

The Metaphysics of Dispositions:
A Case for Counterfactualism

Dissertation

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy
in the Graduate School of The Ohio State University

By

David Stewart Blanks, M.A.

Graduate Program in Philosophy

The Ohio State University

2015

Dissertation Committee:

Ben Caplan, Adviser

Declan Smithies

William Taschek

Copyright by
David Stewart Blanks
2015

Abstract

A glass is fragile. It must be treated with care to prevent it from breaking. Fragility is one of many of dispositions that are part of our ordinary experience. Not only are dispositions ubiquitous in everyday life, they are also prevalent in the sciences. This is a dissertation on what dispositions are. In this dissertation I argue that *counterfactualism*, according to which dispositions are *de re* counterfactual properties (e.g., *being an x such that x would break if x were struck*), is superior to standard accounts of what dispositions are. Advocates of the standard views appeal to causal bases (e.g., in the case of a fragile object, the causal basis is the property of the object that would help causally bring about the object's breaking, were it struck). According to the *identity view*, a disposition just is its causal basis; and, according to *causal functionalism*, a disposition is the property *having a causal basis*.

Many have it that properties like dispositions should be reduced to categorical properties. Examples of simple categorical properties include *being square* and *having three parts*. It is tempting to think that causal bases have something to do with reducing dispositions. This might lead one to think that the standard views have a reductive advantage over counterfactualism. However, I argue that the standard views have no reductive advantage over counterfactualism and no other advantages either. Instead, it is counterfactualism that enjoys several advantages over the standard views, including the

ability to account for baseless dispositions, better preserve the distinction between hypothetical and categorical properties, and ensure a certain kind of parsimony.

Dedication

To my parents:

Charlie and Nancy.

To my brothers and their wives:

Rob and Heather and Tim and Katie.

And to my niece and nephews:

Marian, Hayden, Josh, Judah, Josiah, Isaac and Ethan.

Acknowledgements

Much of this material was presented at the OSU Philosophy Department's Dissertation Seminar in the Springs of 2012, 2013, 2014, and 2015. Many thanks to all the participants in each of those seminars. Thanks especially to Scott Brown and Danny Pearlberg who provided written comments and helpful dialogue on my work.

Portions of Chapter Three and Chapter Four were presented at the 2015 Central Meeting of the American Philosophical Association. Thanks to all the participants for the helpful feedback. Thanks especially to Jennifer McKittrick for written comments. Thanks also to Jennifer McKittrick for helpful dialogue concerning other parts of my dissertation.

Thanks to Sam Cowling, Wesley Cray, David Manley, Bradley Rettler, Abe Roth, Richard Samuels, David Sanson, Stewart Shapiro, Declan Smithies, and William Taschek for reading drafts of my work and providing helpful comments. Thanks to Declan Smithies for giving me a better appreciation of the Lewisian perspective and how the issues with dispositions parallel issues in the philosophy of mind. Thanks to William Taschek for such level headed insight and penetrating critiques. Thanks especially to David Manley for long conversations that helped me see more clearly the view that I favor.

Thanks to Cody Wood, Andy Brown and Nate Cook whose friendship encouraged me and whose questions about my work forced me to consider its practical implications.

Thanks to all those in my community groups for the support and encouragement.

Thanks to my family for encouraging and supporting me since long before I ever began studying philosophy and for continuing to do so to this day. Thanks especially to Rob and Heather who helped illuminate my path.

Thanks to Alexis Liebst who helped get me through the final stages.

Thanks especially to my adviser Ben Caplan, without whom this dissertation never would have been. Over the course of the last several years he met with me seemingly countless times to help me understand various articles and philosophical ideas, to provide feedback on my own ideas and suggestions for making them better, to provide helpful comments and dialogue on everything I wrote, to teach me how philosophy is done and to steer me down the path of constructing a dissertation.

Vita

1999.....D'Evelyn Junior/Senior High School

2002.....B.A. Philosophy (Mathematics minor)
Honors, University of Colorado at
Denver

2006.....M.Div. Biblical and Theological Studies,
Southern Baptist Theological Seminary

2008.....M.A. Philosophy, Northern Illinois
University

2009 to present.....Graduate Teaching Associate,
Department of Philosophy, The Ohio
State University

Fields of Study

Major Field: Philosophy

Table of Contents

Abstract.....	ii
Dedications.....	iv
Acknowledgements.....	v
Vita.....	vii
Chapter 1: Introduction.....	1
1.1. Different Kinds of Properties.....	1
1.1.1. Modal properties vs. non-modal properties.....	1
1.1.2. Counterfactual properties vs. non-counterfactual properties.....	3
1.1.3. Dispositional properties vs. categorical properties.....	4
1.1.4. Hypothetical properties vs. categorical properties.....	9
1.2. What Dispositions Are.....	11
Chapter 2: Counterfactualism and the Conditional Analysis.....	17
2.1. The Simple Conditional Analysis.....	19
2.2. Lewis's Conditional Analysis.....	21
2.2.1. LCA.....	21
2.2.2. Trouble for LCA.....	24
2.3. The Getting Specific Strategy.....	26
2.4. Manley and Wasserman on the Getting Specific Strategy.....	27

2.5. Manley and Wasserman's Conditional Analysis.....	32
2.6. Extrinsic Dispositions.....	35
2.6.1. Lawfully extrinsic dispositions.....	35
2.6.2. Trouble for all.....	38
2.6.2.1. Rethinking old cases.....	39
2.6.2.2. A new direction.....	43
2.7. Saying what Dispositions are According to Counterfactualism.....	45
2.8. Counterfactualism vs. Modalism.....	48
Chapter 3: The Standard Views and Causal Bases.....	51
3.1. Characterizing the Standard Views.....	51
3.2. Saying more precisely what Dispositions are on the Standard Views.....	53
3.2.1. Prior, Pargetter and Jackson on causal bases.....	54
3.2.2. A different approach to causal bases.....	56
3.2.3. Causal bases given PCA.....	63
3.3. Extrinsic Causal Bases?	65
3.4. Metaphysical Bases.....	68
3.5. Counterfactualism and Bases.....	72
3.5.1. Counterfactualism and causal bases.....	72
3.5.2. Counterfactualism and metaphysical bases.....	73
Chapter 4: Reduction for All.....	75
4.1. Humeanism.....	76
4.2. Hypothetical Properties and Reduction.....	80
4.2.1. Reduction as supervenience.....	81

4.2.2. Reduction as identity.....	83
4.2.3. Reduction as grounding.....	87
4.3. Dispositions and Reduction.....	91
4.4. The Standard Views and Reduction.....	96
4.5. Metaphysical Functionalism and Reduction.....	100
4.6. Making Counterfactualism and the Standard Views Reductive.....	101
4.6.1. Counterfactualism.....	102
4.6.2. The standard views.....	106
4.7. Morals.....	111
Chapter 5 Advantages for Some.....	114
5.1. The Natural Place to Start: Counterfactualism.....	114
5.2. No Need to Make Much of the Distinction between a Disposition and Having a Disposition.....	117
5.3. Preserving the Categorical vs. Hypothetical Distinction.....	121
5.4. Ensuring that Dispositions are not a Distinct Kind of Hypothetical Property.....	127
5.5. Accounting for Extrinsic Dispositions.....	129
5.5.1. Causal bases.....	129
5.5.2. Metaphysical bases.....	132
5.6. Allowing for Baseless Dispositions.....	135
5.6.1. No causal basis.....	135
5.6.2. No metaphysical basis.....	140
5.7. Final Thoughts.....	145

References.....	147
Appendix: Named Sentences.....	154

Chapter 1: Introduction

A glass is fragile. It must be treated with care to prevent it from breaking. Fragility is one of many of dispositions that are part of our ordinary experience. Not only are dispositions ubiquitous in everyday life, they are also prevalent in the sciences. In psychology, people are disposed to think certain ways in certain situations. In biology, organisms are disposed to behave a certain way in various environments. In chemistry, certain chemicals are disposed to react with others when intermingled. And in physics, mass, charge and spin all seem to be dispositional properties.¹ It is the aim of this dissertation to elucidate the nature of dispositions. This Chapter in particular will lay the groundwork for what is to come. First we'll examine several kinds of property distinctions and see how dispositions fit in to these distinctions (section 1.1). After that we'll be in a position to lay out the three main views regarding what dispositions are (section 1.2). It is the aim of this dissertation to defend one of those views, namely *counterfactualism*, the view that dispositions are a type of counterfactual property.

1.1. Different Kinds of Properties

1.1.1. *Modal properties vs. non-modal properties*

On the one hand there are modal properties like *possibly being taller* and *being necessarily rational*. These properties have to do with how an object could be or has to

¹This is controversial. See Mumford 2006, 476.

be. And on the other hand there are non-modal properties like *being circular*, *having three parts*, *being six feet tall* and *living in Columbus*. These properties have to do with how objects actually are.

As I see it, there are two types of objects that can have modal properties: propositions and objects that aren't propositions, objects like people, trees, knives, electrons. I also take it that propositions are the sorts of things that can be true or false. A proposition can be either contingently true or necessarily true (unless it is necessarily false). The properties *being necessarily true* and *being contingently true* are modal properties. They are *de dicto* modal properties since they can be instantiated only by propositions. Likewise, propositions can be either necessarily or contingently false (unless they are necessarily true) and can instantiate the *de dicto* modal properties *being necessarily false* or *being contingently false*. Many have it that the proposition that God exists either has the property *being necessarily true* or has the property *being necessarily false*. The proposition that I am in Columbus has the property *being contingently true* at the time of writing. Likewise the proposition that I am in Albuquerque has the property *being contingently false*; I'm not there now, but I could go there.

Modal properties that are had by objects that aren't propositions are *de re* modal properties. Whereas *de dicto* modal properties are alethic (i.e. they have to do with truth or falsity), *de re* modal properties are not.² They have to do with how an object could possibly be or how an object has to be. Hubert Humphrey ran for president in 1968 but

²We could just as easily call *de dicto* modal properties *alethic de re modal properties*, but I'll continue to use the traditional labels, albeit in a somewhat non-standard way. Plantinga (1987, 191) suggests this way of understanding the distinction between the *de dicto* and *de re*. See Sider 2003 for a syntactic way of drawing the distinction between *de dicto* and *de re* propositions.

lost to Richard Nixon. Humphrey has the *de re* modal property *possibly winning the election*, and perhaps he has the *de re* modal property *being necessarily human*. As I write this I'm in Columbus, but I don't have to be; I could be somewhere else. Thus, I have the modal property *contingently being in Columbus*.

Such modal properties can be contrasted with non-modal properties. Properties having to do with where Humphrey is from, his particular size and shape, the clothes he wears, where he lives, the music that he likes are not modal properties. While *contingently being in Columbus* is a modal property, *being in Columbus* is not.

1.1.2. Counterfactual properties vs. non-counterfactual properties

Some properties are counterfactual. Jones is engaged in illegal activities, but Jones is also corrupt. If Jones gets caught, he will try to bribe the judge. Jones has the property *being such that were it the case that he is caught, then it would be the case that he bribes the judge*. This is a *de re* counterfactual property. I use '*de re*' here to emphasize that it is a property had by an object that is not a proposition, in this case Jones. David Lewis (1973) introduces a counterfactual conditional operator, ' $\Box \rightarrow$ ', to be read as "If it were the case that ____, then it would be the case that ...".³ In general, for any object *x* and any properties *F* and *G*, *x* has a *de re* counterfactual property when counterfactuals of the following form are true: "if it were the case that *x* is *F*, then it would be the case that *x* is *G*."

³Lewis (1973, 2-3) notes that some official readings of his counterfactual operator must be taken with caution, since rigidly plugging in the antecedent and consequent can result in statements of obscure meaning and doubtful grammaticality.

Of course there are counterfactual propositions that aren't about a particular object. For example, "If it were the case that we find a cure for cancer, then it would be the case that a great many lives are saved" expresses a true counterfactual proposition, but there isn't obviously a corresponding property had by a particular object.⁴ Thus, I don't claim there is a *de re* counterfactual property associated with such a counterfactual.

Counterfactual properties are distinct from non-counterfactual properties. Non-counterfactual properties include some modal properties—like *possibly winning the election* and *being necessarily human*—and all non-modal properties. (I don't consider counterfactual properties to be a type of modal property.)

1.1.3. Dispositional properties vs. categorical properties

On the one hand there seem to be paradigmatic dispositional properties like fragility and solubility. If you strike a fragile glass, it will break. If you put a soluble substance in water, it will dissolve. And on the other hand there seem to be paradigmatic categorical properties having to do with shape or size. Intuitively, the two types of properties seem different. Dispositions essentially involve a manifestation and stimulus condition.⁵ The glass is fragile. If it were struck, it would break. Fragility is a *disposition*, its being struck is the *stimulus condition* for the disposition, and its breaking is the *manifestation* of the disposition. The sugar is soluble. If it were immersed in water, it would dissolve. Solubility is a *disposition*, its being immersed in water is the *stimulus condition* for the disposition, and its dissolving is the *manifestation* of the disposition. Of course an object

⁴Perhaps it's a property of cancer or those who are or will be afflicted with cancer or perhaps it's a property of the world.

⁵I make no distinction between dispositional properties and dispositions.

still has a disposition even if the manifestation never occurs. A fragile glass that is never struck is still fragile.

Categorical properties seem to be importantly different. I have the property *being six feet tall*. It's a categorical property and doesn't seem to be associated in any way with a stimulus condition or manifestation. Moreover, it doesn't seem to be related to counterfactuals in the way that dispositions are. Instead categorical properties describe how things actually are, not how they would be, were certain circumstances to occur.

Fragility and solubility seem to be connected to counterfactuals in an important way. Elizabeth Prior (1985, 5) claims that "What is commonly accepted by all those who discuss dispositions is that there exists a conceptual connection between a statement attributing a disposition to an item and a particular conditional." And Troy Cross (2012, 115) says, "The traditional approach to disposition ascriptions found, for instance, in Ryle (2000) and Goodman (1983), evaluates ascriptions of conventional dispositional predicates by appeal to a corresponding subjunctive conditional." Specifying the specific counterfactuals associated with dispositions is providing a conditional analysis of dispositions.⁶ Chapter Two will survey some of the prominent conditional analyses in the literature, examine the traditional counterexamples to the various proposals and endorse what I take to be the best conditional analysis going.

There is a long tradition of distinguishing dispositions from categorical properties by appealing to dispositions' close connection with counterfactuals.⁷ The idea is that

⁶I make no distinction between subjunctive conditionals and counterfactuals.

⁷Prior (1982, 93) cites Goodman (1955, 34), who describes it as commonly accepted.

dispositions are unique because having a disposition entails a non-trivial counterfactual.⁸

A fragile object is such that, if it were struck, then it would break. A glass's being fragile entails that, if the glass were struck, then it would break. However, this way of distinguishing dispositions is fraught with controversy. Instead of denying that having a disposition entails a counterfactual, D. H. Mellor (1974, 1982) argues that having even uncontroversial categorical properties such as *being triangular* entails a counterfactual. According to Mellor (1982, 96) "x is triangular" entails "If x's corners were correctly counted the result would be three," where 'correctly' refers to how the counting is done, not whether it gives the correct result. Mellor (1982, 96-97) is explicit about what it means to count corners correctly: "count them all once each, i.e. put them all in some 1-1 correspondence with an initial segment of the sequence of positive integers 1, 2, 3, ... The highest number in the segment is the result of the counting."

Prior (1982) resists Mellor's claim by arguing that, if 'correctly counted' refers only to how the counting is done, then there is no guarantee that the correct answer will be arrived at. Perhaps, in a world with different laws than ours, when someone begins counting the corners of a triangle, the shape changes and comes to have four corners. In such a case the result would not be three. For Mellor's claim to be right, according to Prior, 'correctly' needs to refer to whether a correct result is attained, not to how the counting is done, rendering the counterfactual trivial.

But, as David Manley (2012, 325) points out, there is no reason why we couldn't build the laws into the antecedent of the conditional (if x's corners were correctly counted

⁸My having the property *being six feet tall* entails that if it were the case that an object is red all over, then it would be the case that the object isn't green. These are the sort of cases that the "non-trivial" requirement is supposed to rule out.

while the laws of nature are held fixed, the result would be three), or an anti-deformation clause (if x 's corners were correctly counted and x undergoes no deformation, the result would be three). Such counterfactuals are easy to come by.

In fact Cross (2005) argues that Mellor's challenge can be generalized. Let us suppose that Φ and Ψ are categorical properties and that D is the dispositional property such that its bearer, if it had come to have Φ , would come to have Ψ . Thus, having property D entails a counterfactual, since if an object has D , it will entail that if the object were to have Φ , it would come to have Ψ :

$$(\forall x) (Dx \Rightarrow (\Phi x \Box \rightarrow \Psi x))$$

where the ' $\Rightarrow$ ' represents entailment, and the ' $\Box \rightarrow$ ' represents the counterfactual conditional connective. While it is true that having D entails a counterfactual, having Φ also does, since having Φ entails that, if an object had disposition D , then it would come to have Ψ :

$$(\forall x) (\Phi x \Rightarrow (Dx \Box \rightarrow \Psi x)).$$

Thus by switching the dispositional property with the antecedent of the counterfactual, having the categorical property Φ will entail a counterfactual. Consider again a fragile glass. A glass's being fragile entails that, if the glass were struck, it would break. But having the categorical property *being struck* also entails a counterfactual, since an object's being struck entails that, if the object were fragile, then it would break. Now as a test for distinguishing dispositional properties from categorical properties, whether or not

having a property entails a non-trivial counterfactual will never do, since all categorical properties will come out as dispositional.⁹

Manley (2012) surveys the lengths people have gone to in response to not being able to draw a distinction between dispositional and categorical properties in this manner.

Cross [2005: 330] himself abandons hope for a non-circular account of the distinction between dispositions and categorical properties, and recommends taking it as primitive. Others are willing to simply jettison the intuitive distinction I have in mind. Some are happy to conclude that all properties of things are equally dispositional [Mellor 1974, 1982; Shoemaker 1980], or equally both dispositional and categorical [Martin and Heil 1999; Heil 2005]. Still others deny that the categories of ‘dispositional’ and ‘categorical’ properly apply to properties at all, but rather to predicates; see Mellor [2000], Lowe [2006], and, to some extent, Mumford [1998: 75–6, 205]. (326)

But Manley is quick to caution that such responses are an over-reaction. Manley (2012, 327) points out that our intuitive distinction between properties like fragility and triangularity is strong. The term ‘disposition’ was introduced to track that distinction. If one way of saying what the distinction comes to—that having dispositional properties entail counterfactuals—fails, that does not mean we should give up on the distinction. Manley (2012, 327) thinks that Mellor’s reaction has gotten things the wrong way around: “it seems entirely backwards to assume, as Mellor does, that a property is dispositional just in case it entails (or is equivalent to) a subjunctive conditional, and then go on to conclude that all properties are dispositional [1982:96].” The failure of one way of drawing the distinction isn’t enough to overcome the strong intuitive support for the distinction.

Manley goes on to note that we have not been given any good reason to think that there isn’t a distinction to be made between the two types of properties; we have only

⁹Or at least all categorical properties that serve as stimulus conditions for dispositions.

been given reason to think that one particular attempt does not fare well. It is not surprising that the entailment test is not able to distinguish dispositions from categorical properties. The approach seems wrong-headed. Rather than focus on what having a property entails, we should focus on what these properties *are*. After we understand better what they are, it will become clear how they differ from categorical properties. We already have some grasp of the distinction: dispositions have manifestations and stimulus conditions while categorical properties do not. More can be said, but not until we look more carefully at what dispositions are. We will do so in section 1.2 below. After we examine what dispositions are, it will become clearer how they differ from categorical properties. It is also worth pointing out that intuitively there is a distinction between dispositional and categorical properties and that an account of dispositions that is able to preserve the distinction is to be favored, all other things being equal. If an account of dispositions is not able to preserve the distinction, then that is a drawback of the account.

But, before we consider what dispositions are, let us consider other ways of drawing the distinction. In the next section we'll see that there is another way of making sense of the distinction.

1.1.4. Hypothetical properties vs. categorical properties

The distinction between dispositional properties and categorical properties is actually part of larger distinction between *hypothetical* properties and categorical properties.

Hypothetical properties are supposed to “point beyond” their instances somehow.

Theodore Sider (2001, 41) glosses the distinction this way: “Categorical properties involve what objects are actually like, whereas hypothetical properties ‘point beyond’

their instances.” Thomas Crisp (2007, 105) characterizes a property as being hypothetical “when it points beyond its instances to how things could be, would be, were or will be.” Jonathan Schaffer elaborates on what it means for hypothetical properties to point beyond their instances: the “sense in which [hypothetical] properties ‘point beyond’ their instances is that they concern *what else must be*, while the sense in which [categorical] properties remain self-contained is that they concern just the actual, intrinsic features of the thing itself” (2008, 85; emphasis in the original).¹⁰ The idea is that, when an object instantiates a hypothetical property, the property points beyond the object that instantiates it by telling us something more than how the object actually is.

Putative hypothetical properties include modal properties, counterfactual properties, dispositions and tensed properties.¹¹ Take for example a modal property, *possibly being a lumberjack*. I take it that I instantiate this property. I could pursue lumberjacking and make a career of it. I haven’t decided to do that, but it is a possibility that is open to me. The way in which the property points beyond me is that it says something about how I could be, as opposed to how I actually am. I’m not actually a lumberjack, but I could be one. I am not denying that the property is one I actually have; I am just saying that it points beyond how I actually am. Likewise, consider the property *being necessarily human*. Let’s say this is a property I instantiate. The property points beyond how I actually am to how I have to be. The property *previously containing dinosaurs* is a hypothetical property. The earth instantiates the property, and the property points beyond how the earth actually is now to how it used to be. The earth fails to

¹⁰It is not obvious that categorical properties must be intrinsic. More on this below.

¹¹See Crisp (2007, 93-94) for a brief description of good candidates for hypothetical properties.

instantiate the property *containing dinosaurs*, which is a categorical property describing how the earth actually would be if the property were instantiated.

Categorical properties, by contrast, describe only how objects actually are. I have the properties *being six feet tall* and *being located in Columbus*. These are categorical properties, since they don't point beyond how I actually am. A person in pain has the property *being in pain*, which is also categorical since it doesn't point beyond how the person actually is.

It is worth noting that the purpose of the distinction between hypothetical and categorical properties, as Sider uses it, is to criticize those who countenance *primitive* hypothetical properties, where a primitive hypothetical property is one that is not reduced to categorical properties.¹² Sider invokes the distinction in his criticism of presentists who help themselves to such properties as *previously containing dinosaurs*.¹³ This is a sort of “cheating” according to Sider. The presentist is cheating because he is “unwilling to accept an ontology robust enough to bear the weight of the truths he feels free to invoke” (2001, 41). The cheaters countenance primitive hypothetical properties and this is where they go wrong, or so the criticism goes.

1.2. What Dispositions Are

The glass is fragile. If it were struck, it would break. Fragility is a *disposition*, its being struck is the *stimulus condition* for the disposition, and its breaking is the *manifestation* of the disposition. When talking about dispositions, the starting point seems to be an attempt at providing a conditional analysis. As an example, the simple conditional

¹²More on primitive properties and reduction in Chapter Four.

¹³Presentists think that only present things exist (Crisp 2007).

analysis says that an object has a disposition if and only if the manifestation would come about, if the object were subject to the stimulus condition. The important thing to notice is that there is a counterfactual property that comes from the right-hand side of the conditional analysis. For example, the relevant counterfactual property that comes from the right-hand side of the conditional analysis is the property *being an x such that x would exhibit the manifestation, if x were subject to the stimulus condition*.¹⁴

Chapter Two lays out several of the most prominent conditional analyses, and I'll argue for one in particular. I assume that we can give a conditional analysis of dispositions. And I assume that those who accept the conditional analysis are committed to the counterfactual properties that come from the right-hand side of the conditional analysis. Call the counterfactual properties that come from the right-hand side of whichever conditional analysis one adopts *the counterfactual properties*. Since the starting point in thinking about what dispositions are is the conditional analysis and since the conditional analysis includes a commitment to these counterfactual properties, the most natural thing to say about what a disposition is is that a disposition just is one of these counterfactual properties. Call this view *counterfactualism*. Since counterfactualism is the natural place to start when talking about what dispositions are, it is *prima facie* correct. Counterfactualism is the place to start and one should stick with counterfactualism in the absence of reasons for rejecting it or reasons for accepting the

¹⁴I always mean to pick out such a property when I use the phrase 'counterfactual property that comes from the right-hand side of the conditional analysis'. Roughly speaking, it is the property expressed by the predicate that one is left with when one removes the 'x' from the sentence on the right-hand side of the conditional analysis.

alternative views. Chapter Two ends with a statement of exactly what counterfactualism comes to given whichever conditional analysis one adopts.

There are several alternative views of what dispositions are. Chapter Three will describe these alternatives. It is natural to think that non-primitive dispositions have a basis. For example, it is natural to think that a glass's fragility is importantly related to another property of the glass, perhaps the glass's molecular structure. Typically these properties are understood as *causal bases*. A fragile glass is struck and breaks.

Presumably there is some cause of the glass's breaking, and presumably some property of the glass is causally relevant to bringing about the breaking. That property is the causal basis.

Alternatively a basis can be understood as the property of the disposed object that the disposition metaphysically depends on. When one property metaphysically depends on another property, that first property is *grounded* in the second property. A glass is fragile, and it is fragile in part in virtue of the fact that it has a certain molecular structure. Call this property the *metaphysical basis*. In most cases, the causal basis and the metaphysical basis will be the same property, but the way the properties are picked out differ and the added commitments required to make sense of each differ. Counterfactuals and the causal relation are required to make sense of causal bases, and the grounding relation is required to make sense of metaphysical bases.

The alternative accounts to counterfactualism make much of bases. The two main alternatives, call them the *standard views*, make much of causal bases. According to the *identity view*, a disposition is identical with its causal basis. According to *causal*

functionalism, a disposition is identical with the property *having a causal basis*.¹⁵

Intuitively a disposition could be instantiated in various objects with different bases.

Causal functionalism attempts to capture this intuition by allowing various objects with a single disposition to have distinct causal bases. Instead of identifying the disposition with its causal basis, the causal functionalist identifies the disposition with the property *having a causal basis*. That way, all the various objects have a single property.

There is one more alternative view of dispositions that is closely related to causal functionalism. *Metaphysical functionalism* makes much of metaphysical bases.

According to metaphysical functionalism, a disposition just is the property *having a metaphysical basis*.

