universal that holds necessarily and whose nature is not ontologically determined by the intrinsic natures of the relata.

On a second view, however, the source of the necessity of the necessitation relation is, at bottom, the intrinsic natures of the relata—the properties themselves. This is a third variety of Nomicism, where the source of necessity is internal to the properties.

**Internal Necessary Nomicism:** Objects have causal powers in virtue of having properties that are related to other properties by the nomic necessitation relation, a genuine universal that holds necessarily and whose nature is ontologically determined by the intrinsic natures of the relata.

Notice, though, that Internal Necessary Nomicism is a fundamentally different sort of view than either External Necessary Nomicism or Contingent Nomicism. The fundamental truthmakers of the Internal Necessary Nomicist are the properties themselves; the necessitation relation just comes along for the truthmaking ride. In this sense, Internal Necessary Nomicism is more like our third type of view.<sup>3</sup>

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<sup>3</sup>Conversation with Tomis Kapitan helped me see the similarity between Internal Necessary Nomicism and Neo-Aristotelianism.

### 1.2.3 Neo-Aristotelianism

Neo-Aristotelianism grounds the causal powers of objects in the properties themselves. The Neo-Aristotelian agrees with the Nomicist that regularities are not fit for their assigned duties. On the Neo-Humean view, it seems to the Neo-Aristotelian, the happenings in this world are radically contingent in a way that threatens to make the world wholly unintelligible. There is no genuine unity to events apart from their happening to co-occur in a larger spatio-temporal whole. The Neo-Aristotelian agrees with the Neo-Humean, however, in viewing the Nomicist's posit of a genuine, second-order relation linking particular matters of fact as an unnecessary ontological post. The properties themselves can do its job—and do it better.

The Neo-Aristotelian disagrees with both the Nomicist and the Neo-Humean that you must go outside of the properties themselves to ground causal powers. On both these views, properties are intrinsically impotent, devoid of any intrinsic causal, nomic or modal character. They get activated, as it were, by the laws of nature. In contrast, the Neo-Aristotelian thinks of properties as intrinsically powerful, packing their own causal, nomic and modal character.

**Neo-Aristotelianism:** Objects have causal powers in virtue of the intrinsic natures of properties.

Neo-Aristotelianism is perhaps more properly construed as a cluster of views with different answers to the following question: What is it about the intrinsic nature of a property that makes it the case that, of necessity, objects with that property have those causal powers? I consider various responses to this question in Chapter 6.

### 1.3 An Outline

In this dissertation, I argue for Neo-Aristotelianism. I take it that there are at least two types of considerations that help us decide such metaphysical issues as the nature of causal powers and the connections between how one thinks about causal powers and how one thinks about properties, causation, laws of nature and modality. On the one hand, we often appeal to pre-theoretical commitments or intuitions. On the other hand, we appeal to theoretical issues such as simplicity or explanatory power.

I think that Neo-Aristotelianism is the most intuitive of the available general metaphysical pictures of the world. It is the view that, pre-theoretically, just seems right. We tend to think of ourselves and the world around us, it seems, in a way reminiscent of the old Batman television series. It's not just Batman's fist constantly conjoined in a loose and separate way with criminals falling down. There's also the biffs and bams, or if you prefer a technical term, the causal oopmhs.

But these kinds of intuitions do not settle the matter. If they did, we'd have long ago decided on the correct view. And so, while I will point out unintuitive consequences of the alternatives and features of Neo-Aristotelianism that fit nicely with our intuitions, my argument will not rest solely on an appeal to intuitions. The most widely held of the alternative pictures, Neo-Humeanism, is accepted, not because of its intuitiveness, but in great part because of its theoretical power. In contrast, a systematic Neo-Aristotelian metaphysic is, at best, nascent. The way forward for the Neo-Aristotelian, therefore, is a contribution to an ongoing research program, applying a Neo-Aristotelian understanding of causal powers to a variety of other topics in metaphysics. The central argument of this work is that such views are defensible, and as a result a Neo-Aristotelian metaphysic can plausibly be seen as at least as theoretically powerful as Neo-Humeanism.

Before attempting such a project, it seems to me appropriate to say something, if briefly, about what sort of an undertaking metaphysics is, why it is defensible, and how one goes

about doing it. That is the subject of Chapter Two.

Chapter Three deals with the important preliminary question: Is it true of *all* properties that it is in virtue of having them that objects have causal powers, or is it true of only some subset of properties? I suggest that it is true of the natural or sparse properties and give an account of the natural properties.

Having done that, I turn to the central task of assessing the alternative metaphysical pictures, and I begin in Chapter Four with Neo-Humeanism. I briefly discuss Neo-Humean views of causal powers, properties, laws, causation and modality. I argue that there are important unintuitive consequences and some recalcitrant technical problems. Nevertheless, these do not amount to anything like a definitive argument against Neo-Humeanism. (Rarely does one find a *definitive* argument in metaphysics.) In fact, in the absence of a plausible, well developed, alternative metaphysics, these problems are outweighed by the theoretical power of Neo-Humeanism, which I will briefly spell out.

Nomicism is the topic of Chapter Five. I shall argue that Nomicism is an unstable halfway house between Neo-Humeanism and Neo-Aristotelianism. There are strong reasons for thinking that the laws of nature hold necessarily. If such arguments are successful, we should reject Contingent Nomicism in favor of Necessary Nomicism. To the extent that defenders of Contingent Nomicism can successfully resist those arguments, they can do so only at the cost of embracing a view that is no more theoretically powerful than Neo-Humeanism but needlessly ontologically complex. (The Neo-Humean, in contrast, can resist the argument for the necessity of the laws of nature in a way that is, while in my view implausible, consistent with the central tenants of Neo-Humeanism.) Contingent Nomicism ought to be rejected, therefore, in favor of either Neo-Humeanism or Necessary Nomicism. But I shall argue that Neo-Aristotelianism is preferable to Necessary Nomicism because Neo-Aristotelianism is equally theoretically powerful but simpler. Defenders of Nomicism, therefore, ought to either embrace radical contingency and accept Neo-Humeanism, or embrace full-fledged necessity and accept Neo-Aristotelianism.

I turn in Chapter Six to an exploration and defense of the Neo-Aristotelian metaphysic. I first consider three Neo-Aristotelian views of properties, the basic posit of the Neo-Aristotelian metaphysic. The first view is the Pure Powers view, according to which properties are powers and *nothing but* powers. The second is the Physical Intentionality view, according to which all properties, both mental and physical, are intentional, directed toward something outside of themselves. The third view is the Powerful Qualities view, according to which all properties are *both* qualitative *and* powerful. I will argue that each view is unsatisfactory. Finally, I present and defend what I take to be a further development of the Powerful Qualities view, according to which a quality's being powerful consists in its making true various counterfactuals that describe what objects with that quality would do in the particular circumstances they might find themselves in.

While the alternative views might accept this characterization,<sup>4</sup> they differ from the view I shall defend in that they then go on to explain *why* the properties serve as truthmakers. They are “purely dispositional;” they are “intentional;” they are “two sided.” In contrast, I stop the explanation there. To be dispositional is precisely just to be the truthmaker, and a property's being the truthmaker is primitive.

I then put the account defended to work by proposing and defending Neo-Aristotelian views of modality, causation, and laws of nature. In principle, the views defended could be adopted by any specific version of Neo-Aristotelianism discussed above. Modality, I shall argue, is entirely grounded in the powerful nature of existing actually existing properties. Causation is the exercise of a causal power. Laws of nature are descriptions of the powerful nature of properties. There is, of course, much more work to be done, but this is a contribution to an ongoing research program. The views defended make plausible, I think, the idea that Neo-Humeanism is not the only game in town—nor, I think, is it the best.

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<sup>4</sup>Though they might not. It often seems, for example, that C. B. Martin thinks that no such counterfactuals are both true and non-trivial.

## 2

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# Metaphysics and Method

## 2.1 Truthmakers

The disagreements among Neo-Humeans, Nomicists and Neo-Aristotelians regarding the nature of causal powers are not merely disagreements concerning which causal powers are had in virtue of which properties; nor are they merely about what propositions are true or false. They are, fundamentally, disagreements about the way the world is. Proponents of these views, of course, do disagree about what propositions are true, but those disagreements are driven by disagreements about what the *truthmakers* are for various propositions.<sup>1</sup>

The commitment to truthmakers comes from the simple thought that truth is determined by reality.<sup>2</sup> Consider a simple case, the proposition that some entity,  $e$ , exists. Let ' $\langle p \rangle$ ' represent the proposition *that*  $p$ , and let ' $\langle p \rangle_T$ ' represent the claim that  $\langle p \rangle$  is true. So consider  $\langle e \text{ exists} \rangle$ , and suppose that it is true.  $\langle e \text{ exists} \rangle$ 's truth, according to this simple thought, is determined by reality. Not *all* of reality is needed, though;  $e$  will suffice. So  $e$  determines the truth of  $\langle e \text{ exists} \rangle$ , or  $\langle e \text{ exists} \rangle_T$  in virtue of  $e$ , or  $e$  makes true  $\langle e \text{ exists} \rangle$ . Let us call this relation between a truthmaker and the truth it makes true or determines 'TM'. Thus we can represent this relation between  $e$  and  $\langle e \text{ exists} \rangle$  as  $\text{TM}(e, \langle e \text{ exists} \rangle)$ .

There are a couple of things to note about TM. First, I have construed truthmaking as

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<sup>1</sup>In what follows, I am greatly influenced by Rodriguez-Pereyra (2006).

<sup>2</sup>Rodriguez-Pereyra (2005) makes this point nicely.

a relation, one of whose relata is an entity called a truthmaker. This is not uncontroversial, even among those who accept truthmaking talk. Lewis (2001), among others, argues that truthmakers are not entities, but ways that entities are.<sup>3</sup> Truth supervenes, on this view, not on whether things are, but on how things are. Melia (2005) suggests that we needn't construe truthmaking as a relation, introducing instead 'makes true' as an operator.

Despite this disagreement, I shall assume that truthmaking is a relation between truthmaking entities and truthbearers. I shall assume that truthbearers are propositions, though I will not assume any particular account of propositions. While I will assume that truthmakers are entities, I will not assume any particular account of truthmakers—be they states of affairs, non-transferrable tropes or even Lewis (2003)'s 'things qua truthmakers' (to be explained shortly).

The second thing to note about TM is that, since truthbearers are propositions and truthmakers are entities, in the typical case TM is a cross-categorical relation. It holds between entities in the world and propositions. It relates truthmakers to truth bearers.<sup>4</sup> One implication of this is that TM cannot be entailment, since entailment holds between propositions.

The third thing to note about the truthmaking relation is that truthmaking is not a causal making; it is, rather, the *in virtue of* relation. In virtue of some way the world is, the proposition is true. Fourth, the truthmaking relation is many-to-many. One proposition, say, ⟨there is a pink elephant⟩, can be made true by several truthmakers, say, Pinkie One and Pinkie Two. And truthmakers, say, Pinkie One, can make several propositions true, ⟨there is a pink elephant⟩ and ⟨there is an elephant⟩. In this way, truthmaking is an improved version of a correspondance theory of truth. On a standard version of that theory, truths are a sort of picture of reality, and so the relation between truths and what those truths correspond to is one-to-one. But this would bloat ontology in a way that truthmaking

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<sup>3</sup>See Lewis (2003), however, for an alternative suggestion: truthmakers are particulars considered under some specific counterpart relation—things-qua-truthmakers.

<sup>4</sup>There are cases where TM is not cross-categorical since, for example,  $TM(\langle p \rangle, \langle \langle p \rangle \text{ exists} \rangle)$ .

theory does not.

The simple thought that truth is determined by reality therefore leads us to the idea that truths have truthmakers, which can be captured in the following Truthmaker Principle: If  $\langle p \rangle$  is true, then there is something that bears the truthmaking relation to  $\langle p \rangle$ . Is the converse true? Suppose  $\text{TM}(x, \langle p \rangle)$ . Does it follow that  $\langle p \rangle_T$ ? If TM is supposed to capture the idea that  $x$  makes  $\langle p \rangle$  true, then it seems it does follow. Thus the Truthmaker Principle can be stated:

$$\mathbf{TMP}: \Box ( \langle p \rangle_T \leftrightarrow \exists x \text{TM}(x, \langle p \rangle) )$$

There are two central questions to ask about TMP. First, is Truthmaker Maximalism (TMax) true? It is certainly true of all propositions that if something bears the truthmaking relation to it, then it is true. But is the converse true of *all* propositions? According to TMax, it is—all true propositions have truthmakers:

$$\mathbf{TMax}: \Box \forall \langle p \rangle ( \langle p \rangle_T \leftrightarrow \exists x \text{TM}(x, \langle p \rangle) )$$

Second, is Truthmaker Necessitarianism (TNec) true? According to TNec, the existence of the truthmaking entity for  $\langle p \rangle$  necessitates the truth of  $\langle p \rangle$ . If, in some world,  $x$  is the truthmaker for  $\langle p \rangle$ , then it is the truthmaker for  $\langle p \rangle$  in every possible world in which it exists.

$$\mathbf{TNec}: \forall \langle p \rangle \forall x ( \text{TM}(x, \langle p \rangle) \rightarrow \Box ( \exists y (x = y) \rightarrow \text{TM}(x, \langle p \rangle) ) )^5$$

If both TMax and TNec are true, then we can revise the Truthmaker Principle:

$$\mathbf{TMP*}: \Box \forall \langle p \rangle ( \langle p \rangle_T \leftrightarrow \exists x \Box ( \exists y (x = y) \rightarrow \text{TM}(x, \langle p \rangle) ) )$$

Let's consider TNec first. Lewis (1999) argued that, given TNec, the “demand for truthmakers just *is* the demand for necessary connections.” A central claim of Neo-Humeanism

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<sup>5</sup>As David McCarty pointed out to me, the existential claim needs to be relativized to worlds in order to avoid its being a logical truth. For simplicity sake, I leave that complication out, here and elsewhere.

is the denial of necessary connections between distinct existences. But if, for example,  $\langle e \text{ exists} \rangle$  and  $e$  are distinct existences and TNec is true, then there is a necessary connection between distinct existences. Of course, I don't think this is a problem, since I think there are necessary connections everywhere. But I don't want to make arguing against Neo-Humeanism that easy. So is TNec inconsistent with the denial of necessary connections?

Lewis himself later (Lewis (2003), Lewis & Rosen (2003)) provided truthmakers without necessary connections. His account requires a metaphysics of modality that invokes counterparts to make sense of trans-world identity. Suppose one thinks, with Lewis, that possible worlds are concrete entities. Plausibly, this entails that individuals are world bound—they exist in one and only one possible world. But I think I could have been a truck driver. On Lewis' modal realism, this is true because in some other possible world, I am a truck driver. Well, not *me*—since the thing that is me in this world is world bound—but some counterpart of me, someone who stands in my place in that world.<sup>6</sup>

Who counts as my counterpart in other possible worlds? According to Lewis' account of the counterpart relation, there is no one answer to that question, since it depends on what individual in that world is most similar to me in the relevant respects. Since there are many different ways to be similar or dissimilar, there are correspondingly many different counterpart relations. The counterpart relation that is invoked depends on the context. This flexibility allows Lewis to invoke one particular counterpart relation in an account of truthmakers. What is the truthmaker for  $\langle \text{the cat is black} \rangle$ ? It is simply the cat, considered in such a way as to invoke a counterpart relation that makes all of the cat's counterparts black. Lewis calls this the 'cat qua black'. (Of course, on Lewis' account, the cat qua black is nothing other than the cat.)

I think this account is both implausible and unmotivated, but I will not address the issue here. The point is simply that the demand for truthmakers does not automatically deny

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<sup>6</sup>While Lewis' modal realism seems sufficient for counterparts, it is not necessary. Sider (2001), for example, uses counterparts in his account of cross-temporal identity.

Humean Independence. While the necessity a thing qua truthmaker has is less than the sort of necessity a Neo-Aristotelian would want, it is at least enough to allow the Neo-Humean to accept TNec, appropriately construed.

That, of course, is not reason by itself to believe TNec. Should we believe it? Armstrong (2004b) offers a brief argument in its favor. Suppose, for *reductio*, that  $TM(x, \langle p \rangle)$ , and that TNec is false. Then it is possible that there is some world where  $x$  exists but where  $\langle p \rangle$  is false. And this seems to suggest that  $x$  is not sufficient to make  $\langle p \rangle$  true after all—there must be some further condition that, together with  $x$ , makes  $\langle p \rangle$  true. This seems right. If  $x$  really does make  $\langle p \rangle$  true, it shouldn't be because of anything external to  $x$  itself. But then, if that's right, no matter what situation  $x$  might find itself in, it should make  $\langle p \rangle$  true. While this line of reasoning certainly does not do justice to the issue, it is, given our present purposes, motivation enough to accept TNec.

Consider, now, truthmaker maximalism. According to TMax, every truth has a truthmaker. TMax is perhaps the most controversial thesis in truthmaking theory, primarily because of the difficulty in finding truthmakers for negative propositions and universal generalizations. Consider  $\langle$ the rose is not red $\rangle$ . What is the truthmaker for that proposition? It is not clear what it could be. Perhaps it is a negative fact, but this seems to multiply our ontology in a particularly unwelcome way. First, there are many, many such negative truths, and so in addition to all the truthmakers for positive truths, we have negative truthmakers as well. And, second, what sort of thing is a negative fact? Armstrong's facts are non-mereological compositions of particulars and properties, and so a rose's being red is a non-mereological composition of the rose and redness. But, returning to our example, the negative fact of a rose's not being red is also a non-mereological composition of the rose and redness. How does the positive fact differ from the negative fact? Perhaps there are two sorts of non-mereological composition relations, a positive and a negative one. Or perhaps there is one such relation, but in the negative case, the rose is related by it not to redness but to the negative property, non-redness. Neither solution seems satisfactory.

We might suppose that the truthmaker is some positive state of affairs that is incompatible with the rose being red, say, the rose's being yellow.<sup>7</sup> As Rodriguez-Pereyra (2006) points out, however, on this solution there will be facts about incompatibility that need truthmakers, and such facts seem to be of the negative variety. After all, to say that something is incompatible with something else is to say something about what cannot happen.

Accounting for general truths faces fundamentally the same problem, since general truths like  $\langle$ every rose is yellow $\rangle$  are equivalent to negative truths, in this case  $\langle$ there is no rose that is not yellow $\rangle$ . This issue is central to the topic of causal powers. When an object,  $o$ , has a power,  $p$ , one thing that seems to be entailed is that  $o$  will, say,  $\phi$  in certain circumstances in virtue of having  $p$ . Of course,  $o$  will not  $\phi$  in every circumstance. It is only *ceterus paribus*,  $o$  will  $\phi$ . How, precisely, are we to understand the *ceterus paribus* clause except as saying that, when certain states of affairs do *not* occur,  $o$  will  $\phi$ ?

Briefly, there are three main attempts to solve the problem, by Lewis, Armstrong (1997, 2004b) and Martin (1996) respectively. Lewis' account relies on the thing qua truthmaker idea introduced briefly above. We might consider the rose in such a way as to invoke a counterpart relation that considers only those merely possible roses that are not red as counterparts of the rose. The rose qua not red can therefore stand as the truthmaker for  $\langle$ the rose is not red $\rangle$ . For a general negative existential claim such as  $\langle$ there are no roses $\rangle$ , we can consider the entire world in such a way as to invoke a counterpart relation that makes only those possible worlds with no roses counterparts of the actual world. Thus the truthmaker would be the world qua lacking roses.

Armstrong's solution invokes higher order states of affairs, in particular what he calls 'totality' states of affairs. Such states of affairs are, at bottom, that's all facts, and so they are a type of negative fact. Consider an example:  $\langle$ there are only seven swans on the lake $\rangle$ . What states of affairs is the truthmaker for that proposition? Armstrong offers a relation, the 'totaling' relation, that holds between the mereological sum of the seven swans and

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<sup>7</sup>Rodriguez-Pereyra (2006) traces this solution back to Demos (1917).

the property *being a swan on the lake now*. (For those wary of unrestricted mereological composition, such as myself, we might avoid mereological sums if we could allow the totaling relation to be multi-adic.) In contrast to Armstrong's higher order states of affairs, Martin proposes first order, concrete absences. Thus the truthmaker for  $\langle$ the rose is not red $\rangle$  is a localized entity: the absence of redness. I take Armstrong's and Martin's solutions to be equally acceptable.

Such a brief discussion of the most pressing problem for truthmaking theory will suffice for the moment. Nearly all who are interested in the topic of causal powers accept some variety of the truthmaking principle, even if the details differ from theorist to theorist and not all theorists have worked out solution to all the limit cases such as negative and general truths. Still, the general acceptance of the demand for truthmakers is wide enough to adopt it in what follows. The upshot is that we are not allowed to posit truths without committing ourselves to the existence of something that makes them true. Thus we cannot simply say that certain counterfactuals are true—say, that objects that are soluble would dissolve if put in water—without accepting the existence of something that make them true.

## 2.2 In Defense of Metaphysics

The search for truthmakers takes us beyond observational evidence. Just as the chemist appeals to a deeper, more fundamental reality of protons and electrons and such to explain ordinary, observable chemical reactions, so the metaphysician appeals to a deeper, more fundamental reality when offering a metaphysical theory. Unlike the chemist's, however, the metaphysician's theory is typically empirically equivalent to its rivals, at least in part because the theory usually does not make testable predictions. It is this feature of metaphysics that leads many to question the legitimacy of the project from the start. Empiricists of various sorts claim that metaphysics is meaningless or impossible, and so I must say something, if briefly, in defense of metaphysics. What follows is obviously not

to be taken as a definitive account of the epistemology of metaphysics. Rather, it is an attempt to shake a dogmatic attitude, a widespread empiricist knee-jerk reaction against metaphysics.

On one traditional conception, metaphysical theorizing is an *a priori* task. The metaphysician begins with first principles that are infallibly known to be true by rational reflection, and then deduces from them a generalized metaphysical picture of the world. But this rationalist picture of metaphysical theorizing is mistaken. The multiplicity of metaphysical theories should be our first clue, but more importantly, empirical evidence can lead us to give up propositions that we once took to be evident on the basis of rational reflection. We once took, for example, Euclidean geometry to be the correct geometry of physical space on the basis of *a priori* reflection. Euclid's postulates seemed self-evident. But later reflections—including some empirical observations about the behavior of light rays near the sun that seemed to confirm Einstein's theory of general relativity—led us to reject Euclidean geometry as the geometry of our world. Clearly *a priori* insight is fallible, but is it even *insight*? According to an extreme form of empiricism, only observational claims that can be empirically verified or falsified count as insight, and rational reflection, even when construed as fallible, fails that test.

Just as I thought the extreme rationalist view was mistaken, so too I take the extreme empiricist view to be incorrect. Scientific theorizing is not as empirically pure as the empiricist hopes. We neither formulate nor confirm our scientific theories from the observational evidence alone. The evidence, after all, underdetermines the theory.<sup>8</sup> It is possible for multiple scientific theories to be consistent with the evidence. Consider once again Euclidean geometry.<sup>9</sup> Euclid's Fifth Postulate, if we assume the truth of the other four postulates, is equivalent to the claim that through a given point outside a given line, there is only one parallel to the given line. During the nineteenth century it was discovered that we could

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<sup>8</sup>The classic discussion of the underdetermination of theories by the evidence is Duhem (1962). Quine & Ullian (1970) also emphasized its importance

<sup>9</sup>For a full discussion of the epistemology of geometry, see Sklar (1974). See also BonJour (1998).

replace Euclid's Fifth Postulate with alternative postulates and arrive at constant curvature geometric systems as consistent as Euclid's. Lobashevskian geometry results by replacing it with the postulate that many parallels pass through a given point not on a given line, and Riemannian geometry results by replacing it with the postulate that no parallels do. The possibility of an alternative geometry correctly describing our world seems to have been actualized by Einstein's General Theory of Relativity, which identifies the structure of space with the structure of the gravitational field. The space of our world is, according to General Relativity, variably curved Riemannian and not Euclidean. Scientists were led to accept General Relativity in part on the basis of experiments that showed that light rays appear bent when passing near such massive bodies as the sun, as we would expect if we identified the structure of space with the structure of the gravitational field.<sup>10</sup>

Unfortunately, the observations concerning the behavior of light near the sun do not entail Einstein's theory. If space were indeed as Einstein claims, then the appearance of bent light rays is what we would expect. But we would also expect that outcome if, for example, we postulated the existence of forces proportional to the location and density of matter capable of deflecting even light rays. In fact, such a theory is consistent with all our observational evidence. And further, given *any* observational data, we could in principle construct a Euclidean alternative to General Relativity that is consistent with the data. Clearly the observational evidence alone, therefore, does not entail the theory.

What's more, the observational evidence alone does not falsify the theory. When a theory makes an empirical prediction and gets it wrong, this does not straightforwardly show us that the theory is false. It could be that the experimental set up was to blame, or perhaps the auxiliary hypotheses used to generate the prediction from the theory were false.<sup>11</sup> For some time, our theory about the nature of the sun told us that we could detect neutrinos emitted from nuclear reactions in the sun by detecting reactions in large

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<sup>10</sup>See Brush (1989) for a discussion of the relevance of observation on the acceptance of relativity.

<sup>11</sup>Again, see Duhem (1962).

underground tanks caused by the neutrinos interacting with the contents of the tanks. But when the experiments were conducted, we did not detect the solar neutrinos in the amount expected. This became known as the Solar Neutrino Problem. One option to solve the problem was to reject the theory of the sun, but others were that some mistake had been made in the experimental setup, or that some auxiliary hypothesis was false. (Perhaps the neutrinos would not travel to the earth after all.) Eventually, scientists decided, in part on the basis of more experiments, that it was our understanding of the nature of neutrinos that needed to change. Now scientists believe that there are three different type of neutrinos, electron neutrinos, mau neutrinos and tau neutrinos, and that they can change into each other. The original experiments could detect only the electron neutrinos. And so the failure of the experiment did not lead to a revision of the theory about the sun, but rather a revision in our understanding of neutrinos.<sup>12</sup>

Even the observational evidence itself is not innocent. Observation is influenced by theory; it is theory laden.<sup>13</sup> Which observations we decide to make, for example, is determined by what our theory implies or by what would be noteworthy according to the theory. Theory also informs what counts as a successful observation. Optical theory, for example, tells us that microscopes give us accurate pictures of the microscopic world. Optical theory and chemical theory implies that an electron microscope is reliable as well. Further, the very concepts we use to describe our observations are chosen in part on the basis of our theoretical assumptions.

So the naive view of scientific theorizing is incorrect. There are (in principle) always several empirically equivalent theories regarding any phenomena, where observation alone will not determine the correct one. How might we respond? Skepticism would claim that we simply cannot know which competing theory is correct. On the other hand, empiricism (or at least one version of it) claims that the empirically equivalent theories are actually

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<sup>12</sup>For an accessible discussion, see McDonald et al. (2003).

<sup>13</sup>The phrase comes from Hanson (1958), which includes many examples theory's influences on observation.

different ways of saying the same thing. A conventionalist might claim that neither theory is correct in any deep metaphysical sense—we simply *choose* which theory we want, just as we choose which conventions we will establish.<sup>14</sup> While I cannot argue for the claim here, I take these views to be mistaken. Empirically equivalent theories often do make different claims about the nature of the world, and we can sometimes have rational, not merely conventional, reasons for preferring one over the other. I turn now to what such reasons might look like.

### 2.3 A Methodology

While there are important differences between the two, metaphysical theorizing is analogous to scientific theorizing in important ways. When attempting to choose between competing metaphysical theses, we do not simply start from first principles and deduce in an *a priori* manner the correct claim. Nor do we make observations and read the correct claim straight off the observational evidence by means of obvious inferences. Rather, we look to what the best theory says about the competing theses, and the best theory is determined analogously to how scientists determine the best scientific theory.

(Admittedly empirical observations play a more central role in scientific theorizing, but they play an important role in metaphysics as well. They can, as the Euclidean example illustrates, put pressure on certain metaphysical propositions which causes the metaphysician to rethink his metaphysical picture of this or that phenomena.<sup>15</sup> What's more, advances in science can often lead to advances in imaginative capabilities that can lead to new metaphysical pictures of the world.)

In science, theoretical concerns are constrained by the phenomena—the empirical data. The constraint is not absolute, but it is at least a problem to be explained away when the

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<sup>14</sup>See, for example, Poincaré (1952).

<sup>15</sup>Can empirical observation lead us to question *any* belief, including even fundamental beliefs about logic or norms of rationality? I don't think so, but I don't think anything relevant to the current work hinges on the question.

theory cannot account for the empirical data or experimental results. So a fuller understanding of the method of metaphysics requires two things: a firm grasp of the data of metaphysics, the epistemic base that constrains our theorizing in much the same way experimental results constrain scientific theorizing, and an account of the theoretical virtues, those features that makes for the best theory. I turn first to the epistemic base.

### 2.3.1 The epistemic base

If metaphysics is a search for truthmakers for truths, with which truths do we begin? What truths count as the ‘phenomena’ of metaphysics?

One important part of the epistemic base is, I think, the way things seem to us, because I could not be mistaken about how things seem to me. While I may very well be mistaken when I believe that I am sitting in front of a computer typing, I could not be so mistaken when I believe that *it seems to me as if* I am sitting in front of a computer typing.

It would be a mistake, however, to allow only such seemings into our epistemic base. We should not think that we start with the totality of our evidence consisting in only facts about what psychological states we are in.<sup>16</sup> We start with a significant amount of knowledge about the world. According to Armstrong (2004b), the knowledge that we start with includes the set of Moorean truths. The Moorean truths are “bedrock common sense,” and “a good rough test for the members of this class is that it is almost embarrassing to mention them outside the context of philosophy.” Examples include: that humans have heads, that the world contains rivers and trees and, from my own epistemic situation, that I am sitting in front of a computer typing.

I should note two things about such Moorean truths. First, typically they are imprecise and, as Armstrong put it, ‘surface’ truths. This raises an important issue that I will not here solve: How many philosophical implications do Moorean truths carry? Consider, for example, the proposition that the sun rose this morning. Does it count as a Moorean truth?

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<sup>16</sup>Williamson (2000), among others, makes this point.

If we take it to entail that the sun orbits the earth, then it is false and so cannot count as a Moorean truth. On the other hand, if we take it to entail only the phenomenological aspects of a sunrise, then it seems obviously true but carries little metaphysical import.

Second, Moorean truths are not indubitable. It may at one point have been widely accepted, and considered as obviously true, that the sun moves relative to the earth, but it is no longer accepted. So further reflection or experience can lead us change what we consider to be our epistemic base. Nevertheless, what we now consider to be Moorean truths are part of the base. Our current base may not be where we end up, but it is where we *start*.

The Moorean truths are a subset of a more general set of judgments or intuitions about the way the world is. Do any of these other judgments count as part of the epistemic base? We can think of all of our judgments (or intuitions), including the Moorean truths, along several dimensions. Some judgments are made by non-specialists, by ordinary folk, and are relatively uninformed; others are made by informed folk, scientists for example. That's one dimension. A second is this: some of our judgments are widely accepted; some, less widely accepted. Yet another dimension is that some judgments have strong epistemic pull. Of course they could very well turn out to be wrong, but they are nevertheless quite forceful. On the other hand, some judgments are simply intuitive guesses.

All other things being equal, we prefer the theory that makes true more of our judgments than its rivals. If two theories differ only in that one makes our more informed, more widely accepted, more forceful judgments true and the other makes our less informed, less widely accepted, less forceful judgments true, we prefer the former theory. In other words, we try to include in our epistemic base as many of our more informed, widely accepted and forceful judgments as we can—while at the same time coming up with a simple and explanatorily powerful *theory* of why they are true.

### 2.3.2 What counts as best?

Determining which theory is the best explanation is a complicated matter. It is a messy attempt to make as much of our epistemic base true as possible, while at the same time maximizing theoretical virtues. The theoretical virtues, themselves, must be balanced against one another. (The whole process is much more like an art than a science, but then again science itself is often more like an art than a science. Of course, its being like an art does not entail that there are no correct answers.)

We look for a theory that has explanatory power; it can explain the phenomena well, both a wide range of phenomena and a wide variety. We look for a theory that is unifying; it brings together previously disparate areas under one overarching theory.<sup>17</sup> We look for a theory that is simple; it does not have unneeded posits or complications. We look for a theory with explanatory cooperation; it explains why other theories work. We look for an entrenched theory; it fits in with what else we know about the world. We look for a testable and tested theory; it makes predictions about the world and is confirmed by the (theory laden) evidence.

Some of these virtues come at the expense of others—a simpler theory may not have as much explanatory power—but the theory that has the most virtues and balances them the best is the one we should accept. Since claims about comparative simplicity, explanatory power, entrenchment, and so on are in an important sense intuitive judgements, we afford them weight and balance them with each other as we did the epistemic base.

The end story is this: We look for a metaphysical theory that makes true as many of our judgments about the world as possible. The more such judgments a theory makes true, the more intuitive force it has—it will accord well with how we generally think of the

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<sup>17</sup>See Friedman (1974) and Kitcher (1989), among others, for a defense of the importance of unification in scientific explanation.

world. Of course a theory can't make *all* such judgments true, since they often conflict. It will, however, have much to recommend it to the extent that it is intuitively correct. But intuitive force is not the only concern in theorizing. We want a theory that maximizes the theoretical virtues. Maximizing theoretical power often comes at the expense of maximizing intuitive force, but we look for a reflective equilibrium between them, with perhaps slightly more weight to theoretical power. It is a messy give-and-take balancing of goals, and almost nothing that results is definitive. But it is no less worthwhile because it is difficult.

## 3

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# Natural Properties

I have said that objects have causal powers in virtue of having certain properties. Is this true of all properties? Philosophers use the term ‘property’ in many different ways. To get a clearer sense of the thesis I wish to defend, it is important therefore to be clear precisely what is meant by ‘property.’

### 3.1 Spare and Abundant Conceptions

There are at least two important senses of ‘property’.<sup>1</sup> According to one, the abundant conception, there are at least as many properties as there are meaningful predicates. Such properties can be construed David Lewis style, as sets of possibilia, actual and merely possible objects that exist in only one possible world. There are as many abundant properties as there are sets of possibilia. As Lewis puts it, “any [set] of things, be it ever so gerymandered and miscellaneous and indescribable in thought and language, and be it ever so superfluous in characterizing the world, is nevertheless a property” (Lewis, 1983). This abundance makes them well suited to provide the semantic values for predicates, but unsuited for various other roles that properties are thought to play. Properties, for example, are posited to explain the intrinsic similarity of things, but any two objects, no matter

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<sup>1</sup>Armstrong (1978a,b) is perhaps the modern source emphasizing the two roles typically assigned to properties.

how intrinsically dissimilar, share infinitely many abundant properties. Properties are also posited to ground the causal capacities of things, but the having of most of the abundant properties seems irrelevant to causal capacities.

On a different sense of ‘property’, the sparse conception, there are far fewer properties than there are such sets. The sparse properties “carve out the joints of nature on which the causal powers hinge” (Schaffer, 2004). They play the role of Lewis’ perfectly natural properties, where the “sharing of [the perfectly natural properties] makes for qualitative similarity, they carve at the joints, they are intrinsic, they are highly specific, the sets of their instances are *ipso facto* not entirely miscellaneous, there are only just enough of them to characterize things completely and without redundancy” (Lewis, 1986a). (See also Quinton (1957).)

The distinction has seemed important to many philosophers. Armstrong’s imminent universals are intended to play the same role (Armstrong, 1978a) as the sparse properties. Bealer’s qualities are equivalent to the sparse properties, while his concepts play the role of the abundant properties (Bealer, 1982). Shoemaker’s “genuine properties” are similar to the sparse ones (though they are moderately abundant), and therefore an acquisition of a sparse property is not one of Geach’s “mere Cambridge” changes (Shoemaker, 1980). The sparse properties are on the minimalist end of the spectrum in Swoyer (1996); the abundant, on the maximalist end.

In what follows, I will use the term ‘natural property’ to refer to the sparse conception of properties and the term ‘non-natural property’ to refer to the abundant conception. The natural properties are those that fill certain roles, primary among them being accounting for intrinsic similarity and causality. We believe in the existence of those natural properties that are needed to account for similarity and causality, but no more. Consider, for example, intrinsic relations. A relation is intrinsic just in case it supervenes on the having of monadic properties by the relata. For example, the relation *is the same height* holds between two objects in virtue of the non-relational properties of the objects themselves, namely, their

height. Fix their height and you thereby determine whether they enter into the *is the same height* relation with each other or not. Do we need intrinsic relations to account for similarity? It seems not. The monadic properties of the relata are sufficient. While there may be other properties that do not count as natural for similar reasons, in order to get clear on precisely which properties count as natural I will focus instead on the causality role for natural properties.

## 3.2 Natural Properties and Causation

The natural properties are, in part, those properties that we need to account for causality. We accept as natural only those that are needed to do so, and no more. How, exactly, should we understand the and-no-more clause? In some sense we are supposed to account for causality *minimally*. Doing that, I will argue, requires that we not count as natural those properties that would always overdetermine their supposed effects. The result is that the natural properties are those that contribute nonredundantly to the causal powers objects have.

(Should we allow causal overdetermination as long as it occurs only in the abundant realm? While I prefer to reject causal overdetermination completely, a nice fallback position is one that defines some derivative notion of causation in the abundant realm, and allows overdetermination there but not in the sparse realm.)

### 3.2.1 The Problem with Overdetermination

Overdetermination comes in a number of varieties.<sup>2</sup> A fundamental distinction is that between coincidental and non-coincidental overdetermination. Two causes are coincidental overdeterminers just in case they are independent, sufficient causes of the same effect. Two shooters kill Joe at exactly the same moment. While independent, they are each sufficient

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<sup>2</sup>Sider (2003b) and Funkhouser (2002) for further discussion of different sorts of overdetermination and different sorts of problems associated with each.

causes of Joe's death. Each would have shot and killed Joe if the other had failed to do so. The shooters, then, are coincidental overdeterminers. Two causes are non-coincidental overdeterminers just in case they are each causally sufficient for the effect, but they are not independent from each other. If one of the causes had not occurred, for example, the other would not have occurred as well.

There are at least three types of non-coincidental overdetermination: structural, Boolean and multiply realizable (MR) type overdetermination. Two causes are structural overdeterminers just in case they are distinct, but the one cause is the having of a structural property and the other is the having of the structure out of which the structural property is composed. A structural property is one that is composed entirely of properties of the object's parts and the relations between them. Suppose, for example, that my mass is a structural property. It is composed of the having of certain parts that have certain properties and are related by certain relations. And suppose I am thrown through a window. If my having that mass causes the window to break, and my having parts that have properties and are related to each other by certain relations, acting in concert, also cause the window to break, then they are structural overdeterminers.

Two causes are Boolean overdeterminers just in case they are distinct, but the one cause is the having of a conjunctive or disjunctive property and the other is the having of both of the conjuncts or at least one of the disjuncts. Consider, for example, the property *either weighing 190 pounds or being divisible by three*. It is a disjunction of the property *weighing 190 pounds* and the property *being divisible by three*. If my having of the property *weighing 190 pounds* causes the scale to read 190 and my having the property *either weighing 190 pounds or being divisible by three* also causes the scale to read 190 (and they are distinct), then they are Boolean overdeterminers.

Two causes are MR type overdeterminers just in case they are distinct, but one is the having of a multiply realizable property and the other is the having of its realizer. If being in pain causes me to yelp, and having some realizer of pain, some complex neurological

property, also causes me to yelp (and they are distinct), they are MR type overdeterminers.

What, exactly, is the problem with overdetermination? Sider (2003b) identifies three types of worries about overdetermination: metaphysical, epistemic and cosmic coincidence worries. Consider the last worry first. If overdetermination is widespread, it seems like a massive cosmic coincidence that all sorts of causes end up bringing about the same effect. That, it seems, would demand an explanation. Sider claims, though, that this is a worry only for coincident overdetermination. In non-coincident overdetermination, the putative causes are not independent, even if they are distinct. The dependence of the one cause on the other in such cases seems to make this cosmic coincidence worry disappear. It really isn't a coincidence after all. (Of course, if the dependence of the one putative cause on the other is inexplicable, the cosmic coincidence worry seems to come back into the picture.) Notice, furthermore, the cosmic coincidence worry is a problem only if the coincident overdetermination is widespread. We can allow some coincidences, just not cosmic ones. In what follows I will be concerned primarily with non-coincident overdetermination.

The epistemic worry about overdetermination is that we almost always have no good reason to believe that there is overdetermination. If I find out that Smith's bullet killed the victim, I rarely have any reason to suspect that, in addition to Smith's, someone else's bullet also killed the victim, *at the very same time and place and in the very same manner*. Supposing that I did have good reason would be akin to always taking the conspiracy theorist seriously.

Surely, however, the epistemic worry is no reason to reject non-coincident overdetermination. After all, if we know that some realization of pain causes me to yelp, it seems we thereby know that pain causes me to yelp, since pain supervenes on its realizers. The systematic connection between non-coincident overdeterminers gives us reason to think that, if one of the pair is a cause, then both are. (Again, though, if the systematic connection is inexplicable, the epistemic worry seems to reappear.)

That leaves us with the the metaphysical worry. Unfortunately, the precise nature of

the worry is not exactly clear. Sider offers the following analogy. Causation is like fluid, and there's only a limited amount of causal fluid to go around. And so if one event causes some effect, it uses up all the causal fluid. No other event can cause the effect because the causal fluid is all gone. As Sider rightly notes, no one believes that causation is like this.

But there is a way many philosophers think of causation that does create metaphysical problems for overdetermination. A better analogy is to compare causation to work. (Jaegwon Kim uses this notion; Hall (2004c) calls it the productive account of causation.) On the causal work analogy, if I did the full amount of work required to get something done, there's simply no work left for you to do. And if you contribute work, either I did less than I otherwise would have, or we finished the task more quickly, or we produced something better than I would have if you hadn't contributed your work. If we must talk liquids, we should think of uncaused events as containers. To cause an event is to fill the container. If I am a sufficient cause, I pour enough liquid into the container to fill it. You may have plenty of your own causal liquid, but if I am a sufficient cause for the event, then there's no where for it to go.