This dissertation is an attempt at preserving what I take to be common intuitions about dispositions. First, I think there are dispositions, so I won't be considering an eliminativist position. Second, and less intuitively, I think we can say what dispositions are. I don't think dispositions are *sui generis*.¹⁶ It is only when all attempts of saying what dispositions are have failed that we should resort to a *sui generis* view. And I hope that this dissertation shows that the prospects for saying what dispositions are are not so bleak. Third, I think that there is an intuitive distinction between dispositional properties like fragility and solubility, on the one hand, and categorical properties like *being square*, *being six feet tall* and *having three parts*, on the other hand. I take it that preserving the distinction between dispositions and categorical properties is a theoretical virtue. If a theory of dispositions isn't able to preserve the distinction, then I'm more inclined to say

¹⁵See Chapter Three for a more precise statement of causal functionalism.

¹⁶I leave open the possibility that *sui generis* properties can still be reduced. For more on reduction see Chapter Four.

that there is a problem with the theory than that there is no distinction. At any rate, preserving the distinction is what theories should aim for, and if they can get it, then that counts as evidence in favor of those theories.

Parsimony is another theoretical virtue. Many desire to reduce dispositions—and in fact all hypothetical properties—to categorical properties. The idea is that, all other things being equal, we should go with the theory that posits the fewest primitive hypothetical properties (where a primitive property is one that is not reduced). I'm not at all confident that dispositions can be reduced to categorical properties, but that is the possibility to keep in mind.

This dissertation is an attempt at demonstrating that counterfactualism is at least as good as the alternatives. This result is significant in itself, since counterfactualism has been mentioned in only one paper (Manley 2012).¹⁷ When accounts have been given of what dispositions are, counterfactualism hasn't even been mentioned. This dissertation is an attempt to have counterfactualism taken seriously as a legitimate contender among accounts of what dispositions are.

The only putative advantage that I am aware of that the standard views enjoy over counterfactualism is that the standard views are supposed to be reductive. Chapter Four will explore the issue of dispositions and reduction. We'll see that the standard views and metaphysical functionalism enjoy no reductive advantage over counterfactualism. If counterfactualism is *prima facie* correct, and the alternative views enjoy no advantages over counterfactualism, then counterfactualism is the view of dispositions that should be adopted.

¹⁷Manley calls his view 'modalism', and it is closely related to counterfactualism. See Chapter Two §2.8.

In addition, this dissertation attempts to argue that counterfactualism enjoys some advantages over the alternatives. If I'm right that counterfactualism enjoys some advantages over the alternative views and the alternative view don't enjoy any advantages over counterfactualism, then counterfactualism is the view that should be adopted.

Chapter Five will examine the advantages that counterfactualism enjoys over the alternative views. First, it rightly recognizes the importance of counterfactual properties. Second, it is able to make better sense of the distinction between dispositional and hypothetical properties. Third, it ensures that dispositions are not their own, distinct kind of hypothetical property. This ensures that counterfactualism enjoys a certain parsimony that the alternative views fail to ensure. Fourth, it can better account for lawfully extrinsic dispositions—dispositions that vary among duplicates even when the laws of nature are held fixed. Fifth, counterfactualism is able to account for baseless dispositions. It is not obvious that all dispositions must have a base, and any account that rules baseless dispositions out has a disadvantage.

Chapter 2: Counterfactualism and the Conditional Analysis

Most philosophers think there is an important connection between dispositions and counterfactuals.¹⁸ As Elizabeth Prior (1985) notes, this is uncontroversial.

What is commonly accepted by *all* those who discuss dispositions is that there exists a conceptual connection between a statement attributing a disposition to an item and a particular conditional. The acceptance of the existence of this conceptual connection is a pre-theoretic common ground. (5; her emphasis)

Dispositions are importantly related to counterfactuals. The attempt to connect dispositions with counterfactuals begins with the *simple conditional analysis* (section 2.1). The conditional analysis describes the relation with a biconditional that presumably holds of necessity. The rough idea, for fragility, is that an object is fragile if and only if the object would break if it were it dropped.¹⁹ I take it that there is a *de re* counterfactual property that comes from the right-hand side of the conditional analysis.²⁰ The glass has the counterfactual property *being an x such that x would break if dropped*. I suppose that not everyone will be happy with such a property.²¹ However, given the way I understand parsimony, only primitive properties come at a cost. Counterfactual properties that are reduced don't come at any additional cost. Thus, the mere fact that there are

¹⁸I focus on the metaphysics by talking about dispositional properties and counterfactuals (counterfactual propositions) (see Chapter One §1.2), while others focus on language by talking about dispositional predicates and subjunctive conditional sentences. I assume there is a dispositional property for every dispositional predicate and a counterfactual for every subjunctive conditional sentence.

¹⁹Typically I take the stimulus condition for fragility to be striking but I take it to be dropping in this Chapter since many with whom I interact with regarding the conditional analysis take it that way.

²⁰See Chapter One §1.1.2 for more on counterfactual properties.

²¹It's worth noting that Lewis, who in many ways is my chief opponent in this dissertation, is committed to such properties. See Lewis 1973.

counterfactual properties shouldn't be problematic. There is a problem only if such properties are not reduced.²² It is only primitive properties that increase one's qualitative ideology.

These issues are important to the overall goal of this dissertation, since this dissertation is about defending counterfactualism, the view that dispositions just are counterfactual properties. However, accepting a conditional analysis doesn't determine what one thinks dispositions are. I assume that some conditional analysis is true, and this Chapter will describe what I take to be the best account going.

Counterexamples to the simple conditional analysis have led people to provide more sophisticated accounts. David Lewis (1997) attempts to improve upon the simple conditional analysis by appealing to causal bases (section 2.2). But appealing to causal bases doesn't block all counterexamples. In section 2.3 we'll consider the "getting specific strategy" as a way of accounting for the problems that Lewis's conditional analysis faces. But in section 2.4 we'll see why David Manley and Ryan Wasserman (2008) don't think the getting specific strategy works. A new conditional analysis is needed. Manley and Wasserman (2008) provide an account that is superior to Lewis's (section 2.5). In section 2.6, we'll consider extrinsic dispositions and see that they pose a challenge to all conditional analyses. In section 2.7 we'll see exactly what the counterfactualist thinks dispositions are, given the various conditional analyses. Finally, in the last section, we'll consider how counterfactualism compares to Manley's preferred view, modalism.

²²See Chapter Four §4.1 for more on parsimony.

2.1. The Simple Conditional Analysis

The glass is fragile. If it were dropped, it would break. Fragility is a disposition, its being dropped is the stimulus condition for the disposition, and its breaking is the manifestation of the disposition. The first step in providing a conditional analysis of dispositions is to say how an object's having a disposition is related to the stimulus condition and the manifestation.²³

STEP ONE Connect dispositions with manifestations and stimulus conditions.

Following Lewis (1997, 151), we can state an instance of STEP ONE. Let's say that, for any object x and any disposition D , there is a stimulus condition S and a manifestation M such that

(LSO) x has D iff x is disposed to manifest M when subject to S .

This is *Lewis's step one*. For example, a glass is fragile if and only if it is disposed to break when dropped; a pinch of salt is soluble if and only if it is disposed to dissolve when put in water; and a match is ignitable if and only if it is disposed to ignite when appropriately struck. Let's assume that (LSO) is correct.²⁴

The second step is to connect the right-hand side of (LSO) with a sentence that expresses a counterfactual.

STEP TWO Connect manifestations and stimulus conditions with counterfactuals.

STEP TWO involves completing the open sentence " x is disposed to manifest M when subject to S iff ..." with a sentence that expresses a counterfactual. The basic idea is

²³The "two-step" process comes from Lewis 1997.

²⁴We'll see below that certain cases might cause us to rethink just what the stimulus condition and manifestation are for a particular disposition. I consider this task part of STEP ONE.

illustrated by the *simple conditional analysis*, which is an instance of STEP TWO. For any object x and any disposition D with stimulus condition S and manifestation M ,

(SCA) x is disposed to manifest M when subject to S iff x would manifest M if x were subject to S .

It is widely accepted that (SCA) is too simple. C. B. Martin (1994, 2-4) offers counterexamples to (SCA) involving what are known as “finks.” We can begin by combining the left-hand side of (LSO) with the right-hand side of (SCA) to get (SCAD).²⁵ For any object x and any disposition D with stimulus condition S and manifestation M ,

(SCAD) x has D iff x would manifest M if x were subject to S .

(SCAD) is a consequence of (LSO) and (SCA) and provides an analysis of having a disposition.

There is trouble, however, for (SCAD). Consider the following instantiations of (LSO), (SCA) and (SCAD), respectively:

- (A) The wire is live iff it is disposed to conduct electricity when touching the conductor.
- (B) The wire is disposed to conduct electricity when touching the conductor iff it would conduct electricity if it were touching the conductor.
- (C) The wire is live iff it would conduct electricity if it were touching the conductor.

Here is a counterexample to (C):

Electro-fink. An electro-fink is attached to a dead wire. The electro-fink has reliable, instantaneous information regarding when the wire is touching the conductor and uses that information to make the wire live if it is touching the

²⁵(SCAD) is what the *simple conditional analysis* says about what it is to have a *disposition*, given (LSO).

conductor. So the wire is dead; but, as a result of the electro-fink's actions, it would conduct electricity if it were touching the conductor.

Electro-fink is a case where the left-hand side of (C) is false, but the right-hand side is true. Since (A) and (B) entail (C), a counterexample to (C) ensures that either (A) or (B) is false. On the assumption that the instance of (LSO)—namely, (A)—is true, the instance of (SCA)—namely, (B)—is false. Thus, (SCA) is also false.

Here's another counterexample to (C):

Reverse electro-fink. A reverse electro-fink is attached to a live wire. The reverse electro-fink has reliable, instantaneous information regarding when the wire is touching the conductor and uses that information to make the wire dead if it is touching the conductor. So the wire is live; but, as a result of the reverse electro-fink's actions, it would not conduct electricity if it were touching the conductor.

Reverse electro-fink is a case where the left-hand side of (C) is true, but the right-hand side is false. Again, on the assumption that the instance of (LSO)—namely, (A)—is true, the instance of (SCA)—namely, (B)—is false. Thus, (SCA) is again false.²⁶

2.2. Lewis's Conditional Analysis

2.2.1. LCA

In "Finkish Dispositions," Lewis (1997) offers a new conditional analysis that avoids the problems that finks cause. Lewis (1997, 147-48) thinks that "dispositions are an intrinsic

²⁶A word should be said about an assumption behind these cases. In both *Electro-fink* and *Reverse electro-fink* it is assumed that the disposition in question is intrinsic, that is, that all objects of a particular kind are disposed the same regardless of the particular situations they might be in. Some, given the details of the cases, might be inclined to deny that the wire is dead in the *Electro-fink* case and that the wire is live in the *Reverse electro-fink* case. The idea is that, if a wire is attached to an electro-fink, then the wire is intuitively live, and if a wire is attached to a reverse electro-fink, then the wire is intuitively dead. This of course requires thinking of the disposition in question as an extrinsic disposition. More will be said below in section 2.6 about extrinsic dispositions and how they affect how these counterexamples work.

matter,” adding the exception that “they depend on the laws of nature.”²⁷ But how should we understand ‘intrinsic’ here? Accounts of intrinsic properties are controversial, but, following Lewis (1986a, 62), we can say that an *intrinsic* property is “one that can never differ between two duplicates.”²⁸ According to Lewis, fink cases crucially involve changing an intrinsic property of the disposed object, in particular the one responsible for the disposition. His new conditional analysis is designed to ensure no such change occurs.

A fragile glass is dropped and breaks. Presumably the breaking is caused. There is some intrinsic property, *B*, of the glass that, when combined with the dropping, causally results in breaking.²⁹ Call this property the *causal basis* of the glass’s fragility.³⁰ In this case, perhaps the causal basis is the glass’s molecular arrangement.

The idea behind Lewis’s conditional analysis is that finkish problems can be avoided so long as we ensure that the object in question retains its causal basis.³¹ Thus we have *Lewis’s conditional analysis*, which is his instance of STEP TWO. For any object *x* and any disposition *D* with stimulus condition *S* and manifestation *M*,

(LCA) *x* is disposed to manifest *M* when subject to *S* iff there is an intrinsic property *B* such that *x* has *B* before *x* is subject to

²⁷In section 2.6 below we’ll consider extrinsic dispositions.

²⁸Two things are *duplicates*, according to Lewis (1986a, 61) if and only if “(1) they have exactly the same perfectly natural properties, and (2) their parts can be put into correspondence in such a way that corresponding parts have exactly the same perfectly natural properties, and stand in the same perfectly natural relations.” See also Langton and Lewis (1998). On perfectly natural properties see Lewis 1986a.

²⁹Lewis makes it clear that the causal basis is an intrinsic property, which is required by his thinking that dispositions are an intrinsic matter. (Dispositions with extrinsic causal bases could be extrinsic dispositions.) See note 32 below. Also, Lewis (1997, 149) notes that “Strictly speaking, it is the having of the property that does the causing: a particular event, or perhaps a state of affairs. To speak of the property itself as a cause is elliptical.” I follow Lewis in speaking elliptically here.

³⁰I give a more precise statement of causal bases in Chapter Three.

³¹It is not obvious that all dispositions have causal bases. Lewis (1997, 149) is inclined to think that all dispositions have causal bases, and the target of his analysis are based dispositions. I’ll return to baseless dispositions in Chapter Five.

S and, were *x* to retain *B* and be subject to *S*, *x*'s having *B* and being subject to *S* would jointly be an *x*-complete cause of *x*'s manifesting *M*.³²

Lewis (1997, 156) uses the “*x*-complete cause” locution to specify the properties we’re interested in. An *x*-complete cause is “a cause complete in so far as havings of properties intrinsic to *x* are concerned, though perhaps omitting some events extrinsic to *x*.” The restriction to properties intrinsic to *x* becomes especially relevant when we consider extrinsic dispositions in section 2.6.³³

(LCAD) is entailed by (LSO) and (LCA); we can combine the left-hand side of (LSO) with the right-hand side of (LCA). For any object *x* and any disposition *D* with stimulus condition *S* and manifestation *M*,

(LCAD) *x* has *D* iff there is an intrinsic property *B* such that *x* has *B* before *x* is subject to *S* and, were *x* to retain *B* and be subject to *S*, *x*'s having *B* and being subject to *S* would jointly be an *x*-complete cause of *x*'s manifesting *M*.³⁴

(LCAD) can handle fink problems. (D) is an instance of (LCA).

(D) The wire is disposed to conduct electricity when touching the conductor iff the wire has an intrinsic property *B* before the wire touches the conductor and, were the wire to retain *B* and touch the conductor, the wire's having *B* along with its touching the conductor would jointly be the wire-complete cause of the wire's conducting electricity.

(E) is an instance of (LCAD) and is entailed by (A) and (D).

(E) The wire is live iff the wire has an intrinsic property *B* before the wire touches the conductor and, were the wire to retain *B* and touch the conductor, the wire's having *B* along with its

³²This account is a simplified version. Here is Lewis's (1997, 156-57) official view: “Something *x* is disposed at time *t* to give response *r* to stimulus *s* iff, for some intrinsic property *B* that *x* has at *t*, for some time *t'* after *t*, if *x* were to undergo stimulus *s* at time *t* and retain property *B* until *t'*, *s* and *x*'s having of *B* would jointly be an *x*-complete cause of *x*'s giving response *r*.”

³³In Chapter Three I'll argue for a different account of *x*-complete causes.

³⁴(LCAD) is what Lewis's *conditional analysis* says about what it is to have a *disposition*.

touching the conductor would jointly be the wire-complete cause of the wire's conducting electricity.

Consider *Reverse electro-fink*. The wire is live and has free electrons. But it is also true that, were the wire to retain the property of having free electrons and were the wire touching the conductor, the wire's having free electrons and touching the conductor would be the wire-complete cause of its conducting electricity. So the left-hand side and the right-hand side of (E) are both true. Or consider *Electro-fink*. The wire is dead and lacks free electrons. While it is true that the wire acquires the property of having free electrons after it touches the conductor, the wire doesn't have that property before it touches the conductor, and there is no other intrinsic property the wire has beforehand that would do the work. So the left-hand side and the right-hand side of (E) are both false. So (E) is true and there's no counterexample. In this respect, (LCA) is superior to (SCA).

2.2.2. Trouble for LCA

(LCA) is able to avoid fink problems, but there are other problems it can't avoid. (LCA) was designed to guard against cases that involve intrinsic change, but there are counterexamples that involve, not intrinsic change, but rather change in the environment. In particular, there are the problems of *masks* and *mimicking*.³⁵ Consider the following instance of (LSO).

- (F) A drug is (lethally) poisonous iff the drug is disposed to kill when ingested.

As an instance of (LCA) we get

³⁵See Johnston 1992.

- (G) A drug is disposed to kill when ingested iff the drug has an intrinsic property *B* before the drug is ingested and, were the drug to retain *B* and be ingested, the drug's having *B* along with its being ingested would jointly be the drug-complete cause of the drug's killing.

And as an instance of (LCAD) and a consequence of (F) and (G) we get

- (H) A drug is poisonous iff the drug has an intrinsic property *B* before the drug is ingested and, were the drug to retain *B* and be ingested, the drug's having *B* along with its being ingested would jointly be the drug-complete cause of the drug's killing.

Now consider the counterexample to (H).

Poison. A poisonous drug with an appropriate causal basis (perhaps its chemical composition) is ingested by someone. The drug retains its causal basis, but the person has also taken the antidote and survives.

Here is a case where the drug is poisonous, has and retains a causal basis when ingested, yet it doesn't result in death. The left-hand side of (H) is true, but the right-hand side is false. On the assumption that the instance of (LSO)—namely, (F)—is true, the instance of (LCA)—namely, (G)—is false. Thus, (LCA) is also false.

Now consider another counterexample to (H), which is a reverse mask, also known as mimicking.

Poison parody. A non-poisonous drug, *d*, happens to kill individuals who have also ingested a different, otherwise harmless drug, *h*. A person who has already ingested *h* ingests *d*, and *h* affects the individual's body in such a way that *d*'s chemical composition brings about death.

Drug *d* has the disposition to kill when ingested along with *h*. Presumably the causal basis for the disposition is the drug's chemical composition. However, *d* is not poisonous; it is only mimicking a poisonous drug. So here is a case where *d* has and retains a causal basis and would result in death when ingested, yet *d* is not poisonous.

This is a case where the left-hand side of (H) is false, but the right-hand side is true.

Again, on the assumption that the instance of (LSO)—namely, (F)—is true, the instance of (LCA)—namely, (G)—is false. Thus, (LCA) is also false.

2.3. The Getting Specific Strategy

Lewis (1997) considers cases like *Poison*. While he doesn't give a complete account of how to handle such counterexamples, he suggests the way to go. Lewis (1997, 153) says that

We might offhand define poison as a substance that is disposed to cause death if ingested. But that is rough: the specifications both of the response and of the stimulus stand in need of corrections. To take just one of the latter corrections: we should really say 'if ingested without its antidote'.

Earlier we assumed that the instance of (LSO) for the *Poison* case—namely, (F)—is true.

We see now that Lewis rejects that assumption and would prefer a different instance.

(F') A drug is (lethally) poisonous iff the drug is disposed to kill when ingested *without its antidote*.

Poison doesn't serve as a counterexample to (LCA) with (F') since *Poison* relies on the presence of the antidote to the poison. The modification to the stimulus condition for poisonous drugs affects not only our STEP ONE instance of (LSO) but also our STEP TWO instance of (LCA). We now need (G').

(G') A drug is disposed to kill when ingested *without its antidote* iff the drug has an intrinsic property *B* before the drug is ingested and, were the drug to retain *B* and be ingested, the drug's having *B* along with its being ingested would jointly be the drug-complete cause of the drug's killing.

While the words of (H) remain unchanged, the property it seeks to analyze is changed.

Poison is no longer a counterexample to (H), since it is not a case where a poisonous drug is without its antidote. The counterexample is blocked.

Unfortunately such a strategy won't work to block *Poison parody*, since that case doesn't involve an antidote. Drug *h* is an "enabler," since it turns an otherwise harmless drug into one that kills. In keeping with the getting specific strategy, we need to rule out enablers.

(F'') A drug is (lethally) poisonous iff the drug is disposed to kill
when ingested *without its antidote and without an enabler*.

Poison parody is no longer a counterexample to (H). Drug *d* no longer counts as poisonous, since it is not a case in which *d* is disposed to kill without an enabler. The counterexample is blocked.

Sungho Choi (2009) makes much of Lewis's suggestion and builds on it. In fact, he claims that Lewis could have solved the problems of finks by following a similar procedure and modifying the stimulus condition of fragility. The rough idea is that it must be built into the stimulus condition that there are no finks.

(A') The wire is live iff it is disposed to conduct electricity
when touching the conductor *in the absence of finks*.

If this is how we understood a wire's being live according to STEP ONE, then neither fink counterexample would succeed. Thus, Choi maintains that the best response to finks and masks is to make adjustments in STEP ONE rather than STEP TWO. I'll come back to this proposal at the end of the next section, after we look at Manley and Wasserman's criticism of the getting specific strategy.

2.4. Manley and Wasserman on the Getting Specific Strategy

Manley and Wasserman (2008) lay out and then criticize the getting specific strategy.

Just as Lewis suggests further specifying the stimulus condition for *being poisonous*,

Manley and Wasserman further specify the stimulus condition for fragility. Suppose we

think of fragility as the disposition to break when dropped. But of course we could drop

even a fragile object from one millimeter off the ground and it wouldn't break. Or we

could drop it onto a fluffy surface or we could drop it through a column of honey. In all

such cases, the object would not break, despite the fact that it is fragile. Suppose we use

the getting specific strategy and further specify the stimulus condition for fragility. (Let's

restrict our attention to variations of (SCA) as we consider the getting specific strategy.

It will keep things simpler and be easier to follow, and the criticisms that Manley and

Wasserman bring against the strategy apply equally well to variations of (LCA).)

Suppose we were able to specify the paradigmatic stimulus condition for fragility.

As Manley and Wasserman (2011, 1197) point out, it would look something like this: "x

would break if dropped at such-and-such a height, onto such-and-such a surface, through

such-and-such a medium, etc."³⁶ There are two options: either the specific stimulus

condition described will pick out a single fully determinate case or it will pick out a range

of cases, where a *case* is a fully specified situation that the object could be in. Supposing

that only one case is picked out, let's call that case 'C'. For any object *x*

(1) x is fragile iff x would break if dropped in *C*.

³⁶As Manley and Wasserman are aware, there are mask cases that this strategy still isn't able to handle.

Mark Johnston (1992) considers a fragile glass that is filled with anti-deformation packing. Even if it was dropped in the precise way required, it wouldn't break. Following Manley and Wasserman, let's set that issue to the side for now. In the end it won't matter, since there are other reasons to reject this strategy.

Supposing that a range of cases is picked out, let's call these cases 'the Cs'. For any object x

- (2) x is fragile iff, x would break if dropped in the Cs.

Manley and Wasserman (2011, 1197-98) note that the consequent of (2) is ambiguous and could mean one of the following three options. For any object x

- (2.1) x is fragile iff, were x in some case or other among the Cs, x would break.
- (2.2) x is fragile iff, for some case among the Cs, if x were dropped in that case, x would break.
- (2.3) x is fragile iff, for every case among the Cs, if x were dropped in that case, x would break.

Manley and Wasserman (2008; 2011) describe problems for each account. The problem with (1) is that it suffers from an *Achilles' heel*. Achilles was tough in battle, but he had one weak spot, his heel. Consider a concrete block with an Achilles' heel.

Achilles' heel block. A concrete block can be dropped from any number of heights and in any number of ways and suffers no harm. Yet, if it is dropped in just the right way, from just the right height, it breaks.

Let's say that the exact way in which it would break if dropped is C . According to (1), the block is fragile, but intuitively this is not the case. Intuitively, the block is not fragile, and (1) wrongly tells us that it is. It "merely *mimics* fragility in a very specific circumstance" (Manley and Wasserman 2008, 67). The problem is not ultimately avoided by picking a different C for (1). For any given C that is used in (1), there could be an Achilles' heel case for just that C . Furthermore, an Achilles' heel poses a problem

for (1) even when *C* is among the ideal conditions for the disposition.³⁷ Manley and Wasserman (2011, 1198) speak to the generalized problem when they say “one cannot use a litmus test involving a single determinate case to analyse a disposition that concerns an object’s counterfactual behaviour in a wide range of cases.” The idea is that dispositions have to do with how an object behaves in a wide range of cases. No one case can be used to capture the disposition. As a result, (1) is not a successful version of the getting specific strategy.³⁸

Achilles’ heel block also poses a problem for (2.2). (2.2) requires that at least one of the *C* cases is such that, if an object were dropped in that case, it would break. But we have already seen that the block with the Achilles’ heel is one such case. (2.2) wrongly tells us that the block is fragile.

(2.2) is too easy to satisfy, but (2.3) is too difficult. (2.3) suffers from the problem of *reverse Achilles’ heels*. Consider the following counterexample to (2.3).

Bouncing beaker. A glass beaker is fragile. However, if it is dropped so that it lands perfectly up and down, then it will not break; rather, it will bounce back up unharmed.

The beaker is fragile, but if it is dropped in just the right way—even when that way is part of the ideal conditions for fragility—it doesn’t break. The beaker would break if dropped in all of the *C*s except for one. In this way, the beaker mimics a non-fragile object. The case can’t be ruled out, because it is exactly the kind of case a person would expect a fragile object to break in.

³⁷For example, the *ideal conditions* for fragility don’t include dropping the object through a column of honey or onto a mattress.

³⁸A reverse Achilles’ heel, described below, is also a problem for (1).

Finally, let's consider (2.1). Manley and Wasserman (2008, 70) take the idea behind (2.1) to be that, on the standard possible worlds account of counterfactuals, the object breaks in the closest world or worlds in which it is dropped in one of the *Cs*. Given this understanding, the *Achilles' heel block* serves as a counterexample, since the block breaks in the closest worlds when it is dropped in one of the *Cs*. Furthermore, (2.1) suffers from *the problem of accidental closeness*. Suppose that amongst the *Cs* is a case in which an object is dropped from 20 meters. Consider a block of concrete that intuitively isn't fragile, but it will break if dropped from 20 meters. Suppose that such a block is sitting on a windowsill 20 meters up. The closest world in which it is dropped in one of the *Cs* will be the world in which it is dropped from 20 meters and breaks. Thus, (2.1) wrongly says of the block that it is fragile. Manley and Wasserman (2008, 66) conclude, "The strategy of getting specific ultimately fails, because a disposition can be masked or mimicked even in conditions that are paradigmatic for the manifestation of that disposition—that is, conditions that will not be ruled out by getting more specific."

I'd now like to return to Choi's suggestion of building into the stimulus condition the absence of finks and masks. The problem with his proposal, as Manley and Wasserman (2011, 1215) point out, is that it won't be able to handle Achilles' heels or reverse Achilles' heels. Such counterexamples can't be blocked by ruling out finks and masks. For example, *Achilles' heel block* poses a problem for Choi's suggestion, since it doesn't involve a fink or a mask. Perhaps we could build into the stimulus condition for fragility that the object is not in an Achilles' heel or reverse Achilles' heel case. The problem with this, however, is that cases that involve Achilles' heel or reverse Achilles'

heel cases are paradigmatic for fragility. They aren't obviously "bad" cases, as cases of finks and masks are.³⁹

2.5. Manley and Wasserman's Conditional Analysis

A different conditional analysis is needed. Manley and Wasserman (2008; 2011) defend a conditional analysis that is able to handle both cases that involve intrinsic change and cases that involve extrinsic change. The basic idea behind their proposal is that we need to take into account more than a single conditional in order to handle the problem cases. Their proposal quantifies over ordinary counterfactuals. Their instance of STEP TWO is the *proportional conditional analysis*. For any object x and any disposition D with stimulus condition S and manifestation M ,

(PCA) x is disposed to manifest M when subject to S iff x would manifest M in some suitable proportion of S -cases.⁴⁰

A *stimulus condition case* or an S -case is a precise combination of values of parameters that are relevant for the given disposition.⁴¹ For example, if fragility is the disposition in question, then an S -case will specify the exact height from which the object is dropped, the durometer measurement for how hard the surface that it lands on is, the density of the medium it falls through, etc. Thus an object is fragile if it breaks in a suitable proportion of S -cases. What proportion counts as 'suitable' will depend on the disposition under

³⁹There are more replies that could be made in the debate between Manley and Wasserman and Choi. See Choi 2008; 2009; 2011 and Manley and Wasserman 2011.

⁴⁰The use of 'analysis' suggests that the right-hand side is more fundamental than the left-hand side of the biconditional. While Manley and Wasserman (2011, 1193-94) think that the biconditional is true and holds of necessity, they don't claim either side is more fundamental than the other. I continue to use 'analysis' for ease and continuity.

⁴¹See Manley and Wasserman 2008, 74-75.

consideration and the context of utterance, allowing the proportion of *S*-cases in which the object breaks to vary.

(LSO) along with (PCA) entails (PCAD). For any object *x* and any disposition *D* with stimulus condition *S* and manifestation *M*,

(PCAD) *x* has *D* iff *x* would manifest *M* in some suitable proportion of *S*-cases.⁴²

(PCA) can be used to handle both finks and masks. Consider an instance of (PCA) regarding *Electro-fink*.

(I) The wire is disposed to conduct electricity when touching the conductor iff it would conduct electricity in some suitable proportion of touching-the-conductor cases.

And consider an instance of (PCAD).

(J) The wire is live iff it would conduct electricity in some suitable proportion of touching-the-conductor cases.

Electro-fink doesn't pose a problem for (J) since, despite the presence of "bad" cases, there is still a suitable proportion of cases in which, were the wire touching the conductor, it would be live. (PCA) is also able to handle *Reverse electro-fink*, since there fails to be a suitable proportion of cases in which, were the wire touching the conductor, it would be live.

Likewise with masks and mimicking. Consider an instance of (PCA) regarding *Poison*.

(K) A drug is disposed to kill when ingested iff the drug would kill in some suitable proportion of ingesting cases.

And consider an instance of (PCAD) regarding *Poison*.

⁴²(PCAD) is what the *proportional conditional analysis* says about what it is to have a *disposition*.

- (L) A drug is poisonous iff the drug would kill in some suitable proportion of ingesting cases.

Again, we don't have a counterexample to (L) with *Poison* since, despite the presence of "bad" cases, there is still a suitable proportion of cases in which, were the drug ingested, it would result in death. Likewise, *Poison parody* doesn't pose a problem, since there fails to be a suitable proportion of cases in which, were the drug ingested, it would result in death.

(PCA) is also able to handle Achilles' heels and reverse Achilles' heels. In *Achilles' heel block*, that the block would break if it fell in one particular way is not enough to constitute a suitable proportion of dropping cases in which it breaks. Thus, the block does not count as fragile. Likewise, the beaker in *Bouncing beaker* does count as fragile according to (PCA), since it still breaks in a suitable proportion of dropping cases, despite the fact there is one dropping case in which it doesn't break.

Manley and Wasserman (2008) show how (PCA) is able to account for comparative dispositional ascriptions and has a mechanism for context dependence. Many dispositions seem to come in degrees. For example, objects can vary in how fragile they are. Certain objects are more fragile than others. A single conditional, as seen in both (SCA) and (LCA), is not able to account for such comparisons. The counterfactual expressed by 'the glass would break if dropped' doesn't allow for degrees. It is either true or false. (PCA) can account for a disposition coming in different degrees, since the proportion of *S*-cases can vary. An object with a greater proportion of breaking cases is more fragile than one with a lesser proportion.⁴³ This allows for a scale upon

⁴³See Manley and Wasserman (2007) for more on comparative dispositions and conditionals.

which dispositions can fall. With such a scale, (PCA) also allows for a mechanism to account for context dependence by treating dispositional predicates like any other gradable predicate. ‘Fragile’ can be treated like ‘cold’, ‘loud’, ‘heavy’, ‘tall’, etc. Context is able to select some point along the scale such that objects must fall above it in order to satisfy ‘fragile’ in the context.⁴⁴

2.6. Extrinsic Dispositions

2.6.1. Lawfully extrinsic dispositions

As mentioned above in section 2.1, Lewis thinks dispositions are an intrinsic matter except insofar as they depend on the laws of nature. The exception is important. According to Lewis’s account of intrinsicness, so long as two duplicates can vary dispositionally, the dispositions are extrinsic. It seems that two duplicates subjected to different laws of nature will vary dispositionally, which means that dispositions are extrinsic properties for Lewis. The exception about holding laws of nature fixed allows Lewis to salvage a weaker notion of intrinsicness. Let’s call dispositions that don’t vary among duplicates so long as the laws of nature are held fixed *lawfully intrinsic dispositions*. Lewis thinks that all dispositions are lawfully intrinsic.

Jennifer McKittrick (2003b), however, makes a case that there are a number of dispositions that can vary among duplicates even when the laws are held fixed. Let’s call such dispositions *lawfully extrinsic dispositions*. If it turns out that there is good reason to think that there are lawfully extrinsic dispositions, then Lewis’s starting point for

⁴⁴For more on criticisms to (PCA) and responses from Manley and Wasserman see Bonevac, Dever and Sosa 2006; 2011; Choi 2008; 2011; Vetter 2012; and Manley and Wasserman 2011. For other work related to the conditional analysis see Contessa 2013 and Vetter 2014.

analyzing dispositions—that all dispositions are lawfully intrinsic—is wrong. Countenancing lawfully extrinsic dispositions will, not only force us to reconsider traditional counterexamples to conditional analyses, but also force us to reconsider whether causal bases are intrinsic properties. (More on causal bases in Chapter Three.) McKittrick argues that there are many lawfully extrinsic dispositions including the power to open a door, weight, invulnerability, visibility, and recognizability.⁴⁵ I will focus on invulnerability.

Let's say that a castle has the disposition *invulnerability* if and only if the castle remains unharmed when attacked. I'm sure there are a great many factors that are relevant to the causal basis for the castle's invulnerability. There is the height and thickness of the walls; the material it is made out of; the size of the moat and whether it contains human-eating crocodiles; there is the size and material of the gate; there are the counter-measures it possesses such as trebuchets, drums of oil, etc. But there are other factors that are relevant to whether a castle is invulnerable that do not concern any of the castle's intrinsic properties. (Recall that for now we're taking causal bases to be intrinsic properties.)⁴⁶ Such factors include properties of the castle's environment. Is it located at the bottom of a valley with cliffs on either side from which to attack? Is it located

⁴⁵It seems that dispositions in a great number of masking and mimicking cases could count as lawfully extrinsic dispositions. For example, both *Poison* and *Poison parody* could be taken to be cases of lawfully extrinsic dispositions. A change in the environment brings about a change in how an object is disposed. A drug that is otherwise poisonous fails to kill when ingested in environments where the people who ingest it also have the antidote. And a drug that is otherwise harmless acquires the disposition to kill when ingested in environments where people who ingest it have also ingested a certain other drug. Fara (2005, 50) emphasizes how mundane masking and mimicking cases are. More on reinterpreting these cases below.

⁴⁶Contessa (2012), for example, denies that all dispositions are lawfully intrinsic but maintains that the causal bases of dispositions are intrinsic properties. In Chapter Three I'll argue that causal bases need not be intrinsic properties.

amongst warring peoples with especially large battering rams? Is it easily isolated from its resource supplies? Etc.

Now take a castle that is invulnerable. One of the reasons it is invulnerable is that it is located on a hill. Call it ‘Castle Mount’. (For simplicity’s sake I’ll focus only on the castle’s location relative to its surroundings.) It is too difficult to attack because Castle Mount occupies the high ground. Let’s also say that Castle Mount has causal basis *B*, which will be a complex property involving many of the factors considered above. Now consider a duplicate of Castle Mount, call it ‘Castle Dale’. Castle Dale also has *B*, but it is located in the bottom of a valley, from which it is easy to attack. Intuitively, Castle Dale isn’t invulnerable even though it is subject to the same laws of nature as Castle Mount. Suppose Castle Dale has been attacked and suffered harm several times a year for the last 500 years. The castle would be viewed as a dangerous place to go and not a safe place to seek refuge from attacks. In short, Castle Dale is *vulnerable*.

Some might object that the dispositional properties of an object don’t come and go with the object’s environment. Instead, the dispositional property picked out varies with the context of the ascriber.⁴⁷ They claim that the property ascribed to Castle Mount by a person who says “Castle Mount is invulnerable” is different from the property that is denied Castle Dale when someone else says “Castle Dale is not invulnerable.” Since the property picked out in each case is determined by the context of the ascriber, and since such factors as whether the castle is in a valley or on a hill are contextually salient to the ascribers, different properties are picked out. And, since different properties are picked

⁴⁷Manley and Wasserman (2008, 65 n. 8) seem to accept this view, at least concerning fragility.

out, there is not one property that Castle Mount has that Castle Dale lacks. Thus, we no longer have a case of lawfully extrinsic dispositions.

In response, it seems that the property is the same, since the predicate ascribed to Castle Mount but denied of Castle Dale passes the following test.⁴⁸ Person A points to Castle Mount and asks if it is invulnerable. Person B points to Castle Dale and asks if it is invulnerable. Person C says that A and B are both wondering about whether some castle or other is invulnerable. What person C says seems felicitous, which indicates that A and B are both talking about the same property. There are not two types of invulnerability, one that Castle Mount has and one that Castle Dale lacks. There is only one property, and it concerns whether the castle can withstand attacks. Castle Mount has the property and Castle Dale fails to have that very same property despite their being intrinsic duplicates.

2.6.2. Trouble for all

Lawfully extrinsic dispositions cause trouble for everyone regardless of which conditional analysis is adopted. They cause us to rethink the way we traditionally use the cases of finks and masks. A new way of approaching these issues is suggested, and it remains the case that (PCA) is the best conditional analysis.

⁴⁸See also McKittrick's (2003b, 163-167) response to a similar objection.

2.6.2.1. *Rethinking old cases*

Cases of lawfully extrinsic dispositions pose a problem for all conditional analyses, since they open the door to reinterpreting old counterexamples in new ways.⁴⁹ Castle Dale isn't invulnerable because of the environment it finds itself in. It's in a "bad" environment. But fink cases and mask cases could be viewed in a similar fashion. A wire that is hooked up to an electro-fink is in a bad environment, and a poisonous drug that is taken with its antidote is likewise in a bad environment (but good for the person!). The key difference between dispositions associated with finks and masks, on the one hand, and lawfully extrinsic dispositions, on the other, however, is that, with lawfully extrinsic dispositions, the object in the bad environment is not taken to have the disposition in question (or taken to have it as the case may be), while in fink and mask cases, the object is taken to have the disposition in question (or not taken to have it as the case may be). The wire hooked up to the reverse electro-fink is taken to be live and the drug ingested with the antidote is taken to be poisonous. But the castle in the valley is *not* taken to be invulnerable.

This poses a problem for all conditional analyses, since they must yield opposite results in the different cases, if they are to deliver the intuitively correct verdicts. Manley and Wasserman (2008, 78) handle lawfully extrinsic dispositions with (PCA) by allowing the closeness of the *S*-cases to be taken into account.⁵⁰ The castle in the valley is not invulnerable while the castle on the hill is. The nearby *S*-cases in which the castle in the valley is attacked all involve it suffering harm, while in those cases in which the castle on

⁴⁹As we'll see in Chapter Five §5.5, lawfully extrinsic dispositions pose a special problem for the standard views.

⁵⁰But see §2.8 below.

the hill is attacked the castle suffers no harm. The *S*-cases that are close to the actual world count for more. Manley and Wasserman's solution to this problem is to analyze lawfully intrinsic dispositions differently than lawfully extrinsic ones. Closeness of *S*-cases is relevant with the latter but not the former. If closeness counted in fink and mask cases, then (PCA) would say that the wire hooked to a reverse electro-fink is not live and that the drug ingested with the antidote is not poisonous. A wire that's hooked up to a reverse-electro fink wouldn't be live because, in all or most the nearby worlds, it would not conduct electricity when touching the conductor. A drug that is ingested with its antidote wouldn't be poisonous, because it would not cause death when ingested in all or most of the nearby worlds.

There does, however, seem to be a problem with this approach: it seems to get things the wrong way around. When presented with a case, we shouldn't first be told whether the disposition in question is intrinsic and then alter how 'proportion' is calculated accordingly. Our analysis should tell us whether objects have dispositions, and if duplicate objects, subjected to the same laws of nature, can differ with regard to their dispositions, then we will come to realize that the disposition is not lawfully intrinsic. The conditional analysis is supposed to tell us which objects have dispositions and which objects do not, regardless of which environment they are in. But this is the exact information that is needed to determine whether a disposition is lawfully extrinsic. Thus, it is our analysis that we should use to determine whether a disposition is lawfully intrinsic as opposed to starting out with whether the disposition is lawfully extrinsic.

A new way of approaching the traditional problem cases is needed, one that does not begin with the assumption that all dispositions are lawfully intrinsic. Let's begin by

considering redescriptions of the original cases without any explicit statement of whether the object in question has the disposition in question. Consider the following modification on our original *Electro-fink* case. The case is the same except that any mention of the wire's being dead has been removed.

*Electro-fink**. A device is attached to a wire. The device has reliable, instantaneous information regarding when the wire is touching the conductor and uses that information to make the wire conduct electricity if it is touching the conductor. As a result of the device's actions, the wire would conduct electricity if it were touching the conductor.

The question we want to ask is whether the wire is dead. The answer should not depend on whether we think all dispositions are, or this particular disposition is, lawfully intrinsic. Rather, we are interested in our pre-theoretic intuitions about this case.

Whatever those intuitions yield is the result our conditional analysis should produce. The trouble here is that many of these cases lack enough background information (or are so bizarre that we have difficulty forming intuitions concerning them).

Consider a case from Lewis (1997, 147). There are two glasses, which are categorical duplicates, pulled off an assembly line. However, a sorcerer decides to protect one of the glasses. When it is struck, he is there to protect it, ensuring that it doesn't break. Lewis (1997, 147-48) thinks that the protected glass is fragile, because he thinks that all dispositions are lawfully intrinsic. (SCA) says that the protected glass is not fragile. Lewis describes the situation as he sees it.

I do not deny that the simple conditional analysis enjoys some plausibility. But so does the principle that dispositions are an intrinsic matter. The case of the sorcerer sets up a tug-of-war between conflicting attractions, and to me it seems clear that the simple conditional analysis has the weaker pull. (1997, 148)

Instead of merely considering the case and letting our intuitions be our guide regarding whether the protected glass is fragile, Lewis determines whether the glass is fragile by allowing conflicting attractions to compete. He is more attracted to the view that all dispositions are lawfully intrinsic and that is what determines his final judgment.

It seems to me, however, that we should let the cases speak for themselves and that we should judge whether an object has a disposition on a case-by-case basis. Part of the problem with my suggested approach is that the cases are not always fully described and often involve unusual situations. I think the sorcerer case can be described in two ways, and I think our intuitions—or at least mine!—differ depending on how it is described.

Consider the following case.

Whimsical sorcerer. A whimsical sorcerer just happens to notice that a glass is about to be struck and decides to prevent it from breaking when it is struck. Aside from that lone act of protection, the sorcerer is completely unconcerned with the glass.

The glass in this situation seems fragile. The next time it is struck it will break. The case is similar to a reverse Achilles' heel case. Now consider a different case.

Resolute sorcerer. A sorcerer is resolute in his protection of the glass. He follows it around wherever it goes, always watching over it with a protective eye. Whenever it is struck the sorcerer is right there to ensure that it doesn't break. The sorcerer is so resolute that he devotes his life to its protection. If a person were to come across such a glass, she could do with it what she pleased—drop it from a building, hit it with a hammer, run it over with a bulldozer—but she could never break it.

It seems to me that, intuitively, such a glass is *not* fragile. Far from it, the glass is more rightly thought of as *indestructible*!⁵¹

⁵¹Admittedly, my intuitions that fragility is an extrinsic disposition diverge from the norm.

But now I've given up on the idea that dispositions are an intrinsic matter and more specifically that fragility is intrinsic, says the objector. But for many people the intrinsicness of dispositions was lost as soon as they said dispositions depend on the laws of nature. And of course there are the cases of lawfully extrinsic dispositions that McKittrick (2003b) discusses and that seem to me to be very hard to deny, and they seem to be quite plentiful. The thought that dispositions are an intrinsic matter shouldn't be wielded as an assumption un beholden to the actual cases. If it is anything, it should be a generalization of the way we think about each of the cases.

2.6.2.2. A new direction

While I disagree with the approach of those who start off by assuming that a particular disposition is intrinsic and then use that assumption in all cases that involve that disposition, I think there is something behind their thinking that is right and should be preserved. When we consider a particular case and consider whether an object has a disposition (or doesn't have a disposition) in that case, there are contexts in which we are concerned with viewing the object as a member of a particular class of objects. We are thinking of the object as a member of a homogeneous group.⁵² In such contexts it is natural to think that all the members of the group are disposed alike. Thus we will be more likely to think that an object has a disposition (when other members of the group have that disposition) even when that object is in a "bad" situation. So, for example, in *Poison*, we tend to view the drug as a token of a type of drug, a type that we take to be

⁵²Thanks to Manley for pointing this out in a conversation. However, he has discussed with me in conversation his new approach for dealing with these cases and it is different than what I say here. See below.

poisonous. In those contexts, we view the token drug as poisonous, even when it is ingested with its antidote.

But, if we consider the case in the context of focusing specifically on that lone token drug and the dispositions it has in that specific situation, then we'll be more likely to think that the drug isn't poisonous. In such contexts we are concerned with the nature of a particular individual in a particular situation as opposed to that object as a member of a homogeneous group. The reason the invulnerability case seems clearly to be a case where Castle Dale lacks the disposition is that it is a case whose context makes it clear that we are to consider that particular castle in the particular situation it is in.

Here then is a way of explaining differing intuitions on differing cases without appeal to an assumption about the lawful intrinsicness of dispositions. In contexts in which we view the object as a member of a group we'll think the disposition is lawfully intrinsic. And in contexts in which we view the object as a lone individual in a particular circumstance we'll be more likely to think that the disposition in question is lawfully extrinsic. The reason for this is that, when we view an object as a member of a homogeneous group, we're thinking about how a type of object generally behaves in a wide variety of circumstances, but when we view an individual object in particular circumstances, we're thinking about how that particular object will behave in that specific circumstance. When we view an object as a member of a group, closeness doesn't matter as much, but when we view an object as an individual in particular circumstances, closeness matters more. Consider the wire in *Electro-fink*. Suppose a million similar wires were produced, but only one has always been hooked up to an electro-fink. All the other wires like it are hooked up in "normal" circumstances. If

that's the case, then when we think about *Electro-fink*, we'll be more inclined to view the wire as part of a homogeneous group and think that the wire is in fact dead. The closeness of the cases for that one particular wire don't count for as much. Recognizing the different contexts gives due weight to our intuitions regarding the cases that we consider. There is no need to start with the assumption that all dispositions are lawfully intrinsic.

Of course, for these considerations to be taken in to account, our conditional analysis must be sensitive to contextual factors. Manley and Wasserman (2008) explicitly argue that there is a mechanism for context dependence for (PCA). As mentioned above, (PCA) allows dispositions to come in degrees and also allows for letting certain *S*-cases count for more. Certain *S*-cases can count for more if they are more relevant. Recall that Manley and Wasserman think that, if we are dealing with a lawfully intrinsic disposition, the nearby *S*-cases shouldn't count for more, but that they should if we are dealing with an extrinsic disposition. But now, given the contextual dependence of dispositions (or at least dispositional ascriptions), we give a different reason for why in certain cases nearby *S*-cases count for more. In group contexts—contexts in which we're viewing the object in question as part of a group of homogeneous objects—nearby *S*-cases aren't weighted any differently than distant *S*-cases. But in individual contexts—contexts in which we're viewing the object as a lone object in a particular situation—nearby *S*-cases count for more.

In this way, (PCA) is able to account for finks, masks and lawfully extrinsic dispositions, whereas the other conditional analyses cannot. I do not take this Chapter to have addressed all the issues that pertain to formulating an adequate conditional analysis.

But we have surveyed the most important issues facing conditional analyses and have seen how (PCA) is the best view going. I assume that some conditional analysis is correct, and we'll proceed under the assumption that the correct conditional analysis is (PCA).

2.7. Saying what Dispositions are According to Counterfactualism

According to counterfactualism a disposition is a counterfactual property, but which one? The conditional analysis is where the counterfactualist finds the resources for saying exactly what counterfactual property a disposition is. The counterfactual property comes from the right-hand-side of the conditional analysis.

Recall that (SCAD) is what the *simple conditional analysis* says about what it is to have a *disposition*. For any object x and any disposition D with stimulus condition S and manifestation M ,

(SCAD) x has D iff x would manifest M if x were subject to S .

Presumably (SCAD) is taken to hold of necessity.⁵³ According to counterfactualism, given (SCAD), a disposition with stimulus condition S and manifestation M is the property *being an x such that x would manifest M if x were subject to S* .

Recall that (LCAD) tells us what *Lewis's conditional analysis* says about what it is to have a *disposition*. For any object x and any disposition D with stimulus condition S and manifestation M ,

(LCAD) x has D iff there is an intrinsic property B such that x has B before x is subject to S and, were x to retain B and be subject to S , x 's

⁵³Manley (2012, 322) also presumes the biconditionals hold of necessity.

having *B* and being subject to *S* would jointly be an *x*-complete cause of *x*'s manifesting *M*.

According to counterfactualism, given (LCAD), a disposition with stimulus condition *S* and manifestation *M* is the property *being an x such that x has an intrinsic property B before x is subject to S and, were x to retain B and be subject to S, x's having B and being subject to S would jointly be an x-complete cause of x's manifesting M*.

There seems to be an important difference between what the counterfactualist says dispositions are given (SCA) as opposed to (LCA). With (SCA) we simply have a counterfactual property, but with (LCA) we have a conjunctive property, one conjunct of which is a counterfactual property.⁵⁴ Let's call the property associated with (SCA) a *purely counterfactual property*. The issue here is that there seem to be two aspects to counterfactualism. One is that dispositions are purely counterfactual properties, and the other is that what dispositions are comes from the right-hand side of the conditional analysis. What we learn with (LCA) is that there are certain conditional analyses in which these can come apart. The property we get from the right-hand-side of (LCA) is not a purely counterfactual property. Let's call the sort of counterfactualist who endorses (LCA) a *weak counterfactualist*.

Finally, consider what a disposition is according to counterfactualism, given (PCA). Recall that (PCAD) tells us what the *proportional conditional analysis* says about what it is to have a *disposition*. For any object *x* and any disposition *D* with stimulus condition *S* and manifestation *M*,

⁵⁴Manley (2012, 324 n. 10) takes the view according to which a disposition is the property that comes from the right-hand side of (LCA) to count as a type of functionalism.

(PCAD) x has D iff x would manifest M in some suitable proportion of S -cases.

Thus, according to counterfactualism given (PCAD), a disposition with stimulus condition S and manifestation M is the property *being an x such that x would manifest M in some suitable proportion of S -cases*. The property we get from the right-hand-side of (PCA) is a purely counterfactual property, so there is no trouble in accepting (PCA) and being a counterfactualist.

2.8. Counterfactualism vs. Modalism

I would like to end this Chapter with a brief discussion of how my view of dispositions compares with Manley's. My view of dispositions was arrived at independently of Manley's and differs in subtle ways. While Manley (2012) endorses (PCA), he argues for a slightly different view of what dispositions are. The closest Manley (2012, 323) gets to stating his preferred view of what dispositions are is when he writes "one might propose that a property p is a disposition just in case the following condition holds: there is *some* stimulus ϕ and *some* manifestation ψ such that necessarily: x has p iff for a suitable proportion of ψ -cases, x would ϕ in them."⁵⁵ Manley calls his view '*modalism*', and as I've learned from conversation, he differentiates his view from counterfactualism. Manley doesn't think closeness matters for dispositions.⁵⁶ As a result, he doesn't think dispositions should be identified with counterfactual properties. Instead he identifies

⁵⁵It seems that Manley accidentally has the variables ' ϕ ' and ' ψ ' switched here. I take it that it should read "for a suitable proportion of ϕ -cases." The reason Manley leaves the statement of what dispositions are at a general level is that he isn't assuming we can provide an analysis with specific stimulus conditions and manifestations for every disposition.

⁵⁶Manley and Wasserman (2008, 78) clearly state that closeness matters with (PCA) when assessing extrinsic dispositions. I've been told by Manley that his view is now different and that closeness doesn't matter for any dispositions.

them with what he calls ‘modal properties’. For example, let’s say that fragility is the disposition to break when dropped. Consider all the worlds with the same laws of nature as ours. Roughly, on his view fragility is the property *being an x such that x would manifest breaking in some suitable proportion of dropping cases amongst the worlds with the same laws as ours*. Closeness of worlds doesn’t matter for what fragility is. All striking cases are taken into consideration no matter how distant they are, so long as the laws are preserved.