It may be that this conception of causation begs the question against the Neo-Humean. As we will see in more detail later, the Neo-Humean thinks of causation as reducible to some type of non-causal relation holding between the cause and the effect. Consider the widely accepted counterfactual account of causation. Roughly, some event,  $c$ , is the cause of some other event,  $e$ , just in case  $c$  and  $e$  occur and, were  $c$  not to occur,  $e$  would not have occurred. On this conception, it is difficult to see what the problem is with overdetermination. Surely an event can counterfactually depend on multiple events simultaneously. It might seem that it is precisely this notion of production or causal oomph that introduces the problem with causal overdetermination.

I am inclined to think that the idea of causation as including production is a highly intuitive view of causation; it fits well with how we pre-theoretically think of causation. And as such, a view that does not incorporate it is one that is, all other things being equal,

less plausible. But we should of course remember that such judgments must be embedded into a larger metaphysical dialogue about intuitive force and theoretical power. It may be that we have to give up on the intuitive picture of causation. So if you are inclined to think that the above consideration amount to begging the question against the Neo-Humean, think of it instead as setting forth an alternative view in order to draw out some implications and set that view within a wider theoretical context, which will necessarily be anti-Neo-Humean.<sup>3</sup>

I turn now to drawing some implications of taking the metaphysical worry about causal overdetermination seriously for a conception of natural properties. I will argue that one implication is that we are led to conceive of Boolean, structural and, at least on certain accounts, multiply realizable properties (including determinables) as non-natural properties. The argument in each case will be a version of the causal exclusion argument against non-reductive physicalism in the philosophy of mind from Kim (1998). The argument there is that, if mental properties are distinct from physical properties and sometimes cause physical events, but all physical events have sufficient physical causes, then it seems as if some physical event has both a sufficient physical cause and a mental cause. The sufficient physical cause seems to exclude the mental property from being causally efficacious, unless we allow systematic overdetermination, something Kim thinks we should not allow. Bennett (Forthcoming) helpfully summarizes the argument as claiming that five propositions are inconsistent:

**Distinctness** Mental properties are distinct from physical properties.

**Completeness** Every physical event has a sufficient physical cause.

**Efficacy** Mental properties sometimes are part of the cause of physical events.

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<sup>3</sup>It is worth noting, though, that overdetermination may very well be a worry, independent of the production account of causation. See Bennett (Forthcoming).

**Nonoverdetermination** The effects of mental causes are not systematically overdetermined.

**Exclusion** No effect has more than one sufficient cause unless it is overdetermined.

For our arguments against Boolean, structural and multiply realizable natural properties, we borrow from Kim's argument distinctness, causal exclusion and the denial of systematic overdetermination. The distinctness claim will vary, depending on the type of property under consideration, but causal exclusion and denial of overdetermination remain consistent:

**No Overdetermination** Events are not systematically overdetermined.

**Exclusion** No effect has more than one sufficient cause unless it is overdetermined.

### 3.2.2 Boolean Properties are Non-Natural

Suppose object  $o$  has properties  $P$  and  $Q$ . Consider properties  $(P \wedge Q)$  and  $(P \vee R)$ . Further suppose that distinctness holds:

**Boolean Distinctness** The having of  $P$  together with the having of  $Q$  is distinct from the having of  $(P \wedge Q)$ , and the having of  $P$  is distinct from the having of  $(P \vee R)$ .

Consider a case when  $o$  brings about some event  $e$  in virtue of both having  $P$  and having  $Q$ . The having of  $P$  and the having of  $Q$  are jointly sufficient for  $e$ . It now looks as though  $(P \wedge Q)$  is excluded from causing  $e$ , since by Exclusion any causal input to  $e$  will count as overdetermination, but No Overdetermination rules that out.

Consider a case where  $o$  brings about some event  $e$  in virtue of having  $P$ . The having of  $P$  is a sufficient cause for  $e$ . But, by the same reasoning as above,  $(P \vee R)$  is excluded from causing  $e$ .

So if Boolean properties are distinct from the properties out of which they are made, they are causally impotent, and hence non-natural.

### 3.2.3 Structural Properties are Non-Natural

Suppose object  $o$  is a composite object, composed of parts  $a_1$  and  $a_2$ . Suppose that  $o$  has a structural property  $S$  which is composed of  $a_1$ 's having  $P$ ,  $a_2$ 's having  $Q$ , and  $a_1$ 's being related by  $R$  to  $a_2$ . Further suppose that distinctness holds:

**Structural Distinctness**  $o$ 's having  $S$  is distinct from  $a_1$ 's having  $P$  and  $a_2$ 's having  $Q$  and  $a_1$ 's being related by  $R$  to  $a_2$ .

Consider a case when  $o$  brings about some event  $e$  in virtue of  $a_1$ 's having  $P$  and  $a_2$ 's having  $Q$  and  $a_1$ 's being related by  $R$  to  $a_2$ —they are jointly sufficient, we may suppose, for  $e$ . It now looks as though  $S$  is excluded from causing  $e$ , since by Exclusion any causal input to  $e$  will count as overdetermination, but No Overdetermination rules that out.

So if structural properties are distinct from the properties out of which they are made, they are causally impotent, and hence non-natural.

### 3.2.4 Multiply Realizable Properties are Non-Natural

Pain is the classic example of a property that is taken to be multiply realizable. For a member of the human species to be in pain is for her to be in some specific type of neural state. That neural state, we say, realizes pain in her. But creatures with radically different makeups could be in pain, so that silicon being in a certain arrangement might realize pain in some other species. The higher-level, multiply realizable property is said to depend on and be determined by the lower level realizers. Typically this dependence is cashed out in terms of supervenience. A multiply realizable property  $P$  supervenes on its realizer—on some set of base properties,  $\{Q_1, Q_2, Q_3, \dots, Q_n\}$ —if, necessarily, any object that has  $P$  has one of the  $Q_n$ 's and, necessarily, any object that has one of the  $Q_n$ 's has  $P$ .<sup>4</sup> Suppose

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<sup>4</sup>Note that this formulation of supervenience on intrinsic properties differs from a wider type of supervenience, called global supervenience. For a discussion of various forms of supervenience, see McLaughlin & Bennett (2006), available online at <http://plato.stanford.edu/archives/fall2006/entries/supervenience/>.

that P is not reducible to them. Since we have already concluded that Boolean properties are non-natural, suppose also that P is distinct from any Boolean combination of the  $Q_n$ 's.

**Multiply Realizable Distinctness** P is distinct from any of the  $Q_n$ 's and any Boolean combination thereof.

While different philosophers take the relation between a multiply realizable property and its realizer differently, it is clear that if an object has, say,  $Q_2$ , thereby having P, and  $Q_2$  is causally sufficient for some event e, then the same reasoning that ruled out Boolean and structural properties rules out multiply realizable properties. If distinctness holds, then, multiply realizable properties are non-natural.

It is worth noting that the relation between determinable and determinates is relevantly like that between multiply realizable properties and their realizers. A determinable property, say, being colored, is dependent on its determinates, say, being red, in the sense that, if an object is colored, it has one of the determinates, and having one of the determinates entails having the determinable. Assuming distinctness of determinable and determinates, we arrive at the same conclusion regarding determinables—they are one and all non-natural properties.

The central problem is that the causal powers contributed to objects by Boolean and structural properties are already contributed by the properties out of which they are made. (By 'already,' I mean ontological priority, not temporal. The parts are ontologically prior to the whole out of which they are made.) Similarly, with multiply realizable and determinable properties, any contribution made by them is already made by the realizer and determinate. The resulting picture of the distinction between natural and non-natural properties is that the natural properties are non-disjunctive, non-conjunctive, non-structural, non-multiply realizable, fully determinate properties. In virtue of having such natural properties, objects

have unique causal capacities and are intrinsically similar to those sharing such natural properties.

### 3.3 Infinite Complexity and Levels of Reality

The above account of natural properties is austere. It countenances a limited set of properties as natural. It might seem that the account is too austere, in two ways. First, it might seem to rule out the possibility that the world is infinitely complex. In a world where there is no bottom level, it seems as if the only type of properties available are structural properties, since we can't go to the bottom level to find the non-structural ones. A second, and related, worry is that it might seem to make no room for the properties of the special sciences or properties of medium sized objects, since objects of that level are made up of objects at lower levels. In this section I will respond to these worries.

Consider the possibility of an infinitely complex world. Science tells us that molecules are composed of atoms, that atoms are composed of protons, neutrons and electrons. Further, protons and neutrons are composed of quarks. An infinitely complex world is one where this process of composition never stops. Quarks, in such a world, are composed of still smaller microparticles, which are composed of . . . , and so on, *ad infinitum*. Williams (2007) calls such a world an onion world. (He attributes the term to Ted Sider.) On the surface, it seems that an onion world is possible—indeed, it seems our world could very well turn out to be an onion world.

Suppose, for the sake of argument, that such a world is possible. Here, then, is an argument for the existence of structural universals. If an object, *o*, is a purely composite object, its properties are structural. In onion worlds, all objects are purely composite objects, and so all its properties are structural. One might think that there's nothing wrong with this result, but recall our earlier argument that structural properties are non-natural, and that the intrinsic similarities and causal capacities of an object hang on its

natural properties. If an object's properties in an onion world are all non-natural, then it seems to follow that no objects in an onion world are intrinsically similar or dissimilar, and that no objects have any causal capacities.<sup>5</sup> But surely, the argument continues, whether there is intrinsic similarity and causality in our world does not depend on an empirical matter of fact, whether it is an onion world or not.

In a similar vein, one might worry that the above account of the natural properties leaves no room for the properties of the special sciences such as chemistry and biology. If we accept a view of human persons as composite objects, it looks as though all the properties had by humans are structural and hence non-natural. Surely, though, the special sciences are discovering truths about genuine features of the world—we don't want to be realists about physics but anti-realists about biology!

There are many things to be said in response to these arguments, but I will focus on two. The first response is that, as Heil (2003) argues, there is a widespread use of the idea of levels of reality that rests on mistaken assumptions about the relation between properties and predicates, what Heil calls principle ( $\phi$ ): when some predicate applies to an object, it does so in virtue of some property had by that object and any other object to which the predicate truly applies. But as we discussed earlier regarding truthmaking, the relation between truths and truthmakers is many-to-many. When a predicate correctly applies, it may do so in virtue of different properties in different situations. Do all red things share some one property in common in virtue of which it is correct to say of them that they are all red? It seems not. Of course they all have some fully determinate shade of red, and it's in virtue of having that determinate shade of red that we say the predicate 'is red' correctly applies. But there does not seem to be any one property had by all such red things in virtue of which we call them all red.

The importance of this point is that we need not take all predicates to pick out a

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<sup>5</sup>Block (2003) makes a similar point about Kim's causal exclusion argument—that if Kim's argument is correct, it seems to entail that in an onion world, the causal powers drain away. Block took this as a *reductio* of Kim's argument. See Kim (2003) for his response.

unique property in order to use them correctly, and even to form correct generalizations about them—perhaps even interesting ‘laws’ concerning their behavior and relations to each other. The point regarding the special sciences should be clear: even if we suppose that the predicates of the special sciences do not pick out unique properties, it does not follow—unless one accepts principle ( $\phi$ )—that we are anti-realists about the special sciences. The claims and generalizations there can still be true, interesting and even very important. We can accept ‘levels’ of predicates and generalizations without accepting levels of reality.

But, second, we need not invoke levels of reality in such a cavalier fashion to think that natural properties can be had by composite objects—and thus that, perhaps, some predicates of the special sciences really do pick out natural properties. What is needed is a concept of genuine ontological emergence. The possibility of ontologically emergent properties also allows us to resist the argument for structural universals on the assumption of the possibility of an onion world. (Williams (2007) makes the same suggestion.)

An ontologically emergent property is one that is non-structural or basic, yet had by a composite system. It is a property of the whole, not of the parts. It contributes fundamentally new causal capacities, including, perhaps, the capacity for ‘downward’ causation.<sup>6</sup> It may seem implausible to suppose that the world contains such emergent properties. But while this may be true for chemistry and even biology, there seem to be good philosophical reasons to think that things are different with respect to mental states.

Nevertheless, even supposing that it is implausible to think there are actually any emergent properties, all that is needed to rebut the argument for structural universals is the *possibility* of such properties. Recall that that argument depended on the claim that all properties of composite objects would be structural. But even those who think that the

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<sup>6</sup>For a fuller discussion of emergent properties, see O’Connor & Wong (2005). For a discussion of implications of this conception of emergent properties for thinking about the ontological nature of composite objects, see O’Connor & Jacobs (2003).

existence of emergent properties is implausible admit their possibility.<sup>7</sup> Lewis and Armstrong, for example, both think that it is possible for composite objects to have basic or non-structural properties.<sup>8</sup> Emergent properties seem to be precisely what would block causal drainage in an onion world.

To be sure, it would be physically inexplicable *why* there were such properties in an onion world—not to mention why they occur at *this* level of composition and not some other—since lower level properties would be purely structural and hence causally impotent. Yet this implausibility seems to me to match perfectly the implausibility of an onion world in the first place. Still, in such a world, natural properties could exist in the form of genuine, ontologically emergent, natural properties. Indeed, without such emergent properties, onion worlds would seem to be devoid of all causality, and hence not genuinely possible.

### 3.4 Natural Properties and Causal Powers

The natural properties are those that are non-disjunctive, non-conjunctive, non-structural, not further multiply realizable, fully determinate, and contribute non-redundant causal powers to the objects that have them. Perhaps many of our concepts do not uniquely pick out natural properties, but they may still correctly apply to objects in virtue of the natural properties objects have. They just don't necessarily apply in virtue of one particular natural property. In one context, we may use a concept to pick out one natural property (or perhaps several natural properties, if the concept refers to a structural property). In another context we may use the same concept to pick out a different natural property (or some other structure of natural properties). Still in other contexts, our concepts may not pick out *any* natural property. To be sure, some of our concepts may uniquely pick out a natural property, such that whenever that concept correctly applies, it does so in virtue

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<sup>7</sup>See McLaughlin (1992) for a discussion of the coherence of emergent properties. He takes it that they are coherent, but that there is 'not a scintilla of evidence' for their existence.

<sup>8</sup>Williams points us to Lewis's discussion of the contingency of materialism and Armstrong's endorsement of the possibility in Armstrong (1978a).

of that natural property. Science, we hope, aims at elucidating such concepts, and if some old-fashioned theses in the philosophy of mind are correct, some of our mental concepts do as well. But this is certainly not true in general.

It is important to recognize that the same should be said about our concepts of powers and dispositions. The concept of a power to shatter glass is not applicable to objects in virtue of some one natural property that all objects with the power to shatter glass share. Similarly, not all objects that are disposed to shatter share some one natural property in virtue of which they are disposed to shatter. In fact, it might turn out that *not one* of our concepts of the form ‘the power to  $\phi$  in circumstance  $c$ ’ or ‘the disposition to  $\phi$  in response to stimulus  $s$ ’ uniquely picks out a natural property. The natural properties are simple, but their manifestations and the circumstances in which they occur need not be so simple as to be captured by ‘the power to  $\phi$  in circumstances  $c$ .’

It is worth belaboring the point a bit. One of our central topics is the connection between properties and counterfactuals, and one major thesis I defend is that properties themselves are the truthmakers for various counterfactuals. Typically, however, the connection between the two is discussed in a much more roundabout way. “Properties,” begins the typical strategist, “are or confer causal powers or dispositions, and hence are connected with counterfactuals in the following way. All (or nearly all) properties can be identified with some covert dispositional or power term, such as ‘solubility.’ Then these covert terms can be identified with some overt dispositional or power term, such as ‘the disposition to dissolve when placed in water.’ But overt dispositional or power terms are clearly connected to counterfactuals, since something is disposed to dissolve when placed in water if and only if it *would* dissolve were it put in water.” Thus the process of connecting properties to counterfactuals typically goes by way of *conceptual analysis*.

But that way lies danger. It may be that no one covert dispositional or power concept picks out a natural property. This could happen if multiple dispositional concepts applied to one natural property, and it could happen if no such concepts applied. Furthermore,

even if a covert dispositional concept uniquely picked out a natural property, it might be that no overt dispositional or power concept is equivalent to the covert one. Again this could happen if multiple overt concepts were together equivalent with the covert concept, or if none were. Even supposing the worst case for our dispositional or power concepts, that no covert or overt concepts (or any combination thereof) uniquely pick out a natural property, natural properties might still make various counterfactuals true. A better way, therefore, to specify what we mean when we say that objects have causal powers in virtue of having natural properties is to skip the conceptual analysis altogether, and go straight to the connection between properties and counterfactuals.

### 3.4.1 Functional Specification

We can do so by using the Ramsey-Lewis technique of functional specification. Here I follow Hawthorne (2001), who uses this method to define what he calls causal structuralism. Consider the worldbook of the actual world. It is the conjunction of all the true propositions at the actual world. This is importantly different than the lawbook of the actual world. If Joe is jolly,  $\langle \text{Joe is jolly} \rangle$  is a conjunct of the worldbook, but it will not be in the lawbook. The lawbook specifies how properties are related to each other causally. But again, if in some particular instance, Joe's being jolly causes me to laugh, that will not be a part of the lawbook, for the lawbook concerns what can and must cause what, not what actually does cause what.

Consider all the causal laws involving the natural properties. Let a causal law take the form  $N(P, Q)$ .  $P$ 's instantiation, if  $N(P, Q)$  is true, causally necessitates  $Q$ 's instantiation. The actual causal laws will be much more complicated. Negative charge's instantiation by an electron, in abstraction, does not causally necessitate anything, but embedded in a particular situation it does. Negative charge's being instantiated by  $o_1$  and  $o_1$ 's being related by  $R$  to  $o_2$  and  $o_2$ 's instantiation of negative charge, and so on, causally necessitates  $o_1$ 's being related by the repelling relation to  $o_2$  and so on.

In addition to such complexities, which may be infinitely complex, we will also need some type of *ceteris paribus* clause or appeal to specified conditions. Negative charge sometimes does not repel other negatively charged particles, say, if some other causal power is at work that prevents it from doing so. There are many attempts at specifying the clause needed to make it true that negatively charged particles repel other negatively charged particles. I put off such issues until 4.7.1 and Chapter 6. For present purposes, I assume we can state the causal laws as  $N(P, Q)$  and ignore the necessary complexities.

How, then, do we get the lawbook from the causal laws? Simply conjoin all the true causal laws involving the natural properties. Now we Ramsify the resultant lawbook. Take all property names that appear in the lawbook and replace them with a variable and prefix the lawbook with an existential quantifier for each variable. A simplified version of the Ramsified lawbook will thus look some thing like  $\forall x \forall y \forall z \dots \exists P_1 \exists P_2 \exists P_3 \dots (N(P_1x, P_2x) \wedge N(P_2y, P_3z) \wedge \dots)$ . From the Ramsified lawbook we can get a Ramsey sentence by dropping one of the existential quantifiers.

To say that an object has certain causal powers, say, to bring about an instance of  $Q$ , in virtue of having a certain property, say,  $P$ , is to say that substituting the name of  $P$  for the unbound variable in the appropriate Ramsey sentence results in a true sentence. And that sentence says that, in certain circumstances, there is some property,  $x$ , such that  $P$  necessitates  $x$ , and and some other property  $y$  such that  $P$ 's coinstantiation with  $x$  necessitates  $y$ , and  $\dots$ <sup>9</sup> Substituting  $Q$  in for  $x$  in the sentence will result in a true sentence.

(There is an alternative way of getting an open sentence from the lawbook, introduced in Hawthorne (2001) but originally from Shoemaker. We shall call it the Shoemaker method. Take the causal lawbook. Instead of replacing all property names for variables all in one, we do it piecemeal. Start with some property that appears in the lawbook,  $P$ , and replace its

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<sup>9</sup>I use 'necessitates' here for ease of use. The theory of causal powers I shall offer will be non-reductive, so some primitive is needed, but I here remain neutral on what that primitive is.

name with an unbound variable, leaving all the other property names in place. The resulting open sentence we can call a Shoemaker sentence. The implications for this method, and the differences between the Ramsey sentences and the Shoemaker sentences will be discussed in Chapter 6.)

The Ramsey sentence for a particular property can be thought to represent the causal capacities that an object has in virtue of having that property. But that, in itself, does not require us to think of causal powers or dispositions or capacities as some entity distinct from the property. Nor does it require us to do conceptual analysis of any covert or overt dispositional or power concepts. Rather, we went straight to the connection between properties and laws or, since laws support them, counterfactuals. The Neo-Humean and the Contingent Nomicist take the Ramsey sentences to correctly, but contingently, describe the connection between properties and laws or counterfactuals, while the Necessitarian Nomicist and the Neo-Aristotelian take the relationship to be necessary.<sup>10</sup> The Ramsey sentence (or perhaps the Shoemaker sentence) expresses something deep about the nature of the property, according to the later. It is to these and related issues that I now turn.

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<sup>10</sup>As we will see in Chapter 6, the Pure Powers view does not, strictly speaking, accept this way of using the Ramsified lawbook. It is not that properties make true those sentences; it is rather that properties, in some sense, *are* those sentences.

## 4

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# Neo-Humeanism

The central tenant of Neo-Humeanism is the doctrine of Independence: There are no necessary connections between distinct existences. On this there can be no wavering. Adherence is demanding, too, for the doctrine has significant philosophical implications. Consider a snapshot of some specific moment in time. The world at that moment is made up of things having properties. It is, in that sense, like a three dimensional mosaic, each point in the mosaic having some color. The Neo-Humean must construe the property instances, the colors, in a way consistent with Independence. The instantiation of a property at some point cannot entail anything about any other point. Similarly, the property instances may be related to each other in various ways, and they may also be related to property instances at other moments in time, but those relations must satisfy Independence. Whatever glue holds the world together, it cannot be too strong.

In fact, arguably the most widely accepted version of Neo-Humeanism takes it that the only connections added to the vast mosaic of local, particular property instances are spatial and temporal relations. Everything else—every other truth about the world, including causal, nomic and modal truths—supervenes on the spatio-temporal distribution of those local property instances. (Lewis (1994), the most forceful defender of this thesis, calls it Humean Supervenience.) One must be careful here. The Neo-Aristotelian may very well agree that modal, causal and nomic facts supervene on the distribution of properties in the

mosaic. After all, the Neo-Aristotelian conceives of properties as somehow involving such facts *in their nature*. The Humean Supervenience thesis, instead, claims that all truths supervene on the spatio-temporal distribution of local property instances *conceived of as consistent with Independence*.

Thus the vast mosaic that is this world is intrinsically de-modalized according to the Neo-Humean. The local property instances and the spatio-temporal relations they enter into do not entail anything, *by themselves*, about what might or might not, must or must not happen with any distinct local property instance. Because of this, the defender of Independence who thinks there are genuine modal, causal and nomic facts about the world faces a challenge in accounting for them. To appreciate this challenge, suppose that there is nothing other than this world—all the objects that are related to each other by spatial and temporal relations and that Independence and Humean Supervenience are true. What in the world could ground facts about causation, laws and modality?

Nothing, it seems. Suppose, for example, that it is a universal generalization that all instances of P are followed by instances of Q. Would this be sufficient to ground nomic and causal relations? It seems not. Nomic facts are not merely universal generalizations, since some generalizations are accidental. It may be a universal generalization that there are no spheres of gold 50 feet in diameter, but that seems to be an accident of circumstances, not a law. Contrast that with the claim that there are no spheres of uranium 50 feet in diameter, which is not a mere accident. The Neo-Humean thinks that the we need not go too far to account for the distinction. All that is needed are certain facts about how we systematize the regularities of this world. Causation is a bit different. While a regularity account of causation is consistent with Neo-Humeanism, it is widely regarded as hopeless. Thus the counterfactual account is preferred, and so causation becomes connected with modality. Consider modality: Typically, we think that there are many things that have not happened, and will not ever happen, which are nevertheless possible. Even though I am not and will almost certainly never be a truck driver, I think I could be one. But nothing in the

mosaic as currently conceived can ground this fact. Indeed, it seems that all of modality is collapsed to actuality.

Various responses to this challenge are possible. One type of response is to bite the bullet and give some sort of anti-realist or conventionalist account of causal, nomic and modal truths (or propose a sort of error theory), but I shall ignore these types of responses. A second response, viewed to be nearly as radical as the first, is to deny Independence. The Neo-Aristotelian takes this route by re-construing properties as somehow involving modal, causal and nomic facts *in themselves*. (The Necessary Nomicist takes this route, as well, but instead of straight away making the properties out to be inconsistent with Independence, she adds a relation between properties that does the job.) A third response is to deny Humean Supervenience by adding some other, stronger relation to the mosaic in addition to spatial and temporal relations, though not so strong as to be inconsistent with Independence. This strategy is taken by the Contingent Nomicist, who adds a genuine, second-order, nomic relation.

In contrast to these responses, the Neo-Humean remains steadfast in orthodoxy. She does so by adding entities. In addition to this world, there are many other, merely possible worlds as well. Causation is not a regularity in this world, but a regularity *across* similar possible worlds. And though I am not a truck driver in this world, I could have been because in some possible world, I am a truck driver. Famously, David Lewis thought of possible worlds as of the same kind as the actually existing mosaic. He was happy with desert landscapes, so he added *more* of them. Others, only a bit less wedded to desert landscapes, construed possible worlds as abstract entities of one sort or another.

Below I will consider Lewis' possible worlds and one version of abstract possible worlds, a modified linguistic version, and then consider how adding such possible worlds to the Humean mosaic results in a general metaphysic that is theoretically powerful, even if lacking in intuitive force. But before I turn to that, I think it is important to get clearer on the precise nature of properties, as construed by the Neo-Humean to be consistent with

Independence. After that, I briefly present the general Neo-Humean metaphysic, including accounts of modality, causation and laws of nature. The goal is to show the theoretical force of Neo-Humeanism. The fruit is tempting: accept Humean Supervenience and the existence of possibilia and you get all that and more. But partaking has consequences: I shall end with a brief survey of some problems in paradise. The problems are not decisive, but they are troublesome enough, I suggest, to make considering the alternatives worthwhile.

## 4.1 Properties

There are several questions concerning the nature of properties that metaphysicians take interest in. One, the realism question, concerns whether properties are a part of the ontological furniture of the universe, distinct from the individuals that have them (or sets thereof). A second question concerns the repeatability of properties. Are properties universals, multiply instantiable entities, or are they tropes, particularized properties? If they are universals, yet another question concerns their location. Are properties Aristotelian, wholly located where they are instantiated (and hence, multiply located), or are they Platonic, inhabiting no place or time yet bearing the instantiation relation to particular objects located in space and time?

My primary concern is not with settling these issues. I will assume that some form of realism is correct. I will also record my conviction that properties are not Platonic universals. It seems to me that the Aristotelian universals conception, defended by Armstrong (1978a) among others, and trope theory, defended by Campbell (1990) among others, are nearly equally plausible, though I prefer the Aristotelian conception of universals. Where appropriate I will address the implications of the Platonic, Aristotelian and trope conceptions of properties for the topic at hand. And that topic—the issue I *am* concerned with—is the relation between properties and modal, causal and nomic facts, or that between a property and the causal powers that objects have in virtue of having that property.

### 4.1.1 Categoricalism and Quidditism

Whatever else the Neo-Humean says about properties, they must deny that this relation is necessary. Categoricalism is the view that claims just that: the relation between properties and the causal powers had in virtue of having them is not necessary. I hesitate to use the term ‘Categoricalism’ because it invites confusion. It is fairly standard, though, and so I shall use it—but I will briefly clarify what is *not* meant by ‘Categoricalism.’ Categorical properties are often taken to be those that are actually there, those that are not had conditionally on other circumstances. But this is not how I mean to use the term. Those who deny the thesis of Categoricalism do not think that, somehow, properties are not actually there or that the having of the property is somehow conditional on being in the right circumstances. The *manifestation* of a power or disposition is not always there and is sometimes dependent on the circumstances, but we should not confuse the manifestation of a power with the power itself.

Instead, the disagreement between those who defend and those who deny Categoricalism is a disagreement about the modal strength of the relation between properties and certain facts about what objects with those properties would, could, might and must do. Those who defend Categoricalism claim that the relation is contingent. While objects in fact may have the power to  $\phi$  in virtue of having property P, in other possible worlds they may have P without having the power to  $\phi$ .

Quidditism is the property analogue of Haecceitism about individuals. A haecceity is the thisness of an individual, that which is responsible for making a thing *this particular* thing, rather than that. It is distinct from the qualities that the individual has.<sup>1</sup> Let us use the term ‘Haecceitism’ for the thesis that mere haecceitistic differences are possible. Two individuals differ haecceitistically just in case they have different haecceities. Differing haecceitistically is consistent with sharing many properties and also with differing with

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<sup>1</sup>Perhaps, though, it is a non-qualitative property, as in Adams (1979).

respect to many properties. In contrast, two individuals differ *merely* haecceitistically just in case they share all the same properties but differ haecceitistically. Haecceitism entails that there is a possible world qualitatively identical to, but nevertheless distinct from, the actual world where my haecceity is swapped with yours.

Similarly, a quiddity is the whatness of a property, that which is responsible for making a property this property rather than that one. It is distinct from its causal-nomic role, from the powers that objects have in virtue of having the property. Let us use the term ‘Quidditism’ for the thesis that mere quidditistic differences are possible. Two properties differ quiddistically just in case they have different quiddities. Differing quiddistically is consistent with sharing many causal powers and with differing with respect to many causal powers. In contrast, two properties differ *merely* quiddistically just in case they have precise the same causal-nomic role—objects have precisely the same causal powers in virtue of having them—but they differ quiddistically. Quidditism entails that there is a possible world identical to the actual world with regard to the Ramsified causal lawbook—the worlds are nomically identical—but where quiddities are swapped, and that this possibility is different than actuality.

Everyone who accepts Independence, including the Neo-Humean, accepts Categoricalism, but some who accept Categoricalism deny Quidditism. Call something ‘world-bound’ just in case it exists in one and only one possible world. If properties are world-bound, then Quidditism is false. Quidditism requires that there are two worlds,  $w_1$  and  $w_2$ , which are such that a property that fills a certain causal-nomic role in  $w_1$  fills a different causal-nomic role in  $w_2$ . But that requires that the property exist in both worlds. On the other hand, if properties are not world-bound, if they can be trans-world bilocated, then Categoricalism entails Quidditism. If we allow that properties can exist in multiple possible worlds, including worlds where the causal-nomic roles are entirely different, then there must be something to the property, something that makes the property what it is but that is distinct from the causal-nomic roles.

(It is worth noting that not all who deny Categoricalism deny the existence of quiddities. One could consistently hold that properties somehow involve quiddities but that there are some necessary connections between quiddities and causal powers. We will return to this in Chapter 6.)

In sum, the Neo-Humean accepts Categoricalism. Properties are intrinsically impotent. It is only together with something else that properties get connected with causation, laws and modality. They have no non-trivial modal character, as Armstrong puts it, and there is not much to the intrinsic nature of a property, as Lewis puts it. In addition, those who allow the trans-world identity of properties accept Quidditism. Nearly the only thing that can be said about the intrinsic nature of properties, on this view, is that they are distinct from one another.

## 4.2 Possible Worlds

Given the acceptance of Independence, Categoricalism follows. The world is just one little, local, particular matter of fact—and then another. As we saw earlier, if there is only the one world and each local event is de-modalized and all connections between such local events are de-modalized, then the scope of possibility seem to be drastically limited. If I have some property, say, P, and neither the having of P nor any relation that P enters into entails anything about what might or must occur outside the having of P, there seems to be no grounds for anything else being possible.

The Neo-Humean solves this problem by appealing to the existence of other possible worlds. In this world I have P, but in other worlds I don't have P. What, exactly, is a possible world? While there are many different accounts, I shall focus on two, that of Lewis (1986a) and that of Sider (2002).

### 4.2.1 Lewisian Worlds

Lewis conceives of possible worlds as more things just like the actual world. Here is one way to think of Lewisian worlds: The actual world is the concrete Humean mosaic, the collection of local, particular matters of fact. It is the collection of all things related to each other by space and time. I am part of the actual world, as are you. But the actual world is not the only concrete Humean mosaic that exists, according to Lewis. There is a concrete collection of local, particular matters of fact of which someone like me in everyway is a part, but of which no one like you in any relevant way is a part. (For example, he types a sentence just like the one you are currently reading, but no one like you is there to read it.) There is also a collection of local particular matters of fact of which no one like either of us in any relevant way is a part. There are no talking donkeys in this world, but speaking strictly and without limiting the scope of our quantifier, there are talking donkeys—indeed there are infinitely many of them. They are just not part of *this* mosaic.

Because our world is everything that is related to a part of it by space and time, nothing in any other world is related to anything in our world by space and time. Other worlds exist, but they do not exist anywhere in relation to here and they do not exist at any time in relation to now. Each world is spatio-temporally isolated from every other world. With the possible exception of the natural properties,<sup>2</sup> nothing exists in more than one possible world. The only types of relations holding across possible worlds are similarity relations.

I said the above description was one way of thinking about Lewisian possible worlds. It is, in fact, Lewis' way: “[N]othing is so alien in kind as not to be part of our world, provided only that it does exist at some distance and direction from here, or at some time before or after or simultaneous with now” (Lewis, 1986a). Notice, though, that on this account no object that exists outside of space and time is a part of any world. This seems overly

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<sup>2</sup>Or close-enough-to-perfectly natural properties. Lewis allows that we may need these in addition to the perfectly natural properties in order to account for the possibility of onion worlds. As I argued above, I think emergent properties do the job better.

strong. One who is Lewisian *in spirit* about possible worlds ought to be free to accept the existence, as part of the world, of abstracta. She needn't think they actually exist either; she might think that while the actual world is free from them, there are possible worlds where abstracta (not to mention ghosts and gods of all sorts) exist.<sup>3</sup> This would mean that worlds are not, strictly speaking, collections of all things related to each other by space and time, since abstracta are typically construed as existing outside of space and time. Melia (2003) suggests a different way to describe worlds that are in spirit Lewisian: Such worlds represent the world as containing, say, talking donkeys, by the world really containing talking donkeys. I think this is in keeping with Lewis's overall picture, and it allows abstracta to count as part of a world. Nevertheless, I will from here on out speak of Lewisian worlds as Lewis himself did, as collections of spatio-temporally related things.

There must be enough worlds to account for the plenitude of possibilities. For every way things could have been, there must be some concrete world where things are that way. Lewis accomplishes this by stipulation, but it is a stipulation motivated by Independence. The principle of recombination asserts, roughly, that anything can coexist with anything else, and anything can fail to coexist with anything else. This tells us that any two possibilia can be put together to yield a possible world.

#### 4.2.2 Ersatz Worlds

Lewis is perhaps the only philosopher to believe in the existence of the totality of Lewisian worlds. Nearly all those who accept the existence of merely possible worlds think of them, instead, as abstract representations of the world. Lewis uses the term 'ersatz worlds' for such stand-ins for the real, 'blooming, buzzing' worlds. A possible world where there are talking donkeys, on the ersatz view, is not something with a concrete, talking donkey as a part, but rather something that represents reality as having a concrete, talking donkey as

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<sup>3</sup>It is not exactly clear just how far the Lewisian can go here. Are there possible worlds, for example, where the causal relation is primitive? It's not clear that there could be on Lewis' account.

a part. In fact, the actual world is not at all something concrete. I am not a part of the actual world, but I am represented as being a part of reality by an abstract representation. Of course I am so represented by *many* abstract representations, infinitely many. One such representation accurately represents the way things really are. We call that one the actual world and the others, merely possible worlds.

The precise nature of these abstract representations, and therefore how it is that they represent, varies from theory to theory. On some accounts they are certain abstract states of affairs;<sup>4</sup> on other accounts they are certain properties;<sup>5</sup> on still other accounts they are certain sets of propositions.<sup>6</sup> The account I shall focus on is a modification of linguistic ersatzism, according to which possible worlds are a type of linguistic entity.<sup>7</sup>

Intuitively, a linguistic ersatzer views a possible world as a story or a novel. For a proposition to be true at a world is for it to be entailed by the story. A bit more informatively, we can say that a linguistic ersatz possible world is a maximally consistent set of sentences. The set is maximal just in case for any matter there is a sentence in the set asserting a fact of the matter, and its consistent is primitive. A linguistic ersatz possible world represents the world as including talking donkeys by having the sentence ‘Talking donkeys exist’ as a member (or some equivalent sentence that entails that talking donkeys exist).

The language of the sentences needs to be expressive enough to capture all the possibilities. A natural language most likely would not do, both because natural languages are often ambiguous and because they are not expressive enough, but all that is needed is a linguistic structure that can be interpreted. A typical strategy is to use a Lagadonian language, where each individual (both particulars and properties) stand as names for themselves. Possible worlds can then be construed as maximally consistent sets of ordered  $n$ -tuples, where  $\langle P, a \rangle$  is interpreted as saying that object  $a$  has property  $P$ , and  $\langle R, a_1, \dots, a_n \rangle$  is interpreted as

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<sup>4</sup>See, for example, Plantinga (1974).

<sup>5</sup>See, for example, Stalnaker (1976).

<sup>6</sup>See, for example, Adams (1974).

<sup>7</sup>In addition to Sider, below, see Jeffrey (1965), for example.

saying that  $a_1, \dots, a_n$  are related by R.

Unfortunately for the linguistic ersatz, such a language is still not expressive enough to capture all the possibilities she wishes to be able to capture. In particular, it cannot account for particulars and properties that do not actually exist but might have existed. Since the particulars and properties name themselves, alien particulars (such as my fourth brother) and alien properties (such as positive schmarge, which is otherwise like positive charge except that it *repels* negatively schmarged particles) are not named since they don't exist. One solution to this problem is to introduce variables for particulars and properties. Sentences of the form  $\exists x (x \neq a_1 \wedge x \neq a_2 \wedge \dots)$ , asserting that there is something that is not identical to any existing particular, can then be generated to account for non-existent particulars and, *mutatis mutandis*, alien properties.

Recall that Haecceitism allows for distinct worlds to be qualitatively identical but where two haecceities are switched. Similarly, Quidditism allows for distinct worlds to be causally identical but where two quiddities are switched. There seems no reason to allow actually existing haecceities and quiddities to swap but not allow aliens to do so. As currently conceived, linguistic ersatzism cannot account for alien swapping worlds, since the sentences describing these worlds will be identical. It is for this reason that Sider proposes a significant modification of linguistic ersatzism and introduces the 'pluriverse.'

Instead of introducing ersatz worlds one at a time, Sider introduces them all at once in one sentence. Worlds that are merely quiddistically different with respect to alien properties cannot be differentiated by differentiating two sentences, each of which describes one of the worlds, but they can be differentiated by one sentence that describes them both. "There are two distinct worlds and two distinct alien properties such that ..." will do the trick. The entire pluriverse sentence, as Sider imagines it, will look like,

There are worlds  $w_1, w_2 \dots$  and there are individuals,  $a_1, a_2 \dots$  and there are properties and relations  $P_1, P_2 \dots$  and there are possible individuals  $x_1, x_2$

...distinct from any  $a_n$ , and there are possible properties  $y_1, y_2 \dots$ , distinct from any  $P_n$ , such that ...

A string of open formulas follows the ‘such that,’ each one representing a possible world. Then we can translate talk about individual possible worlds into talk about the pluriverse sentence. ‘There is a possible world where P’ becomes, ‘According to the pluriverse, there is a possible world where P.’ The pluriverse represents by entailment, in much the same way that stories do.

Sider’s version of linguistic ersatzism thus provides an alternative to Lewisian worlds that is consistent with Independence. In contrast to Lewis, who multiplies concrete mosaics, the ersatzer adds entities to the one concrete mosaic, and in Sider’s case, he adds an abstract, linguistic entity that asserts that there are many different representations of the world, where each such representation is a way the world might be. In what follows, I will talk of worlds as Lewisian. Where appropriate, I will note implications of the difference between the two accounts.

### 4.3 Modality

Using just worlds, both actual and merely possible, and similarities between them, the Neo-Humean can construct accounts of modality, causation and laws of nature. I shall begin with modality. Before getting into the details, I want to point out one advantage that Lewis has over perhaps all ersatzers in giving an account of modality. Both Lewis and the ersatzer appeal to possible worlds in their account of modality. One difference, however, is that Lewis offers a *reductive* account, whereas the ersatzer typically takes modality as a primitive. What is a possible world, in contrast to, say, an impossible world? For Lewis, the possible worlds are all and only those worlds that exist, but for Sider, possible worlds are parts of the pluriverse. Since the pluriverse is a sentence, we could construct infinitely many such sentences, some of which assert that there are only two worlds and some of

which assert that there are worlds where contradictions are true, and so on. Which of those counts as the pluriverse sentence? Any will do, as long as they satisfy the constraint that the sentence asserts that there is a world if and only if such a world really is possible. How do we rule out the bad pluriverse sentences that assert that there is some world,  $w$ , when in fact  $w$  is not possible? We rule them out because, says Sider, they are inconsistent, which is itself a modal notion.<sup>8</sup> Lewis' theory of modality, on the other hand, is reductive: it appeals to no modal primitive. What Lewis gains in simplicity of theory comes at the cost of extravagance in metaphysics. There is, as always, a tradeoff between primitive ideology and primitive ontology.

Regardless of what the Neo-Humean takes possible worlds to be, she thinks of modality as quantification over possible worlds. For Lewisian worlds, the principle of recombination guarantees that for any way things could have been, there is a world that is that way. Since no world is some way that a world can't be, any way that a world is is a way things could have been. So asserting a possibility is existentially quantifying over possible worlds, and asserting a necessity is universally quantifying over worlds. Let ' $\diamond$ ' be the possibility operator and ' $\square$ ' the necessity operator.  $\langle \diamond P \rangle$  is true if and only if there is some possible world in which  $P$  is true, and  $\langle \square P \rangle$  is true if and only if  $P$  is true in every possible world.