In most cases modalism lines up with counterfactualism. To use an example from Manley, “If I were married, I wouldn’t be a bachelor” expresses a true counterfactual. I have the counterfactual property *being an x such that, if x were married, x wouldn’t be a bachelor*. While the counterfactual is true, closeness isn’t doing any work. Instead, it is true is because of a modal truth: necessarily, married people are not bachelors. In the same way, with fragility, according to Manley, there is a true counterfactual and fragile objects have counterfactual properties, but the closeness isn’t doing any work. Instead, there is a modal truth doing the work: as a matter of nomological necessity, objects that break in a suitable proportion of striking cases when the laws of nature are held fixed are fragile.⁵⁷

Manley (Manley and Wasserman 2008, 61 n. 4) thinks that fragility is an intrinsic disposition and has never thought that closeness counts for intrinsic dispositions. But what does he say about extrinsic dispositions now since he no longer thinks that closeness counts for them? I’m not entirely clear on how his view now goes, but it involves

⁵⁷One reason Manley provided in conversation for thinking that closeness doesn’t matter for dispositions involve cases with indeterminate laws. I’m setting aside the issue of indeterminism in this dissertation.

thinking that it is a matter of what we choose to hold fixed in the modal base. Contextual factors help determine what is held fixed. We can choose to hold fixed intrinsic properties of objects or extrinsic properties.

It is not obvious to me exactly what the differences come to between modalism and counterfactualism. But I see no reason to restrict our account of dispositions merely to cover properties in worlds with laws like ours. It certainly isn't obvious, for example, that the laws are maintained in the sorcerer cases, yet it seems reasonable to think that objects have dispositions (or fail to have dispositions) in such cases. According to my intuitions concerning the cases, closeness does seem to matter. As W. V. O. Quine (1948, 21) has said, "There remains room for disagreement over the cases."

Chapter 3: The Standard Views and Causal Bases

Now that we've seen what dispositions are according to counterfactualism, it's time to examine in greater detail what dispositions are according to the alternative views. This Chapter will carefully state what dispositions are according to the standard views and metaphysical functionalism. In order to do so, we'll have to say a bit more about what bases are. In the final section, we'll consider the extent to which counterfactualism can make sense of bases.

3.1. Characterizing the Standard Views

Despite counterfactualism's intuitive appeal, surprisingly few people endorse it.⁵⁸ In fact when David Lewis wrote his most explicit work on dispositions in 1997, he didn't mention counterfactualism as a candidate view about what dispositions are. Instead he considered what he took to be the only two options: the identity view and causal functionalism. Because these are the most common views and the only views on the table for Lewis, I call them the standard views.

The standard views make use of causal bases in their account of what dispositions are. In order to understand these views, one must first understand what causal bases are. A fragile glass is struck and breaks. Presumably there is some cause of the glass's breaking, and presumably some property of the glass is causally relevant in bringing

⁵⁸For an exception, see Manley 2012. But see Chapter Two §2.8 for how his view differs from counterfactualism.

about the breaking. That property is the causal basis.⁵⁹ Perhaps it is the glass's particular molecular structure. Note that different fragile objects could have different causal bases. For example, there could be two fragile vases, one made of glass and the other made of porcelain. They are both fragile, but they have different molecular structures.

We are now in a position to say what the identity view and causal functionalism are.⁶⁰ According to the identity view a disposition just is its causal basis.⁶¹ In the case of fragility, fragility is identical to the causal basis for fragility. But which one, since there are many different causal bases for fragility? The disposition is identified with different causal bases in different cases. The glass vase's fragility is the specific type of molecular structure in glass, and the porcelain vase's fragility is the specific type of molecular structure in porcelain. Instead of fragility being one property it turns out to be many. This certainly seems like an oddity and drawback of the view.⁶²

Causal functionalism, on the other hand, is able to avoid this drawback. According to causal functionalism a disposition is the property *having a causal basis*.⁶³ In the case of fragility, fragility is the property *having a causal basis for fragility*.⁶⁴ The idea is that there are properties that play certain causal roles. A disposition is the

⁵⁹Below we'll also see that there is another way of understanding bases. Using the grounding relation we can say that the basis of a disposition is the property of the disposed object that at least partially grounds the disposition. I call such properties *metaphysical bases*.

⁶⁰As we'll see below there is a different way of understanding functionalism that corresponds with the different way of understanding bases. Functionalism understood with causal bases I call 'causal functionalism', and functionalism understood with metaphysical bases I call 'metaphysical functionalism'. See below for more on metaphysical bases.

⁶¹For the identity view see Armstrong 1973, 11-16.

⁶²Lewis (1997, 151) describes it as a drawback.

⁶³For causal functionalism see Prior, Pargetter & Jackson 1982 and Prior 1985. Also see Lewis 1997 where he tentatively endorses functionalism.

⁶⁴Some might wonder whether there is a circularity worry here for the standard views since 'fragility' appears in the statement of what fragility is. Perhaps this is a problem for the standard views, but it won't be one that I am going to press. Perhaps the functionalist could say that fragility is the property *having a causal basis for breaking when struck*.

property of having a property that plays one of those roles. As it turns out, both the molecular structure of glass and the molecular structure of porcelain play that role for fragility.

Notice that it is more difficult for the standard views to make good on the distinction between dispositions and categorical properties. If causal bases and the property *having a causal basis* are categorical properties, then the standard views end up identifying dispositions with categorical properties.⁶⁵ It's difficult to see how there is a difference between dispositions and categorical properties if they are identical! It is no surprise that there has been so much trouble maintaining the distinction between dispositional and categorical properties.⁶⁶ But I claim that the problem is not with the distinction but rather with what the majority have taken dispositions to be. Intuitively there is a distinction, and intuitively there are both dispositions and categorical properties. It is a strike against any view that can't maintain the distinction or denies there are both dispositional and categorical properties.⁶⁷

3.2. Saying More Precisely What Dispositions Are on the Standard Views

On the standard views, what dispositions are depends a great deal on what causal bases are. We need to say what causal bases are in more detail.

⁶⁵According to causal functionalism disposition *D* is the property *having a causal basis for D*. Usually I speak loosely and just say that a disposition is the property *having a causal basis*.

⁶⁶See Manley 2012.

⁶⁷For more on this criticism see Chapter Five §5.3.

3.2.1. *Prior, Pargetter and Jackson on causal bases*

Elizabeth Prior, Robert Pargetter and Frank Jackson (1982) provide one of the most popular statements in the literature of what a causal basis is. They define the causal basis of a “sure-fire” disposition as

(PPJ-CB) “the property or property-complex of the object that, together with [the stimulus condition of the disposition] is the causally operative sufficient condition for the manifestation [of the disposition].”⁶⁸ (1982, 251)

As Lewis (1997, 149) points out, Prior, Pargetter and Jackson assume the simple conditional analysis of dispositions. We saw in Chapter Two that there is reason to think (SCA) is mistaken. Even so, (SCA) does get a lot of cases right. I claim that there is a problem with Prior, Pargetter and Jackson’s account of causal bases that is unrelated to its assuming (SCA). The problem is that it assumes that, any time an object has some property that plays a causal role in some situation, it also plays that role in all situations. In short it assumes that dispositions are lawfully intrinsic.⁶⁹ The problem becomes clear when we examine how their account handles the castle case of a lawfully extrinsic disposition. But, before we examine that, we must ensure that (SCA) gets the right result for the castle case. This will ensure that the problem is not with (SCA) but rather with the assumption that all dispositions are lawfully intrinsic.

Recall the case of invulnerability with the two castles described in Chapter Two, section 2.6.1. Castle Mount is invulnerable—it doesn’t suffer harm when attacked—but Castle Dale is not. Castle Mount and Castle Dale are duplicates. The reason they are not

⁶⁸(PPJ-CB) is what *Prior, Pargetter and Jackson* says a *causal basis* is. See also Contessa 2012, 627.

⁶⁹Recall that lawfully intrinsic dispositions can’t vary among duplicates so long as the laws of nature are held fixed.

disposed alike is that there is more to an object's having a disposition than its intrinsic properties. Dispositions also depend on an object's environment. Assuming (SCA), let's say that a castle has the disposition *invulnerability* if and only if the castle remains unharmed when attacked. Castle Mount is invulnerable and the castle remains unharmed when attacked, so (SCA) gets the right result. Castle Dale is not invulnerable and doesn't remain unharmed when attacked, so (SCA) gets the right result in this case too.

Now let's reconsider the case with an eye toward the causal basis. According to (PPJ-CB) Castle Dale doesn't have a causal basis for invulnerability, since it has no property that, along with being attacked, is sufficient for bringing about that it suffers no harm. This is how it should be, since Castle Dale lacks the disposition. However, it doesn't seem that Castle Mount has a causal basis either. Castle Mount doesn't have a causal basis, since it doesn't have a property that is sufficient to bring about, along with being attacked, that it suffers no harm. It has no property that is sufficient, because the Castle Dale case makes it clear that there is a situation in which the castle's intrinsic properties aren't enough, along with the stimulus condition, to bring about the manifestation.⁷⁰

Quite obviously this is a serious problem for the standard views, since Castle Mount has a disposition but no causal basis. The problem arises, I think, because (PPJ-CB) assumes that dispositions are lawfully intrinsic. That comes out with Prior, Pargetter and Jackson's line on sufficiency. If all duplicates are disposed alike, then a property that

⁷⁰Some might object that a castle's being attacked can't causally contribute to its remaining unharmed. I'm sympathetic with the worry. Perhaps there are dispositions such that their stimulus conditions aren't able to causally contribute to the manifestation, or dispositions with manifestations that are events that can't stand in a causal relation. That would certainly be a problem for the standard views. However, I'm willing to grant to the standard views that we are able to make sense of stimulus conditions causally contributing to manifestations.

is a causal basis in one situation will be a causal basis in every situation.⁷¹ Hence the claim that a causal basis is sufficient, along with the stimulus condition, for bringing about the manifestation. Another approach is needed.

3.2.2. A different approach to causal bases

My suggestion is that we need to get much more fine-grained when it comes to saying what causal bases are. We need to speak of causal bases on a case-by-case basis. But that is exactly what our conditional analysis is supposed to do. I contend that the conditional analysis is our best guide to saying what causal bases are and that we cannot say what causal bases are without the conditional analysis. I don't have a direct argument for this contention, but I see no way to say what causal bases are without the conditional analysis and I seem to be able to say what they are with it.

I will briefly attempt to motivate my claim. An object can have a disposition even if it never undergoes the stimulus condition for the disposition. Advocates of the standard views will want to maintain that such an object still has a causal basis. But then how are we to think of such a causal basis? It is the property of the disposed object that *would* causally contribute to the manifestation of the disposition, *were* the stimulus condition to occur. This is rough. The conditional analysis can help us say more precisely what such a causal basis is. It is the property of the disposed object that would causally contribute to the manifestation in a suitable proportion of cases in which the

⁷¹For more on making sense of lawfully extrinsic dispositions see §3.3 below and Chapter Five §5.5.

stimulus condition occurs.⁷² This suggests that causal bases are closely connected to the conditional analysis, since the conditional analysis tells us which circumstances are required in order for the manifestation to come about.

Thus, I will proceed by assuming some conditional analysis, and then I'll say what causal bases are given that particular conditional analysis.⁷³ We'll begin with the simple conditional analysis. Despite the fact that in Chapter Two we saw that (SCA) is mistaken, it is instructive and simpler to consider what causal bases are supposing it is true. Then we'll move on to my preferred conditional analysis, (PCA).

Supposing (SCA) is right and we can link up dispositions with stimulus conditions and manifestations, we get the claim that, for any object x and any disposition D with stimulus condition S and manifestation M ,

(SCAD) x has D iff x would manifest M if x were subject to S .⁷⁴

For example, (SCAD) entails that, given certain assumptions about fragility, an object is fragile if and only if that object would break if struck. Recall that both the causal functionalist and identity theorist think that what a disposition is is tied, in one way or another, to causal bases. But (SCAD) doesn't mention anything about causation or causal bases. When we begin to talk about causal bases we go beyond what (SCAD) says about dispositions. (SCAD) says that, for any object x and any disposition with stimulus condition S and manifestation M , if x were subject to S , then x would manifest M .

⁷²While McKittrick (2009) doesn't provide an account of causal bases she says something that is importantly related when she considers whether dispositions reduce to what she calls would-be causes. See Chapter Four §4.4 for more on her view.

⁷³My approach is a conditional analysis-first approach that starts with the conditional analysis. I suppose someone could provide a causal basis-first approach that starts with causal bases and then provides a conditional analysis based on them.

⁷⁴Recall that (SCAD) is what the *simple conditional analysis* says about what it is to have a *disposition*.

Adding causal bases to the mix says that the way we get from x 's being subject to S to x 's manifesting M is via causation, a relation between events.⁷⁵ This is the first *causation assumption*.

(CA1) There is a causal relation between events.

Not only are we committed to there being a causal relation, it must be the case that every manifestation event is caused. This is the second causation assumption.

(CA2) All manifestation events are caused.

But it is not enough that all manifestation events are caused. They must be caused in the right sort of way; they must be caused by the right sort of event. Making sense of causal bases requires that some property of the disposed object play a causal role in bringing about the manifestation. Hence,

(CA3) For every manifestation event there is a property of the disposed object that plays a causal role in bringing about that manifestation.

Traditionally there have also been constraints on which of the disposed object's properties play a causal role. In particular, it is the *intrinsic* properties of the object that we are interested in. Hence,

(CA4) Only intrinsic properties of disposed objects can play causal roles in bringing about the manifestation.

This last assumption is less obvious. (More on this issue in section 3.3 below.)

It is worth pointing out that we are not committed to any particular account of causation. Everything we've said so far is compatible with causation being understood either counterfactually or via physical process or some other way.⁷⁶

⁷⁵Sticking with the common view (see Lewis 1973a), I say the causal relata are events, but I doubt anything significant hangs on that. If you prefer to think of them as properties or objects, that is fine.

Those who hold to the standard views must accept something like the four causation assumptions and also (SCAD), assuming it's the best conditional analysis. Combining them we get the claim that, for any object x and any disposition D with stimulus condition S and manifestation M , there is an intrinsic property B such that

(SCAD-CB) x has D iff x has B and, were x subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M .⁷⁷

Recall that Lewis (1997, 156) uses the “ x -complete cause” locution to specify the properties we're interested in. An x -complete cause is “a cause complete in so far as havings of properties intrinsic to x are concerned, though perhaps omitting some events extrinsic to x .”

Contrast the x -complete cause with simply the complete cause. The complete cause of a manifestation includes all the causally relevant properties regardless of whether they are properties of the disposed object. Perhaps the laws of nature will be causally relevant in bringing about the manifestation, or perhaps properties of the environment will be. Thus, we can recognize two different notions of causal basis: an x -complete causal basis and a *complete causal basis*. Unless I specify otherwise, my use of ‘causal basis’ is shorthand for ‘ x -complete causal basis’.

It is important to note that when we talk of “the causal basis of a disposition” we must recognize that it is shorthand for “the causal basis of the manifestation of a disposition.” Strictly speaking there are no causal bases of dispositions, since we are not

⁷⁶I'm setting aside the accounts of causation that reject that the causal relata are events, but one could adopt such an account so long as she makes the relevant changes to the causation assumptions.

⁷⁷(SCAD-CB) is what the *simple conditional analysis* says about what it is to have a *disposition* when the *causal basis* is included. I take it that (SCAD-CB) is still a version of the simple conditional analysis. See Lewis's (1997, 157) conditional analysis which also includes causal bases.

talking about causal explanations of dispositions.⁷⁸ There are only causal bases of manifestations of dispositions.

(Presumably (SCAD) and (SCAD-CB) both hold of necessity. It is an interesting question, therefore, as to which one should be considered *the* conditional analysis. For now it is enough to note that, for the defenders of the standard views, both (SCAD) and (SCAD-CB) are necessarily true.)

With (SCAD-CB) in hand we are now in a position to state more precisely what a causal basis is. Consider an example: two fragile vases are made of different materials—one of glass and the other of porcelain. They have different molecular structures, and thus, presumably, different causal bases. Call the specific molecular structure of the glass vase ' M_g ' and the specific molecular structure of the porcelain vase ' M_p '. For any given disposed object there are two properties associated with the causal basis: a first-order property and a second-order property. In our example, M_g and M_p are both first-order properties, since they both have a second-order causal-role property. Call such first-order properties *CB-realizers*. In order for a property to be a CB-realizer it must have the second-order property. Call the second-order property '*CB-role*'. Let's say that CB-realizers play the CB-role. Thus we can say that, for any property B and disposition D ,

(CB-realizer) B is a CB-realizer for D iff B has *CB-role* for D .

Both vases have a property that plays the CB-role for fragility. In one case it is M_g —the molecular structure of the glass is a CB-realizer—and in the other case it is M_p —the molecular structure of the porcelain is a CB-realizer. Each vase has a property that is a

⁷⁸This is not to suggest that there couldn't be a causal story for how an object acquires a disposition.

CB-realizer in virtue of the fact that each of those properties has the property *CB-role* for fragility.

This is a fine way to say under what conditions some property is a CB-realizer, but without saying what it is to play the CB-role, we haven't said much about what a causal basis is. Fortunately, (SCAD-CB) enables us to state more precisely when a property of an object plays the CB-role. For causal functionalists and identity theorists, all objects with a causal basis have a disposition and only objects with a causal basis have a disposition.^{79, 80} Thus for any object x and any disposition D with causal basis role *CB-role*, there is a property B such that

(D-CB) x has D iff x has B and B has *CB-role* for D .

(D-CB) describes the connection between a *disposition* and its *causal basis*. Together, (D-CB) and (SCAD-CB) entail for any object x , and any disposition D with stimulus condition S and manifestation M , there is a property B such that

(SCA-CB-role) x has B and B plays the CB-role for D iff B is an intrinsic property of x and, were x subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M .

(SCA-CB-role) seems to be an excellent candidate for an analysis of the property *CB-role*.⁸¹ Thus, we can use the right-hand side of (SCA-CB-role) to state more precisely

⁷⁹If a disposition is identical to its causal basis, then all and only objects with causal bases have dispositions. Likewise, if a disposition just is the property *having a causal basis*, then all and only objects with causal bases have dispositions.

⁸⁰Lewis (1997, 149), in providing his conditional analysis, writes "Prior, Pargetter and Jackson [1982] have argued convincingly for the thesis that all dispositions must have causal bases. Let us assume this. Or at any rate, let us agree to set aside baseless dispositions, if such there be." If there are baseless dispositions, then the standard views would need a disjunctive account of dispositions. I take it that that would be a significant disadvantage. I'm going to assume that advocates of the standard views think (D-CB) holds of necessity. See Chapter Five §5.6 for more on baseless dispositions.

⁸¹Those who make much of causal bases owe us an account of *CB-role*, and (SCA-CB-role) seems like the most plausible place to turn.

what *CB-role* is. For any disposition with stimulus condition *S* and manifestation *M*, *CB-role* is the property *being a property P such that, for any object x that has P, P is intrinsic to x and, were x subject to S, x's having P and being subject to S would jointly be an x-complete cause of x's manifesting M*. *CB-role* is a second-order property, but more than that, it is a counterfactual property, which is a type of hypothetical property.⁸² (This will have important implications for how it is that dispositions are reduced to categorical properties on the standard views. I address those issues in Chapter Four.)

We are now in a position to say more precisely what dispositions are according to the identity view and causal functionalism. According to the identity view, for any disposition *D* with stimulus condition *S* and manifestation *M*, the following claims are equivalent.

- D* is the *CB-realizer* for *D*.
- D* is the property that has *CB-role* for *D*.
- D*, had by any object *x*, is the property *P* such that *P* is intrinsic to *x* and, were *x* subject to *S*, *x's* having *P* and being subject to *S* would jointly be an *x*-complete cause of *x's* manifesting *M*.

And according to causal functionalism, for any disposition *D* with stimulus condition *S* and manifestation *M*, the following claims are equivalent.

- D* is the property *having a CB-realizer* for *D*.⁸³
- D* is the property *having a property that has CB-role* for *D*.
- D*, had by any object *x*, is the property *having a property P such that P is intrinsic to x and, were x subject to S, x's having P and being subject to S would jointly be an x-complete cause of x's manifesting M*.

⁸²See Hauska 2008, where he states what causal bases are counterfactually given Lewis's conditional analysis.

⁸³I have and will continue to characterize causal functionalism as the view according to which a disposition is the property *having a causal basis*. Likewise, I'll continue to characterize the identity view as the view according to which a disposition is identical to its causal basis.

The last claims for both the identity view and causal functionalism don't include any explicit causal basis talk. Both *CB-realizer* and *CB-role* have been replaced with what those properties come to.

3.2.3. Causal bases given PCA

We can say what causal bases are given (PCAD).⁸⁴ Recall that, for any object x and any disposition D with stimulus condition S and manifestation M ,

(PCAD) x has D iff x would manifest M in some suitable proportion of S -cases.

There is nothing to prevent advocates of the standard views from adopting (PCAD). Since (PCAD) doesn't mention anything about causal bases, we can make explicit our causation assumptions in (PCAD). Given our four causation assumptions and (PCAD) we get the claim that, for any object x and any disposition D with stimulus condition S and manifestation M , there is an intrinsic property B such that

(PCAD-CB) x has D iff x has B and, were x subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M in some suitable proportion of S -cases.

Both (CB-realizer) and (D-CB) will still be true. What is left is to say what *CB-role* comes to. (D-CB) and (PCAD) entail that, for any object x and any disposition D with stimulus condition S and manifestation M and causal basis role *CB-role*, there is a property B such that

(PCA-CB-role) x has B and B has *CB-role* iff B is an intrinsic property of x and, were x subject to S , x 's having B and being subject to S would

⁸⁴Recall that (PCAD) is what the *proportional conditional analysis* says about what it is to have a *disposition*.

jointly be an x -complete cause of x 's manifesting M in some suitable proportion of S -cases.

Again, (PCA-CB-role) seems to be an excellent candidate for an analysis of *CB-role*. For any disposition with stimulus condition S and manifestation M , *CB-role* is the property *being a property P such that, for any object x that has P , P is intrinsic to x , and were x subject to S , x 's having P and being subject to S would jointly be an x -complete cause of x 's manifesting M in some suitable proportion of S -cases.* Again we see that *CB-role* is a second-order counterfactual property, a type of hypothetical property.

We are now in a position to say more precisely what dispositions are according to the identity view and causal functionalism, given (PCA). According to the identity view, for any disposition D with stimulus condition S and manifestation M , the following claims are equivalent.

- D is the CB-realizer for D .
- D is the property that has *CB-role* for D .
- D , had by any object x , is the property P such that P is intrinsic to x , and were x subject to S , x 's having P and being subject to S would jointly be an x -complete cause of x 's manifesting M in some suitable proportion of S -cases.

And according to causal functionalism, for any disposition D with stimulus condition S and manifestation M , the following claims are equivalent.

- D is the property *having a CB-realizer for D .*
- D is the property *having a property that has CB-role for D .*
- D , had by any object x , is the property *having a property P such that P is intrinsic to x , and were x subject to S , x 's having P and being subject to S would jointly be an x -complete cause of x 's manifesting M in some suitable proportion of S -cases.*

Again, the last claims for both the identity view and causal functionalism don't include any explicit causal basis talk. Both *CB-realizer* and *CB-role* have been replaced with what those properties come to.

3.3. Extrinsic Causal Bases?

Given the above explicit statement of what causal bases are, there is no longer a concern for those who accept the standard views that there are situations in which an object has a disposition and fails to have a causal basis, given the four causation assumptions. (D-CB) ensures them that everything extensionally lines up. Thus, lawfully extrinsic dispositions won't pose a threat insofar as they aren't examples where an object has a disposition but not a causal basis. Castle Mount has the disposition and a causal basis, and Castle Dale has neither the disposition nor a causal basis. That is how things must be for the standard views. Even so, upon considering lawfully extrinsic dispositions, those who accept the standard views might wonder whether causal bases must be restricted to intrinsic properties of the disposed object. That is to say, they might wonder whether (CA4) is right.

(CA4) Only intrinsic properties of disposed objects can play causal roles in bringing about the manifestation.

The reason to want to allow extrinsic properties to count as causal bases is that lawfully extrinsic dispositions seem to show us that there is more to what dispositions are than the intrinsic properties of the disposed object. If two duplicates can differ dispositionally, then there is more to dispositions than the intrinsic properties of objects.⁸⁵

⁸⁵See Contessa 2012, 635.

It is true that Lewis (1997) explicitly takes causal bases to be intrinsic properties, but perhaps the only reason he did so is that he maintained that all dispositions are lawfully intrinsic.⁸⁶ If Lewis acknowledged that some dispositions are lawfully extrinsic, then perhaps he would have allowed for extrinsic causal bases.

Consider the castle case. Castle Mount is attacked and remains unharmed. What properties are causally relevant in bringing about the manifestation? (We need not restrict our answer to intrinsic properties of the disposed object.) Of course there are the intrinsic properties of Castle Mount having to do with, for example, its walls, moats, countermeasures and all the rest. But there are other properties that are relevant as well, namely, *being located on a hill*. The castle's having that property makes it that much more difficult for the enemy to overtake it.⁸⁷ This is an extrinsic property of Castle Mount. Is there any problem in counting such a property of the castle as part of the causal basis? In this case it doesn't seem like there is a problem. While an extrinsic property, and thus a less natural one, *being located on a hill* still seems causally relevant, and there doesn't seem to be any other property of any other object involved that is doing the same sort of causal work as this one.⁸⁸ Thus, there doesn't seem to be a problem with revising our fourth causal assumption to include such properties.

There are other cases of lawfully extrinsic dispositions that seem to involve causally relevant properties that can't reasonably be thought of as being causally relevant properties of the disposed object. One of the most common examples of a lawfully

⁸⁶See Chapter Two, §2.6.1.

⁸⁷I'm assuming a notion of causation according to which not suffering harm counts as an event and extrinsic properties like *being located on a hill* can be causally relevant.

⁸⁸See Lewis 1983, 369-70.

extrinsic disposition is that of a key's disposition to open a particular door.⁸⁹ A key (call it 'Key') is disposed to open a door (call it 'Door') that is equipped with a certain type of lock (call them 'K-locks'). The stimulus condition of the disposition is Key's being inserted into the lock on Door and turned, and the manifestation of the disposition is Door's opening. Key is disposed to open Door, but if Door's lock were changed to a non-K-lock, then Key would lose the disposition to open Door. Thus, Key could lose a disposition without having changed any of its intrinsic properties. Suppose Key is put into the lock on Door and turned and Door opens. What properties are causally relevant in bringing about the manifestation? The intrinsic properties of Key that are causally relevant are its shape and rigidity. But there are also properties of Door that are causally relevant, for example, *being fitted with a K-lock*. This is a property that is not part of the stimulus condition and not a property of Key, and yet it appears to be a causally relevant property.

Should this property be part of the causal basis? Perhaps we could say that it is a property of Key: Key has the property *being such that the lock on Door is a K-lock*, or better, Key has the property *fitting the lock on Door*. The first challenge this suggestion must overcome is whether such a property is a genuine property of Key's. But even supposing that Key does have the property, there is another problem with the proposal. We've already noted that Door has the property *being fitted with a K-lock*. But both properties can't be causally efficacious, since this is not a case of overdetermination. So

⁸⁹The example originally comes from Robert Boyle 1744, 461 (but he uses it to make a different point). See also McKittrick 2003 and Contessa 2012. I use Contessa's nomenclature in describing the case.

which one is causally efficacious? The one that is more natural.⁹⁰ And *being fitted with a K-lock* seems to be more natural than *fitting the lock on Door*. The former property is intrinsic while the latter is extrinsic, which is suggestive. Thus, *fitting the lock on Door* shouldn't be part of the causal basis.

We must modify (CA4) to allow for Castle Mount's property, *being located on a hill*, to be part of the causal basis but disallow Key's property, *fitting the lock on Door*, from being part of the causal basis. It is not just a matter of whether the property is extrinsic, since both properties are extrinsic. Instead it is a question of naturalness.

(CA4*) Only properties of disposed objects that aren't too unnatural can play causal roles in bringing about the manifestation.

Admittedly, (CA4*) is not very precise, but I think it will do, so long as we keep in mind the sort of properties it is supposed to allow and the sort that it is supposed to disallow. Of course, we now need to modify our understanding of an *x*-complete cause to be a cause complete insofar as havings of properties not too unnatural to *x* are concerned.

Advocates of the standard views make much of causal bases. One cannot fully appreciate what they take dispositions to be without providing a precise account of causal bases. I would like to think we've made some progress toward that end. There is another way of understanding bases, however, to which we'll now turn.

3.4. Metaphysical Bases

We should take a step back and ask ourselves what causal bases are supposed to be doing and why we think all dispositions have them. It seems that the intuitive case is that an object like a glass has a disposition, fragility, and we think that fragility is related in a

⁹⁰For more on naturalness see Lewis 1983.

special way to certain (seemingly distinct) properties of the glass. The glass has certain properties that seem responsible for the glass's being fragile. Or perhaps we could say that fragility depends on other properties of the glass, perhaps its molecular structure. But this way of talking seems to be no different than saying that the glass's fragility (metaphysically) *depends* on its molecular structure. And that is another way of saying that fragility is grounded in its molecular structure.

A property can be *wholly* grounded in another property or only *partially* grounded in another property. Likewise, a property can be (individually) partially grounded in several distinct properties and (collectively) wholly grounded in all of them.⁹¹ Let's call the property of the disposed object that the disposition is at least partially grounded in the *metaphysical basis*.⁹² In the same way that we distinguished an *x*-complete causal basis from a complete causal basis, we can distinguish an *x*-complete metaphysical basis from a complete metaphysical basis. The *x*-complete metaphysical basis includes the properties (that aren't too unnatural) of the disposed object that the disposition is grounded in, and the complete metaphysical basis is a set of all the properties the disposition is grounded in. A disposition might be partially grounded in the *x*-complete metaphysical basis, but it is wholly grounded in the complete metaphysical basis. I'll use 'metaphysical basis' to refer to the *x*-complete metaphysical basis.

It is natural to think that dispositions depend on the laws (of course you might think that it is the laws that depend on dispositions).⁹³ I think the lesson from lawfully extrinsic dispositions is that dispositions also depend on environments. In the case with

⁹¹See Chapter Four for more on grounding, especially on how it relates to reduction.

⁹²This is not to suggest that a causal basis isn't metaphysical.

⁹³See Chapter Five §5.5.2.

Key, the complete metaphysical basis includes the laws of nature, Door's having a K-lock and Key's shape and rigidity. The *x*-complete metaphysical basis includes only Key's shape and rigidity. The lock fitted on Door is part of Key's environment, and Key's disposition depends on it.

Let us now compare metaphysical bases with the causal bases. A metaphysical basis is the property (that isn't too unnatural) of the disposed object that stands in the grounding relation to the disposition. A causal basis is the property (that isn't too unnatural) of the disposed object that would stand in the causal relation to the manifestation of the disposition were the stimulus to occur. Suppose we allow that both the causal relation and the grounding relation are explanatory. Then we can say that a metaphysical basis is in the business of giving an explanation, as concerns the properties of the disposed object, of the *disposition*. And we can say that a causal basis is in the business of giving an explanation, as concerns the properties of the disposed object, of the *manifestation* of the disposition, were it to occur. A key difference between the two is that a causal basis is primarily associated with a manifestation of a disposition.

Even so, is a metaphysical basis the same property as a causal basis? It seems to me that in most cases it is. There are exceptions, since a disposed object might not have a metaphysical basis even if it does have a causal basis.⁹⁴ But, otherwise, the property of a disposed object that would causally explain the manifestation of the disposition, were the object in the stimulus condition (and other factors are met as required by the conditional analysis in question), is the same property that non-counterfactually, metaphysically explains the disposition itself. A glass is fragile. It is fragile because of its molecular

⁹⁴See Chapter Five §5.6.2.

structure. That's the metaphysical basis of fragility for the glass. But it is also the case that, were the glass struck, its molecular structure, along with the striking, would causally bring about the breaking. That's the causal basis of the manifestation of fragility for the glass. As we have seen in this chapter, causal bases must be understood counterfactually; that is, CB-realizers have second-order counterfactual properties, namely, CB-roles. A fragile glass that is never struck and never breaks is still fragile and presumably still has a causal basis. But, with no manifestation occurring, there is nothing to explain. Thus, a causal basis must be understood as the property of the object that would causally explain the manifestation, were it to occur. Not so with metaphysical bases. A metaphysical basis is the explanation of the disposition, and the fragile glass that is never struck always has the disposition.⁹⁵

We are now in a position to say what *metaphysical functionalism* is. In the same way that the causal functionalist assumes (D-CB), the metaphysical functionalist assumes (D-MB). For any object x and any disposition D ,

(D-MB) x has D iff x has some property B that is the x -complete metaphysical basis for D .⁹⁶

According to metaphysical functionalism a disposition is the property *having a metaphysical basis* for the disposition in question.⁹⁷ For example, fragility is the property *having a metaphysical basis for fragility*, according to metaphysical functionalism.

⁹⁵It will still be the case that in most cases metaphysical bases will have a CB-role.

⁹⁶This is the link between *dispositions* and their *metaphysical bases*.

⁹⁷I assume that the grounding relation is asymmetric, which will rule out the "metaphysical identity view." If dispositions are grounded in their metaphysical bases, then they are not identical to them. See Rosen 2010.

3.5. Counterfactualism and Bases

We have given a precise statement of what bases are. Such a statement is required for saying what dispositions are according to the standard views. In the final section of this Chapter, I'd like to consider to what extent a counterfactualist can take on bases.

3.5.1. Counterfactualism and causal bases

We've seen what the standard views think about causal bases. They accept the first three causation assumptions along with (CA4*). Nothing about counterfactualism precludes a counterfactualist from making the same causal assumptions. Thinking that dispositions are counterfactual properties doesn't affect one's views on which properties would causally bring about the manifestation. Defenders of the standard views think that for any object x and any disposition D with causal basis role *CB-role*, there is a property B such that

$$(D-CB) \quad x \text{ has } D \text{ iff } x \text{ has } B \text{ and } B \text{ has } CB\text{-role for } D.$$

And I see no reason why the counterfactualist can't think the same.⁹⁸ Whatever the reasons are for thinking that (D-CB) is true (except the reason that the standard views require it to account for dispositions), these are reasons that the counterfactualist should be able to accept.⁹⁹

Of course this doesn't tell us what the relation is between a disposition and its causal basis. The counterfactualist can't maintain the relation is one of identity, but neither can the causal functionalist. What does the causal functionalist think the relation

⁹⁸Although we'll see in Chapter Five that it's better not to have to be committed to (D-CB).

⁹⁹If the only reason to accept (D-CB) is that the standard views require it to account for dispositions, I take that to be a drawback of the standard views. In such a case, the counterfactualist is better off not accepting (D-CB).

is? Perhaps the causal functionalist can say that a causal basis realizes the disposition. A CB-realizer for fragility realizes fragility, that is, realizes the property *having a causal basis for fragility*. The trouble with this suggestion is that saying what the realization relation comes to is controversial and typically requires thinking that the property being realized plays some sort of causal role.¹⁰⁰ Even so, perhaps the counterfactualist could maintain that a CB-realizer realizes the counterfactual property that is the disposition. More promisingly, perhaps the relation between the disposition and a CB-realizer is one of metaphysical dependence. The property *having a causal basis* certainly seems to metaphysically depend on the causal basis in question. So let us turn to what the counterfactualist can say about the relation between a disposition and metaphysical bases.

3.5.2. Counterfactualism and metaphysical bases

We have seen that the counterfactualist can accept the causal assumptions and (D-CB). I see no reason why a counterfactualist couldn't accept (D-MB).¹⁰¹ A disposition is at least partially grounded in the metaphysical basis in question. According to the counterfactualist, the counterfactual property that comes from the right-hand side of the conditional analysis is at least partially grounded in the metaphysical basis in question, and according to the metaphysical functionalist the property *having a metaphysical basis* is at least partially grounded in the metaphysical basis in question.

Now that we have a better understanding of what dispositions are, what causal and metaphysical bases are, and what the relation between them is like, we're in a

¹⁰⁰See Gillett 2003. In this dissertation I set aside the issue of whether dispositions are causally efficacious.

¹⁰¹Again, we'll see in Chapter Five §5.6.2 that it's better not to have to accept (D-MB).

position to consider how it is that dispositions can be reduced. That is the topic of the next Chapter.

Chapter 4: Reduction for All

Now that we have a better idea of what each account of dispositions says about what dispositions are, we can begin assessing the various accounts. I think counterfactualism is the best account going. I'll make the case that counterfactualism is superior to the alternative views in this Chapter and the next. In this Chapter I'll argue that the standard views and metaphysical functionalism have no advantages over counterfactualism. In Chapter Five I'll argue that counterfactualism enjoys some advantages over the standard views and metaphysical functionalism. The only putative advantage that I'm aware of that the alternative views could enjoy over counterfactualism is a reductive advantage. This Chapter will deal with the issue of reducing dispositions to categorical properties.

Since Lewis provides the most complete and comprehensive reductive account of modality that I'm aware of, much of what is said here will be related to Lewis's reductive account. Since Lewis's reductive project is importantly related to Humean supervenience, we'll examine that thesis in section 4.1. Next we'll move on to the issue of reduction and what exactly reduction comes to (section 4.2). I maintain that grounding is the best way to understand reduction (section 4.3). The main thesis of this Chapter is that the standard views (section 4.4) and metaphysical functionalism (section 4.5) don't have any reductive advantage over counterfactualism. The standard views have no reductive advantage, because neither of them is reductive on its own. Metaphysical functionalism has no reductive advantage, because insofar as it is reductive,

counterfactualism is too. The standard views are committed, as a matter of necessity, to counterfactual properties. I spend the rest of the Chapter (section 4.6) reinforcing this claim by demonstrating how both counterfactualism and the standard views can be made reductive on Lewis's account of modality, assuming that it is successful. The idea is that any reductive account of modality that the standard views could use to make their accounts reductive could also be used by counterfactualists to make their account reductive.

4.1. Humeanism

The distinction between hypothetical and categorical properties and the need to reduce hypothetical properties is importantly related to *Humeanism*. Recall from Chapter One that Theodore Sider (2001) invokes the distinction between hypothetical and categorical properties in order to criticize accounts that take hypothetical properties as primitive. Since Humeans don't think there are any primitive hypothetical properties, it is perhaps a Humean view that Sider wants to defend when he criticizes people for countenancing primitive hypothetical properties. Humeanism has been championed by Lewis, who describes it this way:

Humean supervenience is named in honor of the greater denier of necessary connections. It is the doctrine that all there is to the world is a vast mosaic of local matters of particular fact, just one little thing and then another. (But it is no part of the thesis that these local matters are mental.) We have geometry: a system of external relations of spatiotemporal distance between points. Maybe points of spacetime itself, maybe point-sized bits of matter or aether or fields, maybe both. And at those points we have local qualities: perfectly natural intrinsic properties which need nothing bigger than a point at which to be instantiated. For short: we have an arrangement of qualities. And that is all. There is no difference without difference in the arrangement of qualities. All else supervenes on that. (1986b, ix-x)

Roughly the view is that everything supervenes on perfectly natural intrinsic properties instantiated at spacetime points. The concept of supervenience that Lewis (1986a, 14-17) uses is modal. Property *F* supervenes on property *G* if and only if there can be no change in *F* without a change in *G*. So there can be no change in the supervening properties without a change in the distribution of perfectly natural properties.

For Lewis, the supervenience base is made up of perfectly natural properties. Elsewhere Lewis (2008, 204) describes perfectly natural properties as “not at all disjunctive, or determinable, or negative. They render their instances perfectly similar in some respect. They are intrinsic; and all other intrinsic properties supervene on them. They are not conjunctive or structural.” The rough idea is that there is a fundamental level to reality—the supervenience base—and everything else supervenes on it.¹⁰² There are objects of some sort or other that are fundamental according to the Humean, and they instantiate the perfectly natural properties.¹⁰³

I take it that the perfectly natural properties are all categorical properties. There are no primitive hypothetical properties according to the Humean. Notice that, in Schaffer’s description of the distinction between hypothetical and categorical properties in Chapter One, he describes categorical properties as intrinsic. It isn’t obvious why such a restriction is required. In fact my *being located in Columbus* is not an intrinsic property, but it does seem like a categorical property. I instantiate the property *being an uncle*, an extrinsic property, but it certainly seems to describe the way I actually am.

¹⁰²It is tempting to say that “everything else *depends* on the supervenience base.” I refrain from doing so because supervenience, a modal notion, is weaker than metaphysical dependence, which Lewis (1983, 358) eschews.

¹⁰³Elsewhere, Lewis (2008, 204) calls perfectly natural properties ‘fundamental properties’. For Lewis fundamentality and perfect naturalness don’t come apart, but see Schaffer 2004 for an account according to which they do come apart. See also Caplan 2011, 91-92.

Perhaps what Schaffer has in mind is something like Lewis's notion of perfectly natural properties, which are intrinsic.¹⁰⁴

Stephen Mumford (2007) argues that it is only a Humean bias that disallows primitive modal and dispositional properties in the supervenience base. Perhaps Mumford is on to something, but there is certainly more to it than bias. Sider (2003) speaks to the issue.

Accepting necessity or possibility as a primitive feature of reality would be like accepting tensed facts as primitive, or accepting dispositions as primitive, or accepting counterfactuals as primitive. While some are willing to make these posits, others seek to reduce 'hypothetical' notions to 'categorical' notions— notions which are in a sense 'self-contained' and do not 'point beyond themselves' as the hypothetical notions do. (2003, 185)

He goes on to say that parsimony provides a reason to exclude such properties from being primitive: "The metaphysician prefers desert landscapes when she can get them; when it is possible to reduce we should" (2003, 185). Perhaps the reason Lewis excludes primitive dispositional and modal properties is nothing more than a preference for desert landscapes. I suppose that is one of the leading motivations for Humeanism.

The concern that Sider has in mind can be put as a point about parsimony. Following Sam Cowling (forthcoming), I take parsimony to be an *epistemic virtue*: "a feature that makes belief in a theory better justified than belief in otherwise equally good rivals." Parsimony, as typically understood, comes in two kinds: ontological and ideological. Ontological parsimony has to do with existential commitments, while ideological parsimony has to do with primitive concepts. This is a dissertation about properties and so we will be chiefly concerned with ideological commitments. And since

¹⁰⁴Schaffer (2008) argues that hypothetical properties reduce to categorical properties. Schaffer (2008, 82) says his reduction is inspired by Hume and Lewis.

we are chiefly concerned with properties in this dissertation, I'll take ideological parsimony to be understood as commitment to primitive properties (rather than concepts). Furthermore, ideological parsimony can be understood as quantitative or qualitative parsimony, where quantitative ideological parsimony has to do with the number of primitive properties one is committed to and qualitative ideological parsimony has to do with the number of kinds of primitive properties one is committed to. Here we are concerned with qualitative ideological parsimony. When it comes to commitment to primitive properties, the fewer kinds one is committed to the better. We have already seen different kinds of properties including modal, dispositional, counterfactual, tensed and categorical.¹⁰⁵ If, for example, one were to identify dispositional properties with counterfactual properties, one would be committed to one fewer kind of hypothetical property, which would be theoretically virtuous.

I'm interpreting Sider's concern as having to do with qualitative ideological parsimony. Elsewhere Sider (2011, 267) claims that the "good reason for opposing modal primitivism is simply: ideological economy." I take it that Sider thinks it's an epistemic virtue of a theory to be committed to fewer hypothetical primitive properties, all other things being equal. Whether a person is committed to a kind of property as primitive will depend on whether the property can be reduced to other kinds of properties. If a reduction fails, then one is left either to pay for the primitive property in ideological coin or deny there is such a property. In the case of dispositions, one can attempt to reduce dispositions to categorical properties. In the absence of a reduction,

¹⁰⁵Cowling (forthcoming) treats related properties as members of a single kind. For example, he takes essences to be the same kind of property as modal properties. I, however, treat each of the basic kinds of hypothetical properties discussed to be their own kind.

one is left with primitive dispositional properties, which constitutes an ideological cost, or one must deny there are such properties, which carries with it a cost of its own.¹⁰⁶

4.2. Hypothetical Properties and Reduction

I'm assuming that there are dispositions, so the question before us is whether they reduce to categorical properties. As someone who is committed to dispositional realism, even if reductions fail, I'm willing to pay the ideological price of taking dispositions as primitive. This dissertation, however, is not concerned with arguing for the success of reductions and so the question of having to take dispositions as primitive is not of primary importance.

All other things being equal, it's better to reduce hypothetical properties. This will become relevant in assessing different accounts of dispositions. Reductive accounts of dispositions are preferred. But in order to assess different accounts of what dispositions are with regard to reduction, we will need to have an idea about what reduction is. There is a sense in which the Humean reduces all contingent properties to the supervenience base. This suggests that supervenience is a reductive relation for the Humean. We'll consider reduction as supervenience in section 4.2.1. However, it seems that the Humean needs another account of reduction in order to reduce hypothetical properties. We'll consider reduction as identity in section 4.2.2. The trouble with identity, however, is that reduction seems to be an asymmetric dependence relation.

¹⁰⁶The sort of cost I have in mind here is the sort of cost that must be paid by those who deny there are any causal relations. Intuitively there are causal relations and to deny there are is to do harm to our common sense view of the world.

Thus, many have it that reduction has to do with metaphysical dependence. We'll consider reduction as metaphysical dependence (that is, grounding) in section 4.2.3.

4.2.1. *Reduction as supervenience*

There seems to be a sense in which the Humean is a reductionist, or at least fancies herself a reductionist. All there is to the world are the perfectly natural properties instantiated at points. And that's all. What about all the various properties that are not perfectly natural like *being a city*, *being human*, *being located in Columbus*, fragility, *possibly winning*, *being such that were it the case that he is caught, then it would be the case that he bribes the judge*, *being necessarily rational*, *being a soccer ball*, *being in pain*, etc.?¹⁰⁷ All contingent properties supervene on the distribution of perfectly natural properties. There is a sense of reduction in play here, but it's not obvious that the supervenience relation is able to capture it. Reduction seems to have to do with an asymmetric dependence relation, yet supervenience does not ensure asymmetry.¹⁰⁸ Ned Hall (2010) provides a suggestion: "Lewis believes in a metaphysical hierarchy of properties and relations. A property or relation gets its place in the hierarchy depending on how 'natural' it is. So he could happily say that reduction is supervenience of the less natural on the more natural."¹⁰⁹ The idea is that property *F* reduces to property *G* if and only if *F* supervenes on *G* and *G* is more natural than *F*. This should at least ensure asymmetry, and perhaps that is enough for reduction.¹¹⁰

¹⁰⁷See Chapter One §1.1 for a brief description of different kinds of properties.

¹⁰⁸See Kim 1990.

¹⁰⁹See also Bricker 2006.

¹¹⁰There are other reasons to doubt that reduction should be understood as supervenience. As Rosen (2010, 113-114) points out, two parties can agree on supervenience but disagree on metaphysical dependence (grounding).

But, even supposing that supervenience is a reductive relation, it doesn't seem like it will help the Humean with reducing dispositions. The trouble is with hypothetical properties. More is required for hypothetical properties than the actual present distribution of perfectly natural properties. For tensed properties, Lewis needs to become a four-dimensionalist so that the distribution of perfectly natural properties extends throughout time.¹¹¹ The other hypothetical properties still won't supervene on the distribution of perfectly natural properties throughout four-dimensional spacetime. For the other hypothetical properties, Lewis (1986a) needs his many worlds, which are spatiotemporally unrelated but ontologically of a piece with our own. Humphrey's property *possibly winning* doesn't supervene on the actual perfectly natural properties.¹¹² Instead, Lewis requires counterparts and possible worlds for such properties.

The distribution of actual perfectly natural properties throughout spacetime serves as the supervenience base for contingent, categorical, non-perfectly natural properties. Perhaps mental properties supervene on the actual perfectly natural properties, but dispositions do not.¹¹³ Thus, even if supervenience is a reductive relation, it doesn't seem to be the sort of relation that will help reduce dispositions, at least not without expanding the supervenience base. For modal properties, counterfactual properties and dispositions, Lewis needs his worlds. And he reduces them to categorical properties via identity. So

¹¹¹Our chief focus is dispositions, which seem more like the other hypothetical properties rather than tensed properties. As a result, I don't focus on tensed properties or Lewis's four-dimensionalism.

¹¹²My use of 'actual' here needs comment. By 'actual perfectly natural properties' I mean the properties that we're left with when we consider the actual world in isolation from all the other worlds. Humphrey's property *having a counterpart who wins* is not an actual property in this sense, since it is a property he has in virtue of things outside the actual world. If we were to take all the other worlds away, he would fail to have that property.

¹¹³Some might wonder whether dispositions supervene on the actual perfectly natural properties and the laws of nature. However, dispositions require counterfactuals and counterfactuals require other possible worlds. Lewis (1994b, 478-79) makes it clear that his account of laws does not support counterfactuals.

even if supervenience is necessary for reduction, one will need to increase the supervenience base in order for counterfactual, dispositional and modal properties to supervene on categorical properties.

4.2.2. *Reduction as identity*

The way Lewis reduces the hypothetical to the categorical is by *identifying* the hypothetical with the categorical.¹¹⁴ Lewis (1986a) increases his quantitative ontological commitments by including counterparts and possible worlds for his reduction.¹¹⁵ According to Lewis, there is a world for every way our world could have been.¹¹⁶ By increasing his ontology and holding fixed his ideology, Lewis takes himself to incur little cost in exchange for an account of modality. Reality, as made up by the pluriverse, accounts for modality for Lewis.

Consider the proposition that there are blue swans. It's possible for there to be blue swans, so the proposition has the property *being possibly true*. This *de dicto* modal property can be reduced to properties of worlds. The proposition has the property if and only if there is a world in which there are blue swans. Lewis identifies the modal property with a non-modal property. The property *being possibly true* is identical to the property *being such that there is a world in which it is true*. A proposition has the property *being necessarily true* if and only if the proposition is true in every world. The property *being necessarily true* is identical to the property *being such that it is true in*

¹¹⁴Sider (2003; 2006) understands Lewis's reduction to be identity.

¹¹⁵A similarity relation is required to make sense of counterparts and to order possible worlds. However, I take it that Lewis is already committed to such a similarity relation, so it doesn't constitute an additional ideological cost.

¹¹⁶Of course for Lewis's reduction to be successful he must specify non-modally which worlds exist; see Lewis 1986a, 86-91.

every world. By identifying these *de dicto* modal properties with non-modal properties, Lewis has reduced the *de dicto* modal properties and avoided a commitment to that kind of primitive modal property.

Lewis uses counterparts in order to reduce *de re* modality, where a counterpart is an “appropriately similar object in another possible world” (Sider 2008, 1). Humphrey has the property *possibly winning the election* if and only if he has a counterpart who wins the election. And he has the property *being necessarily human* if and only if all of his counterparts are human. The property *possibly winning the election* is identified with the property *having a counterpart who wins the election*.¹¹⁷ And the property *being necessarily human* is identified with the property *having only human counterparts*. By identifying these *de re* modal properties with non-modal properties, Lewis has reduced the *de re* modal properties and is no longer committed to primitive *de re* modal properties.

Modality *de re* involves quantification over individuals. However, Lewis goes on to describe how restricting quantification by counterpart relations is a rather fluid affair. Lewis describes it as

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: if you say what would only be true under certain restrictions, and your conversational partners acquiesce, straightway those restrictions come into force. (1986a, 8)

¹¹⁷Lewis reduces the modal property by identifying it with a categorical property. However, the categorical property is not a perfectly natural property for Lewis. As a Humean, he thinks that it supervenes on the perfectly natural properties. But which ones? We have already seen that such properties fail to supervene on the distribution of actual perfectly natural properties throughout spacetime. Perhaps, then, they supervene on the distribution of perfectly natural properties throughout worlds. I leave this issue to the Lewisians. For our purposes, it is enough to recognize that they reduce modal properties by identifying them with categorical properties.

Different contextual factors will play a role regarding what sorts of *de re* modal properties may be truly attributed to an individual.

Lewis (1973) reduces *de re* counterfactual properties in a similar manner. Smith has the counterfactual property *being such that, were he an honorable man, he would confess*. Smith has the property if and only if all Smith's counterparts who are honorable confess.¹¹⁸ Thus, the property *being an x such that, were x an honorable man, x would confess* is identical to the property *having counterparts such that all of the honorable ones confess*. In this way, Lewis has reduced the counterfactual property to a categorical property and avoided a commitment to primitive counterfactual properties.