Thus the Neo-Humean has a simple metaphysics of unrestricted modality. More often than not, however, we use a *restricted* sense of possibility or necessity. We may not be interested in whether negatively charged particles repel other negatively charged particles in *all* possible worlds, but rather whether it is *nomically* necessary, true in all worlds nomically similar to the actual world. Restricting the scope of possibility or necessity is restricting the scope of quantification over possible worlds. Looking in my fridge, I may lament, 'There is no beer,' but I presumably do not mean to imply that there is no beer *anywhere*. I am restricting the scope of my quantifier: Among the places in my fridge, there

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<sup>8</sup>See Kment (2006) for an interesting, though in my view unsuccessful, attempt to distinguish possible worlds from impossible worlds in a reductive manner.

is no beer. Similarly, I might say that negatively charged particles must repel negatively charged particles. Since I reject Independence, I would willingly assert that claim (as long as it were true) with my quantifiers wide open. The Neo-Humean, in contrast, would assert it but only while restricting her quantifiers: Among worlds relevantly like ours, negatively charged particles repel negatively charged particles.

*De dicto* modality, therefore, and all the related restricted senses of modality—nomic, metaphysical, epistemic and so on—are cases of quantification over worlds. *De re* modality, similarly, is quantification over parts of worlds. If individuals are world bound, something both Lewis and Sider accept, then I am not a part of any other world but this one. I get counted as being a truck driver in some world when someone else standing in my stead, my counterpart, is a truck driver in that world. On this view, *de dicto* modality is quantification over counterparts. I have the property of possibly being a truck driver just in case there is a counterpart of me who is a truck driver. I am necessarily rational just in all of my counterparts are rational. Just as we can restrict the scope of quantification over worlds, we can also restrict quantification over counterparts and produce various restricted senses of *de re* modality. We restrict quantification over worlds by considering various accessibility relations between worlds. We restrict quantification over parts of worlds by considering various counterpart relations between individuals.

### 4.3.1 Comparative Similarity

Typically restricting the scope of quantification over worlds and individuals is accomplished by appeal to various comparative similarity relations. A comparative similarity relation holds between worlds  $w_1$ ,  $w_2$  and  $w_3$  when  $w_1$  resembles  $w_2$  more than  $w_3$  resembles  $w_2$ . The various comparative similarity relations are determined by the balancing of the various respects of similarity and their importance. Judgments about restricted *de dicto* modality, then, are judgments about comparative similarity of worlds. In the same way, judgments about restricted *de re* modality are judgments about comparative similarity of particulars.

(If particulars are world bound, then *all* judgments of *de re* modality are judgments about comparative similarity of particulars.) Similarity relations across possible worlds and parts of possible worlds are therefore central to modality for the Neo-Humean.

Two constraints on comparative similarity should be noted. First, the relation generates a weak ordering of worlds, so that for any two worlds, the contextually determined comparative similarity relation will say which is more similar to the actual world—unless they are equally similar, which is permitted. Second, the actual world counts as most similar to the actual world. Beyond that, not much in general can be said.

Comparative overall similarity relations are inherently vague and context sensitive. There are many respects in which one thing can be similar to another, and in some contexts we focus on one to the exclusion of others, while in other contexts we consider several respects and weigh their importance relative to each other. The context typically determines what respects we are to consider when making overall similarity judgments, and how to weight the respects. We make judgments, for example, about the overall similarity of cities. Sometimes we are interested in the population size; other times, the population density; still others, the demographics of the population. And, of course, those are only a few respects of similarity, and they concern only the population. That is to say nothing about geography, politics, culture, economics, history and all the other respects in which cities might be similar.

Nevertheless, we can and do make such judgments all the time. In fact, Lewis takes the imprecision to be an *attractive* feature of the theory, since restricted modalities are imprecise too:

[T]he restricting of modalities...is a very fluid sort of affair: inconstant, somewhat indeterminate, and subject to instant change in response to contextual pressures. Not anything goes, but a great deal does. And to a substantial extent, saying so makes it so... (Lewis, 1986a)

In sum, since restricted modality, including *de re* modality, depends on comparative similarity, the Neo-Humean view is that it is a fluid, context sensitive affair. In one context we may enthusiastically assert that P is possible. In others, we might scoff and deny P's possibility. And—here is the important upshot so far—since the truth conditions themselves are context dependent, we could easily be correct in *both* contexts.

### 4.3.2 Counterfactuals

Though comparative similarity is such a fluid affair, in some cases we have standard resolutions of the vagueness of similarity. According to Lewis, counterfactual reasoning is one such case. Reasoning about counterfactual scenarios—what would have happened had such-and-such been the case—is a type of reasoning about modality. And so the Neo-Humean accounts for the truth of various counterfactuals in much the same way that they account for true modal claims: by appealing to possible worlds and similarities between them.

Consider, for example, the counterfactual, “If Nixon had pushed the button, there would have been nuclear war.” Let ‘ $\Box \rightarrow$ ’ represent the counter-factual conditional. We read ‘ $\Box \rightarrow b$ ’ as ‘if it were that a, it would be that b.’ The Nixon counterfactual is thus: (Nixon pushes the button)  $\Box \rightarrow$  (nuclear war occurs). The antecedent invites us, according to the Neo-Humean, to consider certain possible worlds, namely, those where Nixon pushes the button. To determine the truth of counterfactual, we look to see if the consequent is true in those worlds. Not *all* of them, though, since the Neo-Humean thinks that Nixon's pushing of the button could co-occur with any distinct event. Speaking with our quantifiers unrestricted, there are worlds where Nixon's pushing of the button is followed by nuclear war. There are worlds where it is followed by the button inexplicably turning to mush. There are worlds where Nixon's pushing the button is immediately preceded by how things actually were on December 1st, 1809, and is immediately followed by how things are at this very moment in time, so that I (or my counterpart) could truly say that he pushed the button just one moment ago even though he is now dead and buried. Some of the worlds

where the antecedent is true don't concern us. In fact, Lewis claims that when assessing counterfactuals, we consider only those worlds that are most similar to the actual world under the following resolution of the vagueness of similarity. (For what follows, see Lewis (1979).)

Two respects of similarity, according to Lewis, are important in counterfactual contexts, similarity of laws and similarity of particular matters of fact. We will discuss the Neo-Humean view of laws below, but for the moment we can think of laws as regularities that meet some further condition. In each particular world, there are no violations of the laws, or miracles, since laws are universal regularities. If there were a violation of the regularity, it would no longer be a universal regularity. Still, we can talk about violations of law in the following sense: An event,  $e$ , that occurs in a world,  $w_1$ , counts as a violation of the laws in some other world,  $w_2$ , just in case the laws of  $w_2$  do not allow events like  $e$  to occur. Two worlds can differ, roughly, in either a significant or a minor way with respect to the laws. A significant difference in laws is, for example, the widespread presence of events in one world that are not allowed by the laws of the other world—widespread miracles. A minor difference in laws is, for example, a small, isolated miracle. Just as there can be significant or minor differences with respect to the laws, two worlds can be similar with respect to particular matters of fact by having exact match over some stretch of space and time or merely approximate match.

Reasoning about counterfactuals is governed by the following prioritization of those respects of similarity. It is of primary importance to minimize widespread violations of the laws of nature. It is of secondary importance to maximize exact match in particular matters of fact. It is of tertiary importance to minimize small violations of the laws. And it is of little or no importance to maximize approximate match of particular matters of fact. Similarity with respect to the laws tend to compete with similarity with respect to particular matters of fact, and the standard resolution favors similarity with respect to the laws.

Return to our counterfactual, “If Nixon had pushed the button, there would have been nuclear war.” Which of all the worlds where Nixon pushes the button count as closest to the actual world under this ranking of respects of similarity—the worlds where nuclear war occurs or the worlds where it does not occur? According to Lewis, a world where Nixon pushes the button but nuclear war does not occur must be one where large scale violations of the laws of nature of the actual world occur. All the traces of Nixon’s button pushing must be erased from the history of that world by a series of successive miracles. So even though it matches the actual world in large areas of particular matters of fact—it differs only in Nixon’s pushing of the button and the successive series of miraculous events but thereafter unfolds as the actual world does—it is less similar to the actual world than a world where he pushes the button and nuclear war ensues. That world requires only a small miracle to initiate Nixon’s button pushing.

Notice that this standard resolution does not allow ‘back-tracking’ counterfactuals. We back-track if we reason thus: If Nixon had pushed the button, then he would have been a different sort of person than he actually was, and if he had been a different sort of person, then he would have had a different upbringing, and so on. If we suppose that determinism is true and hold the laws fixed, then the closest world where something that in fact didn’t happen does happen is one where the past is entirely different. But because of Lewis’ weighting of respects of similarity, the standard contexts disallow back-tracking. After all, perfect match in particular matters of fact, i.e., the history of the universe up to the antecedent of the counterfactual, is more important in comparative similarity than is the small violation of the laws required to implement the antecedent (if determinism is true).

The truth conditions for counterfactuals, then, are as follows:  $(P \Box \rightarrow Q)$  is (non-vacuously) true just in case some world where  $P$  and  $Q$  are true is more similar to the actual world than is any world where  $P$  is true and  $Q$  is false. That is,  $(P \Box \rightarrow Q)$  is true just in case it takes less departure from actuality to get  $(P \wedge Q)$  than it does to get  $(P \wedge \neg Q)$ . And the similarity of worlds in counterfactual reasoning is determined by the above

standard resolution of the vagueness of the similarity relation.

#### 4.4 Causation

Using just the resources that the above account of modality offers, the Neo-Humean can offer a theory of causality. The resources are not much—she has only local, particular matters of fact, both in the actual world and in other possible worlds, and similarity comparisons between them—but they are enough. Traditionally, Humeans accepted some sort of regularity account of causation, whereby causation is just patterns in the distribution of local, particular matters of fact.<sup>9</sup> Various problems led many to reconsider, and Lewis (1973a) cemented the demise of the regularity account. (It is worth nothing, though, that a Neo-Humean could accept a law-based account of causation.) Lewis' own account, arguably the most common Neo-Humean view of causation, is the counterfactual account. Causation is undeniably closely linked with counterfactuals, and Lewis takes the connection to be reduction. Causation just *is* some sort of counterfactual relationship.

Suppose the glass is struck and it breaks. The striking causes the breaking if, were the striking not to have occurred, the breaking would not have occurred. More generally, causes make a difference in the world. Let lower case letters stand for events.  $c$  causes  $e$  just in case they are distinct, they both occur and, were  $c$  not to occur,  $e$  would not have occurred. (In the case where neither  $c$  nor  $e$  occur, we add the claim that, were  $c$  to occur,  $e$  would occur.) The last clause of the account is  $(\neg c \square \rightarrow \neg e)$ . When that clause holds of  $c$  and  $e$ , we say  $e$  is causally dependent on  $c$ . Given the above account of the truth conditions for counterfactuals,  $e$  causally depends on  $c$  just in case some world where  $c$  and  $e$  do not occur is closer to actuality than is any world where  $c$  does not occur but  $e$  *does* occur.

Now take the ancestral of causal dependence, and you've got the causal relation. We say  $c$  causes  $e$  just in case there is a chain of causal dependences between  $c$  and  $e$ , where

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<sup>9</sup>A classic statement of the view is Mackie (1974).

a chain of causal dependence is a finite series of events,  $f, g, h, \dots$ , where  $h$  causally depends on  $g$ ,  $g$  causally depends on  $f$ , and so on.

The view is simple and accounts nicely for the fact that causation does seem closely linked to counterfactual dependence. Given the account of the truth conditions for counterfactuals above, the counterfactual theory of causation also links causation with laws of nature, as seems appropriate. It is to the nature of laws that we now turn.

## 4.5 Laws

As one might expect given the constraints facing her, the Neo-Humean typically takes laws to be a type of regularity. They cannot be just any regularity, since some regularities are merely accidental. The challenge, for the Neo-Humean and anyone else who thinks of laws as a type of regularity, is to specify the further condition that distinguishes genuine laws from accidental regularities.

Lewis (1973b, 1994), following Ramsey (1978) and Mill (1947) before him, specifies the further condition in the following way: The laws are the regularities that appear as a fundamental part of the best, true theories of the world, those regularities that are appropriately systematic. Science aims for the best theory describing nature, and part of what it means to be best is for it to be simple and powerful. Simplicity and explanatory power often come at the expense of each other. We could, for example, get a very informative account by listing *all* the truths, but it would not be very simple. The best theories are those that balance simplicity and explanatory power (among other considerations). Think of a theory as a deductive system, a set of true sentences closed under deduction and axiomatizable. Suppose we fix what the best, true systems are, allowing that there may be multiple best systems. What, then, are the laws? The laws are those regularities that appear as axioms or theorems of all the best systems.

The best systems account of laws can account for the fact that some laws are vacuous,

but not all vacuous regularities are laws. Since generalizations about non-existent things all count as true, a simple account whereby laws are true generalizations allows too many laws. The generalization that all unicorns have white hair, for example, would count as a law. But it does not count as a law on the best systems account since, presumably, it will not feature in the best system. Generalizations that are idealizations, however, might count as laws even though they are vacuously true.

Laws are supposed to support counterfactuals. If it is a law that all Fs are Gs, then it should be the case that, for some individual, a,  $(Fa \square \rightarrow Ga)$ . It is strikingly straightforward how the account of counterfactuals and laws just described accommodates this. Laws support counterfactuals because the closest antecedent worlds, under the standard resolution of vagueness, are those worlds where the laws of the actual world are true. If the laws hold in those worlds, then all Fs are indeed Gs—the law is just the regularity. Since the antecedent and the law are true in all those worlds, the consequent must also be true. In short, laws support counterfactuals because when we reason counterfactually, we hold the laws fixed.

It goes without saying, but I shall say it anyway: The laws, on this view, are contingent. The same property that is actually embedded in a world with certain regularities may have been embedded in a radically different distribution of properties, with radically different regularities. There may be worlds with no laws, or at least no regularities that deserve the title. Here's one way that could happen: Imagine that, when we try to systematize the truths about the workings of the world, we come up with multiple systems that are equally simple and equally explanatorily powerful, yet whose laws contradict each other. Nature in such a world, says Lewis, is unkind. If nature is kind, then the best system will be "so far ahead of its rivals that it will come out first under any standards of simplicity, strength and balance" (Lewis, 1994). Though it might not have been, Lewis thinks it's reasonable to hope that our world is kind.

## 4.6 Causal Powers

The resources are in place for the Neo-Humean account of causal powers. It is true that objects have causal powers in virtue of having properties—but not *only* in virtue of having properties. The property alone is not the truthmaker because the Neo-Humean accepts Categoricalism, and so in some other world the property exists but the laws relating it to other properties are different than they are in this world.

The truthmaker is, rather, the property together with the laws of nature. The property is embedded in a distribution of properties that has certain regularities—that is why objects with that property have those causal powers. Objects that have that property have the power to  $\phi$  in circumstance  $c$  because in all the most similar worlds, all objects with that property in circumstance  $c$  *actually do*  $\phi$ . Since the most similar worlds in counterfactual contexts are, by stipulation, those that share the laws of nature, in all the most similar worlds, it is a universal regularity that instances of  $P$  in  $c$  are followed by the object  $\phi$ -ing. Thus the having of a property together with the laws entails, for the Neo-Humean, the truth of certain counterfactuals. Given that it's a law that all  $P$ s are  $Q$ s, if object,  $o$ , were to have  $P$ ,  $o$  would have have  $Q$ . Let us call this direct connection between properties and counterfactuals the Property-Counterfactual Link ( $P\text{-}\Box\rightarrow$  , for short). Let  $o$  be an object,  $P$  be a property,  $c$  be a circumstance, and  $\phi$  be the manifestation of a power. We can state the Property-Counterfactual Link thus :

$$(P\text{-}\Box\rightarrow): \forall o \forall P (Po \rightarrow \exists c \exists \phi [ (o \text{ is in } c) \Box\rightarrow (\phi o) ] )$$

A different, more typical, way to see the connection between properties and counterfactuals is by way of analysis of power or dispositional concepts. For this route, we first connect the having of a property,  $P$ , with either a covert power term, such as 'solubility,' or an overt power term, 'the power to  $\phi$  in circumstance  $c$ .' Let  $\mathcal{P}$  be a covert power term and  $\mathcal{P}_{\phi,c}$  be the overt power term 'the power to  $\phi$  in circumstance  $c$ .' Let us call this first step in the analysis route the Property to Power Analysis ( $P$  to  $(\mathcal{P} \vee \mathcal{P}_{\phi,c})$ , for short):

$$(\mathbf{P} \text{ to } (\mathcal{P} \vee \mathcal{P}_{\phi,c})) : \forall o \forall \mathcal{P} (\mathcal{P}o \leftrightarrow [ \exists \mathcal{P}(\mathcal{P}o) \vee \exists \mathcal{P}_{\phi,c}(\mathcal{P}_{\phi,c}o) ] )$$

Then, for all the properties that get analyzed in terms of a covert power term,  $\mathcal{P}$ , we analyze  $\mathcal{P}$  in terms of an overt power concept, such as the power to  $\phi$  in circumstance  $c$ . Let us call this the Covert to Overt Analysis ( $\mathcal{P}$  to  $\mathcal{P}_{\phi,c}$ , for short):

$$(\mathcal{P} \text{ to } \mathcal{P}_{\phi,c}) : \forall o \forall \mathcal{P} ( \mathcal{P}o \leftrightarrow \exists \mathcal{P}_{\phi,c}(\mathcal{P}_{\phi,c}o) )$$

Finally, we analyze the overt power concept in terms of the truth of certain counterfactuals. Let us call this the Overt Power to Counterfactual Analysis ( $\mathcal{P}_{\phi,c}$  to  $\square \rightarrow$ , for short):

$$(\mathcal{P}_{\phi,c} \text{ to } \square \rightarrow) : \forall o \forall \mathcal{P}_{\phi,c} (\mathcal{P}_{\phi,c}o \leftrightarrow \exists c \exists \phi [ (o \text{ is in } c) \square \rightarrow (\phi o) ] )$$

Using ( $\mathbf{P}$  to  $(\mathcal{P} \vee \mathcal{P}_{\phi,c})$ ), ( $\mathcal{P}$  to  $\mathcal{P}_{\phi,c}$ ) and ( $\mathcal{P}_{\phi,c}$  to  $\square \rightarrow$ ), we can derive ( $\mathbf{P}$ - $\square \rightarrow$ ).

This way of connecting properties to counterfactuals is similar to what is known as the conditional analysis of dispositions. Of course powers are importantly similar to, if not the same thing as, dispositions. Both are had in virtue of having properties, have typical manifestations and triggering conditions, and the manifestation of both involve causation. It is not surprising, then, that the Neo-Humean would think both are importantly related to counterfactuals.

We should be clear, however, to distinguish the truth of any of the above conditionals from the project of conceptual analysis, which is often how the conditional analysis is offered. As noted in Chapter 3, not all power or disposition concepts pick out natural properties. Indeed, to take the truth of the above conditionals as an analysis of the concepts seems precisely to take concepts to match perfectly with properties. Since I think the relation between concepts and properties is many-to-many, I am not here interested in the analysis of power or dispositional concepts, but rather in the truth value of some form of a conditional relating properties to counterfactuals and, if it is true, *why* it is.

The Neo-Humean takes some form of it to be true. What's more, she must think the right hand side of the conditional involves nothing inconsistent with Independence. Talk of

powers and dispositions is suspect to the Neo-Humean. We may use the language as long as we are clear that we are not committing ourselves to mysterious entities that violate Independence. Thus the conditional states on the right hand side the un-mysterious facts that make true the seemingly mysterious facts of the possession of powers or dispositions. The precise form the conditional is to take is of significant debate. In fact, many anti-Humeans argue that no such conditional is true. I shall return to this issue below in 4.7.1, where I consider several of the anti-Neo-Humean arguments, and in Chapter 6, where I defend a revised version of the conditional.

## 4.7 Objections

The Neo-Humean metaphysic is simple and powerful. If we accept Independence and the existence of mere *possibilia*, we can account for laws, causation and modality in a fairly straightforward manner. The theory is quite beautiful, actually, and should be admired—admired in the way that one admires a beautifully constructed and oddly convincing conspiracy theory. If you forget that the basic story is, well, crazy, and you focus on just the structure of the theory—its explanatory power and simplicity and so on—it is easy to be taken in. In the absence of a similarly well constructed alternative, the particular problems with the theory, if there are any, seem unable to move you. Just as in science, so in metaphysics: we permit anomalies to an otherwise successful theory in the absence of a successful alternative theory. The appropriate response to some particular problem when no solution is immediately obvious is: “Well, yes, but give me some time. After all, you don’t have a better alternative, do you?”

In what follows, my goal is twofold. First, I aim to present a few well known objections to the Neo-Humean metaphysic. I don’t intend to be exhaustive, nor do I intend the objections to be fatal or insurmountable. There is a veritable cottage industry producing ever more complicated responses to these well known objections. No doubt some contrived

solution is forthcoming. My claim will not be that no solution is possible, but rather that the solutions to these anomalies are additions of epicycles upon epicycles. It is time to look for an alternative.

Second, I aim to make vivid the intuitive cost of the Neo-Humean metaphysics. The basic story is, I think, nearly unbelievable. The incredulous stare is appropriate, and not just in the case of Lewisian possible worlds. I do not, however, wish to suggest that this is an independent reason to reject Neo-Humeanism. Intuitions are not dispositive. Rather, the aim is to reinforce the feeling that we ought to consider an alternative picture. If there is an alternative that is as theoretically powerful as Neo-Humeanism and incurs less intuitive cost, *that* is indeed a reason to reject Neo-Humeanism.

#### 4.7.1 Properties, Powers and Counterfactuals

I will begin with an objection most directly related to our topic of causal powers, aimed against the truth of the conditional relating properties to counterfactuals. The two most common objections to connecting properties to counterfactuals are finks and antidotes. (While both are typically presented as objections to the analysis route, they may apply to the direct route as well.) I think both objections fail, and I will argue in Chapter 6 that a revised form of  $(\mathbf{P}\text{-}\Box\rightarrow)$  is true. Below I suggest two ways of responding to the problem of finks, from Lewis (1997) and Bird (2007a). While I will move some way toward a response to the problem of antidotes, the full response will come in Chapter 6.

$(\mathcal{P}_{\phi,c} \text{ to } \Box\rightarrow)$  is, essentially, what is called the simple conditional analysis of disposition. Martin (1994) raised the problem of finkish dispositions as an objection to that analysis. A disposition is finkish just in case it is susceptible to a fink. Finks are possible because dispositions can be gained or lost and their manifestation often takes place over a span of time. Finks cause the object to gain (or lose) the disposition or power quick enough after the stimulus condition to allow (or prevent) the manifestation. Consider the claim that the wire is live, and let it be equivalent to “If the wire were touched by a conductor, then

electrical current would flow from the wire to the conductor.” The wire can become live and can cease to be live, and the flowing of the electrical current from the wire to the conductor takes time. Hence it is possible to cause the wire to become live or cease to be live in the short amount of time it would take the current to flow. Let the wire be hooked up to an *electro-fink*, a machine that can infallibly know when a conductor is touching the wire and can immediately cause the wire to become live or to cease to be live.

Suppose the wire is dead, but the electro-fink would make the wire live were it touched by a conductor. Since it is connected to the electro-fink, it is still true that if the wire were touched by a conductor, then electrical current would flow from the wire to the conductor, since the electro-fink would ensure it. Thus the truth of the counterfactual is not sufficient for the having of the disposition. Or suppose, for a second but similar case, that the wire is live but the electro-fink would make the wire dead if it were touched by a conductor. Though by supposition the wire is live, the counterfactual “If the wire were touched by a conductor, then electrical current would flow from the wire to the conductor” is false. Thus the truth of the counterfactual is not necessary for the having of the disposition.

Just as there can be finkish dispositions, so too it seems possible for there to be finkish powers. Water may have the power to dissolve salt finkishly because a divine agent has decided to remove the water’s power if salt were ever placed in it. Or the water may be too cold to have the power to dissolve salt, but the water may be hooked up to a dissolving-fink, so that, were salt to be placed in the water, the dissolving-fink would immediately warm the water so that the salt would dissolve.

In response to the problem of finkish dispositions, Lewis (1997) offers a revised conditional analysis. The solution involves appealing to the causal basis of the disposition. The causal basis of a disposition or power is the intrinsic property of the thing having the disposition or power that, together with its triggering condition, would cause the manifestation. The causal basis for a specific instance of solubility is some specific chemical structure. The causal basis of the power to repel negatively charged particles is negative charge itself

(assuming for the moment that negative charge is a natural property). As Jackson et al. (1982) argue, all dispositions have causal bases, whether the base is identical with the disposition or not.<sup>10</sup> The same can be said of causal powers. Finks work by removing the causal basis of the disposition or power before the manifestation can arise. To remedy this, the bi-conditional needs to rule out the removal of the basis, and that is Lewis's suggestion.

An object,  $o$ , is disposed or has the power to  $\phi$  in circumstance  $c$  just in case  $o$  has some intrinsic property,  $B$ —the basis of the power to  $\phi$ —which is such that, were  $o$  to be in  $c$  and continue having  $B$ ,  $Bo$  and  $c$  would be an  $x$ -complete cause of  $o$ 's  $\phi$ -ing. A cause is  $x$ -complete just in case it is 'complete in so far as havings of properties intrinsic to  $x$  are concerned' (Lewis, 1997). Let us call this the Revised Overt to Counterfactual Conditional (Revised  $\mathcal{P}_{\phi,c}$  to  $\Box\rightarrow$ , for short):

**(Revised  $\mathcal{P}_{\phi,c}$  to  $\Box\rightarrow$ ):**  $\forall o \forall \mathcal{P}_{\phi,c} (\mathcal{P}_{\phi,c}o \leftrightarrow \exists B \exists t_0 \exists t_1 ( t_0 < t_1 \wedge [(o \text{ is in } c \wedge o \text{ retains } B \text{ until } t_1) \Box\rightarrow ((c \wedge Bo) \text{ is an } o\text{-complete cause of } \phi)] ) )$

The electro-fink, we may suppose, works by changing the wire in some appropriate way before the wire can conduct the electricity (or just in time for it to conduct the electricity). Still, were the electro-fink not to change the wire, and the wire were live, then it would conduct electricity. Similarly, we may suppose that a divine agent has decided to change the water so that it cannot dissolve salt, but were the divine agent to leave the water alone, then the water would dissolve the salt placed in it.

If we took the problem of finks to be a problem for the direct route connection, (**P- $\Box\rightarrow$** ), we could revise it accordingly. Since we are talking about natural properties, the intrinsic property in question is just the property that is connected with the counterfactuals. So if an object,  $o$ , has some property,  $P$ , then there is some circumstance,  $c$ , and some effect,  $e$ , such that, were  $o$  to be in  $c$  and retain  $P$ ,  $c$  and  $o$ 's having of  $P$  would together be an

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<sup>10</sup>The other two of the three thesis defended in that paper—that dispositions are distinct from their causal bases and that they are causally impotent—are, I think, false when made about the natural properties, but perhaps true of the non-natural ones.

o-complete cause of e :

**(Revised P- $\square\rightarrow$ )**:  $\forall o \forall P (Po \rightarrow \exists c \exists e \exists t_0 \exists t_1 ( t_0 < t_1 \wedge [(o \text{ is in } c \wedge o \text{ retains } P \text{ until } t_1) \square\rightarrow ((c \wedge Po) \text{ is an o-complete cause of } e)] ) )$

Both **(Revised  $\mathcal{P}_{\phi,c}$  to  $\square\rightarrow$ )** and **(Revised P- $\square\rightarrow$ )** solve the problem of finkish dispositions or powers. Suppose that one of them were true. Even ignoring for the moment the problem of antidotes, that would not be sufficient for the Neo-Humean. The right hand side of the conditional must be consistent with Independence. It would not do, for example, if some irreducibly causal connection were smuggled into the bi-conditional. The use of *cause* presents no problem unless the counterfactual account of causation fails, but what of the use of *retains*? What is it to say that a retains B until  $t_1$  but that the instantiation of B at  $t_0$  is suitably connected—that is to say, causally—with the instantiation of B at  $t_1$ ? Slightly more troubling, in my opinion, is the restriction that the property in question, the base property, is *intrinsic*. An intrinsic property of me is one that a perfect duplicate of me would have. Ignoring the troublesome cases, we can say, with Langton & Lewis (1998), that an intrinsic property is one that is independent of accompaniment and loneliness. An object is accompanied just in case it co-exists with an entirely distinct, contingent object; otherwise it is lonely. Thus an intrinsic property is one that can be had or not had by an object, regardless of whether that object is accompanied or lonely.

Lewis doubts that we must appeal to irreducibly causal notions in order to explicate what an intrinsic property is. But I'm not so skeptical. Consider a sphere in this world and its lonely duplicate. One thing I know about the sphere in this world is that, were I to touch it, it would cause certain sensations in me. Another is that, were I to push it down an incline, it would roll. Many such things are true of the sphere inhabiting the actual world. Are any such things true of its lonely duplicate? On the Neo-Humean picture, there are lonely duplicates of the actual sphere about which none of those counterfactuals can be truly asserted. Consider one such lonely duplicate. It would not roll were it pushed down

an incline. It would not feel smooth were I (or my counterpart) to touch it. In fact, it would clunk down the incline, if it moved at all, in much the same way that a square in the actual world would, and it would feel pointy, just as the corners of a square would in the actual world. It seems possible that this lonely duplicate of the sphere would have the tendency to act exactly like a square would in the actual world. And yet we are to suppose that it is an intrinsic duplicate of the sphere? I find it hard to believe. Either the lonely duplicate is not an intrinsic *duplicate* after all and, hence, that the offered definition of intrinsic is not correct, or it is an intrinsic duplicate and it would act in at least some of the ways that the actual sphere would act. But then, returning to (**Revised  $\mathcal{P}_{\phi,c}$  to  $\square\rightarrow$** ) above, by asserting that the base property is intrinsic we have smuggled causal facts into the right hand side of the bi-conditional. If these causal facts are irreducible to counterfactuals, the Neo-Humean is in trouble. (Notice, however, that there is no appeal to intrinsicity in (**Revised P- $\square\rightarrow$** ), though it does assume the understanding of natural properties defended in Chapter 3.)

Even if that were correct, all is not lost. There is another way to see that finks are not a problem for a connection between properties and counterfactuals. If we narrow our discussion to natural properties, finks never arise (as Bird (2007a) argues). In the case of natural properties, the property is itself the basis for the causal powers had in virtue of that property. Thus a fink could not work by removing some other intrinsic property of the object; it would have to work by removing the property itself. Suppose, for example, that the charge of electrons is a natural property. Negatively charged particles have the power to repel other negatively charged particles. If charge is a natural property, then the causal basis of charge is charge itself. Thus if a fink were to remove the basis of the power to repel negatively charged particles before the repelling occurs, it would have to remove the particle's negative charge.

In order for a fink to do that and thereby stop the repelling, negative charge cannot act instantaneously. If it were to act instantaneously, there would be no time for the

fink to do its work. Furthermore, even if charge does not work instantaneously—if the manifestation occurs sometime after charge encounters its triggering conditions—the fink can do its work only if charge must persist through the time between the occurrence of the triggering conditions and the occurrence of the manifestation. If the persistence is not required, then the fink’s removal of negative charge would do nothing to stop the manifestation from occurring.

Either causation can occur across a spatial or temporal gap or it cannot. If it can, as some interpretations of quantum mechanics seems to suggest, then it seems as if the continued presence of the cause in either spatially or temporally close proximity to the effect is not required for the effect to occur. But then a fink cannot stop the manifestation from occurring by doing anything to the power in or during the gap. If, on the other hand, causation cannot occur across a temporal gap, then there are two cases. In case one, time is quantized; in case two, it is not. Consider case one where time is quantized. It seems that the manifestation occurs at the very next moment. If it did not, then the cause persists just as it is for some span of moments in time, and then the manifestation occurs. The cause cannot cease to exist since causation cannot occur across a spatial or temporal gap, by supposition. But then, as Bird suggests, there could be no reason for the manifestation to depend on the cause at one moment but not the previous, since the cause at the one moment is intrinsically identical to the cause at any other. Hence it looks like it depends on the first occurrence of the cause, and no subsequent occurrence is needed. On the other hand, consider case two, wherein time is not quantized. Here it looks as though the manifestation cannot occur after all, since the cause must be contiguous in space and time with the effect, but that is not possible if space and time are not quantized. Either way, then, finks cannot work their way into the picture.

To help see the point, consider the following example. Suppose at  $t_0$  Eddie the electron encounters its triggering condition by being closely situated to Eleanor the electron. Eddie’s power to repel Eleanor, we may suppose, manifests itself at  $t_1$ : Eleanor is repelled at  $t_1$ .

A fink could have prevented it only by removing Eddie's negative charge sometime after  $t_0$  but before  $t_1$ . If  $t_0 = t_1$ , then the fink could not have done the job. If, on the other hand,  $t_0 \neq t_1$  and there is no moment in between, so that  $t_1$  is the very next moment, then the fink could not have done the job. Finally, if Eddie's repelling of Eleanor would occur whether Eddie was negatively charged after  $t_0$  or not, then again the fink could not have done the job. ("I'll be different; I promise," would be met only by "You were too repelling the first time.") But the above argument suggests that either there is no moment in between or the repelling would have occurred regardless of Eddie's subsequent change. Hence, there can be no finks to Eddie's negative charge. Of course, nothing depended on the specific character of negative charge, and so the same can be said of all natural properties. There can be no finks to the natural properties.

Finks are not the only problem facing the connection between properties and counterfactuals, however. *Antidotes* to powers work, not by removing the power itself, but by altering the circumstances in which the power finds itself.<sup>11</sup> An antidote to a poison need not work by changing the chemical structure of the poison; it can work by changing the way the body responds to the poison, preventing any ill effects that would otherwise occur were the poison ingested. While it seems correct to say that poison does indeed have the power to kill those who ingest it, if I were to ingest it *after taking an antidote*, it would not kill me.

If we take the analysis route, we must locate the problem of antidotes at either ( $\mathcal{P}$  to  $\mathcal{P}_{\phi,c}$ ) or (**Revised**  $\mathcal{P}_{\phi,c}$  to  $\Box \rightarrow$ ). If we do the former, we could respond to the problem by recasting the overt power term that analyzes the covert power term. We might do so by saying that the covert term 'poisonous' is not equivalent to 'the power to kill when ingested', but is rather equivalent to 'the power to kill when ingested-in-the-absence-of-antidotes' (as Lewis does). Unfortunately, it's not clear whether there is such an equivalent overt term for every covert power term.

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<sup>11</sup>Johnston (1992) calls antidotes 'masks.'

If we do the later, locating the problem of antidotes at (**Revised  $\mathcal{P}_{\phi,c}$  to  $\Box \rightarrow$** ), we could respond to the problem by explicitly excluding antidotes from the conditions specified in the antecedent of the counterfactual. Thus ‘the power to kill when ingested’ is not equivalent to ‘were someone to ingest it, they would die,’ but rather ‘were someone to ingest it without antidotes, they would die.’ But this solution seems to trivialize the connection between overt power terms and counterfactuals. What the resulting equivalence says is that the power to kill when ingested would manifest itself—except when it doesn’t.

Instead of concerning ourselves with the analysis route between properties and counterfactuals, I suggest we take the direct route. The analysis route risks confusing concepts with properties, and perhaps also risks reifying powers as distinct from properties. What’s more, the problem of antidotes is more serious if we take the analysis route. Indeed, Bird (2007a) seems to rest content with the hope that nature will prove kind, and that there simply won’t be any antidotes to the fundamental properties. A metaphysics should not rest on such an unsure foundation.

The problem lies not in the metaphysics, but in taking the analysis of concepts as a route to understanding the metaphysics. If we take the direct route, concerning ourselves instead with the connection between the instantiation of properties and the truth of counterfactuals, we will instead think of properties as making true various propositions about what objects with that property would do in the various circumstances they find themselves in. Once we see this, we will not view antidotes as at all problematic, but rather as part of those circumstances in which the property might find itself. In some circumstances, a poisonous chemical would kill a person who ingested it—roughly in those circumstances where no antidote is in play. But in those circumstances where antidotes are in play, the poisonous chemical still contributes causally, just not by contributing to a death. It might, for example, contribute causally to a certain chemical reaction that leads to a mild stomach ache instead of death. To say that properties are powers is just to say that they make true all the counterfactuals describing how objects with that property would act in the specific

circumstance they might find themselves in, including those situations involving antidotes. The details of this proposal are left to Chapter 6.

#### 4.7.2 Singularism versus Generalism, and Locality

General causal facts relate types of events; singular causal facts relate tokens of those types. A singular causal fact is, for example, this man's smoking causing his cancer. A general causal fact is, to continue the example, the fact that smoking causes cancer. The debate between singularists and generalists is a debate over which sort of facts are more fundamental. The causal singularist believes that singular causal facts are fundamental and determine the general causal facts (if there are any). The causal generalist, on the other hand, believes that the general causal facts are primary to the singular ones.

The Neo-Humean, as we have presented her, is a causal generalist. The counterfactual account as described above grounds singular causal facts in counterfactuals. The truth of counterfactuals is grounded in truths about comparative similarity, which in turn are in part grounded in laws, which are universal *generalizations*. Of course the Neo-Humean might accept a different account of counterfactuals or laws, and so needn't be a generalist, but as presented here, and as is most common, the Neo-Humean accepts generalism.

Some take generalism to be objectionable. Anscombe (1971), for example, argues that there is no reason to suppose that every singular causal relation can be subsumed under a causal law. It is important to note, however, that singularism and generalism do not exhaust the alternatives. One might take the eliminativist route about either singular or general causal facts. Alternatively, one might think that both sorts of facts are genuine, but neither is more fundamental. Nomicism, at least as defended by Armstrong & Heathcote (1991), identifies singular causal relations as instantiations of the necessitation relation, and so takes both singular and general causal facts to be genuine and yet takes neither to reduce to the other. General causal facts are the second order states of affairs wherein the necessitation relation relates two properties. Particular causal facts are instantiations of

these second order states of affairs. Since the second order fact does not entail the first order instantiations, the later is not reducible to the former.

In Chapter 6, I will defend another view that takes both singular and general causal facts to be genuine and irreducible. General causal facts are true counterfactuals describing the essential, powerful nature of properties. Singular causal facts are the manifestation of these powerful properties, where the manifesting is to be understood as the holding of a primitive, external relation between cause and effect. Or to put it another way: *General causal facts are the having of powers or capacities, and the exercise of those powers are singular causal facts.* As a result, singular causal facts never occur without the subsequent general causal facts holding.

Thus I find nothing objectionable about the existence of irreducibly general causal facts *per se*. There are, nevertheless, two important differences between the generalism of the Neo-Humean and the acceptance of general causal facts by the Neo-Aristotelian. First, the Neo-Humean thinks that the general causal facts supervene on the entire local distribution of *non-causal* facts. I consider objections to this supervenience thesis in the next section.

Second, the Neo-Aristotelian's general causal facts are *local* in a way that the Neo-Humean's are not. For the Neo-Humean, the singular truths are fully determined by, and indeed are reduced to, something in part *external* to themselves, both in space and in time. The Neo-Humean thinks of causal facts as counterfactual dependencies. Since counterfactuals are grounded, in part, in the laws of nature, which the Neo-Humean construes as certain types of regularities, the causal facts are, in part, grounded in regularities across space and time in this and in other similar possible worlds. The local happenings involved in my throwing the rock and the glass shattering are not sufficient to make it the case that the rock caused the glass to shatter. Similarly, the local happenings involved in my pain and my wincing are not sufficient to determine if the pain causes the wincing. We must look across all of space and time to determine if similar throwings are followed by similar shatterings, if similar pains are followed by similar winces.

The point is not an epistemic one. It is not merely that we couldn't be sure if my pain causes my wincing. Whatever epistemic solution one has to the problem of induction can be used by the Neo-Humean to address this worry. (That is, so long as the solution is consistent with Independence. It is no surprise that the problem of induction seems most forceful in a Humean metaphysic.) Rather, the point is metaphysical: It is not ontologically determined what causes what by purely local matters of fact. Distant past and future events—and merely possible events as well!—are just as important to determining whether my wincing was caused by my pain. There are worlds just like this one, with respect to what happens in them, up until this point in history and even far into the future where my wincing is not caused by my pain. (Since the Neo-Humean account of causal powers depends on the accounts of laws and counterfactuals, causal powers, too, are non-local in just this sense.)

The Neo-Humean must bite this bullet. As Lewis (1994) puts it, “Like any regularity theory [of laws], the best-system analysis says that laws hold in virtue of patterns spread over all of space and time. If laws underlie causation, that means that we are wrong if we think, for instance, that causal roles of my brain states here and now are an entirely local matter. That’s an unpleasant surprise, but I’m prepared to bite the bullet.” The bullet is indeed unpleasant. On this view, every causal activity is non-local. Agency, for example, is a causal activity. As Timothy O’Connor points out,<sup>12</sup> the Neo-Humean seems committed to saying that whether I have ever even acted at all, freely or otherwise, is metaphysically open long after my death—a surprising and unpleasant result if ever there were one.<sup>13</sup>

### 4.7.3 Causal Supervenience

According to the Neo-Humean, all causal truths supervene on the entire spatio-temporal distribution of particular, *non-causal* matters of fact. Causal facts are not a fundamental

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<sup>12</sup>See his web post at [http://gfp.typepad.com/the\\_garden\\_of\\_forking\\_pat/2006/09/index.html](http://gfp.typepad.com/the_garden_of_forking_pat/2006/09/index.html) and the discussion in the comments.

<sup>13</sup>Hawthorne (2004) argues against Neo-Humeanism along similar lines but appeals to the causal nature of consciousness. For an attempt to make this non-local nature of causation seem less troublesome, see Hall (2004a).

feature of the universe, but reducible to, because supervenient upon, non-causal facts—in particular, facts about all the categorical happenings, both near and far in space and time, and entirely disconnected by space and time. Tooley (1990) offers an argument against this causal supervenience thesis. According to Tooley, there can be worlds that are exactly similar with respect to the non-causal facts, but which differ with respect to the causal facts.