However, as Sider (2003) points out, “there is a bit of awkwardness” here, if the reduction is identity and Lewis is reducing the modal to the non-modal. Sider attempts to make sense of this awkwardness in terms of propositions:

in a sense the reducing terms must indeed be modal if the reduction is successful, since if the reduction is successful then the reducing propositions are modal propositions, given that analysis is identity. The awkwardness should be resolved as follows. Any reductionist programme takes certain notions as being ‘acceptable’. What acceptability amounts to depends on what is driving the reduction—it may be epistemic acceptability, or categoricity, or extensionality, or something else. ‘Non-modal’, then, means ‘acceptable’—a reduction is non-circular or genuinely reductive if the notions it employs are acceptable according to its standards, whatever those may be. (2003, 185)

In this case what is acceptable for Lewis are categorical properties.

Recall that the defining feature of hypothetical properties is that they point beyond how an object actually is to how it could be or has to be. Humphrey has the property *possibly winning*. It points beyond how Humphrey actually is to how he could

¹¹⁸See below for a more thorough account of Lewis on *de re* counterfactual properties.

be. According to Lewis, Humphrey has the property *having a counterpart who wins*. This property must be categorical for the reduction to be successful. Lewis must build his worlds out of categorical properties. Let's restrict our focus to the two relevant worlds: ours and the one in which Humphrey's counterpart wins the election. And let's suppose that each world is such that the categorical, non-perfectly natural properties of a world supervene on the categorical, perfectly natural properties of that world. So far we have two worlds built out of the acceptable categorical properties. Given the counterpart relation, Humphrey also has the property *having a counterpart who wins*. That property is a categorical property, since it involves only categorical properties and the counterpart relation.

As a categorical property, *having a counterpart who wins* isn't supposed to point beyond how Humphrey actually is. But it is also identical to a modal property, which means it must point beyond how Humphrey actually is. At this point the hypothetical reductionist points to the paradox of analysis.¹¹⁹ Here I think that the best that the Lewisian can do is say that modal properties are a subset of categorical properties. All modal properties are categorical properties, but not all categorical properties are modal properties. *Having a counterpart who wins* is a categorical property that is also a modal property. *Being six feet tall* and *being in pain* are categorical properties that aren't modal properties.

Even so, a bit of awkwardness still remains. Modal properties point beyond their instances and categorical properties do not. Thus, *having a counterpart who wins* both points beyond its instances and does not point beyond its instances. There is a sense in

¹¹⁹See Sider 2006.

which *having a counterpart who wins* points beyond how Humphrey actually is. It points beyond the actual Humphrey to a non-actual, possible object that is appropriately similar to the actual Humphrey.¹²⁰ But there is also a sense in which the property doesn't point beyond its instances, because it is a categorical property. All properties are categorical, and a certain subset of the categorical properties point beyond their instances. Included in the categorical properties that point beyond their instances are properties having to do with having counterparts that have certain properties. The categorical properties that point beyond their instances are called 'hypothetical properties'. Thus, all hypothetical properties are categorical properties (preserving the identity between them), and there is still a distinction between the hypothetical categorical properties and the non-hypothetical categorical properties.

4.2.3. Reduction as grounding

At this point, some might be worried that Sider is unable to alleviate all of the awkwardness. Some might be worried that reduction can't be understood as identity, since reduction is asymmetric and identity is not. Some might be worried that, if some property *F* is identical with some other property *G*, then there is only one property and no distinction between *F* and *G*, whereas we are interested in maintaining that there can be two distinct properties that stand in a reduction relation. If *F* and *G* are distinct properties and one reduces to another, then they are not identical. For example, there is a distinction between dispositions and categorical properties, but it might turn out that dispositions

¹²⁰To even call a counterpart a 'merely possible object' is to buy in to Lewis's use of words. It is ontologically of a piece with Humphrey, but it just happens to be spatiotemporally unrelated to him. I'm inclined to call such an object an actual object, but I will stick with Lewis's terminology when I'm talking about his view.

reduce to categorical properties. But, if reduction is identity, then one cannot maintain both that there is a distinction between the two types of properties and that they are identical. I, at least, have these worries.

It seems to me that reduction cannot be understood as identity. With identity there is just one thing out there in the world. But the whole point of thinking there is reduction is that there are two things out there in the world and they are related to each other by an asymmetric dependence relation. It seems to me that, to the extent to which we think there is reduction out there in the world, we think there is metaphysical dependence. I am certainly not denying that there is a sense in which identity can be used for “reductions.” It is very useful for conceptual reductions: we think there are two things out there in the world, so according to our ontology there are two things, but we find out that the two are actually the same thing, thus reducing our ontology by one thing. This sort of “reduction” is not what the metaphysician is interested in, however. Reduction is a relation out there in the world; it’s not what happens when we are able to lessen our ontology. Metaphysical dependence is a relation that is instantiated out there in the world among objects or properties. It seems to be a much better candidate for reduction than identity.

What then are we to make of Lewis’s reduction of modal properties to categorical properties? Lewis identifies the property *possibly winning* with the property *having a counterpart who wins*. But there is supposed to be a distinction between these two properties. The former is hypothetical, and thus points beyond its instances, and the latter is categorical, and thus doesn’t point beyond its instances. But a single property cannot both point beyond its instances and not point beyond its instances! What we’re really

after are two distinct properties, one of which points beyond its instances and the other of which does not point beyond its instances, and one reduces to the other. Since they're distinct, they can't be identical. So reduction can't be identity.

I realize that not everyone will be convinced by what I say here. And I realize that my criticisms go against the majority view, at least for the last several decades. I'm more inclined to go with an alternative account of reduction that recognizes the importance of metaphysical dependence. If property *F* metaphysically depends on property *G*, then we say that *F* is *grounded* in *G*. In what follows, I assume that the best way to understand reduction is via grounding.

Talk of grounding has become more popular of late, and there have been several accounts presented (Fine 2001; Schaffer 2009; Rosen 2010) that have been attempts to make the grounding relation respectable (again). Schaffer (2008) thinks that reduction is a dependence relation and that the grounding relation captures that dependence. He takes himself to be following Kit Fine (2001, 26), who suggests "Reduction is to be understood in terms of fundamental reality." Schaffer (2008) elaborates:

As a relation of dependence, the intended notion of reduction may be glossed in terms of *grounding*. What reduces is grounded in, based on, existent in virtue of, and nothing over and above, what it reduces to. What does not reduce is basic, fundamental, and brute. By way of parable: to create what reduces, God would only need to create what it reduces to. In general, to create the world, God would only need to create what is basic. (83)

One gets the impression that this is the sort of relation the Humeans are after, despite spelling it out only via supervenience. Since everything supervenes on the distribution of perfectly natural properties, all God would need to do to create everything is create the perfectly natural properties and the objects that instantiate them.

Another example that Schaffer (2008, 83) is fond of using is a movie's relation to its sequence of frames. All you have to do in order to create the movie is create the sequence of frames. The movie is grounded in the sequence of frames. Schaffer also provides a more philosophically substantive example:

consider the relation between the physical properties, and the mental and moral properties. The physicalist holds that the physical properties are basic, and that the mental and moral properties are grounded in them. According to the physicalist, all God would need to create would be the physical realm. (2008, 83)

This conception of physicalism is in line with Barry Loewer's (2001, 39) description:

"The fundamental properties and facts are physical and everything else obtains in virtue of them."

Gideon Rosen (2010, 122-26) also thinks that there is an important link between grounding and reduction and that identity isn't reduction. For Rosen, reduction is a relation between propositions and grounding is a relation between facts. Thus, roughly, he has it that, if one proposition *P* reduces to another proposition *Q*, then the fact associated with *P* is grounded in the fact associated with *Q*. He makes it clear that reduction is not a relation of identity when he says that "reduction is a relation between distinct propositions" (124). If a reduction relation holds between two distinct propositions, then those propositions are not identical. Furthermore, reduction is asymmetric for Rosen, whereas identity is symmetric.¹²¹

¹²¹The asymmetry in reduction corresponds with explanatory asymmetry. Rosen says, "Fred is a bachelor because (or in virtue of the fact that) he is an unmarried man, but not vice versa" (124). The fact that Fred is a bachelor is explained by the fact that Fred is an unmarried man, but not vice versa. Likewise, the proposition that Fred is a bachelor reduces to the proposition that Fred is an unmarried man, but not vice versa. The asymmetry assures us that the fact that Fred is a bachelor is not identical to the fact that Fred is an unmarried man.

The reduction relation entails a grounding relation, which in turn corresponds with an explanatory relation.¹²² If property *F* reduces to property *G*, then *F* is grounded in *G* and *F* is explained by *G*.¹²³ A property can be *wholly* grounded in another property or only *partially* grounded in another property. Likewise, a property can be (individually) partially grounded in several distinct properties and (collectively) wholly grounded in all of them. Thus, the reductionist has it that a kind of hypothetical property is wholly grounded in categorical properties. For example, in order to wholly reduce dispositions, they must be wholly grounded in categorical properties. On the other hand, one could partially reduce a disposition by partially grounding it in categorical properties without its being wholly grounded in categorical properties.

Grounding enables us to make better sense of reduction and eliminate the awkwardness that those who take reduction to be identity are saddled with. Suppose we start with Lewis's ontology and then add metaphysical dependence. Having a modal property depends on having the right sort of counterpart. That is to say that having a modal property is grounded in having the right sort of counterpart. The hypothetical property *possibly winning* is grounded in the categorical property *having a counterpart who wins*. Grounding allows us to maintain that these properties are distinct: the former points beyond its instances and the latter does not. *Possibly winning* points beyond Humphrey, since it tells us how Humphrey could have been, but *having a counterpart who wins* doesn't point beyond Humphrey, since it tells us merely that he stands in a similarity relation to a distinct spatiotemporally unrelated object that wins an election.

¹²²Even if reduction were understood as supervenience, I take it that the supervenience relation isn't explanatory.

¹²³Explanation does not factor prominently in this dissertation.

Grounding delivers the result we want, because it allows that there are two distinct properties and one reduces to the other. This is exactly what the reductionist needs, since she is attempting to reduce hypothetical properties, which point beyond their instances, to categorical properties, which don't point beyond their instances.

Of course, one might not think, even given Lewis's ontology, that *possibly winning* is grounded in *having a counterpart who wins*. One might think that having a counterpart who wins doesn't have anything to do with how Humphrey could be. This line of reasoning is known as the *Humphrey objection*.¹²⁴ This is not a strike against grounding but rather a strike against Lewis's reduction. If no categorical properties can be found on which hypothetical properties depend, one will opt for hypothetical primitivism or eliminativism. Since I take it that there are dispositions, if there aren't categorical properties that wholly ground dispositions, then I'll take dispositions as primitive.

Maintaining there is a grounding relation does come at a cost, however. While it is true that positing a grounding relation goes against a substantial and ubiquitous tradition and while it is true that some find grounding incoherent (Lewis (1983) eschews notions of ontological priority as "dubious"¹²⁵), the real cost lies elsewhere. Grounding must be paid for with the coin of ideology.¹²⁶

¹²⁴See Kripke 1980, 45, n. 13

¹²⁵Lewis touts the advantages of supervenience: he describes it as a "stripped down form [of] reductionism, unencumbered by dubious denials of existence, claims of ontological priority, or claims of translatability" (1983, 358).

¹²⁶See Bennett 2011 on grounding grounding.

In what follows, I take reduction to be grounding, but in order to be charitable to my opponents, occasionally I'll consider what happens if we take reduction to be identity instead.

4.3. Dispositions and Reduction

We have seen that there is a sense in which Humeanism is reductive, at least for certain properties, supposing that a grounding relation is taken on board. Contingent, categorical, non-perfectly natural properties at a time are grounded in the actual perfectly natural properties at that time. In order to account for tensed properties, we must expand our ontology across time, becoming four-dimensionalists. That way the contingent, categorical non-perfectly natural properties along with tensed properties are grounded in the actual perfectly natural properties distributed throughout four-dimensional spacetime. That is how we can reduce tensed properties. Such a strategy, however, doesn't help us reduce the other hypothetical properties: modal properties, counterfactual properties and dispositions. Supposing that dispositions are akin to modal and counterfactual properties, in order to reduce all three, we need counterparts, possible worlds and similarity relations. With such resources, the remaining hypothetical properties can be grounded in properties having to do with counterparts, possible worlds and similarity relations.¹²⁷

If I'm right about this, then any view that attempts to completely reduce dispositions to actual categorical properties is mistaken. Either the view will suffer from misidentifying what dispositions are, or it will suffer from failing to reduce dispositions, or both. If either of the standard views is reductive, it will be because dispositions are

¹²⁷I take it that, without the counterparts and worlds, Lewis would have to take modal properties, counterfactual properties and dispositions as somehow primitive.

reduced to categorical causal bases.¹²⁸ Insofar as categorical causal bases are actual properties, this means that the standard views will either fail to reduce dispositions to categorical properties or misidentify what dispositions are. As it turns out, I think that the standard views fail on both counts.¹²⁹

I had been familiar with Lewis's view of modal properties for some time before I began reading about dispositions. It seemed to me to be quite obvious that dispositions were akin to modal and counterfactual properties. Given a successful conditional analysis of dispositions, it seemed obvious to me that Lewis would treat dispositions in the same way as he treats counterfactual properties: reducing them with counterparts and possible worlds. I was shocked to find out that that was not his view. The reduction seemed straightforward. You have the disposition, the conditional analysis that connects the disposition with a counterfactual property and an account of counterfactual properties that connects them with counterparts and possible worlds.

Instead of treating dispositions like counterfactual properties, Lewis commits himself to one of the standard views. As a Humean, his view must be reductive, and as committed to one of the standard views, the way of reduction apparently lies via categorical causal bases. As we'll see in Chapter Five, this spells trouble for Lewis. Lewis (1997, 152) not only explicitly avoids saying what the distinction is between dispositions and categorical properties, but he also explicitly avoids saying what dispositions are.¹³⁰ I believe I can explain why that is. As we have seen with

¹²⁸Presumably their reduction must be understood as identity here.

¹²⁹This Chapter will focus on the standard views' failure to reduce dispositions, while Chapter Five will focus more on the standard views' misidentifying what dispositions are.

¹³⁰See Chapter Five §5.3 for more on this criticism of Lewis's view.

Humeanism and reduction, if one attempts to reduce dispositions to actual categorical properties, one will have either failed to reduce them or misidentified what they are. Lewis refrains from saying what the distinction is between dispositions and categorical properties (a distinction that is needed in order to reduce dispositions to categorical properties), and he refrains from saying what dispositions are.¹³¹ These are the very two problems that one faces when one attempts to reduce dispositions to actual categorical properties. Had Lewis gone with counterfactualism—treating dispositions as counterfactual properties and reducing them with counterparts and possible worlds—he would have had no problem maintaining a distinction between dispositions and categorical properties and saying what dispositions are.

The moral of the story for me is that hypothetical properties are unique and difficult to account for. They don't come easy, and they are not cheap. They are difficult to reduce. Positing infinitely many worlds that are ontologically of a piece with our own but spatiotemporally unrelated is an extreme measure, but apparently that is what is required to reduce modal, dispositional and counterfactual properties (supposing the reduction succeeds).¹³² Hypothetical properties are expensive and must be paid for in one way or another.

I take it that all of this shows that counterfactualism is the superior account of dispositions. The argument comes in two stages. This Chapter will cover the first stage and Chapter Five will cover the second. In this Chapter we'll see that the standard views and metaphysical functionalism don't have a reductive advantage over counterfactualism.

¹³¹ Although Lewis (1997) does tentatively endorse causal functionalism.

¹³² I'm restricting my focus to Lewis's reductive account here.

There are no other putative advantages that I am aware of that the alternative views might enjoy. In Chapter Five we'll see that counterfactualism enjoys some advantages over the standard views and metaphysical functionalism.

4.4. The Standard Views and Reduction

We are assuming the proportional conditional analysis. In Chapter Three we saw what dispositions are for the standard views, given the proportional conditional analysis. Now we need to determine whether these views are reductive. I claim that the standard views are not completely reductive. Thus, they have no reductive advantage over counterfactualism.

What I say in this section and in §4.6 bares several similarities to McKittrick 2009. However, we approach similar issues with different frameworks and with different points of emphasis. I will reference specific similarities along with way, and I'll also note important differences. McKittrick (2009, 31) argues that "dispositions are not reducible to causes." More precisely, I take it that she thinks that dispositions are not reducible to *actual* causes, since she thinks that, at best, dispositions are reducible to would-be causes (2009, 36). Would-be causes are events that would be a cause of another event, were certain things to happen. However, she seems to be skeptical that dispositions reduce even to would-be causes since she is skeptical that a successful conditional analysis can be provided (2009, 42-44).

McKittrick, in arguing that dispositions don't reduce to causes, is primarily concerned with reducing properties to events (or possibly objects) (2009, 31). I'm exclusively concerned with reducing properties to other properties. She understands

metaphysical reduction with supervenience and takes supervenience to be a necessary condition for reduction but not a sufficient condition (2009, 32-33). I take reduction to be a matter of grounding. For the most part she is not concerned with reducing hypothetical properties to categorical properties, but she does say that Lewis can “ultimately reduce causes and dispositions to categorical properties in possible worlds” (2009, 42), and she considers whether dispositions reduce to “non-dispositional” causal bases (2009, 49-57). I’m concerned with reducing hypothetical properties to categorical properties.

Recall that advocates of the standard views are committed to the four causation assumptions.¹³³

- (CA1) There is a causal relation between events.
- (CA2) All manifestation events are caused.
- (CA3) For every manifestation event there is a property of the disposed object that plays a causal role in bringing about that manifestation.
- (CA4*) Only properties of disposed objects that aren’t too unnatural can play causal roles in bringing about the manifestation.

Presumably (PCAD) and the causation assumptions are taken to hold as a matter of necessity. That means that those who accept the standard views are also committed to the necessity of both (PCA-CB) and (PCAD-CB). For any object x and any disposition D with stimulus condition S and manifestation M , there is an intrinsic property B such that

- (PCA-CB) x is disposed to manifest M when subject to S iff x has B and, were x subject to S , x ’s having B and being subject to S would jointly be an x -complete cause of x ’s manifesting M in some suitable proportion of S -cases.
- (PCAD-CB) x has D iff x has B and, were x subject to S , x ’s having B and being subject to S would jointly be an x -complete cause

¹³³See Chapter Three §3.2.2 and §3.3.

of x 's manifesting M in some suitable proportion of S -cases.

The identity theorist goes on to say that a disposition just is its causal basis, and the causal functionalist says that a disposition just is the property *having a causal basis*. Are the standard views reductive, since they reduce dispositions to causal bases or the property *having a causal basis*? Suppose the identity theorist claims that causal bases are categorical properties and the causal functionalist claims that the property *having a causal basis* is a categorical property. That way, in both cases, they are identifying dispositions with categorical properties, and thus reducing dispositions.

The first thing to say in response is that it is not obvious that causal bases and the property *having a causal basis* are categorical properties. Presumably some causal bases could be hypothetical properties, since some could themselves be dispositions. For example, if a causal basis for fragility is some particular molecular bonding, then, as David Armstrong says, "To talk of molecular *bonding* is surely to talk again in terms of dispositions of bonded things" (1973, 13; his emphasis). It seems plausible, then, that at least some causal bases for certain dispositions will be hypothetical properties, and if so, then the identity theorist's and causal functionalist's projects will not be reductive. But of course the dispositions that are causal bases might have causal bases that are not dispositions and so, eventually, it might turn out that all the fundamental causal bases are categorical properties. That is at least an open possibility for the two views.¹³⁴ And I'm willing to grant the possibility for the sake of argument.

¹³⁴On the other hand, there might be dispositions "all the way down" (see Blackburn 1990, 63).

The standard views that adopt (PCA) are committed to *CB-role*. For any disposition with stimulus condition *S* and manifestation *M*, *CB-role* is the property *being a property P such that, for any object x that has P, P is intrinsic to x, and were x subject to S, x's having P and being subject to S would jointly be an x-complete cause of x's manifesting M in some suitable proportion of S-cases.*¹³⁵ *CB-role* is a second-order property, but more than that, it is a counterfactual property, which is a type of hypothetical property.

Suppose a fragile glass has some structural property *F*. And suppose that *F* plays the *CB-role* for fragility, that is, *F* has *CB-role*. *F* is a *CB-realizer* in virtue of having *CB-role*. For *CB-role* to count as a hypothetical property, it must point beyond its instances. But since *CB-role* is a second-order property, it is instantiated by properties. The glass instantiates *F*, and *F* instantiates *CB-role*. *CB-role* is a hypothetical property because it points beyond *F* by telling us something more than how *F* actually is. It tells us that, were *F* combined with striking, it would causally contribute to the glass's breaking.

This means that neither the identity view nor causal functionalism provides a complete reduction of dispositions to categorical properties. They will always be committed to a second-order hypothetical property. While the standard views can reduce

¹³⁵My claim here is related to something McKittrick (2009) says. She considers whether “*x* is disposed to cause a type of event iff *x* has a property *F* which is such that *F* would cause (or would be causally relevant to) that type of event in certain circumstances” (2009, 36; she says that Johnston 1992, 229 discusses a similar account). She thinks that, at best, this will enable a person to reduce dispositions to would-be causes. The big difference between us, however, is that while she is skeptical of whether we can provide a successful conditional analysis (2009, 44), I assume that (PCA) is the correct conditional analysis. It's also worth noting that she considers only (LCA) and not (PCA).

dispositions to categorical properties, they do so at the expense of being committed to other hypothetical properties.

The standard views are even less reductive than this. Since the standard views accept (PCAD-CB), they are also committed to the counterfactual property associated with it.¹³⁶ For any object with a disposition with stimulus condition *S* and manifestation *M* the object has the counterfactual property *being an x such that x has an intrinsic property B such that were x subject to S, x's having B and being subject to S would jointly be an x-complete cause of x's manifesting M in some suitable proportion of S-cases*.¹³⁷ It is yet another hypothetical property that must be reduced if they want their views to be completely reductive. And thus neither of the standard views has a leg up on counterfactualism regarding reduction.

4.5. Metaphysical Functionalism and Reduction

In Chapter Three we saw another view of dispositions that is closely related to the standard views, namely metaphysical functionalism. Let's assume that for any object *x* and any disposition *D*,

(D-MB) *x* has *D* iff *x* has some property *B* that is the *x*-complete metaphysical basis for *D*.¹³⁸

¹³⁶It is an interesting question whether advocates of the standard views should think that (PCAD) or (PCAD-CB) is *the* conditional analysis. That is not a question that needs to be answered here, however. The standard views are committed to the counterfactual properties that are associated with both (PCAD) and (PCAD-CB).

¹³⁷As stated in Chapter One, I'm assuming that, if a person is committed to the truth of, for example, "if it were the case that this kangaroo didn't have a tail, then it would be the case that this kangaroo would topple over," then she is committed to the instantiation of a corresponding counterfactual property: *being an x such that if x had no tail, x would topple over*.

¹³⁸Recall that this is the link between *dispositions* and their *metaphysical bases*.

And let's also assume that all metaphysical bases are categorical properties. According to metaphysical functionalism a disposition is the property *having a metaphysical basis* for the disposition in question. As we have seen, there is good reason to think that a disposition is not wholly grounded in its metaphysical basis, since hypothetical properties like dispositions, counterfactual properties and modal properties don't reduce to the actual perfectly natural properties. Thus, there doesn't seem to be much reason to think that metaphysical functionalism is a reductive view. At best, metaphysical bases can help partially ground dispositions.¹³⁹

However, even if metaphysical functionalism is reductive, it has no reductive advantage over counterfactualism.¹⁴⁰ If dispositions are wholly grounded in categorical metaphysical bases, then the counterfactual properties that counterfactualists identify with dispositions are wholly grounded in categorical metaphysical bases. And counterfactualism would be a reductive view.

4.6. Making Counterfactualism and the Standard Views Reductive

As we have seen, neither the standard views nor counterfactualism are reductive views. But what would it take to make them reductive? One would need a reductive account of modality that is able to reduce both first- and second-order counterfactual properties. Lewis's (1986a) account is the most prominent and most complete account that I'm

¹³⁹While McKittrick (2009) thinks that, at best, dispositions reduce to would-be causes, it is worth pointing out that using metaphysical bases (which she doesn't consider) is a possible way of avoiding would-be causes. But, so long as one accepts the causation assumptions, metaphysical bases will still have *CB-role*, a second-order counterfactual property.

¹⁴⁰It seems to me that it is more plausible to ground dispositions in certain properties of the disposed object, properties of the laws of nature and properties of the environment. I briefly address these issues in Chapter Five §5.5.2. It still turns out that metaphysical functionalism has no reductive advantage over counterfactualism.

aware of.¹⁴¹ Let's suppose that Lewis's account is successful. I claim that with it, we can make both counterfactualism and the standard views reductive.¹⁴² It is my contention that the point generalizes: any given reductive account of modality that can make the standard views reductive, can also make counterfactualism reductive. I won't argue for this contention here, however. It will have to suffice for me to show how Lewis's account can be used to make them both reductive.

If counterfactualism and the standard views can all be made reductive given a reductive account of modality, then that lends support to my claim that the standard views have no reductive advantage over counterfactualism. Whichever reductive account of modality the advocates of the standard views prefer to make their views reductive, the counterfactualist could use the same account to make their views reductive.

4.6.1. Counterfactualism

We saw in Chapter Two that (PCA) is the best candidate for a conditional analysis. The best counterfactualist position will be the one that adopts (PCA). Recall that, for any object x and any disposition D with stimulus condition S and manifestation M ,

¹⁴¹There are other reductive accounts, for example Heller 1998. Heller, following Quine, provides a set-theoretical account of possible worlds and counterparts. A world is a set of ordered pairs, the first member of which is an ordered quadruple that represents a particular point in space-time. The second member of the ordered pair is a set that represents a property so that "a different set represents each property that can be exemplified at a point in space time" (Merricks 2003, 527). Worlds represent things as being a certain way, and they represent things as being a certain way because we use them to do so. Modal claims can thus be analyzed in terms of the possible worlds. Humphrey's possibly winning is analyzed by Heller as Humphrey being represented as winning in some possible world. Counterfactuals could be analyzed with the set-theoretic counterparts, possible worlds and similarity relations.

I'm inclined to agree with Merrick's (2003) criticism of such accounts, however. At any rate, for the purpose of this Chapter, I will use Lewis's reductive account. But I take it that I could make the same basic point—that the standard views have no reductive advantage over counterfactualism—regardless of which reductive account one chooses to use.

¹⁴²It's worth pointing out that McKittrick (2009) isn't concerned with this project at all.

- (PCA) x is disposed to manifest M when subject to S iff x would manifest M in some suitable proportion of S -cases.