Consider a world,  $w_1$ , that is indeterministic and has two laws. The first law governs property P, and the second law governs property S, but the laws are otherwise identical. It is correct to say of both properties that the having of the property causes either the having of Q or the having of R, but not both:

**Law 1:**  $\forall x [ ((Px \text{ causes } Qx) \vee (Px \text{ causes } Rx)) \wedge \neg(P \text{ causes } (Qx \wedge Rx)) ]$

**Law 2:**  $\forall x [ ((Sx \text{ causes } Qx) \vee (Sx \text{ causes } Rx)) \wedge \neg(S \text{ causes } (Qx \wedge Rx)) ]$

Suppose, further, that object  $o$  has both P and S. If  $o$  subsequently gained only Q or only property R, the defender of supervenience might appeal to causal overdetermination.  $o$ 's having of Q was caused both by  $o$ 's having P and by  $o$ 's having S. Though I think overdetermination is problematic, we can ignore this case because a different case makes the problem for supervenience worse. Suppose, instead, that  $o$  subsequently gained *both* Q and R. What are the relevant causal relations? According to the reductionist, they should be fixed by the non-causal facts. But the non-causal facts in this case cannot fix the causal relations because there are two distinct possibilities: first,  $o$ 's having P caused  $o$ 's having Q and  $o$ 's having S caused  $o$ 's having R; second,  $o$ 's having P caused  $o$ 's having R and  $o$ 's having S caused  $o$ 's having Q. Since the non-causal facts cannot fix which causal relations hold, supervenience fails.

Let  $w_1$  be a world with Laws 1 and 2, and where  $o$  has P and S and subsequently gains both Q and R. The structure of Tooley's argument is thus:

1. If  $w_1$  is possible, then causal supervenience fails. (Premise)

2.  $w_1$  is possible. (Premise)
3. Therefore, causal supervenience fails. (1, 2)

Some Neo-Aristotelians cannot endorse this argument. Since one version of that view claims that properties are individuated by their causal roles, it is committed to denying that this putatively possible world is genuinely possible, and hence that premise 2 is false. If Law 1 and Law 2 are the only laws governing properties P and S, then P and S have the same causal roles, and so must be identical.

Nevertheless, there is an argument in the neighborhood that Neo-Aristotelians can endorse. It is not that  $w_1$  is possible, but rather that Neo-Humeanism should be committed to  $w_1$ 's possibility. This argument is thus a *reductio* of Neo-Humeanism:

1. If Neo-Humeanism is true, then causal supervenience holds. (Premise)
2. If Neo-Humeanism is true, then  $w_1$  is possible. (Premise)
3. If  $w_1$  is possible, then causal supervenience fails. (Premise)
4. Therefore, If Neo-Humeanism is true, then causal supervenience fails. (2, 3)
5. Therefore, if Neo-Humeanism is true, then causal supervenience holds and causal supervenience fails. (1, 4)

The key premises in the argument, I think, are premise 2 and 3. After all, few, if any, Neo-Humeans would deny causal supervenience. Thus premise 1 looks secure. Let's start with premise 3? A Neo-Humean might deny it by claiming that  $o$ 's instantiation of either Q or R (or both) are uncaused. Or she might claim that the instantiation of both Q and R are caused, but it's ontologically undetermined which of P or S is the cause. Neither option seems promising.

All that remains is to deny premise 2. And it might, at first glance, seem like the obvious choice for the Neo-Humean, since from premises 1 and 3 we can validly conclude that if Neo-Humeanism is true, then  $w_1$  is not possible. Why, then, should anyone accept premise 2? Independence guarantees that the distribution of particular matters of fact is possible. The Neo-Humean thus must deny that  $w_1$  could be governed by just those laws. Whereas the functional identity of the two laws presents a problem for some Neo-Aristotelians, it

does not for the Neo-Humean because of Independence. Why, then, might Laws 1 and 2 not reflect the genuine nomic structure of  $w_1$ ? It seems to me as if the only possible response here is to assert that, since causal supervenience holds, there simply *must* be further nomic structure. But in the context of this argument, such a response would beg the question.

#### 4.7.4 Nomic Supervenience

Just as the Neo-Humean takes the causal facts to supervene on the non-causal, so she takes the nomic facts to supervene on the non-nomic. And just as many anti-Neo-Humeans object to the causal supervenience thesis, so too many object to nomic supervenience. The problem with nomic supervenience stems from vacuous laws. Earlier we saw that the account of laws defended by Lewis, the best systems account, allows some but not all vacuous generalizations to count as laws. This was a reason to prefer the best systems account over a simple regularity account of laws.

But some vacuous generalizations are laws, and this makes trouble for Neo-Humeanism. Tooley (1977) asks us to consider a world,  $w_1$ , with 10 types of fundamental particles. (What follows is my presentation of Tooley's example.) For each two particle interaction but one, we have discovered an independent law. For the remaining two particle interaction, say between x-type and y-type particles, no law has been discovered because, given the laws and the initial conditions—we may suppose determinism—x and y particles have never and will never interact. Nevertheless, it seems plausible to suppose that there is a law describing how x and y particles would interact, say, that the interaction would result in the x particle being spin up.

To see the plausibility, imagine a series of worlds similar to  $w_1$ , except where x-y particle interactions do occur. (Such interactions, we may suppose, are independent of other two particle interactions.) In  $w_5$ , things are as much like they are in  $w_1$  as possible, but there are 4 x-y particle interactions, each of which resulting in the x particle being spin up. In  $w_4$ , there are 3 such interactions, in  $w_3$ , 2, and in  $w_2$ , 1. The differences between  $w_5$  and  $w_4$ ,  $w_4$

and  $w_3$ , and  $w_3$  and  $w_2$  do not seem sufficient to make a nomic difference. They differ only in the occurrence of one contingent, local event. But then the difference between  $w_2$  and  $w_1$  should also not make a nomic difference. Either there is a nomic difference between  $w_2$  and  $w_1$ , and thus nomic facts seem implausibly sensitive to contingent, particular matters of fact, or there is no nomic difference between them.

If there is no nomic difference, if somehow some vacuous generalizations count as laws, then supervenience fails, as Carroll (1994) argues. Here is one version of that argument. Imagine a second series of worlds,  $w_{10}$  through  $w_7$ , that are as similar to worlds  $w_5$  through  $w_2$  above as possible except that the result of the x-y interactions are the x particle being spin *down*. The differences between  $w_{10}$  and  $w_9$ ,  $w_9$  and  $w_8$ , and  $w_8$  and  $w_7$  again seem nomically insignificant. But then it seems possible that there is a world,  $w_6$ , that is nomically identical to  $w_7$  but where no x-y interactions occur. Now we may compare  $w_1$  and  $w_6$ . They are, we may suppose, exactly identical with respect to the particular matters of fact, but they differ nomically, since in  $w_1$  it is a (vacuous) law that x-y particle interactions result in the x particle being spin *up*, but in  $w_6$  it is a (vacuous) law that x-y particle interactions result in the x particle being spin *down*. So either there is a nomic difference between  $w_1$  and  $w_2$  and between  $w_6$  and  $w_7$ , and hence that nomic facts are implausibly sensitive to contingent particular matters of fact, or there is no nomic difference, and hence nomic supervenience fails.

Let  $w_1$  be a world with a (vacuous) law that x-y particle interactions result in the x particle spin up, and  $w_6$  a world with a (vacuous) law that x-y particle interactions result in the x particle spin down. The structure the argument is thus:

1. If  $w_1$  and  $w_6$  are possible, then nomic supervenience fails. (Premise)
2.  $w_1$  and  $w_6$  are possible. (Premise)
3. Therefore, nomic supervenience fails. (1, 2)

As was the case with the argument against causal supervenience, so too here it is important to note that the Neo-Aristotelian must be careful when endorsing Carroll's argument (as

Bird (2007a) points out), since the Neo-Aristotelian claims that the nomic roles of  $x$  and  $y$  particles are essential to them. Thus it would not be possible to have two worlds,  $w_1$  and  $w_6$ , with the *same* particles governed by *different* laws. If it really is an  $x$  particle in both worlds in exactly the same situations, they will of necessity act in the same way.

Nevertheless, there is as before an argument in the neighborhood that Neo-Aristotelians can endorse. It is not that  $w_1$  and  $w_6$  are possible, but rather that some proposition, together with Neo-Humeanism, entails that they are possible. (This argument is thus a *reductio* of Neo-Humeanism.) The proposition in question is that the laws of nature are not sensitive to small changes in contingent matters of fact:

1. If Neo-Humeanism is true, then nomic supervenience holds. (Premise)
2. If Neo-Humeanism is true and laws are not sensitive to small changes in contingent matters of fact, then  $w_1$  and  $w_6$  are possible. (Premise)
3. Laws are not sensitive to small changes in contingent matters of fact. (Premise)
4. Therefore, if Neo-Humeanism is true, then  $w_1$  and  $w_6$  are possible. (2, 3)
5. If  $w_1$  and  $w_6$  are possible, then nomic supervenience fails. (Premise)
6. Therefore, If Neo-Humeanism is true, then nomic supervenience fails. (2, 3)
7. Therefore, if Neo-Humeanism is true, then nomic supervenience holds and nomic supervenience fails. (1, 4)

How might the Neo-Humean respond to the above argument? Since the Neo-Humean accepts nomic supervenience, she accepts premise 1. Since the two laws in question contradict each other, premise 5 must be true. Neo-Humeanism's commitment to Independence guarantees that both series of worlds,  $w_1$  through  $w_5$  and  $w_6$  through  $w_{10}$ , are possible. Premise 3 guarantees that the small differences between each world in the series does not make a difference in the laws of the worlds, and so premise 2 is true.<sup>14</sup>

She must, therefore, deny premise 3; she must claim that the small differences in each series of worlds at some point make a nomic difference. Beebe (2000), for example, claims that the only reason to think that there is no nomic difference is to accept a "governing"

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<sup>14</sup>Because the Neo-Aristotelian does not accept Independence, she is not committed to the existence of both series of possible worlds, and hence replacing Neo-Humeanism in premise 2 with Neo-Aristotelianism does not produce a true premise. It is an interesting question, however, whether the Neo-Aristotelian can accept premise 3. I address this question in Chapter 6.

conception of the laws of nature, according to which the laws are already out there, dictating how things unfold before all of history has occurred. Since the argument is “clearly born of the view that particular matters of fact depend upon the laws and not vice versa,” it is question-begging since the Neo-Humean rejects this view.

Note, however, that the revised argument claims not that  $w_1$  and  $w_6$  are possible, but that the Neo-Humean should be committed to their possibility. Beebee clearly thinks that it is not committed to their possibility, since the laws are determined by *all* of the contingent particular matters of fact. According to Beebee the Neo-Humean should deny premise 3. Of course Beebee is not claiming that it is obvious or intuitive that premise 3 is false. As she puts it, “if you want to be a Real Humean. . . you have to purge a lot of intuitions about laws that are quite widely accepted . . .” True, that, and it captures nicely what I think the upshot of the above version of Carrol’s argument is: there may very well be reasons to believe nomic supervenience, but we should not pretend that it incurs no intuitive cost.

#### 4.7.5 Pre-emption

So far I have considered objections that most Neo-Humeans think are easily answered, if only by biting the bullet. The problem of pre-emption is a different matter. It and the problem discussed in the next section are seen by many as the most difficult problems—problems which must be solved in order for Neo-Humeanism to be successful. And there is no shortage of attempted solutions to the problem of pre-emption. In short, the typical problem of preemption is that causal dependence (as defined by the Neo-Humean) does not seem necessary for causation since there might be a back-up causal process waiting in the wings, so to speak, so that if the actual cause were to fail, the back-up process would still bring about the effect.<sup>15</sup>

Consider, first, the problem dubbed ‘early pre-emption,’ where a potential causal chain  $c_1$  leading to some effect is interrupted by some other chain  $c_2$  well before the effect is

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<sup>15</sup>Trumping pre-emption, on the other hand, is a counterexample to the *sufficiency* of causal dependence.

brought about by  $c_2$ .  $c_2$  pre-empts  $c_1$  and does so early. A typical example is the conspiring of two assassins to kill their victim. Seeing the first assassin fire her gun and kill the target, the second refrains from firing. If the first assassin had not fired, however, the second would have, and since the second assassin is an expert (we may suppose), she would have been successful. Thus, while the first assassin actually caused the death of the target, the death is not causally dependent on her firing, since the second assassin would have brought about the death. The second assassin was pre-empted early by the first.

Because Lewis' account of causation takes the ancestral of causal dependence, the problem of early pre-emption is easily solved. While the death is not causally dependent on the firing, it is 'stepwise' dependent, since there is a chain of events, each step of which is causally dependent on the prior step. The result of this is that causation is transitive on Lewis' account. While I will not press the matter here, some think that there are successful counterexamples to the transitivity of causation, and thus that this is an objectionable feature of Lewis' account. Lewis (2000) notes that many of the alleged counterexamples share a common structure: Red and Black are opposing forces of some kind or other. Red makes some move that ordinarily would cause Red to triumph. But Black makes a countermove in response which results in Black's triumph. Red's move caused Black's move, which in turn caused Black's triumph. And since causation is transitive, Red's move caused its own defeat. McDermott (1995) gives a version of this sort of example: Suppose A and B each have a switch in front of them with a left and a right position. If both switches are in the same position, C receives a shock. A, seeing that both switches are in the same position and not wanting to shock C, flips her switch to the right. B, seeing A flip her switch to the right and wanting to shock C, flips her switch to the right as well, and C is thus shocked. A's flipping of her switch caused B's flipping of her switch, which in turn caused the shock. Thus the Neo-Humean account must say that A's flipping the switch is a cause of C's being shocked.

While I think these sorts of counterexamples are problematic for the Neo-Humean,<sup>16</sup> the problem of ‘late pre-emption’ seems to me much more difficult, and so I will focus on that problem instead. Suppose Suzy throws a rock at a bottle and hits it, and the bottle shatters. Suzy’s throwing the rock caused the bottle’s shattering. Suppose also that, at the same time that Suzy threw the rock, Billy threw a rock as well. As it happens, Billy’s throw was on the money and would have shattered the bottle, had Suzy’s rock not shattered it first. Billy’s throw was simply a little slower. Thus for each step in the chain from Suzy’s throw to the rock shattering, there is no causal dependence. At every moment in path of Suzy’s rock until the actual shattering, Billy’s rock was there, ready to cause the shattering. And so the counterfactual theory cannot account for the clear causal relation between Suzy’s throwing and the shattering. There is neither causal dependence nor stepwise dependence.

One possible solution is to construe events as fragile. An event, *e*, is fragile just in case *e* could not have occurred at a different time or in a different manner. If all events in pre-emption cases are fragile, then pre-emption poses no problem. After all, if Suzy had not thrown the rock, the bottle would have shattered at a slightly different time or in a slightly different manner. Lewis is reluctant, however, to say that all events are fragile as this does not accord with our pretheoretical use of the concept of an event. Lewis’ (2000) solution, instead, is to alter the type of counterfactual dependence posited. *c* causes *e* not just when whether *e* occurs depends on whether *c* occurs, but rather when whether, when and how *e* occurs depends on whether, when, and how *c* occurs. Say that when an event, *e*, covaries counterfactually with *c* in this way, *c* *influences* *e*. Lewis’ account of causation, then, is that it is the ancestral of influence.

But as Hall & Paul (2003) argue, there are cases of seemingly clear causation without influence. Suppose that some neuron  $N_1$  sends a signal that results in some other neuron  $N_2$  firing. Suppose also that some third neuron  $N_3$  fires in such a way that it would also result

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<sup>16</sup>See Lewis (2000) for a response. In short, he thinks that the reasons we seem ready to accept the cases as counterexamples are not persuasive.

in  $N_2$  firing, but that  $N_1$ , simultaneous to its sending the signal that results in  $N_2$  firing, emits a retarding force on the signal from  $N_3$  so that it goes slower than it would ordinarily. In fact, were  $N_1$  not to emit the retarding force (and so not cause  $N_2$  to fire), the signal from  $N_3$  would move faster and thus cause  $N_2$  to fire at exactly the same time it in fact fires. We may similarly suppose that, in addition to the timing, the manner of  $N_2$ 's firing does not covary with the manner of  $N_1$ 's firing by, for example, supposing that both signals that  $N_1$  emits are extra sensitive to the physical characteristics of  $N_1$ . In short, one can concoct late pre-emption counterexamples to just about any variation of the counterfactual account of causation.<sup>17</sup>

It is perhaps for this reason that some philosophers have appealed to the intrinsic nature of causal processes. (See Lewis (1986c) and Hall (2004b).) On this view, ordinary types of causal processes are accounted for by way of causal dependence or influence, while other, more difficult cases of pre-emption are accounted for in terms of *quasi-dependence*. The causal processes that we intuitively think are causal in cases of pre-emption (and yet do not display causal dependence) count as causes by way of courtesy, since they are intrinsically like other causal processes that do display causal dependence. The latter causal processes, we say, display quasi-dependence. (The use of 'intrinsic' here is a bit disingenuous, since the laws of nature must be held fixed, and the laws are universal generalizations ranging over events wholly extrinsic to the process in question.)

One problem with quasi-dependence is cases of trumping preemption. Schaffer (2000) raised the problem of trumping pre-emption, and Lewis cited it as one of the primary reasons to reject the quasi-dependence account. The cases of late preemption discussed above work by cutting off the preempted causal process before the purported effect occurs.<sup>18</sup> In

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<sup>17</sup>These sorts of examples would also count, *mutatis mutandis*, against a counterfactual account that relies on the fragility of events.

<sup>18</sup>For an attempt to use this fact—that preempted causes do not go to completion—in an account of causation, see, for example, Ramachandran (1997). Since not all cases of preemption work in this way, it seems to me that such attempts fail.

cases of trumping, the preempting cause in some sense *overrides* the preempted cause *without* cutting it off. A typical example is that of simultaneous, identical commands from a sergeant and an officer.<sup>19</sup> Since the soldier knows to obey the higher ranking officer, the officer's command trumps the sergeant's and so is the cause. Unfortunately for the quasi-dependence account, the sergeant's command and the soldier's subsequent action are intrinsically identical (holding fixed the laws) to a process where there is genuine causal dependence—one where, for example, the sergeant, but not the higher ranking officer, gives the order. Since the soldier's action is therefore quasi-dependent on the sergeant's command, the sergeant's command counts as a cause. Whereas cases of late preemption are counterexamples to the necessity of causal dependence for causation, trumped pre-emption cases threaten even the *sufficiency*. There are at least two options for the Neo-Humean regarding trumping. One, as Lewis noted, is to construe cases of trumping as cases of cutting. Perhaps when the soldier hears the officer's order, "this places a block somewhere in his brain, so that the signal coming from the sergeant gets stopped before it gets as far as it would have . . ." Alternatively, the Neo-Humean can construe such cases as cases of genuine causal overdetermination.<sup>20</sup>

Hall (2004c) has persuasively argued that one final kind of pre-emption, 'double pre-emption,' nicely displays the dilemma the Neo-Humean faces. Consider the following case from Hall: Two pilots, A and B, set out for a bombing run. The second pilot, B, notices an enemy pilot zero-ing in on A, and shoots the enemy plane down. A then successfully completes the bombing run. Had B not preempted the enemy, the enemy would have preempted the successful bombing, and so the bombing is causally dependent on the shooting down of the enemy.

To see cases of double preemption more clearly, it will be helpful to make use of the

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<sup>19</sup>Lewis (2000) cites Bas van Frassen as the source of this example.

<sup>20</sup>Note that one option is not available to the Neo-Humean but is available to the Neo-Aristotelian: To construe the trumping and trumped causes events as *jointly sufficient*. Had either event been absent, the other would have been sufficient, but neither is sufficient in the presence of the other. Each is an antidote to the other's sufficiency. I consider Neo-Aristotelian responses to the problem of preemption in Chapter 6.

neural diagrams that Lewis made popular. In such diagrams, circles represent neurons, and the circles are either shaded in to represent the firing of the neuron, or white to represent the non-firing of the neuron. An arrow between two neurons represent a stimulatory connection between them, but a line with a small circle on the end represents an inhibitory signal between the two neurons. Finally, the order of time is from left to right. Compare Figures 4.1 and 4.2. Both include a possible case of preemption, but in one the preempting cause

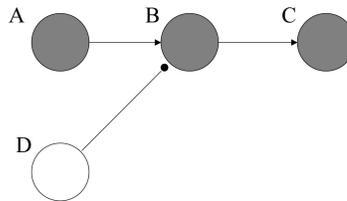


Figure 4.1: A's firing causes B's firing, which causes C's firing. D does not fire.

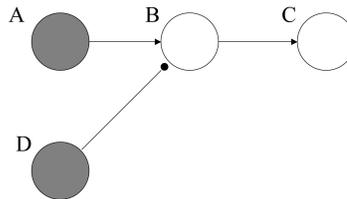


Figure 4.2: A fires, but is preempted by D's firing.

occurs and in the other it does not.

Let's return, then, to a simplified version of double preemption, illustrated in Figure 4.3. Suppose there is some causal process from event A to B to C. Further suppose that there is some event, E, which were it to occur would pre-empt the process from A to C late and hence prevent C. Let D be some event that would normally cause E. Finally, let F be some event, which were it to occur would pre-empt the process from D to E late and hence prevent E. Finally, suppose A, D and F occur, and hence F preempts D. As a result, E does not occur and so C occurs caused by A.

Here, then, is the dilemma facing the Neo-Humean: Either F is a cause of C or it is not. Suppose that it is. After all, C is causally dependent on F since, were F not to occur,

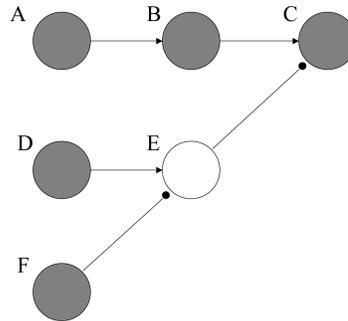


Figure 4.3: Double Preemption

C would not occur. This reasoning might lead one to think that the absence of E would turn F into a non-cause, since absent E, D would not occur and so there would be no need for F to prevent it. But accepting this forces one to deny the intrinsic nature of causation. The alternative is to suppose that F would still be a cause of C even though the event F prevented did not and would not have occurred, which seems highly implausible. Thus taking the first horn of the dilemma, that F is a cause of C, leads to the conclusion that causation is extrinsic. The other horn of the dilemma, that F is not a cause of C, entails that causal dependence is not necessary for causation. The Neo-Humean is thus faced with a choice: she must either deny the intrinsic nature of causation or deny the necessity of causal dependence for causation.<sup>21</sup> And even if she takes the first route, cases of late preemption discussed above threaten the necessity of causal dependence.

It is worth repeating the words of Lewis (1973a) when discussing the prospects of a regularity account of causation. Modified only slightly, they seem especially apt:

<sup>21</sup>Hall's preferred option, instead, is to maintain that there are two types of causation, one that satisfies the dependency account and one that satisfies the intrinsic account. He calls them dependence and production. I see nothing wrong with recognizing that we have a variety of causal concepts, but to take this as evidence for a dualism of the metaphysics of causation is, I think, wrong on at least two counts. First, it seems to me that we have *many* different causal concepts, not two, because causal explanation is a many and varied thing, depending on our interests and the circumstances. And second, we should not take our concepts as mirroring our ontology.

It remains to be seen whether any [counterfactual] analysis can succeed in distinguishing [preempting causes from preempted events]—and whether it can succeed without falling victim to worse problems, without piling on the epicycles, and without departing from the fundamental idea that causation is [counterfactual dependence]. I have no proof that [counterfactual] analyses are beyond repair, nor any space to review the repairs that have been tried. Suffice it to say that the prospects look dark. I think it is time to give up and try something else.

#### **4.7.6 The Big, Bad Bug: Chance**

Just as most Neo-Humeans take the problem of pre-emption seriously, so too they take the problem of chance seriously. The discussion until now has for the most part assumed determinism. Indeterminism complicates matters significantly. While my discussions of chance will be brief, and hence skip both important issues and much of the vast and rich literature on the subject, I do think it's important to see the difficulties the Neo-Humean has in accounting for chance. Lewis (1986b) once said of chance that, “[i]t is here, and here alone, that I fear defeat. But if I'm beaten here, then the entire campaign goes kaput.” I will begin with the central difficulty Lewis was addressing—how to account for chance-y laws—and his attempts to overcome the difficulty. I will then consider problems with the Neo-Humean account of counterfactuals and causation in the context of chance.

#### **Chance and Law**

The Neo-Humean account of laws, assuming determinism, is the best system analysis, according to which the laws are the theorems of the best deductive system of the world. The candidate systems describe the world truly, and the best of those systems is the one that best balances strength with simplicity. Lewis (1994) extended this system to account for chance in the following way. In addition to asserting truths about what events occur in the

world, we allow the system to assert the chances for events to occur (while falling silent about whether chancy events actually occur or not). The best of the candidate systems is now decided by how well the systems balance strength, simplicity, and ‘fit.’ One system fits the world better than another when the first assigns a higher probability to the actual history of events than does the second.

So far so good: The extended best system account of laws has the same advantages the original version did over a simple regularity account. It can distinguish between accidental and genuine regularities, and it allows (in some cases) for vacuous laws. It is important to note that the laws about chance are determined by the actual frequencies in the entire distribution of space and time. The view is, after all, committed to Humean Supervenience, and so that distribution must fix the laws. The laws need not be identical to the frequencies, since the best system allows some variance from the actual distribution if the variance comes with a gain in simplicity, strength or fit. But it is not possible for there to be two worlds that share identical total histories but have different laws, since that would violate Humean Supervenience.

It is this commitment to Humean Supervenience that leads to the problem of undermining, a problem Lewis was, at one point, seriously worried about. Let the probabilistic laws of the world be history-to-chance conditionals of the form, ‘if the history of the world until time,  $t$ , is  $H_t$ , then at  $t$  the probability that  $A$  is true is  $x$ .’ Let the system of laws,  $T$ , entail all history-to-chance conditionals. Intuitively, the problem of undermining is this: At any given point in time,  $T$  may assign a non-zero probability to a course of future events which, if it were to pass, would contradict  $T$ . If that future were to come to pass, the laws would not be as they are, and yet the laws say that this is possible. Lewis calls this ‘peculiar,’ but in typical Lewisian fashion is willing to accept it short of an actual contradiction.

The problem Lewis called the ‘big, bad bug’ is that in conjunction with the Principle Principal (PP), an epistemic principle relating objective chance to subjective probabilities (credence), the best system analysis of laws does in fact entail a contradiction. PP, in short,

tells us that we should conform our credence to the objective chances. If all we know about the occurrence of some future event is that the objective chance of it occurring is  $x$  (i.e., no prophet has announced to us that it will occur), then we should believe to degree  $x$  that it will occur. More formally, following Lewis (1980, 1994): Let  $C$  be some credence function that assigns degrees of belief. Let  $P$  be a function that gives the present objective chances for propositions. Let  $A$  be some proposition about a future occurrence. And let  $E$  be a proposition that specifies the chance of  $A$  in accordance with  $P$  and does not contain any inadmissible information (i.e., no prophet's declarations). Then the Principle Principal is:

$$\text{PP: } C(A/E) = P(A)$$

Given that our evidence,  $E$ , includes the fact that the chance of  $A$  is  $x$  but includes nothing entailing the actual truth value of  $A$ , then our credence about  $A$  should be  $x$  as well. Since  $E$  will include the chances, and the chances are history-to-chance conditionals, PP is often put in terms of the conjunction of the laws,  $T$ , and the history up to some time  $t$ ,  $H_t$ :

$$\text{PP: } C(A/H_t T) = P(A)$$

It is fairly straightforward to derive a contradiction from PP and the Neo-Humean theory of laws. Let  $A$  describe an undermining future. For example, let the entire world consist in a series of one million coin tosses and suppose that the objective chance of heads is 0.5. Pick the halfway point in the series so that there are 500,000 coin tosses to go, and suppose that the frequency of heads to that point is 50%. Let  $A$  be a future in which all the tosses come up heads. Since objective chances do not entail frequencies, this future is not impossible (though it is highly improbable). Thus  $P(A) > 0$ . But  $A$  is an undermining future—if it were to come about, the laws and chances would be different than the actually are. The frequency of heads would be 75%, and thus the objective chance would be somewhere near 0.75, not 0.5 as  $E$  specifies.  $A$  and  $E$  are thus incompatible:  $C(A/E) = 0$ . Applying PP, we derive  $0 > 0$ . The central problem is that PP does not allow evidence about the future, but chances as construed by the Neo-Humean do in fact contain information about the future.

The Neo-Humean account of chance therefore turns PP into a principle that we can never use.

Lewis (1994) and Hall (1994) independently presented a solution to this problem. The solution involves modifying PP to allow Neo-Humean chances without deriving a contradiction. Whereas the original principle conditionalized on the chances on the left hand side of the equation (the credence side), the new principle conditionalizes both sides. As before let  $T$  be the conjunction of laws, including the probabilistic laws, of a world and  $H_t$  the history of the world up to time  $t$ . Thus the New Principle is:

$$\text{NP: } C(A/H_t T) = P(A/T)$$

Undermining futures no longer present a problem, since they are inconsistent with the relevant objective chances. When  $A$  is an undermining future,  $P(A) > 0$  still holds, but  $P(A/T) = 0$ . What's more, NP gives results very close to PP in ordinary cases. Provided that  $A$  concerns some events which are small in proportion to the total number of such events in all of space and time,  $P(A)$  will be very nearly the same as  $P(A/T)$ .

There are, however, several problems with this account. Lewis (1994), for example, complains that this complication is unfortunate. The old principle was more “intuitive,” while the new one “gets quite messy.” In fact, Lewis maintains that the old principle is still the “key to our concept of chance.” While Neo-Humean chances do not fully satisfy the old principle, and so are imperfect candidates, they are still the best available and so count as the chances. “[N]ear enough is good enough,” says Lewis.<sup>22</sup> (This leaves the door open for another account of chance to claim that it can satisfy the old principle better, and hence better deserves the name of chance.) The problem of ‘zero fit,’ addressed by Elga (2004) among others, is another example. Because many candidate systems—systems that ascribe different objective chances to the world—ascribe zero chance to the actual sequence

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<sup>22</sup>Contra Lewis, Arntzenius & Hall (2003) argue that if anything satisfies NP, then something satisfies PP *perfectly*, and thus should count as the chances. What thereby counts as chances, they argue, behaves in unfortunate ways, and so Lewis should abandon his insistence that the chances follow PP.

of a world involving an infinite series of events, the notion of fit does not helpfully rank the candidate systems in such worlds.

For my purposes here, I will ignore these and other problems. Instead I will focus on the problem raised by Hoefer (1997), which I take to be the most significant one facing the Neo-Humean. In short, if the Neo-Humean is to take her Neo-Humeanism seriously, she should not think that the chances ‘govern’ the unfolding of events, and yet if she takes the Neo-Humean theory of chances seriously, she seems forced to do so.<sup>23</sup> Hoefer begins by noting that, on the Neo-Humean account under consideration, the value of  $P(T)$  is defined. But from the perspective of a Neo-Humean, this should seem as a “putting of the cart before the horse.” The chances are defined by the entire spatio-temporal distribution of events. For the theory of chance to give an answer about what the chance of the entire spatio-temporal distribution of events suggests that laws are governing those events, not *vice versa*. The Neo-Humeans, suggests Hoefer, ought to regard  $P(T)$  as “an amusing bit of nonsense.”

Matters are worse, however. Hoefer argues, in short, that the Neo-Humean ought not let the chances guide her credence for scenarios large enough to undermine the laws—by way of NP or PP. To do so is to give the objective chances a governing role in the unfolding of the universe. Hoefer has us imagine that the end of the world is near in a world with 30 coin flips in its past history, exactly 15 of which have landed heads. Only 10 flips remain. Suppose that power, simplicity and fit determine that there are three possible laws for this world, and which laws are actual depend on how the remaining 10 coin flips land. If between 1 and 9 of the flips land heads, the laws would be  $T$ , if 0 land heads, the laws would be  $T'$ , and if all 10 landed heads, the laws would be  $T''$ .  $T$  says that the objective chance of a coin flip landing heads is 0.5;  $T'$  says that it's 0.25; and  $T''$  says that it's 0.75. In fact, we may suppose, 4 of the 10 remaining coin flips land heads, and the laws are  $T$ .  $T$  assigns

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<sup>23</sup>It is worth noting an argument by Black (1998) in the same vicinity. Black suggests that the only way for the Neo-Humean to derive NP from the stipulative definition of chance is to “adopt the pattern of prior credences which you *would* adopt if you were a *realist* about chances.”

a non-zero chance to both the series of coin flips in which 0 land heads and the series in which all 10 land heads.

Let our evidence include the frequency of heads in the first 30 coin flips, the objective chances, and the fact that there are only 10 remaining coin flips. What should our credences be regarding the various possible outcomes of the series of the remaining 10 coin flips? Since we conditionalize on T, we should give no credence at all to the 0 heads and 10 heads outcome, since they are undermining futures. But what of the other possible outcomes? NP tells us to distribute our credence across the various possible outcomes, from 1 flip landing heads to 9, according to the objective chances. Thus the “middle” outcomes (4, 5, or 6 flips landing heads) deserve more credence than the outliers (1 or 9 landing heads).

But this is precisely what the Neo-Humean shouldn't say. The entire pattern of events, *including the future 10 coin flips*, determine the laws. The laws are simply an informative summary of all of history. The laws do not guide the unfolding of these events, since the events are ontologically prior to the laws. Thus, while it would be appropriate to give no credence to the undermining outcomes, it would not be appropriate—it would not be *Neo-Humean*—to give more credence to any one of the non-undermining futures than any other on account of the objective chances. To do so is to think of those chances as governing the world, in some way determining how those flips will go.

Instead, Hofer suggests that the Neo-Humean should restrict the domain of application of the Neo-Humean concept of objective chance. When considering a possibly undermining future, a sequence of events large relative to the total number of such events,

we are dealing with a set of events to which the concept of *Humean* chance does not properly apply. . . [A]ll we can know is that the sequence has to be one compatible with the law, period. Among the sequences equally fit to establish the laws, we can't claim to have reason to think one type or token more probably than another.

Roberts (2001), among others, suggests a similar restriction of the domain of chance. We should accept the connection between credence and chance, according to Roberts, only when our evidence is of a sort that subjects like us could in principle have. Since our actual evidence is never so informative as to entail that the chance of a future event has some specific value, we will never be in a position to assert the chance of undermining futures. The Neo-Humean view of chance has the chances determined by the entire history of the world, the future included, and so we could never be in a position where the objective chances are part of our evidence.

Whatever the means for restricting the domain of chance, it appears that a Neo-Humean ought to do so if she is to be, to use the phrase from Beebe (2000), a ‘Real Humean.’ But this restriction comes at a cost. It opens the door even wider to an alternative theory of chance that better fits the chance role as defined by Lewis. According to Lewis, chance is whatever it is that best satisfies the PP. Because of the problem of undermining, Lewis thinks nothing fills the chance role perfectly, but Neo-Humean chances do it best. In a similar way, Hoefer suggests that the domain of chance is more restricted than might be suggested by PP, but so restricted it still satisfies the chance role near enough. But the Neo-Aristotelian account of chance, the propensity theory according to which in an indeterministic world properties are propensities, can accept PP unrestrictedly and unrevised. Undermining futures present no problem for the Neo-Aristotelian, because the chances do not supervene on history, but on the natures of the properties in the world. (I discuss the Neo-Aristotelian account of chance briefly in Chapter 6.)

Lewis’ objection to anti-Neo-Humean theories of chance is that on that view the connection between chance and actual frequencies is too loose for the anti-Neo-Humean to have any reason to accept PP:

Be my guest—posit all the primitive unHumean whatnots you like. . . But play fair in naming your whatnots. Don’t call any alleged feature of reality ‘chance’

unless you've already shown that you have something knowledge of which could constrain rational credence. I think I see, dimly but well enough, how knowledge of frequencies and symmetries and best systems could constrain rational credence. I don't begin to see [how knowledge of the whatnots] could constrain rational credence [about future occurrences]...I can only agree that the whatnots deserve the name of chancemakers if I can already see, disregarding the names they allegedly deserve, how knowledge of them constrains rational credence in according with the Principle Principal.

Lewis's primary target here is Nomicism, which I discuss in Chapter 5 (and, in particular, a version of the inference problem), but he seems to think the point applies to any 'unHumean whatnots,' including primitive propensities.

In Chapter 6 I will suggest that this complaint is not as successful against the Neo-Aristotelian as it is against the Nomicist. But I will here end with a different point, made persuasively by Hall (2004d): that it is not as clear as Lewis may have hoped how knowledge of *Neo-Humean* whatnots could constrain rational credence—in fact there is good reason to suppose that in some cases, it *couldn't* do so.<sup>24</sup> If Hall is correct, as I think he is, the problem of deriving PP from the chance-makers is not a uniquely anti-Neo-Humean problem; it is actually worse for the Neo-Humean. What follows is Hall's argument.

Consider a simple world of particles that obey Newtonian laws except for collisions between them. When two particles collide in this world, they either rebound in a manner that is perfectly elastic, or they stick together in a manner that is perfectly inelastic. Classify each possible collision by the combined mass of the particles that collide, and suppose that you know that there are many, many collisions of particles for each possible combined mass—that is, all but one mass,  $M_1$ . There is only one collision of particles whose combined mass is  $M_1$ . Suppose that for all the other collisions, the frequencies of elastic outcomes across

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<sup>24</sup>See Strevens (1999) for an argument for the much stronger claim that we could not, *no matter what our chance-maker*, give a non-question-begging argument for PP.

all of space and time conform closely to the formula,  $e^{-kM}$ , where  $k$  is a constant and  $M$  is the combined mass of the two particles. Given that, on the whole, the frequencies of collisions follow that formula, the reductionist should elevate it to a law. Of course it will get one type of frequency wrong, and so the fit will not be perfect: The frequency of elastic outcomes of collisions when the combined mass is  $M_1$  will be either 0 or 1, not, say, 0.3 as we may suppose the law predicts. But this should not keep the Neo-Humean from asserting the law that the chance of an elastic outcome is equal to  $e^{-kM}$ .

Suppose, now, that you are about to witness the one collision of combined mass  $M_1$ . Plugging  $M_1$  into the formula, suppose you get the chance of an elastic outcome is 0.3. Using just the Neo-Humean chance-makers, can we show that our credence ought to be 0.3? You know the frequency of the type of event you are about to witness is either 1 or 0. Applying the principle of indifference, we might think we should assign our credence the value of 0.5. What is it about the Neo-Humean facts—the frequencies—that forces us to assign our credence the value of 0.3 instead? The information about the frequencies of *other types* of collisions seems irrelevant. As Hall puts it, “[a]ll that *is* relevant is that you are about to observe a collision of a certain type, and the frequency of elastic outcomes among collisions of that type is either 1 or 0.” Indeed, unless something about the frequencies, simplicity and fit rationally forces you to set your credence to 0.3 that this unique type of collision will result in an elastic outcome, the Neo-Humean is not merely unable to derive PP—she must say it is false. Thus if anyone is at a disadvantage in attempting to account for the truth of PP, it is the Neo-Humean. There may be some other way to derive PP from the Neo-Humean chance-makers, but it is certainly not clear, even ‘dimly,’ how this would work. Moreover, there is some reason, in the form of the above example, to suppose that it *could not* be done.

### Chance and Counterfactuals

The problems about chance are not confined to the Neo-Humean account of laws. The theory of counterfactuals faces difficulties, too. Suppose that coin tosses are indeterministic, and that Alice and Ben are tossing a fair coin and placing bets on the outcome. Ben bets tails, Alice tosses the coin, and it lands heads. Alice says, “If you had bet heads, you would have won.”<sup>25</sup> That seems true. Can the Neo-Humean account of the truth conditions for counterfactuals deliver that result?

Alice’s counterfactual is true, according to Lewis’s semantics for counterfactuals discussed above, just in case all the closest worlds where Ben bets heads are worlds where the coin lands heads. The closest worlds are then determined by some resolution of the vagueness of similarity of worlds. The one suggested by Lewis puts the avoidance of widespread miracles as most important, the large scale, perfect match of particular matters of fact as second, and the avoidance of small miracles as third. Thus, the closest worlds according to these three factors will be those that share all history prior to some point shortly before Ben’s bet but where some small difference in events right before Ben bets leads him to bet on heads rather than tails. This small difference need not require a miracle if the actual process that leads to Ben to bet tails is indeterministic, but if it does require a miracle, the closest worlds will be those that take a small miracle. Then, since the closest worlds will, but for that one small difference, unfold according to the actual laws, Alice will then toss the coin and it’s outcome will not be determined. In some of the closest worlds, it lands heads, and in some it lands tails. Thus using the first three factors for similarity of worlds leads one to say that the counterfactual is in fact false, not true as it originally had seemed.

Lewis’s fourth clause for determining the overall similarity of worlds was added to deal with cases such as these. It says that it is of “little or no importance” that the worlds are

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<sup>25</sup>The example is originally from Slote (1978). Lewis (1979) cites it in passing. Barker (1999) and Hiddleston (2005b), among others, consider this and similar cases significant enough to warrant rejection of the Neo-Humean account of counterfactuals.

approximately similar in particular matters of fact. If it is of little importance rather than of *no* importance, then of those worlds where Ben bets heads, the most similar ones are those where the coin toss lands heads. Since it lands heads in the actual world, keeping that fixed in the other worlds secures an approximate match in matters of fact. Unfortunately, as Lewis himself noted, “different cases come out differently.” (Lewis’s response is simply to note that he “would like to know why.”) Hiddleston (2005b) drives the point home nicely considering cases quite similar to the coin toss case but which require that approximate match counts for *nothing*. Consider Hiddleston’s fourth example:

Alice offers Ben a bet on a coin toss, but this time Alice can influence its outcome. Ben bets tails. Hoping to win, Alice flips the coin so that it has a high chance (.8, say) of landing heads. It does land heads. She says to Ben, “If you had bet heads, you would have won.”

This time the counterfactual seems false. But if approximate match helps determine similarity of worlds, then it turns out true.

There are other examples, but the point is, I think, sufficiently clear. Different cases require different resolutions of the vagueness of overall similarity of worlds. What’s more, it is not our intuitive notion of similarity that is driving the decision, but the *outcome*. That is, the only way we can come up with some weighting of the respects of similarity in the different cases is to see whether we think the counterfactual is true or false, and then reverse engineer some system of weights that delivers the result. As Lewis (1979) put it,

The thing to do is not to start by deciding, once and for all, what we think about similarity of worlds, so that we can afterwards use these decisions to test [the Neo-Humean theory]... Rather, we must use what we know about the truth and falsity of counterfactuals to see if we can find some sort of similarity relation—not necessarily the first one that springs to mind—that combines with [the theory] to yield the proper truth conditions... [W]e must use what we know

about counterfactuals to find out about the appropriate similarity relation—not the other way around.

What the above examples show is that, even if we follow Lewis’s suggestion to reverse engineer the similarity relation, we cannot find *one* such relation to do the work that is needed.

Indeterminism led Lewis to amend the system of weights of respects of similarity for a different reason. Consider the counterfactual offered by Hawthorne (2005),

1. If I had dropped this plate, it would have fallen to the floor.

If indeterminism is true and certain of our fundamental physical theories are correct, many crazy events have a non-zero probability of occurring. In particular, there is a non-zero probability that the plate would have flown off sideways. Thus, we might be led to assert,

2. If I had dropped this plate, it might have flown off sideways.

In light of 2, we might amend 1 to get,

3. If I had dropped this plate, it would very likely have fallen to the floor.

Lewis (1986d), however, wanted to maintain the truth of 1 and other similar, ordinary counterfactuals. (And so he wished to maintain that *both* 1 and 3 are true.) To do this, he introduced the notion of a ‘quasi-miracle.’

A quasi-miracle is an event that, while not strictly a violation of the laws, is ‘extraordinarily improbable.’ Of course improbability is not sufficient, since any event is highly unlikely given the right contrast class. Rather it is improbability plus remarkability, ‘the way in which the chance outcomes seem to conspire to produce a pattern.’ Because such an event would be “quite unlike the goings-on we take to be typical of our world” its occurrence would make for a significant difference from our world. In effect, Lewis suggests that we alter the standard resolution of the vagueness of overall similarity of worlds to say that it

is of primary importance to avoid a large, widespread miracle *or quasi-miracle*, and it is of tertiary importance to avoid a small, localized miracle *or quasi-miracle*. This allows Lewis to maintain the truth of ordinary counterfactuals such as 1 above in the face of indeterminism. Since the plate's flying off sideways would count as a quasi-miracle, those worlds where the plate flies off sideways would not count as most similar to the actual world under this altered ordering of weights of similarity.

But Hawthorne (2005) has raised several problems with this account. Each problem seems serious, but I shall mention only one. It seems not at all unlikely that this world contains many, many quasi-miracles. Hawthorne considers as one of many examples the fact that the apparent diameter of the sun as seen from the earth's surface is identical to that of the apparent diameter of the moon. Lewis was not concerned with this possibility, but it seems we should be concerned. If the actual world contains many quasi-miracles, then the presence of quasi miracles in other worlds should not count against their similarity with the actual world.

### **Chance and Causation**

A third problem for the Neo-Humean account of counterfactuals and chance, raised by Elga (2001), is directly relevant to the the counterfactual theory of causation. Recall that, in order to get the right verdict in cases of causation, the resolution of the vagueness of overall similarity of worlds must exclude backtracking counterfactuals. Consider two worlds, a divergent world and a convergent world. A divergent world is one that shares all the history of the actual world prior to some point in time,  $t$ , and in which a small miracle occurs at  $t$  that results in different histories after  $t$ . A convergent world, on the other hand, is one which shares all of history with the actual world shortly *after*  $t$  because of some miracle that results in different history *before*  $t$ . Lewis claims that it takes a larger miracle to get a convergent world than it does to get a divergent world.

Consider, for example, Nixon pushing the button. A divergent world is one exactly like

our world until just before Nixon pushes the button, and unlike the world after that since a nuclear holocaust occurs. A convergent world is one whose history priori to Nixon's pushing the button is entirely different, but owing to some miracle after he pushed the button, has a future exactly as the actual world does. Lewis claims that the convergent world would require a widespread miracle to cover up the traces of Nixon's pushing the button, whereas the divergent world just needs some small miracle to get Nixon to push the button.

Elga argues, however, that this runs afoul of statistical mechanics. Elga has us consider the following example. Suppose Gretta cracks an egg at 8:00 into a frying pan. Which counterfactual is true?

1. If Gretta had not cracked the egg, then at 8:05 there wouldn't have been a cooked egg in the pan.
2. If Gretta had not cracked the egg, then at 7:55 she wouldn't have taken the egg out of the refrigerator.

Imagine a world in which the process beginning at 8:00 and proceeding to 8:05 looks exactly like the process in the actual world but flipped over in time, running from 8:05 to 8:00. In this world, the egg sits in the pan slowly uncooking, and then suddenly leaps back into a waiting shell which then closes around the uncooked egg. Such a process is consistent with the laws of our world, even if it would be quite remarkable. What's more, the process is extremely sensitive to changes in the initial condition. The smallest changes in the state of the egg at 8:00 result in the egg just sitting there rather than uncooking and jumping back into its shell.

Given this, we can consider a world which shares the future with the actual world from 8:05 on. In such a world, we may suppose, there is a tiny miracle inserted at 8:05 and the laws are run *backwards*. In this world, the egg formed as a rotten puddle of egg in a pan long ago, and slowly un-rotted, then cooked and so on, until at 8:05 it *looks* as though Gretta cracked the egg at 8:00 when in fact she didn't. Since the egg was never cracked, the world

counts as one of the worlds to consider when attempting to decide which of 1 or 2 above is true. Since it shares perfectly a large section of particular matters of fact, and has only some small miracle at 8:05, it is at least as close to the actual world as one where a the history before 8:00 is shared but history after 8:05 is different because of a small miracle. Hence Lewis' account of causation, dependent as it is on the asymmetry of counterfactual dependence, is not consistent with statistical mechanics.

Finally, I note briefly one further problem with the Neo-Humean account of causation in the countext of chance. To account for indeterministic causation, Lewis (1986c) suggests the use of counterfactual probabilities:  $P \square \rightarrow (\text{Pr}(Q) = x)$ , where the counterfactual is interpreted as usual according to the possible worlds semantics, and  $\text{Pr}$ , the probability operator, ranges over the consequent of the counterfactual. So an event,  $c$ , indeterministically causes another event,  $e$ , just in case there is an indeterministic counterfactual dependence of  $e$  on  $c$ . Were  $c$  not to occur, the probability that  $e$  would occur would be lower than it would be had  $c$  occurred.

There is a rich literature on the topic of probabilistic accounts of causation.<sup>26</sup> There are supposed counterexamples where some event raises the probability of some other event without causing it. Hitchcock (2004), for examples, considers the case of two shooters aiming at a vase. Suppose that both have a 0.5 chance of hitting the vase. Both fire, but shooter 1 hits and shooter 2 misses. Though shooter 2 misses, she nevertheless raised the probability of the vase being hit by shooting and thereby counts as a cause under the proposed account.<sup>27</sup> There are also supposed counterexamples where some event is the cause of an effect but does not raise its probability. A golfer hits a slice from the tee, and so lowers the probability that ball will fall in the hole. Improbably, the ball hits a tree and bounces into the cup.<sup>28</sup>

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<sup>26</sup>A good place to start is Hitchcock (2004).

<sup>27</sup>Menzies (1989, 1996) considers cases of preemption where some event raises the probability of the effect but is not the cause.

<sup>28</sup>The example is originally due to Deborah Rosen, and is discussed in print by Suppes (1970). See Salmon (1980) for other examples of this type.

A more troubling example of this sort is a case of preemption in indeterministic contexts. Hitchcock (2007) offers the following example: An assassin puts a weak poison in the king's drink; it has a 0.3 chance of killing the king. As it happens, it does kill the king. As it happens, though, a second assassin was waiting in the wings with an even stronger poison; it would have had a 0.7 chance of killing the king. Thus, while the first assassin killed the king, if she had not acted, the second assassin would have and thus the probability would have been much higher. Other examples, including those of late preemption, are not difficult to conceive.

#### 4.7.7 Context Sensitivity and Subjectivity

Comparative similarity of worlds is central to the Neo-Humean metaphysic. Unfortunately, when it comes to similarity of worlds, nearly anything goes. The similarity relation is massively pliable, and it is sensitive to linguistic context so that in one context, world  $w_1$  may be more similar to the actual world than  $w_2$ , and in a different context,  $w_2$  may be more similar. This context sensitivity leads to one of two results.

If the Neo-Humean fully embraces the context sensitivity of the similarity relation, then she is led to posit a radical subjectivity at the heart of her metaphysic. The shiftiness of the similarity relation leads, for example, to a shiftiness in causation. In one linguistic context, it is correct to say  $c$  causes  $e$ , but in another it is incorrect. The problem with this result is that causation is not subjective. If  $c$  is the cause of  $e$ , it is so no matter the linguistic context. Explanation is certainly sensitive to context, but causation is not.

To avoid this subjectivity, the Neo-Humean simply reverse engineers the needed system of weights of respects of similarity. She picks and chooses from the many similarity relations as the needs of the theory demand, *but then fixes those particular relations and weightings as the grounds for the phenomenon in question once and for all*. It is the failure to fix the grounds once and for all that introduces subjectivity. Having fixed the grounds, however, she is able to say that, while the similarity relation may give different verdicts in different

contexts, the theory will not because it has stipulated that one of those contexts is privileged over the others. (Of course, which context is privileged will vary from case to case.)

But there are problems with this result, too. First, there seems to be no independent, non-circular motivation for the stipulative privileging of one similarity relation over another for the various cases, other than the fact that that's the way to get the account to work. And second, it should be clear that the truth conditions for counterfactuals no longer rely simply on our ordinary notion of overall similarity. It is, rather, a concocted mix of this relation and that, jumbled together precisely to get the right results. What's more, it turns out that different cases require different similarity relations, resulting in a messy disjunctive account. In short, the theory is *ad hoc*—and inelegant to boot.

#### 4.7.8 Modality and Changing the Subject

The last difficulty I shall consider concerns the Neo-Humean account of modality. Both accounts of modality under consideration, those of Lewis and Sider, appeal to counterparts to analyze modal properties. Roughly, the idea is that the property of possibly being *F* is *identified* with having some counterpart that is *F*. For Lewis, my counterparts are concrete objects, whereas for Sider, they are linguistic constructions. It is facts about these counterparts, their features and relations to other things, that ground modal facts about me and you.

A common complaint against such a view is that it *changes the subject*.<sup>29</sup> We were talking about whether, say, I could be a truckdriver, but now we are talking about some other object (abstract or concrete as you like) and its features. Kripke (1972) famously complained that while Hubert Humphrey no doubt cared about whether *he* would have won the election if he had done so-and-so, he “could not care less whether someone *else*, no

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<sup>29</sup>There are other, serious problems with counterpart theory that I will not address. Of particular note are the problems raised by Fara & Williamson (2005). If counterpart theory is to capture the richness of our ordinary modal language, it will need an actuality operator in its language. Fara and Williamson display the difficulties in doing so. For an attempt at a response, see the unpublished essay by Sider, “Beyond the Humphrey Objection”.

matter how much resembling him, would have been victorious in another possible world.” Similarly Plantinga (1974) considers the fact that there might have been a foolish person very much like Socrates and asks: “How does this fact show that *Socrates* could have been unwise?” The existence of an unwise person much like Socrates “is totally irrelevant to the truth that Socrates—Socrates himself—could have been unwise.”

This way of putting the objection is a bit quick. After all, according to the counterpart theorist, we are talking about a property of Humphrey’s when we talk about the having of a counterpart who wins. As Lewis (1986a) puts it, “thanks to the victorious counterpart, Humphrey himself has the requisite modal property: we can truly say that *he* might have won.” Of course we may be mistaken when we think that some property of ours is constituted in such-and-such a way. Since the Neo-Humean is offering an *analysis* of the modal property, it should come as a surprise that we might be mistaken about its nature. This is just, according to Sider (2003a), a result of the “paradox of analysis.”

But the complaint does get at something very important: the suitability of the *analysans*. This is precisely how Merricks (2003) puts the objection. In short, Merricks’ objection is that, setting Lewis’s concrete possibilities aside, none of the offered reductions of possibilities within a counterpart theoretic framework are uniquely and intrinsically suited to do the job. (Merricks’ objection to Lewis’s reduction is simply that they do not exist.) They are not uniquely suited because there are many, many rival candidates. Sider’s reduction, for example, is a set-theoretic construction from linguistic entities. For any given technique to construct the counterparts, there are untold alternative constructions that produce equally viable entities. For example, the ordered pair  $\langle a, F \rangle$  might be understood to be the sentence ‘*a is F*’ or the sentence ‘*a is not F*.’<sup>30</sup>

More interesting, I think, is the claim that none of the available options for a reductive base is intrinsically suited to do the job. Since my *de re* modal properties are properties

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<sup>30</sup>Sider responds by claiming that our *de re* modal talk is semantically indeterminate over the options. I’m inclined to think this response fails, but a full discussion of the issues would take us too far afield. See “Beyond the Humphrey Objection.”

of *me*, the reductive base must somehow be appropriately linked to me. One natural way for them to do this is to *represent* me as having certain properties. They had better not represent me in virtue of our decisions, else *de re* modality would be dependent on our actions, as Merricks point out. They must represent me all by themselves. But, as Merricks says, sets don't objectively represent anything. "A set just sits there." To say that my possibly being a truck driver just is a certain set of linguistic items, according to Merricks, is akin to saying that my possibly being a truck driver just is a yawning cat. It matters not whether the yawning cat exists; it simply isn't the right sort of thing to do the job.

Sider (2001) conceives of the suitability of counterparts for reducing *de re* modality slightly differently. Rather than intrinsic representation, Sider considers structural fit to be the identifying feature of counterparts. Our use of *de re* modal language has a certain structure. It behaves in a certain way by, for example, licensing certain inferences and not others. And according to Sider, the structure of our modal language fits the semantic structure of counterpart theory. Our *de re* modal language refers to counterparts because we use our language in such a way that it looks like we're referring to counterparts.

But clearly structural fit is not sufficient, either. After all, if there were sufficiently many yawning cats, yawning in ways that are different in some respects but similar in others, and we could define some relations across the yawning cats that behaved in ways sufficiently similar to how our inferences about *de re* modality behaved, *de re* modality would still not be about yawning cats. If it turned out that nothing else existed but the yawning cats that was structural similar to our *de re* modal talk, the correct response would not be that, since close enough is good enough, we should identify *de re* modality with yawning cats. The correct response would be to adopt an *error theory* of modal discourse.

If set theoretic constructions of linguistic entities exist and features of them are structurally similar to our *de re* modal talk, it would be just like the yawning cats. It would be very interesting that such a structure existed—what an interesting coincidence!—but it would seem to have nothing to do with *de re* modality. Counterpart theory, in short, still

changes the subject.

## 4.8 Conclusion

The Neo-Humean metaphysic, on the whole, is simple, elegant and powerful. Accept the existence of possibilia and similarity relations over them, and you get laws, causation, modality and powers that are consistent with Independence and Humean Supervenience. There are, however, serious problems, some of which were discussed above. The problems are not refutations, but they do make one wonder if—indeed, hope that—a better alternative is available. What’s more, the end story is nearly unbelievable. The world and its goings-on are disconnected from each other in a way that makes the unfolding of the universe radically contingent. Perhaps—but *just* perhaps—we could believe it if no other alternatives were available to us. But such is not our lot. There are alternatives, and it is time to give them consideration.

## 5

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# Nomicism

By far the most common alternative metaphysic is Nomicism, defended by Armstrong (1997)<sup>1</sup> and Tooley (1987) among others. If we think of the world as the Neo-Humean does, universal regularities can appear to be massive cosmic coincidences. Particular matters of fact just happen to be distributed in that way, but nothing in the nature of particulars or their properties *makes* any one distribution occur rather than any other. In contrast, the Nomicist thinks there is more structure to the world, that regularities are the sorts of things that can be *explained*. The structure that explains is the existence of a real relation holding between properties, a second-order relation that glues the world together.

I will first consider one version of Nomicism, according to which the necessitation relation holds contingently, and its accounts of properties, laws, causation, modality and causal powers. I then present an objection to Contingent Nomicism. The objection is significant enough, I think, to push one to reject Contingent Nomicism in favor of either Neo-Humeanism or a second version of Nomicism, according to which the necessitation relation holds necessarily. I then present Necessary Nomicism and an objection to it that I also think is forceful. The objections are not decisive—very few ever are—but they are serious enough that they warrant rejecting Nomicism. It an unstable halfway house between

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<sup>1</sup>In his later work (see Armstrong, 2004a,b, 2005a), Armstrong begins to move away from some aspects of his earlier view by identifying universals with their instances, removing much of the motivation for the existence of states of affairs. For present purposes, I will take the view of *A World of States of Affairs* as canonical and ignore this latter, and in my mind unwelcome, development in Armstrong.

Neo-Humeanism and Neo-Aristotelianism, either of which is preferable.

## 5.1 Contingent Nomicism

One way to glue the world together is by positing irreducible necessary connections between distinct existences. Many take such connections to be deeply mysterious, though, and so attempt to find a middle ground between pure Neo-Humeanism and brute necessity. The defender of Contingent Nomicism attempts to do just that. She accepts Independence—or at any rate, *tries* to—but she rejects Humean Supervenience. The mosaic of first-order, particular matters of fact, on this view, is intrinsically just as it is for the Neo-Humean. The difference is that on top of that first-order mosaic is the second-order necessitation relation structuring the world. Since the necessitation relation is contingent, Independence is saved, but since the second-order facts are not determined by the first-order facts, Humean Supervenience fails.

### 5.1.1 Properties

It will be helpful to get clear, if briefly, on the options available to the Contingent Nomicist regarding the metaphysics of properties. All agree that some version of realism about properties is true. (It would be odd if, while insisting on the importance of a genuine, second-order relation between properties, the Contingent Nomicist then added that neither properties nor relations were genuine bits of the world after all.) But they need not, and do not, agree on a particular variety of realism.

Let's start with Armstrong. While he calls the sparse<sup>2</sup> or natural properties 'universals,' for consistency's sake I shall continue calling them properties. Armstrong's properties are Aristotelian in the sense that they are *present in* the particulars that instantiate them. Properties are immanent to the world; they are wholly located in each of their instances. (To

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<sup>2</sup>While his account of the natural properties, his universals, is sparse, it is not as sparse as the view defended in Chapter 3. Armstrong allows conjunctive and structural universals.

have multiple instances is, therefore, to be multiply located.) Properties do not exist uninstantiated. In addition to properties, Armstrong accepts the existence of ‘thin particulars,’ which are the individuals that instantiate properties. Thin particulars never exist without instantiating some property or other (just as properties do not exist uninstantiated). Both properties and particulars are, in that sense, abstractions from *thick* particulars—states of affairs. A state of affairs is a thin particular’s instantiation of a property. It is something over and above the existence of the thin particular and the existence of the property, since both might exist without the one instantiating the other. While states of affairs are mereologically simple, they are non-mereological compositions of particulars and properties.

In contrast, Tooley thinks of properties as transcendent, Platonic entities. They inhabit an other-worldly realm but nevertheless bear a primitive relation of instantiation to some inhabitants of this world. Such properties do not depend on the existence of this-worldly particulars, as Armstrong’s properties do. While in principal they can exist uninstantiated (and typically Platonists think that all properties *do* exist whether they are instantiated or not), Tooley accepts what he calls ‘Factual Platonic realism.’ According to this view, what properties exist in a given world is a contingent matter. In particular, Tooley proposes that while some property, P, exists in two worlds, the conjunctive property, P&Q, might exist in one but not the other.

Contingent Nomicists are thus not forced to choose any particular version of the realist alternatives concerning the nature of properties. They *are* forced, by their commitment to Independence, to accept the thesis that properties are categorical. In themselves, properties are not nomically, causally or modally connected. They are intrinsically impotent. It is only when the necessitation relation has structured the first-order property instantiations that the nomic, causal and modal connections appear. (For those connections, in some sense, *just are* the nomic necessitation relation.) And since the necessitation relation holds contingently, it also has no essential nature.

If the Contingent Nomicist accepts the existence of quiddities and allows them to exist in multiple possible worlds, then they are committed to Quidditism, the thesis that mere quiddistic differences are possible. Armstrong's views regarding both haecceities and quiddities have changed. Concerning haecceities, Armstrong moved from a version of Anti-Haecceitism in *A Combinatorial Theory of Possibility* to what he thinks of as a modest version of Haecceitism in *A World of States of Affairs*. According to the later view, mere haecceitistic differences are possible, but haecceities are not thought of "as a unique inner nature or essence possessed by each particular, something property-like, although a property necessarily limited to one thing." Rather, "[w]hen we have said that different particulars are numerically different, then we appear to have said all that can be said about the nature of particularity." However, he does not accept the existence of haecceities for alien individuals. The truthmaker for the fact that there might have been a particular that is distinct from all actually existing particulars turns out to be the actually existing particulars and the relation of difference. The details need not concern us here. What is important is his move from a version of Anti-Haecceitism to a version of Haecceitism.

In contrast, the Armstrong of *A Combinatorial Theory of Possibility* believed in the existence of quiddities, but the Armstrong of *A World of States of Affairs* moved to a rather striking view of properties analogous to the view adopted there of particulars. In the prior work, Armstrong's acceptance of quiddities led him to deny the existence of alien properties. Since his view of modality is a combinatorial view (see section 5.1.4 below for more detail), alien properties would have to be constructed out of actually existing properties. But no such combination would lead to a new, unique quiddity. But in the later work, Armstrong rejected the existence of quiddities, at least when conceived as a unique inner nature to the property. Rather, within equivalence classes, properties are just barely distinct, numerically different. The equivalence classes are arrived at by considering the adicity of properties. Some properties are monadic, some dyadic relations, and so on. But each monadic property is distinct from the others in virtue of, well, nothing. It just is

distinct.<sup>3</sup>

Thus Armstrong was led to accept ‘deflationary’ accounts of both haecceities and quiddities. Actually existing haecceities and quiddities are merely numerically distinct. (This applies to quiddities within an adicity equivalence class, not across the equivalence classes.) Mere haecceitistic and mere quiddistic differences regarding the actually existing particulars and properties are possible. Matters are different for alien individuals and alien properties however. The accounts given for those are similar. Alien individuals do not possess a haecceity, even in this weak sense; similarly, alien properties do not possess a quiddity, even in this weak sense. Nevertheless, the possibility of an alien individual is grounded in the existence of actual haecceities and the relation of difference; the possibility of alien properties is grounded in the existence of actual quiddities (with the same adicity) and the relation of difference.

Armstrong therefore accepts Quidditism with regard to the actually existing properties but not with respect to alien properties. Tooley does not specifically address the topic of quiddities and Quidditism, but he often talks about properties as if he accepted the existence of quiddities and hence accepted Quidditism. In *Causation*, Tooley compares his Platonic view with Armstrong’s Aristotelianism in the following way:

Over against [Armstrong’s] metaphysics, I wish to set another, the central theses of which are, first, reality must be determinate, that is, that whatever exists must have an intrinsic nature, and second, that anything with an intrinsic nature is capable of independent existence. According to this alternative conception, states of affairs may be of three sorts. First, those that consist of the existence of an individual possessing an intrinsic nature. Second, those that consist of the possession of properties by such individuals. Third, those that involve relations among two or more such determinate individuals. It follows from this that bare particulars cannot exist, but bare—i.e., uninstantiated—universals can. The

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<sup>3</sup>I consider problems with Armstrong’s account of properties as ‘barely distinct’ in Chapter 6.

former are precluded because only what has a determinate, intrinsic nature can exist, other than as an abstraction. Universals on their own, however, do have an intrinsic nature, and there is therefore no bar to their enjoying independent existence.

The passage suggests that properties have an intrinsic nature in a way particulars do not. Properties seem to be or have quiddities, whereas particulars are at most merely numerically distinct in the sense defended by Armstrong. If that were correct, Tooley would also be committed to Quidditism.

### 5.1.2 Laws

Consider the distinction between accidental regularities and laws of nature. There happen to be no gold spheres of one mile in diameter. That, we may suppose, is a universal regularity. There also happen to be no uranium spheres of one mile in diameter. That is also a universal regularity. But the latter is not merely a universal regularity; it is also a *law*. The Neo-Humean account discussed in Chapter 4 above places the difference in the fact that one regularity, but not the other, belongs in our best systematization of the world.

The Nomicist thinks differently. A universal regularity—say, all Fs are Gs—is a law when the necessitation relation holds between F and G, symbolized as  $N(F, G)$ . The holding of the necessitation relation between properties is supposed to be stronger than a true universal regularity; indeed, it is supposed to *entail* the regularity.  $N(F, G)$  entails  $\forall x (Fx \rightarrow Gx)$ . But it nevertheless holds contingently. (In fact, Tooley identifies laws theoretically, as that relation that holds contingently between properties and entails the regularities.)

Thus the second-order world of the Contingent Nomicist is much like the first-order Neo-Humean world. Contingent Nomicism is a kind of *second-order Neo-Humeanism*. To see this, consider the following question: In virtue of what is it the case that in world  $w_1$  the necessitation relation holds between F and G, but in world  $w_2$  it holds between, say, F

and H? The correct answer according to the Contingent Nomicist is the same as the answer given by the Neo-Humean to the question: In virtue of what does F regularly co-occur with G in this world but, say, H in some other world? In both cases, the correct answer is, “Nothing—it just does.”

An important point for both Tooley and Armstrong is that when F bears the necessitation relation to G, there is some sense in which F and G are literally bound together. For Armstrong, the sense is the same as the sense in which a property and a particular are bound together in a states of affairs: non-mereological composition. For the holding of  $N(F, G)$  is just a higher order state of affairs, and so F and G are non-mereological parts of it. Tooley accepts something similar for his transcendent properties, though the details are not as clear as one might hope.<sup>4</sup> When  $N(F, G)$  holds, Tooley (1987) says F exists “only as a part of the conjunctive” property F&G. For both Armstrong and Tooley, this feature of their account is supposed to give the result that, when  $N(F, G)$  holds, whenever F is instantiated, G is instantiated. The holding of the necessitation relation entails the appropriate, lawful regularities.

Laws support counterfactuals. How does the Contingent Nomicist account for this? They do so in much the same way that the Neo-Humean does. Recall that for the Neo-Humean, laws support counterfactuals because when we consider the closest antecedent worlds, we are considering worlds where the laws are held fixed. This is grounded in the fact that, in the standard resolution of the vagueness of similarity of worlds, we take similarity with respect to laws to be of primary importance. The Contingent Nomicist agrees. We hold the laws fixed, says Armstrong (1997), because they are “important and it is easy and natural to keep them fixed.” To be sure, Armstrong believes the Contingent Nomicist has an advantage over the Neo-Humean in this regard. (I take up this issue below when discussing objections to Contingent Nomicism.) But the account is the same.

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<sup>4</sup>For a discussion and criticism of the details, see Sider (1992).

### 5.1.3 Causation

Armstrong (see, for example, Armstrong & Heathcote, 1991; Armstrong, 1997) identifies causation with the instantiation of the necessitation relation. This identification, however, is *a posteriori*. According to Armstrong, we begin epistemically with singular causation. We can observe a singular causal relation without knowing whether it is subsumed under some regularity. There is no *a priori* or conceptual reason to think that all causal relations must be subsumed by a law. Nevertheless, it is in fact the case that all singular causal relations are subsumable. The identity between causal relations and instantiations of the necessitation relation is thus a Kripkean necessity. It is conceivable that singular causal connections are not so identical, but given the identity discovered *a posteriori*, the identity is necessary.

Tooley comes to the same conclusion by a much different route. As he did with laws, he identifies causation theoretically: It is the unique relation that, in the case of causation, determines the direction of probabilities. Here the specific postulates that he uses to describe the relation theoretically need not concern us. What does concern us is that Tooley believes one cannot specify the postulates about how causation determines the probabilities if one accepts only singular causal statements. Hence Tooley's preferred method of specifying causation theoretically is unavailable to a pure singularist view of causation. Tooley opts, then, for a view that accepts both singular and general causation. Singular causal relations are instantiations of general causal laws.

### 5.1.4 Modality

The theory of modality that Armstrong (1989) defends does not rely on the necessitation relation, but rather on *rearrangements* of properties and particulars. It is a combinatorial theory of modality, since possible worlds are rearrangements or combinations of actually existing objects. But it is also a *fictionalist* account, since Armstrong does not think that

there are states of affairs that do not obtain. Merely possible worlds, according to this theory, do not exist since they are states of affairs that fail to obtain. Still, we can talk about non-existent states of affairs as if they did exist. Non-existent states of affairs are fictions: we can say what would be true, were those state of affairs to obtain. Consider, then, the fiction that lots of these fictions, the non-existent states of affairs, exist. Modal talk, according to Armstrong, is talk about what would be true, were the fiction that there exist such-and-such non-existent states of affairs true.<sup>5</sup> Necessary truths are those that, according to the fiction, are true in all the non-existent states of affairs, and possible truths are those that, according to the fiction, are true in at least one.<sup>6</sup>

But it is important to note that Contingent Nomicism does not require Armstrong's account of modality. The central posit of the theory, the necessitation relation, plays little (if any) role in the above account of modality. Contingent Nomicism, itself, is consistent with many alternative accounts, including those of Lewis and Sider discussed above. And there are good reasons to prefer those theories, *even accepting the truth of Contingent Nomicism*. Fictionalist accounts are problematic for many reasons, both intuitive and technical.<sup>7</sup> I shall not review those reasons here. Instead, I will assume that the Contingent Nomicist accepts either Lewis's or Sider's account of modality.

### 5.1.5 Causal Powers

The Contingent Nomicist views causal powers in much the same way that the Neo-Humean does. Objects have causal powers in virtue of having properties—but not *only* in virtue of having properties. Since Categoricalism is true, in some other world the property exists but the laws relating it to other properties are different than they are in this world. The

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<sup>5</sup>In this way, it is like the theory explored by Rosen (1990). They differ in what their respective fictions say possible worlds are.

<sup>6</sup>Unfortunately, it is not as clear as one might hope how to get the possible worlds from rearrangements of actually existing properties and particulars. For discussion, see Sider (2005).

<sup>7</sup>See, for example, Rosen (1993), where it is shown that, among other thing, fictionalists about possible worlds appear committed to the thesis that, necessarily, there exist many possible worlds! See also Hale (1995).

truthmaker is, rather, the property *together with the laws of nature*. The difference between the Neo-Humean and the Contingent Nomicist lies in their differing accounts of the laws of nature. For the latter, the law is the property's being related to other properties by the necessitation relation. And it is the property together with its being related to other properties by the necessitation relation that makes it the case that objects with that property have those causal powers.

### 5.1.6 Objections

The Contingent Nomicist attempts a fine balancing act, maintaining Independence on the one hand while denying Humean Supervenience on the other. Noble as the attempt may be, it fails. There are several problems with Contingent Nomicism, but I will focus primarily on the inference problem, which shows that the balancing act couldn't succeed. Before turning to that, I briefly consider a problem the Contingent Nomicist has with singular causation in the context of indeterminism. (I consider a third problem specific to Armstrong's view of quiddities in Chapter 6.)

#### **Indeterminism and Singular Causation**

The Contingent Nomicist wants to have both singular and general causation. From the perspective of a Neo-Aristotelian, there is nothing problematic about this. But there is some question whether it is possible to maintain both, where one is the instantiation of the other, in the context of indeterminism. In fact, I will now present a brief argument for thinking that, if indeterminism is true, then the Contingent Nomicist must either give up singular causation or construe causation as something over and above the instantiation of a law.

Let us consider how the Contingent Nomicist deals with laws and causation in an indeterministic context. For ease of presentation, I will consider the view defended by Armstrong (1997), but what is said applies, *mutatis mutandis*, to Tooley's view. If indeterminism is

true, then the relation of necessitation turns into one of objective *probabilification*. Suppose that there is a probabilistic law that Fs are Gs, say, the probability that an F is a G is 0.5. F probabilifies G to a 0.5 degree. We can represent this as  $P_{0.5}(F, G)$ . We can divide the instances of F into those that cause G and those that do not. Armstrong's theory of causation in such indeterministic contexts is that, in those cases where F causes G, the law is instantiated, but in those cases where F fails to cause G, the law is *not instantiated*.

I think this is a mistake. Recall that, on Armstrong's view, a second-order state of affairs, in this case  $P_{0.5}(F, G)$ , is a non-mereological composition of  $P_{0.5}$  and F and G. This state of affairs is a unity; the constituents are bound together. But how could it be that the constituents are bound together, and yet one of the constituents is instantiated *without the others*? That is what Armstrong is proposing, and yet the proposal goes against Armstrong's own account of states of affairs.

He needn't propose that, of course. Here is an alternative picture. If  $P_{0.5}(F, G)$  holds, then whenever F is instantiated,  $P_{0.5}(F, G)$  is instantiated as well. *But that's not what singular causation is*. If it were, then G would always follow. Rather, when F is instantiated but G is not, F still probabilified G. It just didn't cause it. Causation, on this view, is not the instantiation of the probabilistic law. It is something in addition.

The trouble with this view is that causation is no longer the instantiation of a law. The Contingent Nomicist would either have to add a distinct relation of singular causation or deny singular causation altogether. The latter option is implausible. On this option, the only type of causation is general. That seems to imply that it is rocks falling, in general, that bring about pains in feet, in general. But that can't be right; it is *that* rock's falling that caused pain in *this* foot. But the former option, to add a distinct singular relation over-and-above the necessitation relation, raises the question of how these are related, and introduces a complication that the Contingent Nomicist would rather avoid. It is not clear, therefore, how the Contingent Nomicist can accommodate singular causation in the context of indeterminism.

(Notice that, while the Neo-Aristotelian has both singular and general causal facts, she does not propose two distinct relations, one of singular causation and one of general causation. Rather, general causation is grounded in the nature of the monadic natural properties. There is, therefore, only one relation of causation on her view, though there are general causal facts not grounded in that relation.)

### **The Inference Problem**

van Fraassen (1989) raises what he calls the identification problem and the inference problem. The identification problem is that we must identify what it is about the world that makes a relation a law. It will not do to tell us that it is a relation of nomic necessitation any more than, as Lewis quipped, calling a person Armstrong tells us that she has big biceps. The inference problem is that, whatever that relation turns out to be, its holding between F and G must allow us to infer something about actual things that are F and actual things that are G. But it is difficult to see how it does this. Why can it not be the case that  $N(F, G)$  while  $x$  is an F but not a G?

I shall concern myself here only with the inference problem—or rather, two versions of the inference problem that are particularly instructive. The first version of the inference problem comes from Bird (2005). He focuses on the relation between the second-order states of affairs  $N(F, G)$  and the regularity  $\forall x (Fx \rightarrow Gx)$ . Call the relation that holds between F and G whenever the regularity  $\forall x (Fx \rightarrow Gx)$  holds the ‘extensional inclusion relation,’ and let it be symbolized as  $R(F, G)$ . The claim that  $N(F, G)$  entails the regularity is thus the claim that  $N(F, G)$  entails  $R(F, G)$ . Since some universal regularities are not laws,  $R(F, G)$  does not entail  $N(F, G)$ .

As Bird notes, while  $N$  is itself contingent, the entailment between  $N(F, G)$  and  $R(F, G)$  is necessary. Hence,  $N$  has a non-trivial modal character, a necessary connection between distinct existences that violates Independence. In order to save Independence, the Contingent Nomicist must deny that  $N(F, G)$  entails  $R(F, G)$ . Given Categoricalism, which

the Contingent Nomicist accepts, this is as we should expect. While  $N$  is a second-order property, it is nevertheless a property to which Categoricalism applies. Perhaps, then, the Contingent Nomicist should say that some other relation, short of entailment, holds between  $N(F, G)$  and  $R(F, G)$ .

Perhaps it is a mere regularity that, whenever  $N(F, G)$ ,  $R(F, G)$ . Then what of the Contingent Nomicist's claim that  $N$  *explains*  $R$ ? The regularity is supposed to be insufficient to explain why a particular  $F$  must be a  $G$ . Introducing a mere regularity strips the Contingent Nomicist of her ability to explain the regularities better than the Neo-Humean does. The only difference between this new view and the Neo-Humean is that the former has a second-order regularity, whereas the regularity of the Neo-Humean is first-order. It is difficult, at best, to see how this can be an advantage.

Perhaps the relation between  $N$  and  $R$  should be that of contingent necessitation. Here, Bird argues, the Contingent Nomicist faces a vicious regress. Why, we may wonder, is it the case that  $\forall x (Fx \rightarrow Gx)$ ? Because, the Contingent Nomicist answers,  $N(F, G)$ . Why is the case that, whenever,  $N(F, G)$ ,  $R(F, G)$ ? Because, she answers,  $N'(N, R)$ . Now we might ask, why is it the case that whenever  $N'(N, R)$ ... We are off to the races. The regress is vicious, because  $N(F, G)$  is supposed to *explain*, but it cannot explain until we understand why, whenever  $N(F, G)$ ,  $R(F, G)$ .

One final option seems available to the Contingent Nomicist. Perhaps  $N(F, G)$  and  $R(F, G)$  are not fully distinct existences. Because Independence holds only for distinct existences, this supposition would save Independence. But at what cost? Now the Contingent Nomicist's view is an odd variant on the *regularity* view. The law that all  $F$ s are  $G$ s is the regularity, plus some further fact about  $N$ . But if the regularity explains itself, the Neo-Humean was never at a disadvantage to begin with. Better to accept Neo-Humeanism and do away with this odd extra bit of ontology.

In his reply to Bird, Armstrong (2005b) concedes that he must take on some necessities. He notes that he "should not be too worried if contingency [of the laws of nature] has to be

given up.” But this is no minor concession. For this would be a denial of Independence. I consider this necessitarian version of Nomicism below. Bird’s argument is a significant blow to Contingent Nomicism.

To see the significance of the problem, let us consider a second version of the inference problem, raised by Fales (1993). He argues that Armstrong needs the laws of nature to be necessary. I think his argument is fatal to Contingent Nomicism. In particular, to the extent that Armstrong can successfully reply, he can do so only at the cost of making Nomicism no more theoretically powerful than Neo-Humeanism.

Laws are supposed to support counterfactuals. “If I were to mix these chemicals, a certain chemical reaction would take place.” To evaluate the counterfactual, we imagine a situation where I do mix the chemicals. But why not suppose that in such a situation, nothing happens? Or why not suppose that immediately after mixing the chemicals, but before they have a chance to react, they fly apart? That’s because we imagine that the laws of nature are fixed. Laws support counterfactuals.

Consider the counterfactual  $(Fa \square \rightarrow Ga)$ . Suppose it to be a ‘mere’ Neo-Humean law that all Fs are Gs. Is that enough to support the claim that, though a is in fact not F, were it F, it would be G? Armstrong argues no. When we imagine the situation where a is F, we are enlarging the facts on which the Neo-Humean law supervenes. We are imagining a different spatio-temporal distribution of properties. Why suppose, says Armstrong, that in our imagined scenario, the regularity, all Fs are Gs, is the same? Armstrong says we have no such reason, and that therefore Neo-Humean laws cannot support counterfactuals. But, according to Armstrong, Nomicism can. An imagined enlargement of the first order facts, a being F, would do nothing to change our conviction that the second order fact,  $N(F, G)$ , holds. The second order fact is a single fact, no matter how many instances it has or doesn’t have.

Notice that nomic necessity plays no role in Armstrong’s reasons for thinking that his laws support counterfactuals. It is, rather, the unity of the property. Is this sufficient to

support counterfactuals? Fales argues that it is not. When conceiving the scenario where  $x$  is  $F$ , why should we hold  $N(F, G)$  fixed? After all, there are many worlds where  $N(F, G)$  fails to hold, since  $N$  is a contingent relation. It must be mere convention, not something purely objective about the world, that makes us keep the laws fixed. Armstrong (1993) replies that in fact “there is something conventional in our keeping laws ‘fixed’ ” and that, as a result, “counterfactual discourse is in a measure second-grade discourse.”

But once Armstrong admits this, the distinction between Nomicism and Neo-Humeanism begins to fade. After all, the Neo-Humean can appeal to convention in keeping the regularities fixed. They can avail themselves of Armstrong’s explanation: Holding the laws fixed is a convention for us. As Armstrong put it, “[i]t is a very deep convention, but it is not something absolutely forced on us. The way the world works, its laws, must have overwhelming importance for creatures in the world. Biologically speaking, the main reason for the existence of conditional thinking is its role in planning. And in planning, the laws of the world, so far as we know them, must be assumed to be unchanged.” This is entirely consistent with a Neo-Humean view of laws.

Armstrong’s reason for thinking that, while his laws can support counterfactuals, Neo-Humean laws cannot is that for the Neo-Humean, “the law in a counterfactual situation must literally be taken as an expanded entity, raising the question by what warrant it is asserted that the imagined cases behave like actual ones” (147). But how is this ontological issue at all relevant? The Neo-Humean claims, I have supposed, that there is a convention that in counterfactual reasoning we hold the laws fixed. That is what warrants us to think that the imagined case behaves like the actual one, just as convention is what warrants us in holding  $N(F, G)$  fixed.

Armstrong argues that it is not enough to keep the laws fixed *semantically*, as the Neo-Humean can, but she must keep the laws fixed *ontologically*, which she can’t since the counterfactual scenario is one where the truthmaker for the laws is different. It is this difference that is supposed to explain why the Neo-Humean is not successful in supporting

counterfactuals. First, isn't holding the law fixed enough? Why the extra requirement to hold its truthmaker fixed? Second, it's not clear to me that the Neo-Humean cannot hold the laws *ontologically* fixed. Couldn't the Neo-Humean give a sufficiently complex account of regularities in terms of sets of worlds, where the truthmaker for the fact that a particular world has a particular regularity is that it is a member of a particular set, say, the set of nomically equivalent worlds? Then the truthmaker for the fact that a different world has the same regularities is the same: it is a member of that set of worlds. I see no reason to suppose that such an account, or some other similar Neo-Humean account, of holding the truthmaker for a law fixed is more problematic than Armstrong's account. In short, Neo-Humeanism is equally suited to support counterfactuals.

Armstrong, in the end, cannot maintain that mere regularities are not as strong as the holding of the necessitation relation unless he accepts that the necessitation relation holds, well, necessarily. So either the Contingent Nomicist must retreat to Neo-Humeanism, or admit that she cannot maintain the truth of Independence.