According to the counterfactualist, a disposition with stimulus condition S and manifestation M is the counterfactual property *being an x such that x would manifest M in some suitable proportion of S -cases*. Obviously this is a hypothetical property, so it must be reduced to one or more categorical properties. What we need is a general way of reducing counterfactual properties. Lewis (1973; 1986) provides the most plausible reductive account that I'm aware of.

In his *Counterfactuals*, Lewis (1973) gives an analysis of counterfactuals. For example,

- (3) If kangaroos had no tails, they would topple over.

is analyzed roughly as follows: all the possible worlds that are as similar as possible to our own in which kangaroos have no tails are possible worlds in which they topple over.

Lewis introduces a counterfactual conditional operator, ' $\Box \rightarrow$ ', to be read as "If it were the case that ____, then it would be the case that" Using the operator we can formalize

(3) as

- (4) Kangaroos have no tails $\Box \rightarrow$ Kangaroos topple over.

Now consider another of Lewis's examples:

- (5) If the winner had not bribed the judge, then he would not have won.

As Lewis points out, by this we don't mean

- (6) The winner did not bribe the judge $\Box \rightarrow$ The winner did not win.

What (6) says is that all the nearby worlds in which the winner didn't bribe the judge are also worlds in which the winner didn't win. But this is certainly false (assuming there are

worlds in which the winner doesn't bribe the judge), since there are no worlds in which the winner fails to win. What is needed is a *de re* property of the winner expressed by the formula

$$(7) \quad x \text{ did not bribe the judge } \Box \rightarrow x \text{ did not win.}$$

We are interested in what would happen to the actual winner of the race, not in what would happen to whoever satisfies the description 'winner of the race'.

Lewis offers the following symbolization of the claim that there was at least one Roman emperor who, if only he had had gunpowder, would have conquered all of Europe:

$$(8) \quad (\exists x)(Rx \ \& \ (Gx \ \Box \rightarrow Cx)).^{143}$$

Lewis goes on to formalize the claim that an object has a disposition *D* if and only if, when it is subject to stimulus conditions *S*, it would give manifestation *M*:

$$(9) \quad (\forall x)(Dx \equiv (Sx \ \Box \rightarrow Mx)).^{144}$$

Notice that (9) is just (SCAD) symbolized.¹⁴⁵

Generally speaking we are interested in the formula $\lceil \varphi_x \Box \rightarrow \psi_x \rceil$, where both φ_x and ψ_x are open formulas with '*x*' as a free variable. What is important for our purposes

¹⁴³Let *R* be 'is a Roman emperor'; let *G* be 'has gunpowder'; and let *C* be 'conquers all of Europe'.

¹⁴⁴Let *D* be 'is a disposition'; let *S* be 'undergoes the stimulus condition for the disposition in question'; and let *M* be 'gives the manifestation for the disposition in question'. This goes against my typical use of the letters '*D*', '*S*' and '*M*'. Throughout the dissertation I have used these letters as variables where '*D*' has as values dispositions, '*S*' has as values stimulus conditions, and '*M*' has as values manifestations.

¹⁴⁵Recall that (SCAD) says that, for any object *x* and any disposition *D* with stimulus condition *S* and manifestation *M*, *x* has *D* if and only if *x* would manifest *M* if *x* were subject to *S*. Lewis notes, however, that he is inclined to think that (SCAD) is false but that he can still say what someone who asserts (SCAD) means (1973, 38). But why does Lewis think (SCAD) is false? After all, Lewis claimed (SCAD) was false in 1973, and Martin didn't publish his paper criticizing (SCA) until 1994. The answer, I suspect, is that Martin's counterexamples to (SCA) were already known to Lewis when he wrote *Counterfactuals*. He says (1997, 143) at the beginning of "Finkish Dispositions" that Martin's refutation of (SCA) had "long been a matter of folklore—I myself learned of it from Ian Hunt in 1971—but now it has belatedly appeared in print."

is saying what the satisfaction conditions for $\lceil \varphi_x \Box \rightarrow \psi_x \rceil$ are. The satisfaction conditions will tell us how to interpret sentences like (SCAD).

Lewis gives the satisfaction conditions for $\lceil \varphi_x \Box \rightarrow \psi_x \rceil$ using counterparts and possible worlds. He gives several reasons for using counterparts, many of which are the same as the reasons for which he uses counterparts in his account of *de re* modal properties.¹⁴⁶ Before giving the technical account of the satisfaction conditions, let's consider an example.

(10) If Jones were an honorable man, he would confess.

First, we must account for the case in which (10) is a counter-possible, the case in which there is no possible world in which Jones is an honorable man. Counter-possibles, where the antecedent is necessarily false, are vacuously true for Lewis (1973, 24-26). Second, we must account for the case in which Jones has multiple counterparts in nearby possible worlds (perhaps even multiple counterparts in a single world). It needs to be the case that all of Jones's counterparts in these worlds who are honorable also confess. Let's call the nearby worlds we're interested in the *accessible worlds*. Combining these considerations, Lewis gives the satisfaction conditions for $\lceil \varphi_x \Box \rightarrow \psi_x \rceil$ at some world relative to a set of accessible worlds Γ ordered by some similarity relation:

something satisfies $\lceil \varphi_x \Box \rightarrow \psi_x \rceil$ at a world α (relative to a set of accessible worlds Γ ordered by some similarity relation) iff either

- (i) at no world w in Γ does it have a counterpart that satisfies φ_x at w , or
- (ii) there is at least one world w in Γ such that some counterpart of it at w satisfies φ_x at w , and every counterpart of it at any world w^* in Γ that is at least as similar to α as w is to α also satisfies ψ_x at w^* .¹⁴⁷

¹⁴⁶See Lewis 1973, 40-41. He mentions several reasons; I'll mention one: the counterpart relation avoids the problems created by transworld identity and allows for flexibility.

¹⁴⁷See Lewis 1973, 42, 49.

Condition (i) covers the case where the formula is vacuously true when the antecedent is impossible. The first conjunct in (ii) requires that there is an accessible world in which the antecedent is true. In our example it means that Jones has at least one counterpart in an accessible world who is honorable. The second conjunct in (ii) requires that every counterpart of Jones in accessible worlds that are at least as similar to the actual world as the one in which Jones's counterpart is honorable is to the actual world also confesses. The set Γ of accessible worlds that is relevant can vary depending on the context.

Recall from Chapter Two that the first step in providing an analysis of dispositions is to say how an object's having a disposition is related to the stimulus condition and the manifestation.

STEP ONE Connect dispositions with manifestations and stimulus conditions.

Following Lewis (1997, 151), we can state an instance of STEP ONE. Let's say that, for any object x and any disposition D , there is a stimulus condition S and a manifestation M such that

(LSO) x has D iff x is disposed to manifest M when subject to S .

This is *Lewis's step one*. And recall that the second step is to connect the right-hand side of (LSO) with a counterfactual.

STEP TWO Connect manifestations and stimulus conditions with counterfactuals.

STEP TWO involves completing the open sentence " x is disposed to manifest M when subject to S iff ..." with a sentence that expresses a counterfactual. We are assuming the *proportional conditional analysis* is correct, and it is an instance of STEP TWO. We can begin by combining the left-hand side of (LSO) with the right-hand side of (PCA) to get

(PCAD).¹⁴⁸ Recall that, for any object x and any disposition D with stimulus condition S and manifestation M ,

(PCAD) x has D iff x would manifest M in some suitable proportion of S -cases.

(PCAD) is a consequence of (LSO) and (PCA) and provides an analysis of having a disposition.

We can now use Lewis's account of *de re* counterfactual properties to state satisfaction conditions for the right-hand side of (PCA) with counterparts and a set of accessible worlds Γ . This is

STEP THREE Connect counterfactuals with counterparts and possible worlds.

The interpretation of any counterfactual is going to be at a world relative to a set of accessible worlds.¹⁴⁹ For Lewis, we get that, for any object x and any disposition D with stimulus condition S and manifestation M ,

(PCA-Step 3) x would manifest M if x were subject to S at a world α (relative to a set of accessible worlds Γ ordered by some similarity relation) iff either

- (1) at no world w in Γ does x have a counterpart that is subject to S at w , or
- (2) there is at least one world w in Γ such that a counterpart of x is subject to S at w , and a suitable proportion of x 's counterparts in Γ that are subject to S also manifest M .

Furthermore, (LSO) and (PCA-Step 3) entail (PCAD-Step 3). For any object x and any disposition D with stimulus condition S and manifestation M ,

¹⁴⁸Recall that (PCAD) is what the *proportional conditional analysis* says about what it is to have a *disposition*, given (LSO).

¹⁴⁹This seems to be assumed by Lewis (1973, 38).

- (PCAD-Step 3) x has D at a world α (relative to a set of accessible worlds Γ ordered by some similarity relation) iff either
- (1) at no world w in Γ does x have a counterpart that is subject to S at w , or
 - (2) there is at least one world w in Γ such that a counterpart of x is subject to S at w , and a suitable proportion of x 's counterparts in Γ that are subject to S also manifest M .

According to the counterfactualist, a disposition with stimulus condition S and manifestation M is the counterfactual property *being an x such that x would manifest M in some suitable proportion of S -cases*. Given our understanding of reduction, this means that a disposition with stimulus condition S and manifestation M is grounded in the property *being an x such that a suitable proportion of counterparts of x in nearby worlds that are subject to S also manifest M* .

4.6.2. The standard views

As we have seen, the standard views are not completely reductive on their own, since they are committed to both a first-order and a second-order counterfactual property. We have seen that, supposing the success of Lewis's modal reduction, counterfactualism can be made reductive. I claim that, using the same resources, the standard views can also be made reductive. I believe the point generalizes (although I won't argue for it here): any reductive account of modality that makes the standard views reductive, will also make counterfactualism reductive. This lends support to my claim that the standard views have no reductive advantage over counterfactualism.

Let's begin by reducing the first-order property to counterparts and possible worlds and then we'll see that the second-order property can be reduced using the same resources. We first start with STEP THREE for (PCA-CB). Using the same reasoning as

above, we'll eventually end up with (PCAD-CB-Step 3). For any object x and any disposition D with stimulus condition S and manifestation M ,

- (PCAD-CB-Step 3) x has D at a world α (relative to a set of accessible worlds Γ ordered by some similarity relation) iff either
- (1) at no world w in Γ does x have a counterpart that has a property B and is subject to S at w , or
 - (2) there is at least one world w in Γ such that a counterpart of x has a property B and is subject to S , and a suitable proportion of counterparts of x that have a property B and are subject to S in Γ also manifest M .

The first-order counterfactual property we're concerned with is as follows: for any object with a disposition with stimulus condition S and manifestation M the object has the counterfactual property *being an x such that x has a property B such that were x subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M in some suitable proportion of S -cases*. Given our account of reduction and assuming that there are worlds in which the stimulus condition occurs, this means that this counterfactual property of an object with a disposition with stimulus condition S and manifestation M is grounded in the property *being an x such that a suitable proportion of x 's counterparts that have a property B and are subject to S also manifest M* .

Now let's consider how to reduce the second-order counterfactual property that the standard views are committed to. When reducing first-order properties, we're interested in the counterparts of objects (not properties), but with second-order properties we're interested in the counterparts of properties—the properties that instantiate the

second-order property.¹⁵⁰ Unlike concrete objects, however, properties can be located in different possible worlds.¹⁵¹ For Lewis, the property *being red* is the set of all red objects. The property is located everywhere there is a red object, whether actual or possible. On Lewis's view the very same property *being red* is instantiated in our world and in nearby worlds. Thus, when it comes to properties, a counterpart relation isn't required.

We'll use the same strategy as above and take STEP THREE with the relevant biconditionals. In this case it's (PCA-CB-role). Recall that, for any object x and any disposition D with stimulus condition S and manifestation M and causal basis role *CB-role*, there is a property B such that

(PCA-CB-role) x has B and B has *CB-role* iff B is an intrinsic property of x and, were x subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M in some suitable proportion of S -cases.

Using the same reasoning as above, we'll end up with (CB-role-Step 3). For any object x , any property B and any disposition with stimulus condition S and manifestation M

(CB-role-Step 3) B is a property of x and, were x subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M in some suitable proportion of S -cases at a world α (relative to a set of accessible worlds Γ ordered by some similarity relation) iff either

- (1) at no world w in Γ is B instantiated by an object that is subject to S at w , or
- (2) there is at least one world w in Γ such that B is instantiated by an object that is subject to S , and a suitable proportion of objects that instantiate B and are subject to S in Γ also manifest M .

¹⁵⁰I'm assuming that the properties in question are *de re* counterfactual properties.

¹⁵¹See Lewis 1986a, 50.

For any object x with a disposition with stimulus condition S , manifestation M , and with property B that has *CB-role*—ignoring worlds in which B is not instantiated or not instantiated by an object that is subject to S —*CB-role* is grounded in the property *being a property P such that, for any possible objects xx that have P , a suitable proportion of xx that are subject to S also manifest M* . Thus, we see that, given the success of Lewis’s reductive account of modality, both counterfactualism and the standard views can be made reductive.¹⁵²

4.7. Morals

We have assumed that some conditional analysis is correct. As it turns out, accepting a conditional analysis has important implications for reducing dispositions. Everyone who accepts a conditional analysis is committed to the counterfactual property that comes from the right-hand side of the conditional analysis. Without a way of reducing counterfactual properties, a view that accepts the conditional analysis is non-reductive. We have seen that Lewis’s account of modality, supposing it is successful, provides the resources for reducing counterfactual properties. The standard views are also committed to second-order counterfactual properties.¹⁵³ For the standard views to be completely reductive they must reduce both the first- and second-order counterfactual properties.

¹⁵²McKittrick (2009, 42-44), after describing how Lewis could reduce “causes and dispositions to categorical properties in possible worlds,” goes on to criticize his potential reduction on three grounds. She thinks that “(1) It assumes that all dispositions have causal bases and (2) that these causal bases are intrinsic; and (3) it does not address the masking counterexamples” (2009, 42). I agree with McKittrick about (1) (see Chapter Five §5.6). While I don’t think we need to take causal bases to be intrinsic properties (see Chapter Three §3.3), I do think there is a worry for the standard views in the vicinity (see Chapter Five §5.5). The third problem is avoided by using (PCA).

¹⁵³Counterfactualists who accept causal bases are also committed to these second-order counterfactual properties.

We have seen that Lewis's modal resources are able to reduce these second-order counterfactual properties as well.

The moral is that, with a way of reducing counterfactual properties, both counterfactualism and the standard views are reductive, but without a way of reducing counterfactual properties, neither counterfactualism nor the standard views are reductive. A way of reducing counterfactual properties is not part of any of the views. Rather, ways of reducing such properties represent additional commitments. As a result, the standard views have no reductive advantage over counterfactualism.

I suppose this result really shouldn't be surprising. Dispositions are hypothetical properties and hypothetical properties are difficult to reduce. We've seen the lengths that Lewis goes to in order to reduce them. In order to reduce tensed properties, Lewis posits the existence of all times, a substantial ontological commitment. However, such a strategy doesn't seem to help with the modal, counterfactual and dispositional properties. Instead, he needs counterparts, possible worlds and similarity relations to account for modal and counterfactual properties. Since dispositions seem to be closely related to modal and counterfactual properties, it should come as no surprise that counterparts, possible worlds and similarity relations are required to reduce dispositions as well. We shouldn't be surprised that any putative reduction that doesn't use such resources isn't actually reductive.

The trouble with the standard views is that they attempt to reduce dispositions to the distribution of actual perfectly natural properties. I said above that those who try to reduce dispositions to the distribution of actual perfectly naturally properties will either misidentify what dispositions are or fail to reduce them, or both. This Chapter shows

how they fail to reduce them (without additional commitments). The next will attempt to show that they also misidentify them.

Chapter 5 Advantages for Some

In the previous Chapter we saw that the standard views and metaphysical functionalism have no advantage over counterfactualism. It seems to me that counterfactualism is the more natural view (section 5.1). If counterfactualism is *prima facie* correct and the alternative views don't have any advantage over counterfactualism, then that gives us a reason to be counterfactualists. However, I also think that counterfactualism enjoys some advantages over the alternative views. This Chapter will examine each in turn. In sections 5.2, 5.3 and 5.4 we'll see that counterfactualism is more easily able to say what dispositions are and what the distinction between dispositions and categorical properties comes to. In section 5.5 we'll examine a difficulty that lawfully extrinsic dispositions raise for the alternative views, and in section 5.6 we'll see that the counterfactualist has the advantage of not needing to think that all dispositions have bases. In the end, I hope it becomes clear that counterfactualism is the better account of what dispositions are.

5.1. The Natural Place to Start: Counterfactualism

The natural place to start when talking about what dispositions are is the conditional analysis. Even David Lewis (1997), who is committed to one of the standard views, starts with the conditional analysis. As we saw in Chapter Two, the *proportional conditional analysis of dispositions* from Manley and Wasserman 2008 is the best

conditional analysis going. For any object x and any disposition D with stimulus condition S and manifestation M

(PCAD) x has D iff x would manifest M in some suitable proportion of S -cases.

I'm assuming that everyone accepts the conditional analysis, and I'm also assuming that accepting the conditional analysis includes accepting a counterfactual property as well, namely the one that comes from the right-hand side of the conditional analysis. An object with a disposition with stimulus condition S and manifestation M has the counterfactual property *being an x such that x would manifest M in some suitable proportion of S -cases*. It is clear from (PCAD) that every object with a disposition also has the corresponding counterfactual property. For example, every fragile object has the property *being an x such that x would break in some suitable proportion of striking cases*. When it comes to saying what dispositions are, the natural place to start is to say that the disposition just is the counterfactual property. For example, fragility just is the property *being an x such that x would break in some suitable proportion of striking cases*.

Everyone is committed to the conditional analysis and the corresponding counterfactual property, and all disposed objects have such a counterfactual property. The simplest and most straightforward thing to do is identify them. It is certainly not surprising that an *analysis* of a property tells us what that property *is*.

According to the standard views, causal bases are essential to what dispositions are, and according to metaphysical functionalism, metaphysical bases are essential to what dispositions are. However, it is not at all obvious that all disposed objects have a

basis. That is a thesis that must be argued for.¹⁵⁴ Lewis (1997, 149), in arguing for his conditional analysis, says the following on the issue,

Prior, Pargetter and Jackson have argued convincingly for the thesis that all dispositions must have causal bases. Let us assume this. Or at any rate, let us agree to set aside baseless dispositions, if such there be. Our goal, for now, is a reformed conditional analysis of based dispositions.

Those who are committed to the standard views or metaphysical functionalism must assume that all dispositions have bases or must argue that all dispositions have bases, but it is an advantage not to have to. If advocates of the standard views and metaphysical functionalism merely give an account of based dispositions and there are baseless dispositions, then they'll be forced to provide a disjunctive account of dispositions in general.

One is committed to the counterfactual property counterfactualists identify dispositions with by accepting the conditional analysis. But in order to accept one of the standard views or metaphysical functionalism, one must make an additional claim that all disposed objects have bases. I take it that this gives some reason to think that counterfactualism is the more natural starting point when thinking about what dispositions are. And, insofar as the possibility remains that some dispositions have no bases, I take it as a clear advantage for counterfactualism. (More on this below.)

The conditional analysis is important for saying what dispositions are. Not only is everyone committed to the counterfactual property that comes from the right-hand side of the conditional analysis, but the property seems important when it comes to saying what dispositions are. Counterfactualism recognizes this, while the standard views and

¹⁵⁴See Prior, Pargetter and Jackson's (1982) argument that all dispositions have causal bases. Also see McKittrick 2003a.

metaphysical functionalism do not. The counterfactualist identifies dispositions with counterfactual properties, while the standard views and metaphysical functionalism officially don't even acknowledge their existence. I take this consideration to count in favor of counterfactualism.¹⁵⁵

5.2. No Need to Make Much of the Distinction between a Disposition and Having a Disposition

The key insight of counterfactualism is that the conditional analysis tells us what dispositions are. Adherents of the standard views deny that.¹⁵⁶ One can adopt a conditional analysis without saying what dispositions are, according to the standard views. In fact, that is exactly what Lewis (1997) does. Lewis is interested in providing a conditional analysis, but he is hesitant to say what dispositions are.

Lewis makes it clear that, on his view, the conditional analysis by itself is not enough to say what dispositions are. The chief aim of Lewis's paper is to provide a conditional analysis, which is required for reducing dispositions. He states that the aim of his paper is not to give an account of what dispositions *are*. Rather his aim is merely to say what it is to *have* a disposition. He writes,

Our plan is to answer one question without getting entangled in another. The question we want to answer is 'What is it to *have* such and such a disposition (as it might be, the disposition to break if struck)?'. The question we want to leave unsettled is 'What *is* a disposition?'. (1997, 151; his emphases)

So for the standard views the conditional analysis, by itself, doesn't tell us what dispositions are. By itself, it tells us only what it is to have a disposition. With the

¹⁵⁵ At least in the case of Lewis, the reason he doesn't mention counterfactual properties when discussing dispositions is not that he doesn't think there is such a property. Not only does Lewis (1973) admit counterfactual properties, he has an account of them.

¹⁵⁶ I focus on showing the advantage counterfactualism has over the standard views in §§5.2-5.4. However, much of what I say can be applied to metaphysical functionalism.

conditional analysis in hand, Lewis thinks that one can go on to say what dispositions are, if one so chooses. Dispositions are either causal bases or the property *having a causal basis*.

It's preferable if the conditional analysis tells us what dispositions are. Our account will be simpler, and we'll achieve our goal more quickly. It strikes me as odd that Lewis puts so much weight on the distinction between saying what a disposition is and saying what it is to have a disposition. All other things being equal, a view of dispositions that doesn't require putting such weight on the distinction is to be preferred.

But why is it that Lewis thinks it is so important to carefully distinguish the two projects and insisting that the conditional analysis doesn't tell us what dispositions are? As far as I can tell, the best way of answering that question and understanding the standard views in this regard is to consider Lewis's analytic functionalism, which is seen in his account of mental properties.¹⁵⁷ The rough idea can be presented in three stages. Stage one involves specifying the causal role of the target property. The causal role is supposed to be *a priori* and necessary. The second stage is to determine via scientific research which properties play that causal role. This is supposed to be *a posteriori* and contingent. And the third stage is to identify the target property with whichever property plays the causal role. Consider the example of pain. In stage one we specify pain's causal role: perhaps it causes exhibiting certain behaviors in response to certain stimuli. Next, we look to science to tell us which property plays that role: perhaps it is C-fibers firing. Finally we identify pain with C-fibers firing. Notice that in stage one we haven't said what pain is; rather, we have said what it is to be in pain. It isn't until stage three

¹⁵⁷See Lewis 1966; 1972; 1980; 1994a.

that we say what pain is. This means that there is more to saying what pain is than saying what its causal role is.

Notice also that, in stage three, one can either go with the identity view or causal functionalism. The identity view identifies pain with whatever property plays the pain role.¹⁵⁸ Causal functionalism, on the other hand, identifies pain with the property *having a property that plays the pain role*.

Lewis seems to be using a parallel strategy with dispositions. Stage one involves providing the conditional analysis, which supplies the causal role for dispositions. This doesn't tell us what dispositions are; it tells us only what it is to have a disposition. In stage two we empirically determine which properties play the causal role for the disposition in question. And in stage three we identify the disposition either with whichever property plays that role (the identity view) or with the property *having a property that plays that role* (causal functionalism).

I take it that this helps explain why Lewis thinks that the questions "what is a disposition?" and "what is it to have a disposition?" come apart in such an important way. The latter question is answered in stage one but not the former. The former question isn't answered until stage three. This also helps explain why the standard views deny that the conditional analysis, by itself, tells us what dispositions are and yet still hold that the conditional analysis is required for saying what dispositions are. It also helps explain why Lewis thought there were only two possible answers to the question, what is a disposition?

¹⁵⁸Lewis (1994a) adopts the identity view for mental properties.

Lewis's use of analytic functionalism with dispositions explains why he is not a counterfactualist. But yet, given his (1973; 1986a) account of properties, he is, in fact, committed to counterfactualism. For Lewis (1986a, 50-69), necessarily coextensive properties are identical. Presumably the conditional analysis holds of necessity. Lewis thinks that the conditional analysis tells us what it is to have a disposition. But Lewis also thinks that any object with a disposition will also have a counterfactual property (the one counterfactualists identify dispositions with). This means that all and only objects, both actual and possible, that have a disposition will also have the counterfactual property that comes from the right-hand side of the conditional analysis. For example, all and only fragile objects, actual and possible, will have the property *being an x such that x would break in a suitable proportion of striking cases*. This means that fragility is necessarily coextensive with the counterfactual property. For Lewis, this means that the two properties are identical, which means that fragility just is the counterfactual property *being an x such that x would break in a suitable proportion of striking cases*.¹⁵⁹ The same holds for all the other dispositions as well. Thus, Lewis, given his view of properties, is committed to counterfactualism.¹⁶⁰

I suppose that those who favor the strategy of analytic functionalism will view the fact that the standard views use that strategy as an advantage of the standard views. I'm not in a position to comment on the legitimacy of using the strategy of analytic functionalism to identify mental properties, but when it comes to dispositions, the strategy must answer for itself. For those who don't already favor analytic functionalism

¹⁵⁹Supposing Lewis accepted (PCA).

¹⁶⁰While Lewis is committed to counterfactualism, since the view is necessarily coextensive with both the standard views, all three views will be identical for Lewis.

and for those with sympathies for counterfactualism, analytic functionalism, as applied to dispositions, appears to belabor a distinction that there is no need to belabor. It seems to overcomplicate things and prevent us from going with the natural view of dispositions. Furthermore, as we'll see in the next two sections, it also seems to lead to other problems.

5.3. Preserving the Categorical vs. Hypothetical Distinction

There seems to be considerable disadvantage of analytic functionalism: the inability to preserve the distinction between hypothetical and categorical properties. I'm assuming that there is a distinction between hypothetical properties and categorical properties; and that there is a distinction between dispositions, in particular, and categorical properties; and that there are both dispositions and categorical properties.¹⁶¹ But analytic functionalism allows for the possibility of identifying a disposition with a categorical property. Some might view that as a virtue as concerns reduction, but as we saw in Chapter Four section 4.2, it involves identifying two seemingly distinct properties, which some find problematic.

Lewis (1997, 152) recognizes the problem involved in identifying dispositions with categorical properties and attempts to avoid it. His strategy for avoiding the problem is to refrain from saying what dispositions are and to refrain from maintaining a distinction between dispositional and categorical properties. If one doesn't say what dispositions are and doesn't maintain a distinction between dispositions and categorical properties, then one avoids saying that dispositions are categorical properties.