## 5.2 Necessary Nomicism

Fales (and Swoyer (1982) and Tweedale (1984) among others) suggest that the solution is to accept a Necessitarian version of Nomicism. Laws are the holding of a genuine second order relation between properties that holds necessarily. But Necessary Nomicism faces a dilemma. Either the necessity relation is itself the source of necessity, or the properties that are related by the necessity relation are the source of necessity. Consider each in turn.

On the one hand, suppose the source of necessity is the nature of the properties related by the necessitation relation. (Swoyer holds this view.) Let us call this view Internal Necessary Nomicism, since the source of necessity is internal to the properties linked by the necessitation relation. On this view, properties have an intrinsic, modal nature that suffices to fix the laws. This is the view of the Neo-Aristotelian, with the seemingly needless

addition of a second-order relation. The necessitation relation is an unnecessary ontological posit. This is so for at least two reasons. First, the relation does no metaphysical work. It is redundant, both as a truthmaker and a potential cause. The properties, themselves, are the truthmakers and causally efficacious entities. Second, what seems to follow, at least for those like myself who accept the view of natural properties defended in Chapter 3, internal relations are not genuine properties. Armstrong would call such an entity an ‘ontological free lunch,’ but of course *there are no free lunches*. To say that an entity is an ontological free lunch is to say that we can talk about it, use concepts that seem to refer to it, make true statements using those concepts, and so on—but it just isn’t part of the furniture of the universe. Better to do away with internal relations altogether, including this necessary necessitation relation. Doing so would lead us to accept Neo-Aristotelianism.

On the other hand, suppose the source of necessity lies in the nature of the necessitation relation, a view we can call External Necessary Nomicism since the source of necessity is external to the properties related by the necessitation relation. Fales, perhaps unique among Necessary Nomicists, defends this position. His reasons for adopting this view are, primarily, that the alternative view just considered is unsatisfactory. I consider his objections, as applied to Neo-Aristotelianism, in Chapter 6. Suppose, for the moment, that the objections can be answered, and that Neo-Aristotelianism is a coherent, theoretically powerful option. This, of course, is a significant assumption, and it incurs a debt that I attempt to pay in Chapter 6. But suppose it’s true for the moment. Consider, then, the positive view Fales defends: there is a property, the necessitation relation, that has an intrinsic, modal nature, a nature which in turn grounds the laws of nature but which is in turn grounded in nothing else. But Neo-Aristotelianism has those, too, just at a lower level. Once one has admitted such a property, the question then turns to which properties we should suppose are like that. There is, therefore, nothing stopping one from positing that all the first-order, natural properties have an intrinsic, modal nature that grounds the laws of nature.

If, as we're assuming, this view can be made out coherently, why not accept the first-order properties and be done with the second-order necessitation relation? It seems an unnecessary ontological posit. Better, once again, to accept Neo-Aristotelianism.

### 5.3 Conclusion

Nomicism is motivated by the thought, proper in my view, that the Neo-Humean world is too intrinsically empty to do the work of a metaphysics of laws, and so attempts to provide a more substantive account. But the Contingent Nomicist wishes to respect Independence. Balancing these two demands proves to be too difficult. If laws are to entail regularities, Independence must be rejected, and if they are to support counterfactuals, they must be necessary. To the extent that defenders of Contingent Nomicism can successfully resist those arguments, they can do so only at the cost of embracing a view that is no more theoretically powerful than Neo-Humeanism but needlessly ontologically complex. Contingent Nomicism ought to be rejected, therefore, in favor of either Neo-Humeanism or Necessitarian Nomicism. But Neo-Aristotelianism, if it can be made out coherently, is preferable to Necessitarian Nomicism because Neo-Aristotelianism is equally theoretically powerful but simpler. Defenders of Nomicism, therefore, ought to either embrace radical contingency and accept Neo-Humeanism, or embrace full-fledged necessity and accept Neo-Aristotelianism (again, if it can be made out coherently). Given the difficulties with Neo-Humeanism discussed in Chapter 4 above, Neo-Aristotelianism would be preferable, were it coherent and theoretically powerful. It is time to show that it is both.

## 6

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# Neo-Aristotelianism

Let us return to our starting point. I began Chapter 1 by noting that objects in this world are powerful. They make things happen and bring things about. That objects have powers is not an inexplicable fact; objects have powers *in virtue* of having properties. And, at least in this world, the exercise of these powers appears to be lawful; objects seem to act in ways that are patterned and regular.

Our inquiry, then, concerns what it is that makes this true. Why is the world that way? What is the source of the powers in this world? And why are these powers ordered as they are? The first view we considered is Neo-Humeanism. In short, the Neo-Humean's answer to these questions is that there really is no answer. The world—the distribution of local qualities across all of space and time—just is the way it is. Nothing *makes* it that way. Fortunately for us, the distribution of qualities is patterned and regular in ways that are suitably and informatively summarized. As a result, it is true that things are powerful and act in lawful ways. But it could have so happened—indeed, it might still happen in our world—that the distribution of qualities was patternless and random, in which case it would not be correct to say that things are powerful and act in lawful ways. The world is, you might say, ungoverned but luckily well-behaved.

The second view, Nomicism, answers these questions by suggesting that, while the world is well-behaved, this is not a result of happenstance. It is well-behaved because it is

governed by the laws of nature.<sup>1</sup> Laws make it the case that objects are powerful and act in lawful ways. Why do the laws make it so? Here Nomicists split. Some—the Contingent Nomicists—say there simply is no reason. Others—the Necessary Nomicists—say because the laws are necessary.

I turn now to a third view, Neo-Aristotelianism.<sup>2</sup> On this view, the world is neither ungoverned nor governed from without by laws; it is *self-governed*. The world unfolds as it does because of the way it is intrinsically. Objects are powerful because the properties they have are intrinsically powerful (or dispositional). In some sense or other, having those powers is at least part of what it is to have that property, since powers are at least part of the nature or essence or being or identity of the property. While there is disagreement about precisely what it means for properties to be powerful,<sup>3</sup> powerful properties are central to all versions of Neo-Aristotelianism. What's more, this commitment to powerful properties brings with it a denial of Independence. Whereas both Neo-Humeanism and Contingent Nomicism reject necessary connections, Neo-Aristotelianism has them in spades. It is because properties in some manner introduce necessary connections into the world that the Neo-Aristotelian can account for modality, causation and laws of nature in terms of powerful properties.

Neo-Aristotelianism has its roots in Aristotle and the Aristotelian tradition, but as a contemporary analytical metaphysic, its beginnings are much more recent. Indeed, the contemporary version of the view is in its relative infancy compared to Neo-Humeanism. Mumford (Forthcoming*a*) traces its contemporary roots to a strand of philosophy of science primarily in England and, independently, a strand of metaphysics primarily in Australia. Reflection on the importance of dispositions in contemporary science, especially physics, led Harré (1970); Harré & Madden (1973, 1975), Bhaskar (1978) and Cartwright (1983, 1989)

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<sup>1</sup>The exception to this is Internal Necessary Nomicism. On that view, the properties themselves are the source of necessity, and the laws of nature come along for the ride. It would be inaccurate on such a view to say that the laws make the world well-behaved.

<sup>2</sup>The view also goes by the name of Essentialism, as in Ellis (2001).

<sup>3</sup>Some prefer to describe them as dispositional. For our purposes, the descriptions are equivalent.

to some form or other of Neo-Aristotelianism. Reflections on the metaphysics of causation led Martin (1984, 1993a, 1994) and Molnar (1999, 2003) to similar views.<sup>4</sup> More recently, these two strands have merged into something of a budding research program. Among the many contributors are Mumford (2004, 2006), Bird (2006, 2007a), Ellis & Lierse (1994); Ellis (2001, 2002) and Heil (2004, 2005) (and with Martin in Martin & Heil (1998, 1999)).

This chapter is an exploration and defense of Neo-Aristotelianism—a contribution to this research program. I first consider the fundamental ontological posit of Neo-Aristotelianism, powerful properties, and I defend one particular view of what it means for properties to be powerful, that properties are the truthmakers for the counterfactuals regarding what objects with those properties would do in various circumstances. I submit that part of the reason we should accept this view of properties, and Neo-Aristotelianism as a whole, is its theoretical power. The rest of the chapter is devoted to exploring this in detail, as I defend Neo-Aristotelian accounts of modality, causation and laws of nature all in terms of powerful properties. The result is a metaphysic that, I claim, is more intuitive and at least as theoretically powerful as Neo-Humeanism. If I'm right about that, then we have good reason to reject Neo-Humeanism in favor of Neo-Aristotelianism.

## 6.1 Properties

The central feature of the various Neo-Aristotelian accounts of properties is their denial of Categoricalism and Quidditism. Properties somehow involve, *in themselves*, modal, nomic or causal facts, and as a result they violate Independence. They also violate Quidditism, because the powers conferred by a property are in some way part of the nature of the property. But this is far from an account of properties. What *are* properties? How is, precisely, that they violate Independence?

There are two tasks that a Neo-Aristotelian who offers an account of properties must

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<sup>4</sup>Mumford notes that though their publications are more recent, the ideas were developed in the 1960s when they led a seminar on causation together.

complete. First, she must say whether *all* natural properties are to be accounted in the same way. I will adopt as a working assumption Monism, the thesis that all properties satisfy the same account. The most challenging cases for the Neo-Aristotelian who wishes to defend Monism are spatial and temporal relations. I briefly consider such relations in section 6.1.7 below.

The second task is to say what the nature of a property is. Nature, as Aristotle said of being, is said in many ways. In section 6.1.1 I distinguish two senses of the nature of a property. I then turn to three existing Neo-Aristotelian accounts of properties. The first is the Pure Powers view defended by Shoemaker (1980)<sup>5</sup> and more recently Bird (2007b) and Mumford (Forthcoming*a,b*). The second is the Physical Intentionality view defended by Place (1996)<sup>6</sup> and Molnar (2003). And the third is the Powerful Qualities view, versions of which are defended by Martin (1993a,b, 1997); Martin & Heil (1998, 1999) and Heil (2004, 2005). I then present what I take to be a more defensible version of the Powerful Qualities view, what I shall call the Truthmaker view, and argue that it is preferable to the others.

### 6.1.1 Natures

The Neo-Humean has little need for a robust terminology for talking about properties as they are intrinsically. Properties are, in a sense, empty on the inside. There's simply not much to say about properties in themselves. This contrasts with the Neo-Aristotelian, who wishes to ground modal, causal and nomic facts in properties. Hence Neo-Aristotelians talk, as I have in defining Neo-Aristotelianism, of the *intrinsic nature* of a property. Others speak of its *essence*, its *identity*, or its *being*.

Traditionally, the essence of a thing is that whereby it is what it is, and the nature is that whereby it acts as it does. (The old-fashioned, Aristotelian view is that in the case of a substance, essence and nature are the same: substantial form.) In its traditional sense,

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<sup>5</sup>Shoemaker (1998), however, seems to change the view defended earlier, so that it no longer is a Pure Powers view.

<sup>6</sup>See also Armstrong et al. (1996).

then, it doesn't quite make sense to speak of the nature of a property.<sup>7</sup> Properties are not themselves actors in the world; the substances that instantiate them or events of which they are constituents are the causal actors. Still, we can talk of the nature of a property analogously—namely, in a sense where essence and nature refer to the same thing, the what-it-is of the property. We can use other terms to talk about the what-it-is: identity, being and quiddity. When we inquire about the nature, essence, identity, being or quiddity of a property in this way, we are not talking about something other than the property itself to which the property is somehow related. Rather, we are inquiring about the property itself, its ontological make-up.<sup>8</sup>

But there is an alternative sense of these terms that we need to distinguish sharply from the above what-it-is sense. It is perhaps easiest to see the distinction when considering the *identity* of a property. In the what-it-is sense, the identity of a property is that to which the property is identical. It is an answer to the question, "What is it?" But there is a very different sense of identity, on which the identity of a property is *that by means of which a property can be identified*. Such an identity is not an answer to the question, "What is it?" It is the answer to the question, "How do we fix our reference on it?" It is something like a uniquely satisfied definite description. It is, and this is the important point, distinct from the property, something other than the property. It might be a conjunction of truths, a series of facts, or a collection of second-order properties that are uniquely true of or had by the property in question. Each of the terms nature, essence, identity and quiddity can be used in this sense. Even the *being* of a property is sometimes understood in this sense, as when Bird (2006) defines the being of X as "those facts that are entailed by the fact that X

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<sup>7</sup>In the case of a substantial form, it would be more appropriate to say that the form *is* a nature, not that it has one. With regard to properties, or 'accidents' in the traditional terminology, it would not strictly be appropriate to say either that an accident has a nature or that it is a nature. Whereas Aquinas discusses the *essence* of an accident in *De Ente Et Essentia*, as far as I know he does not similarly discuss the *nature* of an accident.

<sup>8</sup>Traditionally, accidents do not have an essence or being *in their own right*, because they exist only *in re*. They have existence only when instantiated. Aquinas expresses this by saying that accidents have an incomplete essence.

is, in virtue of the essence of X.” Bird appears to be using ‘essence’ in the what-it-is sense, and ‘being’ in this later sense, which I shall call the external profile sense.

The importance of the distinction between the internal, ontological-make-up sense—the what-it-is sense—of these terms on the one hand, and the external profile sense on the other will be clear when we consider particular Neo-Aristotelian views of properties.

### 6.1.2 Quiddities

Before turning to those views, we must make one more distinction, this time between two different conceptions of quiddity in the what-it-is sense. Some Neo-Aristotelians will give an *analysis* of the ontological make-up of a property, whereas others will think of properties as ontologically primitive. The what-it-is of such a primitive property is often called a quiddity. (This is to be distinguished from the use of quiddity as a second order property of the property, or some other thing distinct from the property itself.) Among those who identify the ontological structure of a property, the what-it-is, with a quiddity, some think of quiddities as robust and some think of them as bare. It is important for us to get a grasp on this distinction between, as we might put it, a *thick* and a *thin* conception of quiddities.

Perhaps the best way to do so is to consider someone who at one point accepted the existence of thick quiddities but at another point rejected them in favor of thin quiddities: David Armstrong. Recall from Chapter 5 that the context in which this switch occurs is Armstrong’s theory of possibility, and in particular, his account of alien individuals and properties. Armstrong (1989) rejected the existence of alien properties and still does. But originally, his reason for rejecting them was that, as he put it, “each universal must surely have its own nature.” Such a nature is a thick quiddity, which in turn is nothing other than the property. Combining such natures cannot give you a new nature, and so there couldn’t be any properties other than those that are actually instantiated.

Comparing this account of quiddity with Armstrong’s account of haecceity is instructive. Armstrong rejected “strong” haecceities but accepted “weak” ones. What’s the difference?

Strong haecceities differ from each other *by nature*; weak haecceities differ *merely numerically*. When you have said that two weak haecceities are different, you have said all there is to say. If you have encountered one weak haecceity, then, from the perspective of it simply being a haecceity, you have encountered them all. Compare this with thick quiddities, which the Armstrong of *A Combinatorial Theory of Possibility* accepted. Thick quiddities differ from each other by nature. In *A World of States of Affairs*, he would describe this earlier view in this way: To encounter one thick quiddity is “emphatically not to have encountered them all.” Thick quiddities are the sorts of things with which “the phenomenologically minded may think... we have a direct acquaintance...”

The Armstrong of *A World of States of Affairs* still rejected quiddities for alien properties, but he tentatively rejected thick quiddities in favor of a thin quiddities, analogous to weak haecceities. Thick quiddities, he thought, “involve ontological embarrassment,” since science does not seem to concern itself with them. And so he accepted a view whereby quiddities in the case of actually instantiated properties differ merely numerically. Within each adicity class of properties, to encounter one quiddity is to have encountered them all.

Notice that neither account of quiddity ascribes an internal, ontological structure to a property. Properties are ontologically basic on both views. Hence there are at least two options for those who accept properties as ontologically basic. They can identify them with thick quiddities, the first option, or with thin quiddites, the second option.

I think, however, that the thin quiddity account is mistaken, for similar reasons as those given by Schneider (2001). Recall from Chapter 3 that sparse properties are invoked to explain the objective similarities and differences of things and their causal powers. But in what sense could thin quiddities account for either? Differing with respect to some property would not ground a *qualitative* dissimilarity, since properties differ, not by qualitative nature, but merely numerically. If anything, differing with respect to them would seem to ground *numerical* difference. In the same way, sharing a property wouldn’t ground a qualitative similarity. As Schneider put it, “if every universal with the same -adicity only differs

numerically, then objects having *any* universal with the same -adicity should resemble each other equally.” (If the properties are immanent, then the sharing of them would at least be overlap of being, but would not ground *qualitative* similarities. Having the same property would be the simple sharing of a non-mereological part.)

Similarly, thin quiddities could not ground causal powers. Something more is needed to the nature of a property, in virtue of which that property grounds precisely those causal powers. If the difference between properties within an adicity class is mere numeric difference, then, as Schneider put it, “why don’t they all simply confer the same causal powers?” In short, thin quiddities could ground neither objective similarities and differences, nor causal powers. If we are going to accept properties as basic, we should identify them with thick quiddities.

### 6.1.3 The Pure Powers View

The first Neo-Aristotelian account of properties I shall consider is the Pure Powers view. (The view could just as well be called the Pure Dispositions view, but I will stick with talking about powers.) Properties, on this view, are powers and *nothing but* powers. It will take a little bit of work to see precisely what this means.

It will be most helpful in understanding the view, I think, to turn to a recent defense of it, that of Bird (2007b).<sup>9</sup> While he calls the view he defends Dispositional Monism, it is simply the view that all natural properties are pure powers. To say that a property is a pure power or that it is dispositional, according to Bird, is to say that it has an essence that can be “characterized dispositionally. Thus for some property P . . . , there is a stimulus S and a manifestation M such that it is essential to P that anything that possesses P thereby possesses the disposition to manifest M in response to stimulus S.” It is not immediately clear whether Bird takes this essence to be the ontological what-it-is or the external profile

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<sup>9</sup>Shoemaker (1980) is perhaps the first to explicitly adopt this view, but he is unfortunately not as clear as one might hope.

of the property. This will become important shortly.

Bird is primarily concerned to rebut a common objection to the Pure Powers view, but understanding the objection and his response will give us a deeper understanding of precisely what the view is. The problem is known as the regress objection. It has been raised by many philosophers, and it is typically put in terms of a metaphor. While he was not concerned with the Pure Powers view *per se*, Russell (1927) noted in a similar context that, “[t]here are many possible ways of turning some things hitherto regarded as ‘real’ into mere laws concerning other things. Obviously there must be a limit to this process, or else all the things in the world will merely be each other’s washings.” Similarly, Armstrong (1997) worries that on the Pure Powers view, “everything is potency, and act is the mere shifting around of potency.” The problem with such a view, according to Armstrong, is that “particulars would seem to be always re-packing their bags as they change their properties, yet never taking a journey from potency to act. For ‘act’ on this view is no more than a different potency.” Martin (1997) likens the exercise of a causal power, on the Pure Powers view, to the issuing of a promissory note “that may be actual enough, but if it is only for *another* promissory note which is . . . , that is entirely too promissory.”

A property on the Pure Powers view is a power to bring about the manifestation of another property, and in some sense that’s all the property is. But, as the metaphors above suggest, a regress lurks. If the what-it-is of a property  $P_1$  is exhausted by its relation to another property  $P_2$ , then the what-it-is of  $P_1$  has not been determined until the what-it-is of  $P_2$  has been specified. Since all properties are pure powers, we are off to the races. Bird compares the Pure Powers view, in this regard, with the view that all words get their meaning by explicit definitions—we shall either need an infinite number of words or we will eventually come full circle.

Bird considers three interpretations of the regress objection and defends the Pure Powers view against them. The first is an epistemological interpretation, and we need not concern

ourselves with that interpretation.<sup>10</sup> On the second interpretation, the claim is that the pure Powers view ascribes *too little actuality* to properties. This can be seen in Armstrong's complaint above that potencies are never actualized. Bird successfully shows that this objection is mistaken. First, it begs the question. It assumes that powers or dispositions are not fully actual. But the defender of the Pure Powers view—indeed, all Neo-Aristotelians—insist that powers are actual, genuine, full-blooded features of objects. What *is* merely potential is their manifestation. The objection assumes, as Bird puts it, that powers can be real “only if they are really something else.”

Bird's second response is to point out that if powers are less than fully actual, categorical properties are even worse off. There is simply not much to the nature of a categorical property. We can say that it is distinct from other properties, that it is multiply instantiable, and that it has an adicity. But, Bird claims, the Pure Powers view says all of that but adds that it has a dispositional character. “[T]he essential features attributed to the nature of a categorical property are a proper subset of those attributed to an essentially dispositional property.” The regress objection, in short, gives us no reason to think the Pure Powers view ascribes too little actuality to properties.

But there is a third interpretation of the regress objection that Bird finds more worrisome. According to this version of the regress objection, the *identity* of a property is indeterminate if it is conceived as a pure power. If *all* properties are pure powers, then “the identity of any property is determined by its relations to other properties.” This entails either that there are infinitely many properties or that the identity of each property is eventually determined by relations that other properties bears to *it*. The structure of the identity of properties is circular, and therefore each property's identity is indeterminate.

According to Bird, the pure powers view is indeed committed to the thesis that a property's identity is determined by its relations to other properties. Bird then shows,

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<sup>10</sup>For a presentation of the epistemological worry, see Swinburne (1980). For a response, see Bird (2007b). I'm inclined to agree with Hawthorne (2001), who in a similar context suggests that such arguments rely on dubious epistemological premises.

quite persuasively, that given certain assumption about powers one can uniquely determine a property merely by reference to the relations it enters into with other properties. He compares this task to that of uniquely specifying the nodes of a graph (or more generally, the nodes of any structure) by means of the directional lines between the nodes. Just as the identity of the nodes can supervene on the structure of the graph given certain assumptions about the graph, so too the identity of pure powers can “supervene on the pattern of their manifestation relations.” The circularity of such relations “does not prevent the identities of those powers from being fully determined by the asymmetric pattern” of such relations.

How should we interpret Bird’s use of “identity” here? Here is an interpretation that is tempting: Bird’s Pure Powers view is an account of the external profile of properties, the features of properties by means of which we can uniquely pick them out. According to this view, when we have specified all the manifestation relations that hold between properties, we have said all that needs to be said in order to pick out which properties there are and to distinguish one property from another. This is to be contrasted with the combination of Categoricalism and Quidditism. Since the manifestation relations that hold between properties are contingent according to those doctrines, specifying the relations will not be sufficient to pick out the properties uniquely. Indeed, there simply is *no* profile that would succeed in uniquely picking out a particular property always, everywhere and in all possible worlds, if Categoricalism and Quidditism are true.

Notice that on this interpretation of the Pure Powers view it is not an account of the what-it-is of properties. It is, for example, consistent with identifying properties with thick quiddities, though this depends on how one interprets the ‘pure’ of Pure Powers. If powers are pure because all one *needs* to refer to in order to uniquely identify a property is the relations it enters into with other properties, then properties can be identical with thick quiddities. Typically it is thought that thick quiddities can be identified *phenomenologically*, and so that would be one way, *in addition* to the relations it enters into with other properties, to identify a property. The result would be a view whereby properties are identical with

something that is both richly qualitative and richly powerful or dispositional. We might call such properties ‘powerful qualities.’ (If, in addition, one substituted the counterfactual truths that the powerful quality makes true for Bird’s manifestation relations as the profile of the powerful qualities, then the result is the view I shall defend below in 6.1.6.)

On the other hand, if powers are pure because *the only way* to identify a property is by means of the relations it enters into, then properties cannot be thick quiddities; if they are quiddities at all, they are thin quiddities. The result would be a view whereby properties are not identical with something that is richly qualitative, but rather identical with something that, while distinct from the relations it enters, can nevertheless be described or picked out *only* by means of such relations. We might call such a view the Thin Powers view. While this may be the view of some who call their view of properties the Pure Powers view, I know of no one who holds it. (As mentioned before, I think it would be a mistake to identify properties with thin quiddities, and so I think we should reject the Thin Powers view.)

Such profile interpretations of the Pure Powers view are tempting, but they are mistaken. The leading defenders of the Pure Powers view, Bird and Mumford, do not take themselves to be offering merely an external profile of properties, by means of which we can uniquely identify them. They mean to be giving an account of what properties *are*. Bird says that, “the identity of any property is determined by its relations to other properties.” Here ‘identity’ means that to which it is identical, the what-it-is of a property. The phrase ‘determined by’ might mislead one into thinking the identity is distinct from, though determined by, the relations. That is incorrect. The determination talk can, *without loss of meaning*, simply be dropped. The resulting view would be that properties are identical with the relations into which they enter.

We might express the view this way. Let  $R$  be the manifestation relation. The view is that every property  $P$  is identical to the set of all instances of  $R$  such that  $P$  bears  $R$  to some property or some property bears  $R$  to  $P$ . Let  $R(x_1, x_2)$  be an instance of the  $R$  relation and  $\mathbb{P}$ , the set of all properties. Then the claim is:

$$\forall P \in \mathbb{P} ( P = \{ R(x_1, x_2) : x_1, x_2 \in \mathbb{P} \wedge ( P = x_1 \vee P = x_2 ) \} )$$

While this statements *seems* immediately circular, since P appears in the specification of the set to which P is identical, it is not necessarily so. The Ramsified lawbook method avoids this sort of immediate circularity. Consider a toy world, call it TOY, with three properties, P<sub>1</sub>, P<sub>2</sub> and P<sub>3</sub>, such that R(P<sub>1</sub>, P<sub>2</sub>), R(P<sub>2</sub>, P<sub>3</sub>) and R(P<sub>3</sub>, P<sub>2</sub>). The Ramsified lawbook of TOY would thus be:  $\exists x \exists y \exists z ( R(x, y) \wedge R(y, z) \wedge R(z, y) )$ .

We can now arrive at the identity of each of the properties in TOY by dropping the appropriate quantifier. Each property is identical to the set of instances of R that satisfies one of the resulting open formulae:

$$P_1: \exists y \exists z ( R(x, y) \wedge R(y, z) \wedge R(z, y) )$$

$$P_2: \exists x \exists z ( R(x, y) \wedge R(y, z) \wedge R(z, y) )$$

$$P_3: \exists x \exists y ( R(x, y) \wedge R(y, z) \wedge R(z, y) )$$

There is a sense in which this specification of properties is still circular. To specify P<sub>1</sub> I refer to P<sub>2</sub>, and in specifying P<sub>2</sub> I refer back to P<sub>1</sub>. I don't refer to them *by name*, but I do refer to them. But this circularity is less immediate than the previous circularity, where I referred to P<sub>1</sub> in specifying P<sub>1</sub>.

It is important to say a bit more about R, the manifestation relation. It is the relation that holds between P and Q when Q is a possible manifestation of P. It is, therefore, an essentially modal relation. The modal nature of it, though, may not be immediately clear. It is a relation, after all, not a monadic property. In what way, then, is it an essentially modal relation? Consider the simple case where the property is identical to a single instance of R. To have that property *just is* to have the power to produce some other property instantiation. That power needn't be manifested, and so to have that property may be to be related to an uninstantiated property. To be sure, objects that have such a property have it actually, but to have it may involve being related to something non-actual. A less

simple property, one that is identical to several instances of the manifestation relation, has additional modal structure, since the several instances are necessarily tied together. To have such properties *just is* to have something that is identical to *all* of those relations. In such cases, we might say, the relations are a packaged deal.

While I think the above statement of the view is more clear than most, I think there are important questions left to ask. Note that the properties are sets of relations. What are the *relata* of these relations? There seems to be four options: 1) Substances; 2) Properties; 3) Instances of the manifestation relation itself; or 4) Nothing.

Consider, first, the claim that the *relata* of the manifestation relation are substances. If that is correct, then the view is not that properties are identical to the relations into which *properties* enter, but rather that properties are identical to the relations into which *substances* enter. I will return to this view below.

Consider, second, the claim that the *relata* of the manifestation relation are properties. This is really just a round about way of saying that the *relata* are instances of the manifestation relation itself, because properties, on the Pure Powers view, are identical to instances of the manifestation relation. That brings us to option 3, that the *relata* of the manifestation relation are instances of the manifestation relation. Notice that there is a kind of circularity in this view, but as Bird has shown, this does not entail that we cannot specify the relational structure of properties.

The problem with such a view is not that we are unable to specify the relational structure or its nodes. Rather, it is that the structure we are able to specify is a *relational* structure. The view, it seems to me, forces us to accept a wildly implausible view of the world as *entirely* relational. It forces us to accept a relational version of the bundle theory of substances.<sup>11</sup> Suppose we try to accept a non-bundle theory of substance. On this view, for a substance to instantiate a simple property is for it to instantiate a relation. But there are only two ways to instantiate a relation. First, something instantiates a relation by being one of the *relata*.

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<sup>11</sup>Heil (2004) makes this point briefly.

Then the view reduces to the claim that properties are identical to relations into which substances enter, a view I will consider shortly. Second, something instantiates a relation by being *an instance of* the relation. This view reduces substances to relations, but it also reduces properties to relations. It is a wholly relational view of the world.<sup>12</sup> What is it for a substance to have a property? It is for a set of sets of instances of R to have as an element a set of instances of R that is related by R to some other set of instances of R that is an element of some other set of sets of instances of R. I see nothing inconsistent about such a view. I just think it's obviously false; there's entirely too much R going around. The world, if this view were correct, would be much too relational.

Finally, consider option 4, the claim that there are no *relata* of the manifestation relation. Notice, though, that it's not merely that there happen to be no *relata*, which is the case for any relation that has no instances. The claim here is more substantive: there are no—and *could be no*—*relata* of the manifestation relation. I see two problems with such a view. First, it's not clear to me in what sense it is a relation if it could not possibly have *relata*. Second, a slightly altered version of the above objection applies to this view. In what way does a substance instantiate this *relata*-less relation? If it instantiates it by being one of its *relata*, then the relation is not *relata*-less after all. If it instantiates it by being an instance of the relation, we are again left with a wildly implausible bundle theory of substances, according to which everything that exists is purely relational. It's relations all the way around and all the way down.<sup>13</sup>

Return, then, to the claim that properties are identical to the manifestation relations into which *substances* enter. To say that I have a property, on this view, is to say that I am related in various ways to other objects. How am I related to other objects? By being disposed to cause them to be related to other objects in various ways (and by being

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<sup>12</sup>Holton (1999) seems to defend such a view.

<sup>13</sup>Perhaps, instead, this view is a version of the analysis of properties offered in Mumford (Forthcoming*b*). According to that account, properties are powers, and while powers are *relation-like*, they are not relations. See below for a brief discussion.

disposed to be caused by other objects to be related in various ways to other objects). Which objects am I related to? Those that are appropriately related to other objects. This is an important and philosophically interesting theory of properties. It should appeal to many anti-Neo-Humeans. Indeed, while I think it is in the end unsatisfactory, I would prefer it to any Categorical account of properties.

Why, then, do I find it unsatisfactory? Because it seems to me that it is a form of *nominalism*. It is not a pure form of nominalism, to be sure, since relations are genuine. But there are no intrinsic, monadic properties, only relations. The Pure Powers theorist will no doubt insist that there are intrinsic properties; it's simply that what those intrinsic properties are is bundles of relations.<sup>14</sup> But this is akin, I claim, to the modal counterpart theorist insisting that we really do have modal properties; it's simply that what those modal properties are is the having of a counterpart who has certain nonmodal properties. Thus there are two responses to the Pure Powers theory: one that sees it as an appropriate simplification of a Neo-Aristotelian theory of properties, and one that sees it as a *elimination* of properties. The best way to explain this divergence is to consider phenomenological properties of conscious experience.

Consider, for example, the conscious experience of seeing red. There is something that it's like to be in that state or have that property, something that is accessible by introspection. The qualitative nature of such properties, known as 'qualia,' forces itself upon us—or so it seems to many. The literature on qualia is vast; our current task demands that we avoid

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<sup>14</sup>It is interesting to note that Neo-Aristotelians appear unable to accept the common definition of intrinsic properties defended by Langton & Lewis (1998) that appeals to existing in isolation. If you are a Pure Powers theorist, taking away the other property instances would be to eliminate all of the properties, since properties depend for their identity on all the other properties that exist. Even those who accept the Powerful Qualities view can't straightforwardly accept the standard account. For properties, at least those of our world, appear inherently interconnected. We simply cannot consider what properties I or a duplicate of me would have were I to exist in isolation from everything else. I *couldn't* exist in isolation. There are too many causal requirements that involve property instantiations outside of myself. How, then, should a Neo-Aristotelian define intrinsic properties? I don't have the space to defend an account here, but if what I say about spatial and temporal relations in 6.1.7 is correct, a surprisingly simple answer results: Intrinsic properties are just natural properties. There are no extrinsic natural properties. Indeed, if one is inclined to reject internal relations, as I am, the result is that the only genuine natural properties there are, are intrinsic monadic properties and external, singular causal relations.

wading in. Instead, I want to focus on two of the many philosophical responses to qualia. The first response is to accept qualia as genuine, irreducible features of the world, even if they are not micro-physical or even physical properties.<sup>15</sup> The second response is to deny their existence altogether—or at least analyze them into something more philosophically respectable.<sup>16</sup>

These alternative approaches to qualia can be brought into the current debate about powers by first considering how each approach would respond to Armstrong's change from thick to thin quiddities. Those who think of qualia as irreducible features of the world will see the change as a move from the acceptance to the rejection of qualia. Such a move would empty our mental experiences of their rich qualitative nature. It would result in a sort of *elimination* of the mental. In contrast, those who think of qualia as reducible or eliminable will see the move from thick to thin qualia as appropriate and welcome. For it is precisely a reduction or elimination of what they consider the *extra* qualitative whatness of properties. This extra something, as Armstrong put it, is an "ontological embarrassment."

The debate over qualia does not translate perfectly into the context of Neo-Aristotelianism, because defenders of irreducible qualia often appeal to arguments that Neo-Aristotelians could not: arguments that appeal to the possibilities of inverted qualia and zombies. A zombie is a perfect physical duplicate of me who has no phenomenal experience; he's empty on the inside but acts in every way as I do. If zombies are possible, then clearly phenomenal properties are not physical properties.<sup>17</sup> Since Neo-Aristotelians typically assert both that all properties are causally efficacious and that they bestow the powers they do necessarily, they are committed to denying the possibility of zombies. Similarly, two persons' qualia are inverted when, for example, I have the phenomenal experience of green in all and only those

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<sup>15</sup>The classic argument in favor of irreducible qualia is from Jackson (1982, 1986). See also Chalmers (1996), among many others.

<sup>16</sup>One approach is to identify phenomenal properties with intentional properties, and to give a physicalist account of intentional properties. See, for example, Dretske (2003).

<sup>17</sup>Chalmers (1996) is perhaps the first to make the possibility of zombies central in the argument for irreducible qualia.

situations in which you would have the phenomenal experience of red. Here, again, many Neo-Aristotelian cannot assert the possibility needed to get the argument going. For distinct phenomenal experiences could not, on their view, have exactly the same causal-functional role.

Still, we can consider what a Neo-Aristotelian who is friendly to qualia would say about the Pure Powers view, in contrast to what a Neo-Aristotelian who prefers to reduce or eliminate them would say. The later would welcome the Pure Powers view. In the context of Categoricalism, Armstrong was forced to accept thin quiddities because there was nothing to the nature of the property otherwise. A rejection of thin quiddities in that context would be akin to nominalism. But the denial of Categoricalism opens the possibility of rejecting quiddities *altogether* without thereby becoming a nominalist. What is left to the being of a property is precisely the relations of manifestation.

In contrast, a Neo-Aristotelian who thinks of qualia as genuine, irreducible features of the world would reject both the move from thick to thin quiddities and the move from thin quiddities to Pure Powers. Neither view can account for the phenomenological character of experience. Such a Neo-Aristotelian thinks that if the Pure Power view is correct, *everything* is zombie-like, disposed to act in certain ways but empty on the inside. Everything is intrinsically empty of all qualitative nature. In contrast, these Neo-Aristotelians will want to say that properties are *both* qualitative *and* powerful. I will defend such a view in 6.1.6, and so the details are postponed. Here I merely point to one reason why a Neo-Aristotelian might reject the Pure Powers view. Since a defense of mental qualia would take us too far afield, I leave the Pure Powers view as a live option for those Neo-Aristotelians who are not friends of qualia. Because I think the argument for mental qualia is strong, however, I am inclined to reject the Pure Powers view.

Mumford (Forthcoming<sup>b</sup>) describes the Pure Powers view in a slightly different manner than Bird. For Mumford, “to be property F is just to bear certain relations to all other properties, G, H, I, . . . , in virtue of the causal powers of F (and reciprocal powers of G, H,

I, ...).” One way of interpreting Mumford’s view is that he holds the same view as Bird’s, whereby properties are instances of the manifestation relation. Everything that was said above about Bird’s view could then be said of Mumford’s view.

But Mumford also describes the view as an *analysis* of properties in terms of powers. Powers, then, are a basic ontological category, and properties are understood in terms of powers (or clusters of powers). This statement of the view seems to push one away from identifying properties with relations, and toward identifying properties with a distinct, basic ontological entity, a power (or a cluster of powers). Powers may be relation-*like* and property-*like*, but they are not relations or properties.

I think this view should also be rejected. In order to distinguish it from Bird’s view, it cannot be that powers are identical to the manifestation relations into which they enter. Suppose, then, that powers are basic, and they enter into (essentially modal) manifestation relations with each other but are not identical to such relations. Some power  $P_1$  is related by  $R$  to some further power  $P_2$ .  $P_1$  *must* be related by  $R$  to  $P_2$ . Why must it be so?

One option is that the explanation for the necessity lies in the manifestation relation itself. I see two problems with such a view. First, it now looks like powers are not primitive after all. A power’s being the power that it is is grounded in the nature of the manifestation relation. It would no longer be clear what the being of the power itself is, apart from the manifestation relation. Second, the view seems needlessly ontologically complex. There are both properties and the relation of manifestation. Bird’s Pure Powers view above needs only instances of the manifestation relation. The view I shall defend below needs only qualities and the truthmaking relation. Simplicity seems to favor those views.

Suppose, instead, that the source of necessity lies in the properties themselves (as I think Mumford would suppose). One result is that the manifestation relation is an internal relation, and hence is not an addition of being. The powers themselves are all that is needed, an important gain in simplicity. Like Bird’s view above, I think this is a philosophically interesting and important theory of properties. Properties are powers, and powers are basic,

irreducible entities. There are two reasons I prefer an alternative account of properties. First, it's not clear how this theory of properties can accommodate the phenomenological character of experience. Phenomenal properties will either be reductively identified with basic powers to produce effects (and be produced by certain causes), a move that those who think of qualia as irreducible will reject, or they will be basic features in their own right, in addition to basic powers. But then how would phenomenal properties relate to powers? If they are identical, then the view becomes a version of the Powerful Qualities view to be considered below. If they are not identical but merely correlated, then the view is needlessly complex, accepting two sorts of properties as basic in their own right when one would do the job.

The second reason I prefer an alternative account is that the view seems a radical departure from traditional theories of properties. Properties are *reduced* to some distinct ontological category. There is nothing *in itself* wrong with such departures. Indeed, I myself will suggest several such departures. Nevertheless, we take such drastic measures only when forced. I think this measure—accepting an analysis of properties in terms of some distinct, basic ontological category—is not forced, because there is a better Neo-Aristotelian option available.

#### 6.1.4 The Physical Intentionality View

One alternative option is the Physical Intentionality view. Whereas the Pure Powers view attempted to explain the modal nature of properties by saying that properties are pure powers, the Physical Intentionality view explains the modal nature of properties by asserting that all properties are *intentional*, fundamentally directed outside themselves in a way traditionally reserved for mental states.

The road to this view was paved by Martin & Pfeifer (1986), who argued that contemporary accounts of intentionality failed to distinguish between mental intentionality and non-mental dispositionality. “Accepting any of these current accounts,” they suggested,

“will be to take a quick road to panpsychism!” One way to respond would be to suggest an alternative way to draw the distinction and avert panpsychism, which Martin and Pfeifer attempt. Another way would be to reject the distinction and accept mental *and physical* intentionality. The Physical Intentionality view takes the later option, and it is defended by Place (1996, in Armstrong et al. (1996), and 1999) and Molnar (2003).

Central to any account of intentionality is the notion of *directedness*. If I am thinking about the rain, then my thought is about—is directed toward—rain. There is an important sense, though, in which dispositions or powers are also directed—they are directed toward their manifestations. Powers are powers *for* something, just as thoughts or hopes are *about* something. Furthermore, the objects of both intentional and dispositional states need not exist. In the case of intentionality, the object of my hopes or fears need not exist in order for me to hope for or fear it. Similarly, the result of a power’s manifesting itself need not exist in order for an object to have the power. The Physical Intentionality view takes these analogies seriously. Both kinds of states—thinking about, say, rain and having the power to, say, repel an electron with such-and-such a force—are intentional. One is an example of mental intentionality; the other is an example of physical intentionality.

While interesting and provocative, the view has few defenders and, I think, should be rejected. As Mumford (1999) and Bird (2007a) have shown, the analogy between mental intentionality and physical dispositionality breaks down. It does seem that the two marks of intentionality discussed so far, directedness and possible non-existence of object, are shared by both mental intentional and dispositional states.<sup>18</sup> But, first, the notion of directedness is not as clear as one might hope. Mumford points out that a falling rock is in some sense directed toward the ground, and yet we do not want to say that its falling is thereby intentional.

There are, and this is the second point, *other* marks of intentionality. Bird considers four

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<sup>18</sup>Even if it is granted that dispositions or powers are in some sense directed toward their manifestations, we should be careful not to move from that to a sort of animism, as Mumford cautions. Powers do not *strive* for their manifestations in the way that mental beings might strive for a goal.

other marks of intentionality—indeterminacy, intensionality, extrinsicity, and direction of causation—and argues that the analogy between mental intentionality and dispositionality fails in each case. I shall here consider only the first two. Consider, first, the indeterminacy of intentional states. I can think of a person without thinking of her as having a specific number of hairs on her head. The person of my thought is indeterminate (even if the person my thought is about is not). Are dispositions likewise indeterminate? As Bird argues, if there is indeterminacy with respect to powers, it is unlike the indeterminacy of intentional mental states. The indeterminacy of the later is the “lack of a complete description.” Powers might have an infinite number of possible manifestations. (An electron might repel one other electron situated so-and-so in relation to it by a force of such-and-such. For each of the infinitely possible spatial relations, there may be some specific force of repulsion.) But each of the many possible manifestation is fully determinate. Even if indeterminism is true, the indeterminacy of a power (now a propensity) is, well, *indeterminism*—not the lack of a complete description.

Consider, next, the intensionality of intentional mental states. When talking about intentional mental states, states that have some intentional object, we are in an intensional context: substitution of identicals is not truth preserving. It may be true that I believe the person outside my door is wet, but I may not believe that the President of the United States is wet, even if the person outside my door *is* the President (unbeknownst to me). Molnar claims there is a parallel in the case of powers. ‘Acid has the power to turn this piece of litmus paper red,’ does not entail, according to Molnar, ‘Acid has the power to turn this piece of litmus paper the color of Post Office pillar boxes.’

Bird shows, however, that in the context of a theory of natural properties, Molnar’s example does not work. Suppose that the predicate of the first sentence picks out a natural property, redness. How should we understand the expression in the predicate of the second sentence, ‘the color of Post Office pillar boxes’? If it picks out a natural property, it will be the same natural property, redness. And so the first sentence will indeed entail the second

sentence. If, on the other hand, it picks out a non-natural property, then the two predicates will not be co-referring expressions. Then the fact that the first sentence does not entail the second sentence is not indicative of intentionality.

Thus while powers may be in some respects like intentional mental states, they are unlike them in important ways. It would be a mistake, therefore, to account for the modal nature of properties by appealing to physical intentionality.

### 6.1.5 The Powerful Qualities View

While the Pure Powers theorist thinks of properties as *purely* powerful, the Powerful Qualities theorist thinks of properties as *both* qualitative *and* powerful. The challenge is to say how it could be that properties are both at the same time. In this section, I consider various statements of the view from Martin and Heil, and present several objections, focusing on one from Molnar (2003).

One way that Martin (1993a,b) attempted to capture the dual nature of properties, on the Powerful Qualities view, is to say that properties are *dual sided*. Properties are “Janus-faced” or, alternatively, each property is “a two-sided coin.” This seems to entail that properties have two parts or faces or sides, one that is qualitative and one that is dispositional or powerful. But that leads immediately to the question raised by Armstrong (in Armstrong et al. (1996)): How are the two sides related? Are they merely contingently related, or necessarily so? If the relation is contingent, then it appears possible to have the qualitative side linked with one dispositional side in one world, but a different dispositional side (or perhaps none at all) in a different world. Neo-Aristoteleans would deny that possibility, so perhaps the relation should be necessary. Then, Armstrong argues, the qualitative side is necessarily connected, by way of the dispositional side, with the various causal effects the property brings about. The dispositional side is no longer needed to explain the various causal effects. A simpler view would “cut out the middleman” and assert that the qualitative is directly, necessarily connected to its effects.

Martin, however, did not intend to defend such a dual sided view. There is an alternative way of capturing the dual nature of properties, what he calls the Limit view. On this way of putting the view, no property is purely dispositional or purely qualitative. They are purely dispositional or purely qualitative “only at the limit of an unrealizable abstraction.” Thus the qualitative nature and the dispositional nature are “abstractly distinct but actually inseparable.” Taken to its extreme, this seems to imply that dispositionality and qualitativity are not genuine features of properties. They are merely ways that we consider properties. Martin (1997), in moving away from the above, two-sided view, seems to confirm this:

What is qualitative and what is dispositional for any property is less like a two-sided coin or a Janus-faced figure than it is like an ambiguous drawing. A particular drawing, remaining unitary and unchanged, may be seen and considered one way as a goblet-drawing and, differently considered, it is a two-faces-staring-at-one-another drawing. The goblet and the faces are not distinguishable parts or componenets or even aspects of the drawing, although we can easily consider the one without considering, or even knowing of, the other. The goblet-drawing is identical with the two-faces drawing.

It is tempting to interpret this as claiming that dispositionality and qualitativity are not real features of properties, but rather are *ways of considering* the property.<sup>19</sup> After all, the drawing is *in itself* ambiguous. It is only when *we interpret it* that it is disambiguated. Perhaps, then, we should say that properties are not, *in themselves*, dispositional or qualitative.

But that interpretation is difficult to square with other things that Martin (along with Heil) say about the view. Indeed, in the essay from which the above quote is taken, Martin

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<sup>19</sup>Mumford (1998) seems to defend this view: “I have been trying to guard against taking the dispositional-categorical distinction to be anything more than a distinction in the way we talk about instantiated properties or states of the world. The danger is projection of this distinction onto the world such that it is taken to be a division in reality rather than just a division in the way we talk about reality.” But he has since changed his mind and accepted the Pure Powers view.

says that “the qualitative and dispositional are identical with one another and with the unitary intrinsic property itself.” Martin & Heil (1999) describe the view this way:

Properties are not purely qualitative... But neither are properties purely dispositional... Instead, every property is at once dispositional and... qualitative. Dispositionality and qualitativity are built into each property; indeed, they *are* the property... What we propose boils down to a surprising identity: the dispositional and the qualitative are identical with one another and with the unitary intrinsic property itself.

Let’s follow Heil (2004) and call this the Identity view. Clearly the Identity view is not attempting to say that the dispositionality of a property is merely a way of considering the property; otherwise it would not say the dispositionality *just is* the property.

The problem is that Martin and Heil seem to say that it *is* a way of considering the property immediately after the above quote: “[T]hese are simply different ways of representing the selfsame property... [A] property’s dispositionality and qualitativity are, at bottom, the property looked at in two complementary ways.” Suppose that we emphasize the analogy with the ambiguous drawing, and hence say that on the Identity view the dispositionality and qualitativity of a property are simply ways that we consider the property. The following objection from Molnar (2003) then seems forceful. Since there “must be some difference between a faces drawing and a goblet drawing even if one set of lines can be considered to be either or both,” it seems to follow that the difference is *in us*, in our considering of the drawing. Thus if we take the analogy seriously, being a dispositional or qualitative property is *mind-dependent*. “Whether an object has powers and qualities depends in part on the considerings that happen (on what we see things as).”

Can Martin and Heil avoid this result without slipping back into the Dual Sided view? I suggest they can only by rejecting the ambiguous drawing analogy, and instead comparing

the identity of the dispositional and the qualitative with other *a posteriori* identities.<sup>20</sup> Martin and Heil do, after all, describe the identity of the dispositional and qualitative as “surprising,” but it is not the identity of the ambiguous drawing that is surprising. Looking at the drawing and suddenly seeing that I can view it as a goblet drawing *and* a two-faces-looking-at-each-other drawing, I do not say to myself, “And here I thought I was looking at two different drawings!” What is surprising is that the very same drawing, whose identity with itself was never in doubt, can be interpreted in such different ways.

In contrast, ordinary *a posteriori* identities can be and often are surprising. That Hesperus, the evening star, is the same object as Phosphorus, the morning star, is something we can imagine might have been false. In order for the Identity view to be analogous to such *a posteriori* identities, it needs to distinguish the dispositional or powerful from the qualitative in such a way that, though we can imagine that they might have been distinct, they are in fact identical. I suggest that we do so by appealing to the truthmaking relation.

### 6.1.6 The Truthmaker View

To be qualitative is to be identical to a thick quiddity. To be powerful is *to be the truthmaker* for the counterfactuals describing what objects with that property would do in the various circumstances they might find themselves in. The Truthmaker version of the Powerful Qualities view, then, is the claim that the qualitative is identical to the powerful. One and the same thing is both identical to a thick quiddity *and* the truthmaker for the counterfactuals. All natural properties are powerful qualities.

Consider, first, the qualitative nature of properties. I claimed above that phenomenal properties are richly qualitative in a way that Pure Powers are not, and that we ought to accept mental qualia. The simplest view, therefore, would be one where *all* properties had

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<sup>20</sup>Martin & Heil (1998) do say that they are “not entirely happy with the terminology” of the ambiguous drawing analogy.

the same qualitative nature. All properties have—or, more accurately, they *are*—an intrinsic qualitative character, a quality. The primary difference between mental and physical properties, on this view, is not the presence or absence of qualia. It is the nature of *our access to qualia*. In the mental case our access is more direct; in the physical case, less direct. Qualia are not, in themselves, mental, and so this is not a form of panpsychism. Qualia that are constituents of mental states are mental, but many qualia are not constituents of mental states. The later are physical qualia.

Consider, second, the powerful nature of properties. The necessity involved in the Truthmaker view is simply the necessity of the truthmaking relation. Thus the manner in which the Truthmaker view denies Categoricalism is clear, and, given the specific truths that properties make true, the denial of Categoricalism is immediately connected to modality, causation and laws. Let property P be had by object o and serve as the truthmaker for the counterfactual, “if o were in circumstance c, then o would  $\phi$ .” Clearly this is a modal truth, since counterfactuals are modal, but it is also a causal truth. It says how o would *manifest* P, by bringing about  $\phi$ . And, finally, the counterfactual can serve as a law: Objects with P in c will  $\phi$ . (Below I defend accounts of modality, causation and laws.)

The truthmaking relation, in this case, is the bottom of the story. In attempting to answer the question, ‘Why does this quiddity make true these counterfactuals?’ the only answer is that it is that quiddity and not some other. In particular, the quiddity need not be the truthmaker in virtue of some ontological structure in the quiddity itself. That is one advantage of the truthmaking relation; truths and truthmakers are not related one-to-one. A truthmaker is not required to be structured in the way the truth it makes true is. The truthmaker can be a unitary entity—and is in our case. To be powerful is not to have some internal structure, be it relational or otherwise. Just as with Martin and Heil’s Identity view, so too with the truthmaker view: That which is qualitative is identical to that which is powerful, and both are identical with the unitary property itself.

The Truthmaker view, then, is quite similar to the Martin and Heil Identity view. I

think it would be appropriate to consider the one as a further development of the other. On both views, properties are qualitative *and* powerful. Yet on both views properties have a unitary intrinsic structure. The primary difference comes in the Truthmaker view's appeal to the truthmaking relation to account for a property's powerful nature. It's not clear to me that Martin and Heil would welcome this move.

On the one hand, Martin was one of the early driving forces in the demand for truthmakers. Armstrong (2004b), for example, cites Martin as the impetus for the centrality of truthmakers in Armstrong's metaphysics. Martin himself speaks often of the need for truthmakers for robust counterfactuals: He argued for "the need of a nonregularist disposition power base as a truth-maker for strong conditionals and counterfactuals" (Martin, 1993b), and insists that "there must be that in virtue of which an indefinite number of strong dispositional and counterfactual statements are true" (in Armstrong et al., 1996). On the other hand, Martin has long argued that there are no non-trivial counterfactuals that capture the essence of dispositions. "Any attempt to gloss dispositions in terms of conditionals is doomed to failure" (Martin, 1996), and "[c]ounterfactuals can be used to say something about the world only if they are understood as clumsy linguistic gestures to real causal capacities, dispositions and tendencies" (Martin, 1984).

Despite his opposition to the conditional analysis of dispositions, I think the Truthmaker view is consistent with the spirit of Martin and Heil's Identity view (if not the letter). Even in the midst of arguing against the conditional analysis, Martin (1994) says that "[s]tatements ascribing causal dispositions or powers are *somehow* linked to (strict or strong) conditional statements." What is objectionable about the conditional analysis, according to Martin, is that it aims to be a *reductive* analysis. The counterfactual conditionals I shall offer as those made true by powerful qualities will not allow for a reductive analysis. What's more, powerful qualities may make an infinite number of counterfactuals true, and so any one ordinary counterfactual will indeed be only a "clumsy linguistic gesture" at the true powerful nature of powerful qualities.

How, then, should the counterfactuals be formulated? Recall the method for obtaining the Ramsified causal lawbook (discussed in 3.4.1 above). For the moment, assume determinism. If we let  $N(P, Q)$  be a simplified expression of a causal law, then we arrive at the causal lawbook by conjoining all such laws. If we replace the names of all the variables and prefix the lawbook with an existential quantifier for each variable, we get the Ramsified lawbook. If we drop one of the existential quantifiers, then the resulting open formula captures in a simplified way the counterfactuals made true by a natural property.

Let's formulate the counterfactuals in a more complete way. First,  $N(P, Q)$  is shorthand for the counterfactual, "if  $P$  were instantiated, then that instantiation would cause  $Q$  to be instantiated," or alternatively, "having  $P$  would cause its bearer to have  $Q$ ." Let  $C$  be the singular causal relation. Then the counterfactual can be represented as:

$$\forall x (Px \square \rightarrow C(Px, Qx))$$

Clearly this represents an extraordinarily simple law. It does not involve any sort of triggering condition, and it involves only one object.

Consider, then, a slightly more complex law. Let property  $P_1$ 's triggering condition be that it is had by an object that is related by some relation  $R_1$  to some distinct object that has property  $P_2$ , and let  $P_1$  be (at least in part) the power to cause the other object to have property  $P_3$ . If the triggering condition is part of the cause of the manifestation, then our law is, "For any  $x$  and  $y$ , if  $x$  and  $y$  were to be related by  $R_1$  and  $x$  were to have  $P_1$  and  $y$  were to have  $P_2$ , then  $x$ 's and  $y$ 's being just so would jointly cause  $y$  to have  $P_3$ ." More formally:

$$\forall x \forall y ( ( ( R_1(x, y) \wedge (P_1x \wedge P_2y) ) \square \rightarrow ( C( (R_1(x, y) \wedge (P_1x \wedge P_2y)), P_3y) ) ) )$$

The antecedent of the counterfactual is a complex of property instantiations, and the consequent is a singular causal relation holding between that very property instantiation complex (the would-be cause) and some other property instantiation complex (the would-be effect).<sup>21</sup>

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<sup>21</sup>The idea that the antecedent specifies a property complex comes from a similar idea in a conference

We are much closer to capturing the nature of the counterfactuals made true by powerful qualities, but there are two remaining complications. First, properties typically make many more than just one such counterfactual true; the number may be infinite. Negatively charged particles have the power to repel other negatively charged particles in a specific way for each of the many possible distances between them, and multiplying the number of negatively charged particles multiplies the possibilities. For each possible, causally relevant<sup>22</sup> property complex that some property might find itself in, it will be part of the truthmaker for a counterfactual that specifies what would happen were that property complex instantiated. For this reason, the view could have been called the Blue Print view, since the totality of counterfactuals made true by some property serves as a sort of causal-modal blue print for the property.<sup>23</sup> As might be clear, this fact will enable the Truthmaker theorist to offer a robust metaphysics of modality that appeals only to powerful qualities.

Second, and perhaps more importantly, the counterfactuals need to be qualified. In particular, we need to introduce a notion of causal completeness. While finks pose no problem for the counterfactual conditionals above (for reasons given in 4.7.1 above), *antidotes* do. For example, let  $P_1$  be the ingestion of poison,  $P_2$  be death, and  $P_3$  be the antidote to poison. The counterfactual  $\forall x (P_1x \square \rightarrow C(P_1x, P_2x))$  is false, since it's possible to take the antidote before ingesting the poison. The fix, however, is simple. The property complex specified in the antecedent of the counterfactuals must be causally complete—it must either include or rule out the various possible antidotes.  $P_1$ , *in those cases where  $P_3$  is not instantiated*, will cause  $P_2$ . But in those situations where  $P_3$  is instantiated,  $P_1$ , together with  $P_3$ , will cause something else, perhaps a stomach ache ( $P_4$ ).

Say that a property complex  $PC_1$  is “causal” when it would be a joint cause of some

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paper by W. Russ Payne defending a “property theoretic” semantics of counterfactuals. The semantics I offer below is similar in some ways to Payne’s account, including the rejection of possible worlds.

<sup>22</sup>Not *every* addition of properties to some property  $P_1$  will yield a unique, causal counterfactual of the above form that is made true by  $P_1$ . Many properties will be causally irrelevant to  $P_1$ ’s instantiation.

<sup>23</sup>I got the ‘Blue Print’ name from Neil Williams during discussion of a paper I presented at a workshop at the University of Bristol. He intended it, however, to be *objectionable*.

other property complex  $PC_2$ , were it instantiated. Then a causal property complex  $PC_1$  is “complete” when it is instantiated without any other property complex  $PC_4$  such that were  $PC_1$  and  $PC_4$  coinstantiated, they would jointly bring about some  $PC_3 \neq PC_2$ . Each counterfactual made true by a powerful quality will need to specify a causally complete property complex.

Return to our simple poison and antidote example. To make the example as simple as possible, suppose there are no other antidotes and nothing else that could possibly be causally relevant to the poison’s causing death. Then  $P_1$  (the poison) is (at least part of) the truthmaker for two counterfactuals:

$$\forall x ( (P_{1x} \wedge \neg P_{3x}) \sqsupset C(P_{1x}, P_{2x}) )$$

$$\forall x ( (P_{1x} \wedge P_{3x}) \sqsupset C(P_{1x}, P_{4x}) )$$

The simplifying assumptions can be done away with. Suppose there are many, perhaps infinitely many, antidotes to the poison. Let  $COM(Pa)$  mean that  $a$ ’s instantiation of  $P$  is causally complete. Then we can represent the less simple counterfactuals made true by powerful qualities in the following way:

$$\forall x ( (P_{1x} \wedge COM(P_{1x})) \sqsupset C(P_{1x}, P_{2x}) )$$

$$\forall x ( ((P_{1x} \wedge P_{3x}) \wedge COM(P_{1x} \wedge P_{3x})) \sqsupset C((P_{1x} \wedge P_{3x}), P_{4x}) )$$

...

$$\forall x ( ((P_{1x} \wedge P_{nx}) \wedge COM(P_{1x} \wedge P_{nx})) \sqsupset C((P_{1x} \wedge P_{nx}), P_{mx}) )$$

The truthmaker view, therefore, is the claim that all natural properties are identical to a quiddity that makes true some combination of counterfactuals like those above. The end result is that properties are powers to causally contribute in particular ways to the various particular circumstances in which they might find themselves.

## Objections and Replies

I will consider objections to the Neo-Aristotelian accounts of modality, causation and laws in the respective sections below. There are, however, four objections specifically aimed at the Truthmaker view of properties that I will now consider.

**Trivial Counterfactuals** Martin (1994) argued that any true counterfactuals that attempt to capture the powerful nature of properties will be trivial. Are the counterfactuals specified above trivial? Recall the distinction (made in 4.6 above) between a conceptual analysis of powers or dispositions and a truthmaking connection between properties and powers. The conditional analysis is framed in terms of analyzing concepts, whether they be covert power concepts like ‘solubility’ or overt power terms such as ‘the power to  $\phi$  in circumstance  $c$ .’ The above counterfactuals will be trivial only if we take them to be an analysis of such concepts. Suppose we were interested in analyzing ‘the power to  $\phi$  in  $c$ .’ Then adding the causally complete clause amounts to saying that objects with the power to  $\phi$  in  $c$  would  $\phi$  in  $c$  *unless they don’t*.

But we are not interested in an analysis of concepts. To learn that some property P would bring about some other property Q, unless it were co-instantiated with some other property, is not trivial at all. It is only trivial if we name P the power to bring about Q. But on the Truthmaker view, the concept ‘the power to bring about Q’ applies to P precisely because it makes that counterfactual true, not the other way around. The counterfactuals made true by powerful qualities are, therefore, not trivial.

Furthermore, it seems odd to me to say that there are no true, substantive counterfactuals that describe what objects with a particular power would do in particular circumstances. Surely there is a fact of the matter. If there is a fact of the matter, then there are truths that describe it. And if there are truths that describe it, then there is some truthmaker or truthmakers for those truths. Were it not so, we would be left asserting that, while the electron has the power to repel other electrons, there’s no fact of the matter about when or

in what circumstances or in what manner it will do so. That seems like no power at all.

**Introspection and Powerful Qualities** Typically it is thought that our access to qualia is maximally direct in a way that our access to any other state is not, so that it simply is not possible for me to be deceived about what sort of phenomenal experience I am having. But, it might be objected, I cannot have such access to powerful qualities, even those that are mental, because I don't know the full truth about any powerful qualities merely by way of introspection. After all, I don't know by introspection the many, perhaps infinitely many, counterfactuals that my current phenomenal states make true. Hence, the objection might continue, powerful qualities cannot be qualia.

The issues here are complex; for our purposes a short response will have to suffice. The reason reductive materialism is not consistent with the claim that we have maximally direct access to the character of our phenomenal experiences is because it posits an underlying structure to those experiences that is not accessible by introspection. But powerful qualities are not structured or structural in virtue of being powerful. They are simple. As a result, the Truthmaker version of the Powerful Qualities view can accept a much stronger form of direct access than reductive materialism can.<sup>24</sup> It is possible, on the Truthmaker view, for me to be directly aware of certain properties without being aware of their counterfactual profile. I can be aware of them simply because the thick quiddity to which the property is identical—the qualia—is directly present to me in my experience.

When I am aware of a qualia in that manner, I am not thereby aware of everything true of it, or everything that it makes true—even what is essentially true of it or what it essentially makes true. What the Truthmaker view must deny is that, in virtue of having a phenomenal experience, I know *all there is to know* about that phenomenal experience. That is highly implausible anyway. When I have the experience of seeing red, I don't thereby know that

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<sup>24</sup>Indeed, while I will not argue for this here, I think it is consistent with most forms of strong access that friends of irreducible qualia propose. It is, for example, consistent with both the Incorrigibility and Justification Theses of Chalmers (2003).

you also are having that very same experience. While that's a merely contingent feature of the phenomenal experience, I think my lack of knowledge of the various counterfactuals made true by some phenomenal experience is more like my lack of knowledge that you share that experience than it is like the lack of knowledge of someone who is not currently having (or has never had) that experience at all.

**Fales' Objection** I ended Chapter 6 by issuing a promissory note. Now that the Truthmaker view of properties has been set out, I think it is clear how to pay the debt. Fales offers three objections to what I called Internal Necessary Nomicism, according to which the necessity of the necessitation relation is grounded in the intrinsic nature of the *relata*, the properties related by the necessitation relation. Since the Truthmaker view grounds the truth of causal laws in the intrinsic natures of properties, the objections aimed at Internal Necessary Nomicism should, if they are successful there, work against the Truthmaker view as well. The first two of Fales' arguments, however, assume Armstrong's identification of singular causal relations with instantiations of causal laws. Below, I shall argue that we should reject that identification. That leaves Fales' third argument.

According to Fales, the fact that laws can be extraordinarily complex is problematic for any view that grounds the laws in the intrinsic natures of properties. We saw above that antidotes force the Truthmaker view to specify some particular causal result that would be brought about for each of the possible, causally complete property complexes that a property might find itself in. As a result, the counterfactuals that a property makes true might be numerous, perhaps infinite. It is this result that Fales finds objectionable. As Fales put it, "every lawful combination of causes, and their effects, will have to follow from the natures of the related universals," and "this complexity must somehow be built into the structure of each of the universals joined by the causal web." According to Fales, the only way to do so is to suppose that "universals have tremendously complex natures."

The proper response to Fales' argument is, I think, clear. Truthmakers are not a sort

of picture of the truths they make true. (Nor must truthmakers have some distinct part for each distinct truth they make true. *Every* truthmaker, whether a powerful quality or not, makes infinitely many truths true, after all.) It is, therefore, incorrect to suppose that if some truth or collection of truths is incredibly complex, the truthmaker must be correspondingly complex. The complexity of laws is grounded in or made true by, *but not built into*, the unitary, intrinsic nature of properties.

**Against Monism** The Truthmaker view, as I have stated it, is a form of Monism. It claims that *all* properties satisfy the same account. Molnar (2003) suggests that, in contrast to the mental case, physical qualia are “not in good ontological standing.” We simply have no reason, according to Molnar, to believe in physical qualia, especially at the sub-observable level. There, according to Molnar, there “are no (wholly or partly) qualitative properties *to reduce*.” But if it is granted, as Molnar does, that there are mental qualia, then of course there *is* reason to believe in qualitative properties, even in the non-mental realm. If there were mental qualia but no non-mental qualia, we would be forced to accept two radically different kinds of properties. All properties, we are to suppose, are powerful, but some are Pure Powers and some are qualities. A simpler view would postulate the identity of all properties with thick quiddities or qualia.

Suppose one accepts qualia in the mental case, but finds (as Molnar does) the suggestion that there are physical qualia problematic. Instead of thinking of mental qualia as causally powerful, one might accept a ‘mirror’ view, according to which mental properties are pure qualities and physical properties are pure powers. The relational structure of the Pure Powers view would then find a non-relational ground in the mental. Pure powers would, in the end, be powers to cause certain actual mental experiences in us. I see two problems with this view. First, mental properties are causally effective. To suggest that my belief that it is raining was not part of the cause of my taking an umbrella with me strains credulity, to say the least. With a bit more flair, we could say with Fodor (1990) that if mental

properties are not causally effective, then “practically everything I believe about anything is false and it’s the end of the world.” Second, I see no way to distinguish this mirror view from *idealism*, where physical objects are the permanent possibility of sense data.

A third mixed view is defended by Molnar (2003) and Ellis (2001). All monadic properties, on this view, are pure powers, but spatial and temporal relations are purely qualitative. I will consider spatial and temporal relations shortly, but for the moment it will suffice to note two problems with the Molnar-Ellis view. First, it is difficult to see why spatio-temporal relations are not to be counted among the causally relevant properties. But if spatio-temporal relations are causally relevant, they will appear in the Ramsified causal law book and, therefore, objects will have powers in virtue of entering into such relations. Second, this mixed view cannot account for the phenomenological character of experience. Mental states, on this view, will be entirely devoid of qualitative nature. Monism, therefore, should be accepted.

### 6.1.7 Relations

Can the Truthmaker view’s account of properties be extended to spatial and temporal relations? I think time is more difficult than space, in part because I have firm Presentist intuitions. I shall therefore ignore time altogether. (I shall also ignore purely logical and mathematic relations.) I would be happy enough to be able to defend an account of spatial relations. Alas, I shall not really even attempt that. Rather, I shall offer without much defense a speculative, causal theory of spatial relations.

It would be straight forward to accommodate spatial relations within the Truthmaker view. As I said above, spatial relations will certainly be a part of the lawbook for a world, and so they will be the truthmaker for a Ramsified sentence (with the appropriate quantifier dropped). Since the account offered above of powerful properties is that they are such a truthmakers, spatial relations will be powerful. All that remains is to identify spatial relations with a quiddity. Indeed, given that Categoricalist accounts of properties treat spatial

relations as analogous to monadic properties, where the difference lies merely in the adicity, and that some Neo-Aristotelians (Ellis and Molnar, for example) treat spatial relations as categorical properties, it would seem the least controversial position the Truthmaker theorist could take.

But it still seems unsatisfying to me. Spatial relations do not seem to *qualify* objects intrinsically. They are not ways some object is, in itself, but rather are ways that objects are related. I am therefore inclined to think that spatial relations have no intrinsic qualitative character. One option, then, would be to maintain the Truthmaker view for monadic, natural properties and the Pure Powers view for spatial relations. Bird (2007a) ably defends the view of spatial relations as Pure Powers.

It seem to me, however, that it would be preferable to offer a *reductive* account of spatial relations. The Neo-Aristotelian has the resources, I think, to do so. Spatial relations are to be reduced to the holding of singular and general causal facts. Spatial relations are, in short, causal relations. As I will argue below in 6.3, Neo-Aristotelians should accept both general causal facts, in the form of causal counterfactuals made true by powerful qualities, and singular causal relations, in the form of primitive, external relations. To say that  $x$  and  $y$  are related by some spatial relation,  $R$ , is just to say that they occupy certain relative positions in two, related causal frameworks, that of causal powers and that of causal relations. For  $x$  and  $y$  to occupy relative positions in the structure of causal powers is for them to be, as Martin puts it, reciprocal disposition partners. For  $x$  and  $y$  to occupy relative positions in the structure of causal relations is simply for singular causal relations to hold between  $x$  and  $y$  among the many singular relations that hold between objects in general.

The view is quite simple. There is only one genuine relation in our ontology, the singular causal relation. All other relations are either internal and hence not genuine or are to be reduced to the having of monadic, powerful properties together with the holding of the singular causal relation. I think it is sufficiently interesting to warrant further consideration.

## 6.2 Modality

The Truthmaker view is a coherent, plausible account of properties for the Neo-Aristotelian. (This is especially true for those who are friendly to irreducible qualia, but even those who are not can accept some version of the Pure Powers view.) Part of the reason we should accept the Truthmaker view, and Neo-Aristotelianism in general, is the work it can do for us. It is time now to put it to work. I begin with modality.

### 6.2.1 Neo-Aristotelianism With Possible Worlds?

Perhaps the simplest view of possibility and necessity would be to embed a Neo-Aristotelian account of properties within a possible worlds framework for a metaphysics of modality, and this is a common Neo-Aristotelian view. I think it would be a mistake to do so, however. First, it would seem odd to have modally rich properties doing no or little work in a metaphysics of modality. Better, I think, to put them to work by making them the truthmakers for modality.

Second, there are unique problems facing a Neo-Aristotelian metaphysics of modality that appeals to possible worlds. Consider the following problem, raised by Bigelow (1999) and Armstrong (1999). Suppose determinism is true, and consider a simple counterfactual, “if I had mixed these chemicals, reaction X would have taken place.” According to the standard possible worlds semantics for counterfactuals, to assess the truth of that counterfactual we go to the closest world to the actual world where the antecedent is true. Lewis allowed small miracles in order to prevent backtracking in deterministic scenarios. But if Neo-Aristotelianism is true, then given that I didn’t mix the chemicals, it doesn’t seem possible for me to have mixed them unless the entire history of the universe were different. The world unfolds as it does, if determinism and Neo-Aristotelianism are true, *of necessity*. It seems to follow that *all* counterfactuals in deterministic contexts are backtracking. (Indeed, many counterfactuals in *indeterministic* contexts will be backtracking as well, since

propensities are not propensities for just *anything*.)

There are at least two concerns about that result. First, it seems strange that what makes it true that if I had mixed these chemicals, reaction X would have taken place is a world whose history is entirely different than ours. The antecedent specifies a fairly local event after all. Second, even if that were unproblematic, the standards for overall similarity would need to be changed in order to get the results to accord with our ordinary evaluations of counterfactuals. But its not clear that there is a fix available that would do so.

Neo-Humeans and Contingent Nomicists will certainly reply, “So much the worse for Neo-Aristotelianism.” I think the appropriate reply is rather, “So much the worse for possible worlds semantics for counterfactuals,” but before developing that response, I should note an interesting reply by Handfield (2001). According to Handfield, the Neo-Aristotelian need only suppose that ‘space-invaders’ are possible. A space-invader is an uncaused property instantiation. While this would make a strong form of determinism false—since the laws plus the state of the world at some time will not entail the state of the world at some other time—it would nevertheless be consistent with the truth of necessary laws governing the properties of this world, since the laws do not rule out uncaused property instantiations. (We might compare this to the determinism of a Newtonian system. If no particles enter the system from an infinite distance, a Newtonian system is deterministic. But Newtonian mechanics is consistent with the arrival of such particles.)

If space-invaders were possible, then the problem of backtracking for Neo-Aristotelians could be solved. To arrive at the closest possible world where the antecedent is true, we go to a world where a space-invader is instantiated shortly before the antecedent, with powers to impact the unfolding of the universe so that the antecedent occurs. The instantiation of a space-invader is a localized, law-abiding miracle. Hence it counts for little in terms of the overall similarity of worlds, and so non-back-tracking worlds get counted as closer to actuality than back-tracking worlds.

Even ignoring the implausibility of an uncaused event, I have two worries about Handfield's solution. First, it requires the existence of possible space-invaders that have the power to effect the world in such a way that the antecedent occurs—for *every* possible antecedent of a true counterfactual. I just don't see any reason to believe that requirement is met. Is there some small, local property instantiation that, together with my local situation when I in fact did not mix the chemicals, would have caused me to mix the chemicals were it instantiated? Perhaps. But are there such properties for all the true counterfactuals we might wish to assert? That seems much less plausible.

Second, the solution seems forced and unnatural, the very sort of solution many anti-Neo-Humeans accuse the Neo-Humeans of offering. Better would be a solution that flowed naturally from the Neo-Aristotelian picture of the world. I think such a solution is available.

### 6.2.2 Neo-Aristotelianism Without Possible Worlds

According to the Truthmaker view, properties themselves make true various counterfactuals describing how objects with those properties would act in various possible situations. In short, properties ground modal facts. From this perspective, possible worlds can seem irrelevant to modality. There may very well be such things, but they are not the grounds, the truthmakers, for possibility and necessity.<sup>25</sup> Powerful properties are.

According to the theory to be developed, modality is grounded in the nature and distribution of actually existing, powerful properties. Modality is irreducible (since powerful properties are themselves modal), and it is part of the fundamental fabric of the actual, concrete<sup>26</sup> world. Roughly, some state of affairs A is possible just in case there is some actually instantiated property complex that is a power to bring about A (or there is some

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<sup>25</sup>I think Plantinga (1974) holds a similar view. While it is tempting at times to interpret him as grounding modality in the possible worlds themselves, I think he accepts primitive modal properties as the ground for modality, but his Platonism allows him to then construct possible worlds. For discussion, see Merricks (2003).

<sup>26</sup>Platonists can accept this view of modality, but once we admit properties as abstract objects, it seems less clear to me why we would be interested in eliminating possible worlds. Below, however, I consider one reason to prefer the Platonic over the Aristotelian account of modality.

property complex that is a power to bring about a property complex that is a power to a property complex . . . , that is a power to bring about A).<sup>27</sup>

The basic approach is not new. Pruss (2002), for example, suggests what he calls the ‘Aristotelian’ alternative to possible worlds. “A non-actual state of affairs is possible if there actually was a substance capable of initiating a causal chain, perhaps non-deterministic, that could lead to the state of affairs that we claim is possible.” Pruss notes that such a view is probably the “closest to ordinary language notions of possibility,” and fits well with our experience of “ourselves being capable of producing effects.” It is, in short, an intuitively appealing view of modality.

Is it also theoretically powerful? There is, unfortunately, no systematically developed framework for the Aristotelian account of modality.<sup>28</sup> I will therefore offer the beginnings of a systematic Aristotelian account of modality based on the Truthmaker conception of properties. Roughly, modal facts are counterfactual facts, and counterfactuals are made true by powerful properties. A full development of the theory, therefore, requires on the one hand a semantics for counterfactuals that appeals only to properties and their powerful natures, and on the other a reduction of possibility and necessity to counterfactuals. I provide a sketch of these in sections 6.2.3 and 6.2.4 respectively.

Before proceeding, I should note two important qualifications. First, the account of modality offered is not intended to account for mathematical and logical truths. It is, rather, an account of the modal truths concerning concrete objects. It would be nice if the account could be generalized to account for more formal truths, but at present I don’t see how to do so. Second, the account of modality offered is not a *reductive* account. The world is inherently modal because it contains irreducible counterfactual facts—namely, the

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<sup>27</sup>Martin & Heil (1999) describe something like this view, but then say are not endorsing it.

<sup>28</sup>Perhaps the closest is the account of causal powers and the alternative, causal semantics of counterfactuals defended by Hiddleston (2005b,a). His account builds on the structural equation models of causality defended by Pearl (2000), among others. While his account is important, I don’t see how it could be used to develop a systematic account of *modality*. I think the alternative picture I offer here allows us to do just that.

instantiations of powerful properties.

### 6.2.3 A Powers Semantics for Counterfactuals

The basic idea of the powers semantics for counterfactuals is quite simple. When I assert a counterfactual, “If I had mixed these chemicals, then reaction X would have occurred,” the antecedent and consequent specify complexes of natural properties. The counterfactual is true just in case the antecedent property complex is a power, every exercise of which would bring about the consequent property complex.<sup>29</sup>

Lets distinguish a counterfactual sentence or utterance from a counterfactual proposition. The standard possible worlds semantics builds the context sensitivity of counterfactual reasoning into the truth conditions for counterfactual propositions. In one context, it’s true that if I had mixed the chemicals, reaction X would have occurred, but in another context, the very same proposition is false. In contrast, the powers semantics builds the context sensitivity into the conditions of assertion, the conditions under which a specific counterfactual utterance counts as asserting a specific counterfactual proposition. In one context, the sentence “if I had mixed these chemicals, then reaction X would have occurred” expresses one proposition, and in another context, the very same sentence expresses a different proposition. (And those propositions may have different truth values.) Hence the notorious vagueness of counterfactuals gets built into the means of asserting counterfactual propositions, not the truth conditions for them.

According to Lewis (1973b), a counterfactual is an “invitation to consider what goes on in a selected ‘counterfactual situation’.” Whereas Lewis interpreted that to mean that we consider what goes on in a selected possible world, the powers semantics for counterfactuals

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<sup>29</sup>A similar basic idea is proposed by W. Russ Payne in unpublished work. My own thinking about an alternative semantics for counterfactuals was influenced by Payne’s proposal, but there are important differences, four of which I note here. First, I develop the basic idea into the beginnings of a formal system. Second, I offer an account of modality in terms of counterfactuals. Third, I do not appeal, as he does, to strict conditionals since transitivity fails for the conditionals I offer. Fourth, Payne prefers a Platonist ontology.

interprets it to mean that we consider what a selected property complex causally brings about. Whereas Lewis claimed that the truth conditions for the counterfactual are determined partly by the antecedent and partly by context, the powers view claims that what proposition is asserted is determined partly by the antecedent of the sentence and partly by context. (When left unspecified, Lewis suggests that we are asked to consider a range of worlds rather than a single determinate world. The powers semantics might instead suggest that we are asked to consider a range of determinate propositions.)

The factors that determine when a counterfactual sentence expresses a particular counterfactual proposition are highly context sensitive. In fact they will be as sensitive to context as Lewis' respects of similarity are. In general, to borrow Lewis' phrase, saying so makes it so. (That is, saying that some property is instantiated in the antecedent property complex makes it so.) Still, there are a few general things we can say about how context determines the proposition asserted by a sentence. Our interpretation of counterfactual utterances seems to be guided by at least two rules:

**Charity** Be *charitable* when determining which property instances goes into the antecedent.

If there are two interpretations available, choose the interpretation that makes the counterfactual more plausible.

**Normalcy** Interpret the antecedent as specifying a property complex as *normal* as possible.

Normalcy is determined by closeness to actuality, which is in turn determined, first, by sameness of properties and, second, by similarity of causal profiles.

There is much more to be said, but this description of how counterfactual sentences assert counterfactual propositions should suffice for present purposes. Consider, for example, the series of counterfactuals offered by Lewis: "If Otto had come, it would have been a lively party. If Otto and Anna had come, it would have been a dreary party. But if Waldo had come as well, it would have been a lively party." In this case, Charity and Normalcy make the same demands. The first counterfactual is to be interpreted as "If Otto had come and

the attendees had otherwise been the same as actual, it would have been a lively party.” This makes the party as close to the actual party as possible, and we are able to interpret the others similarly while satisfying the demands of Charity.

Consider the counterfactual “If Ceasar had been in command, he would have used the atom bomb.” Just as the context determines of what the speaker was supposing Ceasar was in command—in this case, the Korean war—so too context determines what else goes into the antecedent. Charity demands that we interpret the claim in the most plausible way, so that we assume Ceasar had at his disposal the atom bomb, for example. But if, instead, the speaker had claimed, “If Ceasar had been in command, he would have used catapults,” we interpret the antecedent so that Ceasar has at his disposal typical Roman tools of warfare, rather than those typical of contemporary wars.

Again, more could be said about how context determines the content of the antecedent, but this should suffice for present purposes. What remains is to develop a formal system that captures the relation between two properties (or property complexes) when the one is a power to bring about the other, which would allow us to offer a formal semantics for counterfactuals. Once that formal semantics is developed, we can then offer axioms governing the counterfactual that will allow us to generate a modal system as well. I now offer a basic formal system for a semantics of counterfactuals. The basic system was developed by David McCarty in an unpublished manuscript. What follows is my presentation of McCarty’s system. I have, however, altered it slightly at some points. In addition to minor stylistic variations, I have expanded some of the proofs (and added one for the S1 axiom), and I have suggested two rules that differ from the rule McCarty offers for generating S4 and S5. Any defects in what follows are of my own making.

### **The Formal System**

Let  $p, q, r, \dots$  be atomic formulae and  $\phi, \psi, \chi, \dots$  be logical formulae. Start with a basic propositional logic with  $\wedge$  and  $\neg$ , so that if  $\phi$  and  $\psi$  are formulae, so are  $(\phi \wedge \psi)$  and  $\neg\phi$ .

Add the connective  $\Box\rightarrow$  (to be interpreted as the counterfactual conditional), so that if  $\phi$  and  $\psi$  are formulae, so is  $(\phi \Box\rightarrow \psi)$ . (In 6.2.4, I will add  $\Box$  and  $\diamond$  as defined symbols.)

**Definition of a Stage** Let a *stage*,  $S$ , be a finite state description. Formally, a stage is a consistent set of formulae, so that the set  $\{p, \neg p\}$  is a stage. Stages are consistent, so if  $\phi \in S$ , then  $\neg\phi \notin S$ . On the intended interpretation, a stage is a property complex, with each atomic formula representing a property.

**Definition of a Chain** Let a *chain*,  $C$ , be an infinite sequence of stages,  $S_0, S_1, S_2, \dots$ , such that each stage is a power to bring about the next stage. Let ' $S_0 \mathbb{P} S_1$ ' be interpreted as ' $S_0$  is a power to bring about  $S_1$ .' Then a chain is an infinite string of stages,  $S_0, S_1, S_2, \dots$  such that  $S_0 \mathbb{P} S_1 \mathbb{P} S_2 \mathbb{P} \dots$ . For each pair of stages,  $S_n$  and  $S_{n+1}$ , in a chain,  $S_n \mathbb{P} S_{n+1}$ .

Necessary Nomicists could interpret  $\mathbb{P}$  as the necessitation relation, and hence substitute  $\mathbb{N}$  for  $\mathbb{P}$ . I shall continue to use  $\mathbb{P}$  to represent the *is a power to bring about* relation. Intuitively, a chain is one way that a series of exercises of powers (or disposition manifestations) might run its course. (Or, if you prefer the necessitation relation, a chain is one way of tracing through  $\mathbb{N}$ .) The powerful properties that there are determine many, many chains.

I now place three requirements on stages and chains. First, in order to guarantee that  $(p \Box\rightarrow p)$  turns out true, we require that formulae are preserved across  $\mathbb{P}$ . If  $p \in S_n$ , then  $p \in S_{n+1}$ . This may force us to be careful when saying which atomic formulae represent which properties. For example, if  $p$  is a power to bring about  $\neg p$ , then we shall need to relabel  $\neg p$ . Perhaps we could relabel it as  $q$ , so that we can represent ' $p$  is a power to bring about  $\neg p$ ' as ' $\{p\} \mathbb{P} \{p, q\}$ .' (We might do this by, for example, time indexing properties.)

Second, every possible property complex is a power for some other property complex. This is consistent with the thesis that all natural properties are powerful qualities. More formally,  $\forall S_n \exists S_{n+1} (S_n \mathbb{P} S_{n+1})$ .

And, third, to ensure some tautology holds at each stage in each chain, we insert a

‘dummy letter’  $p$  that names no property in each stage in each chain.

**Definition of Evaluable** Since stages are finite, not all formulae will be elements of every stage. Therefore, we define what it means for a formula to be *evaluable* in a stage of a chain. The definition is by recursion over the structure of a formula  $\phi$ :

1. For atomic formula  $\phi$ ,  $\phi$  is evaluable in  $S$  if and only if  $(\phi \in S \vee \neg\phi \in S)$ .
2.  $(\phi \wedge \psi)$  is evaluable in  $S$  if and only if both  $\phi$  and  $\psi$  are evaluable in  $S$ .
3.  $\neg\phi$  is evaluable in  $S$  if and only if  $\phi$  is evaluable in  $S$ .
4.  $(\phi \Box\rightarrow \psi)$  is evaluable in  $S_n$  if and only if  $\phi$  is evaluable in  $S_n$  and  $\psi$  is evaluable in  $S_{n+1}$ .

Intuitively, the notion of evaluability is meant to capture the fact that not every property is a part of every property complex. If either a property or its negation is included in some property complex, then we say that it is evaluable in that complex.

**Definition of Truth in a Stage** Now we are able define *truth in a stage* for a formula. Truth in a stage,  $S \models \phi$ , is defined only for  $\phi$  evaluable in  $S$ , and the definition is by recursion over the structure of  $\phi$ :

1. For atomic formula  $\phi$ ,  $S \models \phi$  if and only if  $\phi \in S$ .
2. For  $(\phi \wedge \psi)$ ,  $S \models (\phi \wedge \psi)$  if and only if  $S \models \phi$  and  $S \models \psi$ .
3. For  $\neg\phi$ ,  $S \models \neg\phi$  if and only if  $S \not\models \phi$ .
4. For  $(\phi \Box\rightarrow \psi)$ ,  $S_n \models (\phi \Box\rightarrow \psi)$  if and only if, for the least number  $i$  for which  $(\phi \Box\rightarrow \psi)$  is evaluable in  $C$  and such that  $i \leq n$ ,  $S_i \models \phi$  and  $S_{i+1} \models \psi$ .

Intuitively, a counterfactual is true in a stage if and only if, tracing back in the chain to the first stage  $S_i$  when the antecedent is evaluable, the antecedent is true at  $S_i$  and the consequent is true at  $S_{i+1}$ . Thus if  $\phi$  is true at some stage and is a power to bring about  $\psi$ , then  $(\phi \Box\rightarrow \psi)$  will be true along with  $\phi$ , and  $\psi$  will be true at the next stage.

**Definition of Truth in a Chain** We are now able define *truth in a chain*. For chain  $C$  and formula  $\phi$ ,  $C \models \phi$  if and only if there is an  $S$  in  $C$  such that  $S \models \phi$ .

**Definition of Validity** Finally, we say  $\phi$  is *valid*,  $\models \phi$ , if and only if  $\forall C (C \models \phi)$ . And an argument with premises  $\Gamma$  and conclusion  $\phi$  is valid,  $\Gamma \models \phi$ , if and only if  $\forall C ( (C \models \Gamma) \rightarrow (C \models \phi) )$ .

**Theorem 1** We can now prove that truth in a chain provides a definition of truth—that it is a model for classical propositional logic: For any chain  $C$  and formulae  $\phi$  and  $\psi$ ,

1.  $C \models (\phi \wedge \psi)$  if and only if  $C \models \phi$  and  $C \models \psi$ , and
2.  $C \models \neg\phi$  if and only if  $C \not\models \phi$ .

**Proof** Begin with 1. Assume  $C \models (\phi \wedge \psi)$ . By definition of truth in a chain, there is some stage  $S_i$  such that  $S_i \models (\phi \wedge \psi)$ . By definition of truth in a stage,  $S_i \models \phi$  and  $S_i \models \psi$ . But then by definition of truth in a chain,  $C \models \phi$  and  $C \models \psi$ .

To prove the converse, assume  $C \models \phi$  and  $C \models \psi$ . Then there is some stage  $S_i$  and some stage  $S_j$  such that  $S_i \models \phi$  and  $S_j \models \psi$ . Assume  $i \leq j$ . Assume for the moment that if  $\phi$  is evaluable at  $S_n$  and  $S_m$  and  $n \leq m$ , then  $\phi$  is true in  $S_n$  if and only if  $\phi$  is true at  $S_m$ . (Call this Lemma 1.) Then it follows that  $S_j \models \phi$  and  $S_j \models \psi$ . Hence, by definition of truth in a stage, it follows that  $S_j \models (\phi \wedge \psi)$ . Hence, by definition of truth in a chain, it follows that  $C \models (\phi \wedge \psi)$ .

Now we prove 2. Assume that  $C \models \neg\phi$ . By definition of truth in a chain, there is some  $S_i$  such that  $S_i \models \neg\phi$ . Again, assume Lemma 1. Then it follows that  $S_n \models \neg\phi$  for every  $S_n$  at which  $\phi$  is evaluable. Then by definition of truth in a chain,  $C \not\models \phi$ .

To prove the converse, assume  $C \not\models \phi$ . Then there is some stage  $S_i$  at which  $\phi$  is evaluable but  $S_i \not\models \phi$ . Then it follows that  $S_i \models \neg\phi$ . Then, by the definition of truth in a chain, it follows that  $C \models \neg\phi$ .

To complete the proof for Theorem 1, we need to prove

**Lemma 1** If  $\phi$  is evaluable at  $S_n$  and  $S_m$  and  $n \leq m$ , then  $S_n \models \phi$  if and only if  $S_m \models \phi$ .

**Proof** The proof proceeds by induction on the structure of a formula. For the base case, consider an atomic formula  $p$ , and assume  $p$  is evaluable at  $S_n$  and  $S_m$ ,  $n \leq m$ , and  $S_n \models p$ . Then  $p \in S_n$ . By definition, formulae are preserved across  $\mathbb{P}$ , so that if  $p \in S_n$ , then  $p \in S_{n+1}$ . It follows that  $p \in S_m$  and so  $S_m \models p$ . To prove the converse, assume that  $S_m \models p$ , but for *reductio*, assume  $S_n \not\models p$ . Since by assumption,  $p$  is evaluable in  $S_n$ , it follows that  $S_n \models \neg p$ . But then it follows, by the reasoning in the first part of the proof, that  $S_m \models \neg p$ .  $\perp$

For the inductive hypothesis, assume that  $\phi$  and  $\psi$  are both evaluable at  $S_n$  and  $S_m$  and  $n \leq m$ , and that  $S_n \models \phi$  if and only if  $S_m \models \phi$  and  $S_n \models \psi$  if and only if  $S_m \models \psi$ . Now we prove that

1.  $S_n \models (\phi \wedge \psi)$  if and only if  $S_m \models (\phi \wedge \psi)$ ,
2.  $S_n \models \neg\phi$  if and only if  $S_m \models \neg\phi$ , and
3.  $S_n \models (\phi \Box \rightarrow \psi)$  if and only if  $S_m \models (\phi \Box \rightarrow \psi)$ .

For 1: Assume  $S_n \models (\phi \wedge \psi)$ . By definition,  $S_n \models \phi$  and  $S_n \models \psi$ . By the inductive hypothesis,  $S_m \models \phi$  and  $S_m \models \psi$ . Then by definition  $S_m \models (\phi \wedge \psi)$ . For the converse, assume  $S_m \models (\phi \wedge \psi)$ . Then by definition  $S_m \models \phi$  and  $S_m \models \psi$ . Then by the inductive hypothesis,  $S_n \models \phi$  and  $S_n \models \psi$ . By definition,  $S_n \models (\phi \wedge \psi)$ .

For 2: Assume  $S_n \models \neg\phi$ . By definition,  $S_n \not\models \phi$ . Then by the inductive hypothesis,  $S_m \not\models \phi$ . Then by definition  $S_m \models \neg\phi$ . To prove the converse, assume  $S_m \models \neg\phi$ . By definition,  $S_m \not\models \phi$ . Then by the inductive hypothesis,  $S_n \not\models \phi$ . Then by definition  $S_n \models \neg\phi$ .

For 3: Assume  $S_n \models (\phi \Box \rightarrow \psi)$ . Then there is some  $1 \leq i \leq n$  such that  $S_i \models \phi$  and  $S_{i+1} \models \psi$ . Since  $i \leq n \leq m$ , it follows that  $S_m \models \phi$  and  $S_{m+1} \models \psi$ . Hence,  $S_m \models (\phi \Box \rightarrow \psi)$ . To prove the converse, assume  $S_m \models (\phi \Box \rightarrow \psi)$ . By definition,  $S_m \models \phi$  and  $S_{m+1} \models \psi$ . By the inductive hypothesis,  $S_n \models \phi$  and  $S_{n+1} \models \psi$ . Hence by definition  $S_n \models (\phi \Box \rightarrow \psi)$ . ■

It follows immediately from Lemma 1 that

**Lemma 2** If  $S_i \models \phi$ , then for the least  $j \leq i$  such that  $\phi$  is evaluable at  $S_j$ ,  $S_j \models \phi$ .

**Proof** Assume  $S_i \models \phi$ , and consider the least  $j \leq i$  such that  $\phi$  is evaluable at  $S_j$ . From Lemma 2, we know that  $S_i \models \phi$  if and only if  $S_j \models \phi$ . Hence,  $S_j \models \phi$ . ■

**Inference Rules** I now introduce the basic rules of inference. Let  $\phi \vdash \psi$  represent derivability in the counterfactual system and  $\phi \vdash_{prop} \psi$  be derivability in classical propositional logic. Our rules include all the rules and axioms for classical propositional logic with  $\wedge$  and  $\neg$ . In addition, we include two basic rules governing  $\Box \rightarrow$  :

$\Box \rightarrow$  **Modus Ponens:**  $(\phi \Box \rightarrow \psi), \phi \vdash \psi$

$\Box \rightarrow$  **Closure:** If  $\psi_1 \dots \psi_n \vdash_{prop} \chi$ , then  $\phi \Box \rightarrow \psi_1 \dots \phi \Box \rightarrow \psi_n \vdash \phi \Box \rightarrow \chi$

Having introduced the basic inference rules, we can prove that the system is *sound*:

**Soundness Theorem** If  $\Gamma \vdash \phi$ , then  $\Gamma \models \phi$ . Hence, if  $\vdash \phi$ , then  $\models \phi$ .

**Proof** To prove Soundness, we prove that all of the rules preserve truth in a chain. Since we have proved in Theorem 1 that our system is a model for propositional logic, and propositional logic is sound, then all the propositional rules and axioms preserve truth in a chain.

For  $\Box \rightarrow$  Modus Ponens: Assume  $C \models (\phi \Box \rightarrow \psi)$  and  $C \models \phi$ . Let  $S_i$  be the least stage at which  $(\phi \Box \rightarrow \psi)$  is evaluable and  $S_j$  be the least stage at which  $\phi$  is evaluable. Then  $S_i \models (\phi \Box \rightarrow \psi)$  and  $S_j \models \phi$ , and  $j \leq i$ . By Lemma 2,  $S_i \models \phi$ . Then it follows that  $S_{i+1} \models \psi$ . Then by definition  $C \models \psi$ .

For  $\Box \rightarrow$  Closure: Assume we can show that  $\psi_1 \dots \psi_n \vdash_{prop} \chi$ . Assume that  $C \models (\phi \Box \rightarrow \psi_1) \dots C \models (\phi \Box \rightarrow \psi_n)$ . From Lemmas 1 and 2, it follows that there is some stage  $S_i$  such that  $S_i \models (\phi \Box \rightarrow \psi_1) \dots$  and  $S_i \models (\phi \Box \rightarrow \psi_n)$ . By definition, it follows that  $S_{i+1} \models \psi_1 \dots$  and  $S_{i+1} \models \psi_n$ . Assume for the moment that truth in a stage is closed under  $\vdash_{prop}$ . (Call this claim Lemma 3). It would then follow that  $S_{i+1} \models \chi$ . Then by definition,  $C \models \chi$ .

To finish the proof of Soundness, then, all that is required is to prove:

**Lemma 3** If  $S_i \models \Gamma$  and  $\Gamma \vdash_{prop} \phi$ , then if  $\phi$  is evaluable at  $S_i$ , then  $S_i \models \phi$ .

**Proof** Suppose  $S_i \models \Gamma$ ,  $\Gamma \vdash_{prop} \phi$ , and  $\phi$  is evaluable at  $S_i$ . Suppose for *reductio* that  $S_i \not\models \phi$ . Since  $\phi$  is evaluable at  $S_i$ , it follows that  $S_i \models \neg\phi$ . Then  $\{\Gamma, \neg\phi\} \subset S_i$ . But given that  $\Gamma \vdash_{prop} \phi$ ,  $\{\Gamma, \neg\phi\}$  entails a contradiction.  $\perp$  ■

### 6.2.4 Modal Facts are Counterfactual Facts

With the formal semantics for counterfactuals in place, we can now reduce the modalities to counterfactuals. Intuitively, P is necessary just in case it would hold come what may. P is possible just in case it would not fail to hold, come what may. To capture this in the formal system, recall that p is true in every stage in every chain, and so the tautology  $(p \vee \neg p)$  is true in every stage in every chain. Let  $\top$  abbreviate this tautology.

**Definition of  $\Box$  and  $\Diamond$**

$$\Box\phi =_{def} (\top \Box \rightarrow \phi)$$

$$\Diamond\phi =_{def} \neg(\top \Box \rightarrow \neg\phi)$$

These definitions preserve the interdefinability of the modalities, so that  $\Box\phi$  is equivalent to  $\neg\Diamond\neg\phi$ .

Stalnaker (1968) noted that the modalities could be defined by means of counterfactuals, but this fact has not been put to much use. Recently, Williamson (2004) notes that “starting with the counterfactual conditional, we can build a promising theory of metaphysical necessity and possibility,” and goes some distance toward doing so.<sup>30</sup> I here suggest that the definability of the modalities in terms of counterfactuals allows the Neo-Aristotelian to accept counterfactuals as primitive and reduce all of possibility and necessity to them.

<sup>30</sup>In unpublished work, Williamson proves much of the equivalence between counterfactuals and the modalities. While the system I offer is quite similar to Williamson’s, his primary concern is in epistemology.

With the rules of inference and the above definitions in place, we can derive the various modal systems.

**Proof of K:**  $\Box(\phi \rightarrow \psi) \vdash (\Box\phi \rightarrow \Box\psi)$  Assume  $\Box(\phi \rightarrow \psi)$ . By the above definition of  $\Box$ , this is equivalent to  $\top \Box \rightarrow (\phi \rightarrow \psi)$ . Assume  $\Box\phi$ . Again, this is equivalent to  $\top \Box \rightarrow \phi$ . Since  $(\phi \rightarrow \psi)$ ,  $\phi \vdash_{prop} \psi$ , it follows by  $\Box \rightarrow$  Closure that  $\top \Box \rightarrow \psi$ . But that is equivalent, by definition, with  $\Box\psi$ . ■

**Proof of T:**  $\Box\phi \vdash \phi$  Assume  $\Box\phi$ . By definition, this is equivalent to  $\top \Box \rightarrow \phi$ . Since  $\top$  is a theorem of propositional logic, it follows by  $\Box \rightarrow$  Modus Ponens that  $\phi$ . ■

**Proof of S1:**  $\Box(\phi \rightarrow \psi), \Box(\psi \rightarrow \chi) \vdash \Box(\phi \rightarrow \chi)$  Assume  $\Box(\phi \rightarrow \psi)$  and  $\Box(\psi \rightarrow \chi)$ . By the above definition of  $\Box$ , this is equivalent to  $\top \Box \rightarrow (\phi \rightarrow \psi)$  and  $\top \Box \rightarrow (\psi \rightarrow \chi)$ . Since  $(\phi \rightarrow \psi), (\psi \rightarrow \chi) \vdash_{prop} (\phi \rightarrow \chi)$ , it follows by  $\Box \rightarrow$  Closure that  $\top \Box \rightarrow (\phi \rightarrow \chi)$ . But that is equivalent, by definition, with  $\Box(\phi \rightarrow \chi)$ . ■

In order to prove the characteristic axioms of S4 and S5, a further axiom governing  $\Box \rightarrow$  is needed. What is needed is a rule governing embedded counterfactuals.<sup>31</sup> Unfortunately, more work is needed here. It's not clear to me which of the many possible axioms should be adopted. Here is one way of rendering the characteristic axioms of S4,  $\Box\phi \vdash \Box\Box\phi$ , into the counterfactual system:

$$(\top \Box \rightarrow \neg\phi) \vdash (\phi \Box \rightarrow (\top \Box \rightarrow \neg\psi))$$

Intuitively, this says that if  $\phi$  fails comes what may, then supposing that  $\phi$  holds would lead to any other proposition failing come what may. (Counterfactually supposing an impossibility takes one to an impossible world, to use possible worlds language.)

Here is a way of rendering the characteristic axiom of S5,  $\Diamond\phi \vdash \Box\Diamond\phi$ , into the counterfactual system:

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<sup>31</sup>The two suggestions that follow are derived from suggestions by Williamson.

$$(\phi \Box \rightarrow (\top \Box \rightarrow \neg\psi)) \vdash ((\top \Box \rightarrow \neg\phi) \vee (\top \Box \rightarrow \neg\psi))$$

Intuitively, this says that if supposing  $\phi$  counterfactually leads to an impossibility, then either the impossibility is an impossibility independent of  $\phi$  or  $\phi$  itself is impossible. Stating it in pure counterfactual terms: If supposing that  $\phi$  leads us to suppose that  $\psi$  would fail come what may, then either  $\psi$  would fail come what may (independent of  $\phi$ ), or  $\phi$  would fail come what may.

More exploration of these and alternative axioms governing embedded counterfactuals is needed. While more work is therefore needed on a counterfactual system of modality, I think the system offered is an important beginning, and it displays well a promising, systematic Neo-Aristotelian account of modality—an account I think is worth defending.

### 6.2.5 The Plenitude of Possibility

There are important objections, however. The most glaring issue is the scope of possibility. If the Neo-Aristotelian account of modality is correct, the range of possibilities seems drastically limited. There are those possibilities the Neo-Aristotelian wants to (and thinks she can) account for, and there are those that she thinks are not genuine and hence wishes to explain away. I consider the former types of possibilities in this section, and the latter in the next.

If laws are descriptions of the powerful nature of properties, then laws are necessarily true. Are they true come what may or even whatever might have come? To use possible worlds talk, are they true in all possible worlds? Surely not. Surely there could have been *different* properties that behaved slightly or even radically different than the properties actually instantiated in this world. In short, surely alien properties are possible.

How might the Neo-Aristotelian account for the possibility of alien properties? One way would be to adopt Platonism, as Bird (2007a) does. If properties are Platonic, then all properties exist, whether they are instantiated or not. Their existence grounds their

possibility. There can even be laws describing how they would interact with the instantiated properties, were the uninstantiated properties to be instantiated. The ease of this solution makes the Platonic view of properties attractive. Is there an alternative?

Suppose one accepted the Aristotelian conception of properties. One response to our initial intuition that there might have been other properties is to deny it. All possible properties are actually instantiated. That seems implausible.<sup>32</sup> Another response, suggested by Hawthorne (2001), is to accept a primitive Principle of Combination (as Lewis does) to generate the plenitude of possibilities. For any logically consistent Ramsified causal lawbook, there are distinct properties corresponding to the open sentences of those causal lawbooks. The plenitude of possibility “corresponds to the plenitude of consistent lawbooks.”

With some qualification, I see no reason to *deny* the suggested Principle of Combination. The qualification is that we may not be able to posit *distinct* properties for all the open sentences of the myriad of causal lawbooks. (More on that in a moment.) So qualified, the Principle is almost certainly true. It’s the primitiveness that bothers me. Here there is a truth without a Truthmaker—or so it seems. What makes it true that for each possible lawbook there is some set of properties that the lawbook describes? The Neo-Aristotelian who is not a Platonist about properties has no truthmaker to offer.

But there is one remaining alternative. If the Neo-Aristotelian is a *theist* who believes in the existence of an *omnipotent* God, then perhaps God’s omnipotence provides the truthmaker for the Principle of Combination.<sup>33</sup> On this view, God could bring it about that any number of actually uninstantiated properties are instantiated. The plenitude of possibility would then be grounded in the powers of actually existing objects, including the power of an omnipotent God, to bring about various instantiations of alien properties. (Note that on this view we can not say that God can bring it about *because* it is possible, and what

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<sup>32</sup>See Bird (2007a), however, for an in depth discussion of this option.

<sup>33</sup>Pruss (2002) suggests this option. In fact, he thinks the truth of the Neo-Aristotelian conception of modality may work as a premise in an argument for the existence of God. Because I am a theist, I do think that God’s omnipotence is the truthmaker for the possibility of alien properties. But I doubt Pruss’ suggested argument for the existence of God would be very persuasive.

God cannot bring about can't be brought about *because* it is impossible. For on this view, to be possible is just to be one of the many manifestations of some power, including God's, and to be impossible to be no manifestation of no power.)

Even if the Neo-Aristotelian can thus provide truthmakers for alien properties, either by way of Platonism or by way of God's omnipotence, it might seem as though some possibilities are left out. In particular, it is difficult for the Neo-Aristotelian to account for the possibility of distinct properties with *symmetrical* causal profiles. Consider the example from Hawthorne (2001). Let there be four properties,  $P_1$ ,  $P_2$ ,  $P_3$  and  $P_4$ . And suppose the lawbook is as follows:  $N(P_1, P_3) \wedge N(P_2, P_3) \wedge N((P_1 \wedge P_2), P_4)$ . Note that  $P_1$  and  $P_2$  are distinct, since their coinstantiation would bring about  $P_4$ . That lawbook seems possible. And yet the open sentences of the Ramsified lawbook corresponding to properties  $P_1$  and  $P_2$  are identical.

The Shoemaker sentence I introduced at the end of Chapter 3 avoids this problem. Instead of Ramsifying the lawbook by removing the occurrences of all properties names all at once, we do so piecemeal, leaving in place all the property names but one. For example,  $P_1$ 's Shoemaker sentence will be "it brings about  $P_3$  and, together with  $P_2$  brings about  $P_4$ ," whereas  $P_2$ 's Shoemaker sentence will be "it brings about  $P_3$  and, together with  $P_1$  brings about  $P_4$ ." Thus we can allow a wider range of distinct properties than we otherwise might have been able to allow.

It seems strange to me, however, that the essence of a property should include an essentially *particular* reference, a reference to another property by name. I am inclined, therefore, to simply bite the bullet and deny the intuition.

### 6.2.6 The Illusion of Contingency

The intuitions of contingency do not stop there, however. Consider the claim that electrons might have attracted other electrons. The Neo-Aristotelian, as described above, will concede: Surely there might have been a property much like negative charge except that

objects with this property attract each other. But if someone were to persist, “No, I mean that the very same property, negative charge, might have disposed particles to attract each other,” here the Neo-Aristotelian must stand her ground.

I don’t think standing her ground here is too costly. Recall that the identification of the powerful nature of a property is an *a posteriori* necessity. Hence, like the necessities of Kripke (1972), it is epistemically possible that they are false.<sup>34</sup> The empirical aspect of our identification of the powerful nature of properties is currently even stronger than the empirical aspect of, say, the identity of Hesperus and Phosphorus. There was a time when it was a very live possibility that that identity was false—perhaps there was a time when it was even implausible to suppose they were identical. But now the evidence is overwhelmingly in favor of the identity. Not so with our identification of powerful properties. There’s a very real sense in which we still don’t know their powerful nature. First, we could very well be mistaken about what properties are natural. And even supposing we know the inventory of natural properties, it would be foolish to think we know their full powerful nature.

Still, many philosophers insist: “Even if we’re correct in thinking that negative charge is in fact a fundamental property such that particles with it repel each other, it still might have been that negatively charged particles attracted other negatively charged particles.” The Neo-Aristotelian rightfully resists. First, it’s not clear that this is genuinely imaginable. As van Inwagen (1998) put it when considering the question whether we can imagine a world with transparent iron, “If we simply imagine a Nobel Prize acceptance speech in which the new Nobel laureate thanks those who supported him in his long and discouraging quest for transparent iron and displays to a cheering crowd something that looks (in our imaginations) like a chunk of glass, we shall indeed have imagined a world, but it will not be a world in which there is transparent iron.” Vague imaginings of a phenomena are no imaginings of it at all. Second, even if it is imaginable, that it not the best reason to think it’s possible.

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<sup>34</sup>Most Neo-Aristotelians offer something like the Kripkean response to the appearance of contingency. For two well developed responses, see Bird (2007a) and Handfield (2004).

And third, even if imagination is good reason for possibility, the end result is one, fallible intuition pitted against many others. While I doubt it really is a strong intuition, even if it were, Neo-Aristotelianism is on the whole much more intuitive than Neo-Humeanism, and if the argument of this chapter is correct, it is also theoretically powerful.

### 6.3 Causation

The Neo-Aristotelian can offer a strong, anti-Neo-Humean theory of causation, a theory we might call the Powers theory. Causation, according to the Powers theory, is the exercise of a power (or manifestation of a disposition). The terms ‘exercise’ and ‘manifestation’ display an ambiguity between a process and a product; I mean the term in the process sense. Hence it might be more accurate to say that the causal relation is the exercising of a power. The having of the power in the specific circumstance is the cause and the resulting property complex is the effect.

The Powers theory is hinted at by, among others, Martin (1997) when he says “[c]ause and effect itself should be explained in the more basic terms of the Mutual Manifestation of Reciprocal Disposition Partners.” Molnar (2003) defends a Powers theory as well. He accepts the primacy of singular causation (driven, at least in part, by his acceptance of a trope theory of properties), and says that causation is “generative behavior of objects governed by their properties.” Effects, according to Molnar, are typically ‘polygenic.’ They tend to be the result of multiple different powers working in concert. (To use Martin’s phrase, the cause is typically a collection of mutual manifestation partners.) And powers are, according to Molnar, ‘pleiotropic.’ In different circumstances they contribute to different effects. (They have many different mutual manifestation partners.)

Mumford (Forthcoming<sup>a</sup>) is the most recent defender a Powers theory of causation. According to Mumford, the Powers theory of causation posits, not ‘contingent cause and effect,’ but rather ‘power and its manifestation, which remain distinct existences but with

a necessary connection between them.’ In particular, the necessary connection is a relation between universals and is instantiated by the instances of those universals. This is similar to the view of causation defended by Armstrong, but with necessity. This view, according to Mumford, ‘respects the singularist intuition that whether one token event a causes another token event b depends on nothing more than a and b and any relation between them.’ But it can accept general causation as supervenient on the singular causes. Finally, causation will be an *internal* relation, according to Mumford.

I think the Powers theory of causation ought to be accepted, but I disagree with Mumford in two important ways. First, instead of supposing that causation is a singular, internal relation, I propose that it is a singular *external* relation. Second, and what follows, is that general causal relations cannot supervene on singular causal relations. Rather, general causal facts are not relations, but are simply the various counterfactuals made true by powerful properties. General causal facts are the having of a powerful property; singular relations are the exercising of that powerful property.

The reason I think this view is preferable is similar to the objection to Armstrong’s account of singular and general causation that I raised in 5.1.6. Armstrong proposed that singular causal relations are instantiations of general causal relations. I objected that this is not consistent with indeterminism. Indeterminism is also problematic for Mumford’s view that causation is an internal relation. If indeterminism is true, then powers are propensities. Suppose I have the propensity to raise my hand, but on some particular instance fail to do so. What should we say about singular and general causation in this case? While there is clearly no manifestation of the propensity, just as clearly we want to say that I still had the propensity to raise my hand. The general causal fact, that my propensity makes the raising of the hand likely to some specific degree, cannot supervene on the singular causal relations.

What’s more, the singular causal relations cannot be *internal*. If they were, the effect would have to be instantaneous with its cause. Suppose there were some delay. Then there

is some delay in *whether the cause is a cause at all*. If indeterminism is true, then the effect might not follow from the cause. The internal nature of Mumford's singular relation makes the existence of the *relata* ontologically prior to the existence of the relation. There seems to be no sense in which such a relation could be a relation of *production*.

None of this is a problem for the view I propose. Singular causal relations are external. General causal relations are not relations at all; they are facts about what objects with the same property would do in various specific circumstances. Neither supervenes on the other.

### **Pre-Emption**

Given that the Powers theory of causation entails that causes are *sufficient* for their effects but does not entail they are necessary, the 'problem' of pre-emption is almost entirely dissolved. For nearly all examples of pre-emption are counterexamples to the necessity of the cause, not its sufficiency. Consider, then, cases of trumping pre-emption raised by Schaffer (2000). Cases of trumping involves two causes that both 'fire,' but in which we are to suppose that one trumps the other as cause and so counts as the only cause. Both officer and sergeant command the soldier to advance at precisely the same time, and the soldier advances on account of the officer's command, not on account of the sergeant's. This is an apparent counterexample to the sufficiency of the cause.

What should the Neo-Aristotelian who defends the Powers theory of causation say in response? She must deny that *only* one is a cause. Both events must be a cause or part of the cause. I propose the following: Each putative cause is an antidote to the other—not to the other's being a cause, but to the other's being a *sufficient* cause. In the absence of the other, each event would be a sufficient cause of the soldier advancing. In the presence of the other, however, they are *jointly* sufficient. The alternative option, that the example is a case of genuine causal overdetermination, is available as well, but I prefer the antidote solution.

### Chance

The powers theory of causation is consistent with chance. General causation will then be sufficiency for probabilities. That is, instead of property P making true a counterfactual such as  $\forall x(Px \square \rightarrow C(Px, Qx))$ , it makes true one more like this:  $\forall x(Px \square \rightarrow \Pr(C(Px, Qx))) = N$ . Notice that the probability in the consequent is not *comparative* as it is for Neo-Humeans. This is precisely because general causation involves sufficiency rather than necessity. Hence this use of probability does not face the same objections that the Neo-Humean's use of counterfactual probability does.

## 6.4 Laws

A natural Neo-Aristotelian account of the laws of nature is that they are descriptions of the powerful natures of properties. Nearly all Neo-Aristotelians propose such an account. For the Neo-Aristotelian who accepts the Truthmaker view of properties, the counterfactuals made true by powerful properties are excellent candidates for laws construed as descriptions of powerful properties.

If we prefer *strict* laws, each such counterfactual will hold of necessity. If we prefer *ideal* laws, consider the subset of those counterfactuals that includes only those whose antecedents refer to ideal circumstances, excluding the messy factors of ordinary circumstances. If we prefer *normal* laws, consider the subset of those counterfactuals that includes only those whose antecedents refer to normal circumstances, messy factors and all. If we prefer *generalizations*, group the counterfactuals by *consequents* and generalize over the antecedents of the counterfactuals in each group.

No matter the preference, the account remains the same. Laws are *propositions* that describe in some manner the powerful nature of properties. This contrasts with both the Neo-Humean and the Nomicist. Propositions do not govern, as the Nomicist's laws do; they describe a self-governed world. What the propositions describe is not a series of

isolated occurrences that happen to form patterns that are capable of being informatively summarized, as the Neo-Humean's laws do; they describe a series of occurrences that flow as they do *by nature*.

### **Sensitive Laws?**

In Chapter 4, I charged the Neo-Humean with accepting laws that are too sensitive to contingent, particular matters of fact. It is clear that in an important sense, Neo-Aristotelian laws are not sensitive to contingent, particular matters of fact, as the Neo-Humean laws are. The laws describe what properties—whenever and wherever they occur—might and must do. What they actually do depends on the contingent, particular matters of fact, but what they might and must do is invariant.

There may, however, be one relevant sense in which the Neo-Aristotelian laws are sensitive to contingent, particular matters of fact. Unless one is a Platonist, it seems that when two properties are not instantiated, there is no truthmaker for any truths describing their possible interactions. Hence, what laws there are might be sensitive to what properties are instantiated. (Perhaps the theistic Neo-Aristotelian can make use of the all-in-one-go method used by Sider (2002) to generate his possible worlds. On this account, God's omnipotence is such that, whoever has that property is capable of bringing about instances of properties,  $P_1, P_2, \dots, P_n$  such that  $\dots$ . Then there would be a truthmaker for how two alien properties would interact: God's power to bring about two properties such that they would interact in such-and-such specific ways.)

### **The Inference Problem**

In Chapter 5, I charged the Contingent Nomicist with an inability to answer the inference problem. Why should we suppose that, when we make a counterfactual assertion, the laws hold? The only way for the Contingent Nomicist to answer this question, I argued, was either to accept the necessity of laws, or make our holding fixed the laws a matter of

convention. Can the Neo-Aristotelian avoid this dilemma? Since the laws are necessary, the laws hold in all counterfactual suppositions in which those very same properties are instantiated.

But, an objector might insist, the Neo-Aristotelian as you've described her wants to allow that *other* properties might have been instantiated. Why must it be that in our counterfactual supposition, the very same properties are instantiated? It's possible, after all, that other properties are. Given the account of counterfactuals offered above, it's clear why and when we keep the actual properties instantiated in the counterfactual supposition. While speakers sometimes mean for us to consider alien properties, typically they *mean* for us to consider a counterfactual situation with the actual properties. When in doubt, Normalcy demands that we try to interpret the antecedent as involving actual properties. But we needn't do so. The inference problem, on Neo-Aristotelian account of counterfactuals, dissolves into a *clarity* problem, if it is a problem at all.<sup>35</sup>

### **Laws and Chance**

It is also clear how the Neo-Aristotelian account of laws can accommodate chance and the Lewis's Principal Principle. Chance laws are descriptions of the nature of propensities. They take the form of a counterfactual probability, such as  $\forall x(Px \square \rightarrow \Pr(C(Px, Qx))) = N$ ). The Neo-Aristotelian can accept PP is a primitive principle of rationality that governs our assignment of credence. While she cannot *derive* PP from her metaphysics—the actual distribution of events might differ from what the general causal facts might lead us to believe they would be—neither could the Neo-Humean, as I argued in Chapter 4. What's more, the Neo-Humean cannot accept PP, but only some restricted form of it. In contrast, the Neo-Aristotelian can accept it unrestrictedly.

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<sup>35</sup>For discussion of this problem for Neo-Aristotelianism, see Robb (1999), Lange (2004, 2005), and Handfield (2005).

### No Laws or All Laws?

Some Neo-Aristotelians have argued that the proper account of laws is an *eliminativist* account. Mumford (2004), for example, argues for what he calls a *realist* lawlessness: There are no laws of nature, but there are essentially dispositional properties. He argues for that view on the basis of the claim that laws, if they exist, must govern the world. But laws do not govern, and so laws do not exist. While I agree that laws do not govern, I think it's false that laws must govern, if they exist. To think otherwise would be to let the *Nomicist* determine the ground rules for the debate.

It seems to me as if the Neo-Aristotelian view of laws should not be *eliminating* but rather should be *liberating*. The Neo-Humean and Nomicist were forcing laws to simultaneously serve two demanding masters: metaphysics and epistemology. But such is an impossible task. Because the Neo-Aristotelian posits inherently modal and nomic entities, she alone is capable of freeing the laws to fully and properly serve the master of epistemology. The proper response is, I think, to embrace *all* laws.

Explanation is, after all, a many and varied thing. Sometimes a regularity is genuinely explanatory. Sometimes, a well systematized regularity is explanatory. Sometimes a unifying proposition is explanatory. Sometimes an idealized proposition is explanatory. Sometimes a *ceterus paribus* proposition is explanatory. Sometimes, counterfactually invariant propositions are explanatory. Sometimes, a *false* proposition is explanatory. Sometimes, appealing to the necessary pre-conditions for human experience is explanatory. Sometimes a model is explanatory. Sometimes a symmetry is explanatory. The Neo-Aristotelian can accept all of that, because none of those explanations are also required to *glue the world together*. It comes pre-glued.

## 6.5 Conclusion

The Neo-Aristotelian can offer a systematic metaphysics that is theoretically powerful, and is an extremely intuitive picture of the world. I have attempted to show that it's true by providing, if briefly, Neo-Aristotelian accounts of properties, modality, causation and laws. Much work is left to do, but the result is clearly an important metaphysics, worthy of serious consideration.

The theoretical power of the Neo-Aristotelian metaphysics can be helpfully summarized by contrasting the accounts of powers, modality, general and singular causation and laws offered by it with those offered by the Neo-Humean and the Contingent Nomicist.

	Neo-Humeanism	Contingent Nomicism	Neo-Aristotelianism
Powers	All Properties	Properties + N	Properties
Modality	All Properties	?	Properties
General Causes	All Properties	Properties + N	Properties
Singular Causes	-	Properties + N	External Relation
Laws	All Properties	Properties + N	Properties

The Neo-Humean needs only the existence of all properties across space, time and all possible worlds, and she is able to generate accounts of powers, modality, general causes, and laws. The Contingent Nomicist needs properties together with the Necessitation relation to generate accounts of powers, general and singular causes, and laws. (The Necessitation relation does not generate an account of modality, so the Nomicist typically accepts some other account of modality.) The Neo-Aristotelian, however, needs only properties to generate accounts of powers, modality, general causes and laws. For singular causes, she needs to add an external relation of manifestation. (If she were willing to reduce singular causes to general causes, as the Neo-Humean is, she could get rid of the external relation as well.)

The contrast between the Neo-Humean and Neo-Aristotelian on the one hand, and Contingent Nomicist on the other, is stark. The former need only properties, whereas the latter needs properties together with the Necessitation relation. The Contrast between the Neo-Humean on the one hand and Neo-Aristotelian on the other is also stark, but it's full nature is not displayed in the above chart. Each offers a fairly simple, systematic metaphysics: Accept the existence of properties and generate your metaphysics from there. But the conceptions of properties are dramatically different, one offering modally impoverished (but much more numerous) properties, the other offering modally rich (but less numerous) properties.

If the Neo-Aristotelian views of properties, modality, causation and laws I have offered are plausible, then a significant argument in favor of Neo-Humeanism is undercut. Neo-Humeanism, this argument runs, may have some unintuitive consequences, but it is immensely theoretical powerful. So it ought to be accepted. The suggestion of this dissertation is that Neo-Aristotelianism is at least as theoretically powerful. If that's correct, then there is a seemingly simple argument for Neo-Aristotelianism. It captures well the pre-theoretical view of the world as a world of powerful actors making things happen. That's the way it seems—and that's the way it is.

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Jonathan D. Jacobs  
*Curriculum Vitae*

## Area of Specialization

- Metaphysics

## Areas of Competence

- Logic
- Philosophy of Science
- Philosophy of Mind
- Philosophy of Religion
- Epistemology

## Academic Positions

- Instructor, Philosophy, University of Saint Thomas, 2006 – present

## Education

- Ph.D., Philosophy, Indiana University, Bloomington, 2007
- B.A., Philosophy and History, Seattle Pacific University, *magna cum laude*, 1999

## Publications

### Refereed

- O'Connor, T. & Jacobs, J. D. (2003). Emergent individuals. *The Philosophical Quarterly*, 53, 540-55.

## Presentations

### Refereed

- “Causal Powers and Their Truthmakers,” Dispositions and Causes Workshop, University of Bristol, December 1st, 2005

- “Relative Identity and the Trinity,” Society of Christian Philosophers, Midwest Division Meeting, September 2002

### **Invited**

- “Now We See Dimly: Philosophical Reflections on the Doctrine of the Trinity,” University of Saint Thomas, October 2007
- “Causal Powers and Their Truthmakers,” Northern Illinois University, January, 2006
- “Causal Powers and Their Truthmakers,” Indiana University, September, 2005
- “Locke on Identity,” Indiana University, Fall 2001
- “Relative Trinitarianism,” Seattle Pacific University, Spring 2001
- “Relative Identity and the Trinity,” Indiana University, Fall 2000
- “The Metaphysics of Modality,” Seattle Pacific University, Fall 2000
- “Kripke and the Contingent A Priori,” Indiana University, Fall 1999

### **Comments On**

- W. Russ Payne, “Supporting Causal Counterfactuals with Properties,” Inland Northwest Philosophy Conference, May 2003
- David W. Concepcion, “On Ambiguities in The Ability to do Otherwise and the Private Nature of Blameworthiness,” Indiana Philosophical Association, November 2002
- Neil Manson, “The This-Universe Objection,” Indiana Philosophical Association, Spring 2002
- Richard Corry, “Perception, Causation, and the Limits of Knowledge,” Indiana University, Fall 2001
- Ted Parent, “A Coherence Theory of Subjective Probability,” Indiana University, 2000
- Timothy O’Connor, “Agents and Causes: The Metaphysics of Free Will,” Indiana University, 2000
- Timothy O’Connor, “The God of Abraham, Isaac, and Anselm?” Seattle Pacific University, 1999

## **Teaching Experience**

### **University of Saint Thomas**

- Natural Philosophy and Metaphysics – Fall 2007
- Logic – Spring 2007
- Philosophy of the Human Person – Fall 2007, Summer 2007, Fall 2006

### **Indiana University**

- Introduction to Philosophy – Fall 2005, Spring 2005, Fall 2004, Spring 2004, Spring 2003, Fall 2002, Summer 2002
- Thinking and Reasoning – Fall 2003

## **Service**

- Assessment Committee, University of Saint Thomas, 2007–

## **Professional Memberships**

- American Philosophical Association
- Society of Christian Philosophers