If we remain neutral in the disagreement between... [the identity view and causal functionalism], not only do we refuse to say which properties are

¹⁶¹See Chapter One §1.1.

dispositional; equally, we refuse to say which properties are *non*-dispositional, or ‘categorical’. So we would be unwise to speak, as many do, of ‘categorical bases’. Because if we then saw fit to go Armstrong’s way, and to identify the disposition itself with its causal basis (in a particular case), we would end up claiming to identify dispositional with non-dispositional properties, and claiming that dispositions are their own categorical bases! Rather than risk such confusion, we do better to eschew the alleged distinction between dispositional and ‘categorical’ properties altogether. (1997, 152)

Notice that Lewis takes categorical properties to be coextensive with non-dispositional properties. Such an understanding of categorical properties is not unusual.¹⁶² And I don’t think it significantly alters his concern. Suppose Lewis thought that there are hypothetical properties—including dispositions and counterfactual properties—and that categorical properties are non-hypothetical properties. I think he would be just as reluctant to identify dispositions with categorical properties.

Let’s examine more carefully why Lewis wants to avoid having to say what the distinction between dispositional and categorical properties comes to. Lewis highlights the problem that is created for the identity view, but I think the same problem exists for causal functionalism. Suppose we can make good on the distinction between dispositional and categorical properties. We can now ask whether a causal basis or the property *having a causal basis* is a dispositional or categorical property. Lewis thinks that, if it is a categorical property, we’ll risk confusion.¹⁶³ The problem is that the standard views would be identifying a dispositional property with a categorical property.

¹⁶²Only those who talk about hypothetical properties more generally (see Chapter One) recognize that dispositions are one type among many kinds of hypothetical properties.

¹⁶³Lewis points out the trouble only with identifying a disposition with a categorical causal basis and not with identifying a disposition with a categorical property *having a causal basis*. I take it that, in the cases in which causal bases are categorical properties, the property *having a causal basis* is also categorical. I make the case here that there is trouble both for the identity view and causal functionalism if causal bases and the property *having a causal basis* are categorical properties.

If dispositional and categorical properties are distinct, it is mysterious how they could be identical.

A similar problem was raised for Lewis's own view of reduction and analysis in Chapter Four section 4.2. There we saw that Lewis identifies the modal property *possibly winning* with the property *having a counterpart who wins*. The former is a hypothetical property, because it points beyond how Humphrey actually is to how he could be, and the latter is a categorical property, because it is based merely on there being an object similar to Humphrey (except that he wins) in a world similar to our own. However one assesses the coherence of Lewis's identity of the hypothetical with the categorical, it seems to me that Armstrong's identity is worse.¹⁶⁴

Suppose that we grant Lewis his ontology and that we grant that his ontology is categorically acceptable. There is a sense in which the property *having a counterpart who wins* points beyond how Humphrey is in the actual world.¹⁶⁵ It tells us something about how someone similar to him is. Let's grant Armstrong that causal bases are categorical properties. Is there a sense in which a causal basis points beyond the object that has it? Consider some object x with disposition D to manifest M when subject to S and with some categorical CB-realizer F . Does F point beyond how x is? Here we might be tempted to say that F tells us that x would manifest M in a suitable proportion of S -cases. But that would be a mistake. F by itself tells us no such thing. What is doing the hypothetical work in this case is the second-order counterfactual property *CB-role* had by

¹⁶⁴I have argued against Lewis's view of reduction in Chapter Four §4.2, but for those who aren't convinced, I'll argue here that identifying dispositions with the categorical properties currently under consideration is worse than identifying certain hypothetical properties with properties involving counterparts.

¹⁶⁵Those who are sympathetic to the Humphrey objection are less likely to admit this.

F. So long as *F* has *CB-role*, *CB-role* points beyond its instance, *F*, and it tells us that *F* would causally bring about *M* in a suitable proportion of *S*-cases. But a categorical property in the absence of a second-order hypothetical property doesn't point beyond its instances. And so, for Armstrong, there isn't a sense in which *F* is hypothetical. It is not as if Armstrong is claiming that *F* just is the property *having many counterparts such that a suitable proportion of those that are subject to S also manifest M*. If he were, then we could see how *F* points beyond its instances. The major difference between Lewis on modal properties and the view of dispositions under consideration—the identity view along with categorical causal bases—is counterparts. The way that modal properties point beyond their instances for Lewis's account of modal properties is that such properties involve counterparts. But, without counterparts, it is difficult to see any sense in which a categorical property, by itself, can point beyond its instances.

Causal functionalism doesn't fare any better. The causal functionalist identifies a disposition with the property *having a causal basis*. Using our example above, let's suppose that *F* is categorical. Perhaps the property *having a causal basis* is also categorical, since it doesn't tell us anything more than how *x* actually is. It tells us only that *x* has a causal basis. If that is right, then the causal functionalist faces the same sort of trouble the identity theorist faces when she identifies a disposition with a categorical property since there isn't a sense in which the property *having a causal basis* points beyond its instances.

My interpretation of Lewis is that he also recognized that identifying dispositions with categorical properties, especially without reference to counterparts, is problematic in a way that his account of modal properties is not. The same point can be made by

appealing to my claim in Chapter Four. There we saw that dispositional, counterfactual and modal properties don't supervene on the actual perfectly natural properties. For Lewis, in order to account at least for counterfactual and modal properties, we must appeal to counterparts, possible worlds and similarity relations. The reason Armstrong's identity claim is potentially more problematic than Lewis's identity claim is that Armstrong attempts to identify a disposition with an actual categorical property. At least for the other related hypothetical properties—counterfactuals and modal properties—Lewis recognizes that the identity requires talk of counterparts and possible worlds.¹⁶⁶

It is also worth pointing out how odd it is for Lewis, as a Humean, to eschew the distinction between dispositions and categorical properties. In Chapter Four section 4.1, we saw that Humeans deny there are any primitive hypothetical properties. In order to exclude primitive hypothetical properties, one must be able to distinguish between them and the acceptable categorical properties. As a Humean, Lewis is committed to maintaining a distinction between hypothetical and categorical properties, but his view of dispositions apparently prevents him from doing so.¹⁶⁷ I take this as evidence that there is something wrong with his view of dispositions.

The counterfactualist, however, faces no such worry and is happy to embrace the distinction between hypothetical and categorical properties. The counterfactualist identifies dispositions with counterfactual properties—which are clear examples of

¹⁶⁶Recall what reductions of dispositions look like given Lewis's modal framework from Chapter Four. The account we end up with is radically different than maintaining that a disposition is identical to its (actual) categorical causal basis.

¹⁶⁷I'm assuming that Lewis's point generalizes from dispositions to hypothetical properties (and from non-dispositional properties to non-hypothetical properties). Even if that assumption is wrong, as a Humean, Lewis is committed to maintaining a distinction between dispositional and categorical properties, since I take it that no perfectly natural properties are dispositional.

hypothetical properties. Even in the case where causal bases are categorical properties, the counterfactualist can say that the counterfactual properties supervene on causal bases, avoiding any problem. And, with the case of categorical metaphysical bases, the counterfactualist can say that the counterfactual properties are (at least partially) grounded in metaphysical bases. If Lewis had considered counterfactualism, he would not have had to eschew talking about what dispositions are and how they differ from categorical properties. I take it that this constitutes a considerable advantage for counterfactualism.

I've assumed that there is a distinction between dispositional and categorical properties and that there are both dispositional and categorical properties. The chief purpose of this dissertation is to say what dispositions are. It can't be overemphasized how antithetical Lewis's comments are to my project. He thinks it's best to refrain from saying what dispositions are and refrain from maintaining a distinction between dispositional and categorical properties. The exact projects this dissertation is concerned with are what Lewis is attempting to avoid. This is surprising and worth thinking about. My understanding of why this is the case is that it results from the shortcomings of Lewis's view on dispositions, including his use of analytic functionalism. He uses his analytic functionalism and is committed to one of the two standard views. In so doing, he puts himself in a position in which he must refrain from saying which of the standard views is correct and must refrain from maintaining the distinction between dispositional and categorical properties.

As I said in the Chapter One, I'm interested in giving an account of dispositions that preserves some basic intuitions. I think that it is intuitive to think that there are

dispositions (and that it's best if we can say what they are) and that there is a distinction between dispositions and categorical properties. All other things being equal, a view of dispositions that is able to preserve those intuitions is superior to those that aren't. In the passage above, Lewis, as someone committed to one of the standard views, thinks it's best to endorse a view that doesn't preserve those intuitions.¹⁶⁸ I take it that this indicates a shortcoming not only of the standard views but also of analytic functionalism applied to dispositions. Counterfactualism avoids such problems and is able, not only to say what dispositions are, but also to maintain the distinction between dispositions and categorical properties.

5.4. Ensuring that Dispositions are not a Distinct Kind of Hypothetical Property

We've just been considering the sort of problems that the standard views face when causal bases are categorical properties. As it turns out, if causal bases are not categorical properties, the standard views face a different sort of problem.

It is not obvious that causal bases or the property *having a causal basis* are categorical properties. Presumably some causal bases could be hypothetical properties, since some could themselves be dispositions. For example, if a causal basis for fragility is some particular molecular bonding, then bonding is naturally understood as a disposition. Perhaps the dispositions that are causal bases have causal bases that are not dispositions and so, eventually, it might turn out that all the fundamental causal bases are categorical properties. But perhaps not. Perhaps, as Simon Blackburn (1990, 63)

¹⁶⁸I also think that much of the dispute surrounding making sense of the distinction between dispositions and categorical properties (see Chapter One §1.3) has more to do with inadequate views of dispositions and less to do with the inadequacy of the distinction.

suggests, there are dispositions “all the way down.” If there are dispositions all the way down, that creates a special problem for the standard views.¹⁶⁹

According to my understanding of ideological parsimony, it is better to be committed to fewer distinct kinds of hypothetical properties.¹⁷⁰ Thus, a view according to which dispositions and counterfactual properties are distinct kinds of properties is less ideologically parsimonious than a view according to which dispositions are counterfactual properties, all other things being equal. If there are dispositions all the way down, then dispositions will remain a distinct kind of hypothetical property for the advocates of the standard views, and their view will be less parsimonious than counterfactualism. Counterfactualism enjoys the advantage of guaranteeing that dispositions are not a distinct kind of hypothetical property. The standard views are unable to guarantee that dispositions are not a distinct kind of hypothetical property. Thus, counterfactualism guarantees a certain type of ideological parsimony, while the standard views can only hope for it.

Recall that the standard views and counterfactualism are already committed to counterfactual properties. Given a prior commitment to counterfactual properties, it is better to identify dispositions with counterfactual properties—ensuring dispositions are not a distinct kind of hypothetical property—than simply to hope that dispositions turn out to be categorical properties.

When faced with the question of distinguishing dispositional properties from categorical properties, the standard views face a trilemma. If they deny the distinction,

¹⁶⁹ Again, I’m supposing that the property *having a causal basis* is categorical or dispositional just in case the relevant casual basis is.

¹⁷⁰ See Chapter Four §4.1.

they fail to respect the intuition that there is a distinction. This is the horn Lewis takes. If they admit the distinction, then they'll face one of two problems. If they identify dispositions with categorical properties, then they face the problem that results from identifying a hypothetical property with a categorical property. This is the horn Armstrong takes. If they don't identify dispositions with categorical properties, then they face the problem of failing to say why it is that dispositions are not a distinct kind of hypothetical property. None of the options is appealing. It's better to go with a different view of dispositions; it's better to go with counterfactualism.

5.5. Accounting for Extrinsic Dispositions

5.5.1. Causal bases

According to the standard views, a disposition is either its causal basis or the property *having a causal basis*. As I said in Chapter Three, 'causal basis' is shorthand for 'x-complete causal basis'.¹⁷¹ The x-complete causal basis can be contrasted with the complete causal basis, which includes all of the properties that are causally relevant for bringing about the manifestation, not just the properties of the disposed object. With certain dispositions, the difference between the x-complete causal basis and the complete causal basis is substantial, and that forces advocates of the standard views to choose between two uncomfortable positions.

Recall from Chapter Two the discussion of lawfully extrinsic dispositions—dispositions that vary amongst duplicates while holding the laws of nature fixed. And recall from Chapter Three the discussion regarding whether causal bases must be intrinsic

¹⁷¹In this sub-section and the next, I'll include the 'x-complete', since I'm contrasting x-complete bases with complete bases.

properties. I argued there that causal bases need not be intrinsic properties but they can't be too unnatural. With certain dispositions, the complete causal basis will include properties that the *x*-complete causal basis doesn't include.

For example, Key is disposed to open a Door which is equipped with K-locks. The stimulus condition of the disposition is Key's being inserted into the lock on Door and turned, and the manifestation of the disposition is Door's opening.¹⁷² The *x*-complete causal basis of Key's disposition to open Door includes properties of Key having to do with its shape and rigidity. Properties of other objects are also relevant, however. Door has the property *being fitted with a K-lock*, which is causally relevant to Door's opening when Key is inserted and turned, but it is not a property of Key. Door's property *being fitted with a K-lock* is part of the complete causal basis but not part of the *x*-complete causal basis.¹⁷³

Such dispositions seem more difficult for the standard views to account for. Gabriele Contessa (2012, 635) says that the result of lawfully extrinsic dispositions "does not fit equally well with many views about the nature of dispositions and their relation to their bases." He goes on to name both the identity view and causal functionalism as views that don't fit well with lawfully extrinsic dispositions. The rough idea behind the identity view is that we are to identify dispositions with the property (or properties) that are causally relevant for bringing about the manifestation in some suitable proportion of stimulus condition cases. However, lawfully extrinsic dispositions force the identity theorists to make a decision.

¹⁷²For more on this example see Chapter Three §3.3.

¹⁷³It also seems that laws of nature will play a causal role as well. More on laws of nature in §5.5.2 below.

Advocates of the identity view have two options. First they can say that dispositions are properties that aren't too unnatural and that causally bring about manifestations in a suitable proportion of stimulus cases. On this option, dispositions are identified with x -complete causal bases. Door's property *being fitted with a K-lock* is excluded. Key's property *fitting the lock on Door* is also excluded, because it is too unnatural. A property having to do with the lock on Door is obviously causally relevant in bringing about Door's opening. The drawback of the first option is that no such property is part of what the disposition is. Causally relevant properties must be excluded.

It is difficult even to state the second option for identity theorists. It is tempting to say that the second option is to say that dispositions are properties of the disposed object (regardless of how natural those properties are) that causally bring about the manifestation in a suitable proportion stimulus cases. This option will still exclude Door's property *being fitted with a K-lock* since it is not a property of Key, but it will include Key's less natural property *fitting the lock on Door*. There is a tension here. We want to include all the causally relevant properties, but we can include only properties of the disposed object, and those properties, in a lot of cases, are too unnatural to be causally efficacious. Properties of the disposed object like Key's *fitting the lock on Door* is too unnatural to be causally efficacious. So the second option seems to be very problematic.

Causal functionalists must make a similar decision. I take it that, for any property F , the property *having F* will be as natural as F . The rough idea behind causal functionalism is to identify a disposition with the property *having a property or some properties that are causally relevant for bringing about the manifestation in a suitable proportion of stimulus cases*. Causal functionalists, then, are faced with two similar

options. They can identify a disposition with the property *having an x-complete causal basis*, or they can identify a disposition with the property *having a complete causal basis*. The first option allows them to identify a disposition with a property that isn't too unnatural but has the drawback of excluding properties that are causally relevant. The second option is supposed to include all the causally relevant properties but some of them will be too unnatural to be causally efficacious.

The counterfactualist is faced with no such worry. According to counterfactualism, Key's disposition to open Door is just the property *being an x such that x would open Door in a suitable proportion of inserting-and-turning cases*. It matters little whether the *x*-complete causal basis differs importantly from the complete causal basis. The counterfactualist can recognize both properties. No problem arises because the counterfactualist doesn't attempt to build causal bases into what dispositions are.

5.5.2. *Metaphysical bases*

A similar drawback arises for metaphysical functionalism. As I said in Chapter Three 'metaphysical basis' is shorthand for '*x*-complete metaphysical basis', which can be contrasted with a complete metaphysical basis. With certain dispositions, the difference between the *x*-complete metaphysical basis and the complete metaphysical basis is substantial.

Consider again Key's disposition to open Door. An *x*-complete metaphysical basis for the disposition includes the relevant properties of Key's shape and rigidity. But the disposition depends on other properties too. It also depends on Door's property *being*

fitted with a K-lock. That property is part of the complete metaphysical basis for the disposition but not the *x*-complete metaphysical basis.

It is worth mentioning that Key's disposition not only depends on properties of Key's environment, but it also seems to depend on the laws of nature.¹⁷⁴ Laws of nature that are capable of at least partially grounding dispositions, and thereby at least partially explaining them, won't be acceptable to Humeans. Consider Rosen (2010, 119-20; his emphasis) on the issue.

Why is it that, as a matter of fact, any two bodies attract one another with a force inversely proportional to their square distance and proportional to their masses? It is natural to say that this mere regularity corresponding to Newton's law of gravitation holds *because it is a law of nature that bodies attract one another in this way*. This is controversial as a matter of philosophy, of course. The so called Humean view would reverse the explanatory order, insisting that the nomic fact obtains in part because every body happens to attract every other body in a certain way.¹⁷⁵

I agree with Rosen that it is natural to think that it is the law that does the grounding and thus the explanatory work. One of the guiding considerations in this dissertation has been an attempt to preserve a natural view. I can't help but think that Humeans have missed the mark in this regard concerning laws, and their view is less preferable because of it.¹⁷⁶ At any rate, even if dispositions don't depend on laws, my argument against metaphysical functionalism goes through so long as dispositions depend on properties of the environment of the disposed object. So long as there are dispositions for which

¹⁷⁴Of course, one could think that the dependence relation goes the other way around so that it is the laws of nature that depend on dispositions. See Bird 2007. Are we more inclined to think that dispositions explain the laws of nature or that the laws of nature explain dispositions? I tend to think the latter is the preferred view, but it isn't required for my argument against metaphysical functionalism. The argument goes through so long as dispositions depend on the environments of the disposed objects.

¹⁷⁵Rosen cites Lewis 1973.

¹⁷⁶Surprisingly, Lewis (1994b, 478-79) seems to think that our account of the laws of nature isn't beholden to our pretheoretical intuitions concerning them.

complete metaphysical bases differ from *x*-complete metaphysical bases, a problem arises for metaphysical functionalism.

(If dispositions are fully grounded in all these properties, including properties of laws, then there is a sense in which we have reduced dispositions. But we won't have reduced dispositions to categorical properties, since I take it that the properties of laws that are capable of grounding dispositions will be hypothetical properties. This is precisely why Lewis, as a Humean, eschews such laws. As a result, I think the project of wholly reducing dispositions to categorical properties is unpromising.)

The rough idea behind metaphysical functionalism is to identify a disposition with the property *having a property or some properties that ground the disposition*.

Metaphysical functionalists have two options. First, they can say that a disposition is the property *having an x-complete metaphysical basis*. The drawback of this option is, for example, that Door's property *being fitted with a K-lock* isn't included in the *x*-complete metaphysical basis. Second, they can say that a disposition is the property *having a complete metaphysical basis*. This option has the advantage of including (in some extended sense) properties having to do with the lock on Door, but it has the drawback of identifying a disposition with a potentially very unnatural property.

Counterfactualism has no problem with dispositions that have complete metaphysical bases that substantially differ from *x*-complete metaphysical bases. A disposition, that is a certain counterfactual property, can be partially grounded in the *x*-complete metaphysical basis, partially grounded in the environment and partially grounded in the laws of nature. For counterfactualism, questions about what a

disposition is are not beholden to what grounds the disposition in the same sort of way as they are for metaphysical functionalism.

5.6. Allowing for Baseless Dispositions

5.6.1. No causal basis

As mentioned above, the natural starting point for thinking about what dispositions are is the conditional analysis. I maintain that the *prima facie* view of dispositions is that a disposition just is the counterfactual property that comes from the right-hand side of the conditional analysis. The standard views take a less natural approach by building causal bases into what dispositions are. The problem with this is that it isn't at all obvious that all dispositions have causal bases. Advocates of the standard views must take these assumptions to hold of necessity.

- (CA1) There is a causal relation between events.
- (CA2) All manifestation events are caused.
- (CA3) For every manifestation event there is a property of the disposed object that plays a causal role in bringing about that manifestation.
- (CA4*) Only properties of disposed objects that aren't too unnatural can play causal roles in bringing about the manifestation.

In Chapter Three we stated the causal assumptions but didn't question whether they are necessarily true. In addition, the standard views are committed to (D-CB).¹⁷⁷ For any object *x* and any disposition *D* with causal basis role *CB-role*, there is a property *B* such that

- (D-CB) *x* has *D* iff *x* has *B* and *B* has *CB-role* for *D*.

¹⁷⁷Recall that (D-CB) describes the connection between a *disposition* and its *causal basis*.

It isn't obvious that (D-CB) is true. One must argue for it. The question before us is whether (D-CB) holds of necessity or whether it is possible for there to be dispositions without causal bases.¹⁷⁸

There are two ways that (D-CB) can be false. First, an object can have a disposition but no causal basis because there is no causation, *a fortiori* none of the disposed object's properties are causally relevant in bringing about the manifestation. This type of counterexample involves rejecting (CA1) along with the other three causation assumptions. In such cases there is no complete causal basis and thus no *x*-complete causal basis. Second, an object can have a disposition in a world with causation, but sometimes when the manifestation comes about, it isn't caused by any of the disposed object's properties. This type of counterexample involves rejecting only (CA3) and probably (CA4*). In such cases there is a complete causal basis but no *x*-complete causal basis.

Consider an example of the first type; consider a world without causation. No events stand in the causal relation with one another. There is just one thing happening and then another, nothing more. Now consider a fragile glass in that world. According to (PCA) the glass is disposed to break when struck if and only if it would break in a suitable proportion of striking cases. But the glass doesn't have a causal basis, because the breaking wouldn't be caused, were it to occur. If the glass were struck, it would break. But the glass has no properties, along with the striking, that causally bring about the breaking, since there is no causation.

¹⁷⁸See McKittrick 2009, 49-57. She considers a case in which there are two worlds that differ dispositionally but are the same as concerns non-dispositional causes and laws.

Someone might object at this point by saying that the causal relation just is given by counterfactuals, which we have from the conditional analysis of dispositions.¹⁷⁹ Some event e_1 causes some other event e_2 if and only if, were it the case that e_1 does not occur, then it would be the case that e_2 does not occur. Consider a case where the glass is struck and breaks. If the glass hadn't been struck, then it wouldn't have broken, which means that the striking *caused* the breaking. So there is causation in such a world after all. And, in the case of fragility, presumably there is a property of the fragile object that is causally relevant in bringing about the breaking, which means that in this case there is a causal basis.

While I think there is reason to doubt that a counterfactual account of causation is the best way to understand causation, it does seem that those who accept it will be unmoved by the counterexample. Such people will think it is metaphysically impossible for there to be a world with disposed objects without causation. However, the counterexample might succeed if one doesn't also think that causation is analyzed with counterfactuals.¹⁸⁰

A disposed object with no causal basis is a problem for the standard views. If an object doesn't have a causal basis, then it doesn't have a disposition according to the identity view. And, if an object doesn't have a causal basis, then it doesn't have the property *having a causal basis*, which means that it doesn't have a disposition according to causal functionalism. Counterfactualism doesn't run in to trouble here, since a counterfactualist need not accept (D-CB). In the counterexample above, the

¹⁷⁹Lewis (1973a; 2004), for example, accepts a counterfactual account of causation.

¹⁸⁰Those who think causation can be read off the history of the world will also be unmoved by the counterexample.

counterfactualist is able to make sense of the disposition. All that is required is the conditional analysis. In a world with no causation, fragility just is the property *being an x such that x would break in a suitable proportion of striking cases*. Nothing is said about causation, and there is no need for the disposed object to have a causal basis.

Consider a different counterexample of the first type. A factory produces glasses that are categorical duplicates. All of the glasses from the factory are fragile—that is, all of them would break in a suitable proportion of striking cases—except for one. One glass, instead of being fragile, is indestructible—it is disposed not to break when struck.¹⁸¹ Those who accept a counterfactual account of causation will say that the striking, along with some property of the glass, causally brings about the glass's remaining unbroken.¹⁸² Thus, they maintain that it has a causal basis. But notice that not everyone who accepts a counterfactual account of causation can agree on this. For Humeans, only categorical differences can make a causal difference.¹⁸³ Thus, a Humean like Lewis who accepts a counterfactual account of causation won't be able to maintain that the indestructible glass has a causal basis.

Consider a counterexample to (D-CB) of the second type, in which a disposed object has a complete causal basis but no *x*-complete causal basis. A sword factory produces swords that are categorical duplicates. All of the swords lack the ability to cut through large stones, except for one. A sorcerer whimsically decides to enable one sword to cut through large stones, not by changing any of the sword's intrinsic properties, but

¹⁸¹I suppose intuitions will diverge as to whether the glass is, in fact, indestructible. The case is not unlike the case of the *Resolute sorcerer* discussed in Chapter Two §2.6.2.

¹⁸²I'm granting that causal relations between such events are acceptable.

¹⁸³See Lewis 1979.

by causing stones to split in half when the sword comes in contact with them. The sword has the disposition to cut stones in half when swung at them. The sword would cut stones in half in a suitable proportion of swinging-at-a-stone cases. The manifestation of the split stones are all caused, but they aren't caused by any property of the sword that isn't too unnatural. Instead the splitting is caused by the sorcerer. So here is a case of a disposed object with a complete causal basis, but not an *x*-complete causal basis.¹⁸⁴

As we saw above, those who accept a counterfactual account of causation won't agree that the sword has no causal basis. But Humeans must admit that the sword does not have a causal basis, since none of the other categorical duplicates are so disposed. Since the disposition has no causal basis, the standard views aren't able to account for the disposition. Counterfactualism is able to account for it, since the disposition just is the property *being an x such that x would split stones in half in a suitable proportion of swinging-at-a-stone cases*.

No doubt a Humean will think such cases are metaphysically impossible, but all other things being equal, an account of dispositions that is able to account for such cases is preferred. Such cases suggest that what a disposition is has more to do with the conditional analysis and the corresponding counterfactual properties and less to do with causal bases.

¹⁸⁴ Again, it seems natural to me to think that the sword does have the disposition, but I'm sure not everyone sees it that way.

5.6.2. *No metaphysical basis*

Now let's consider dispositions without metaphysical bases. Recall that the metaphysical functionalist must think that (D-MB) holds of necessity. For any object x and any disposition D ,

(D-MB) x has D iff x has some property B that is the x -complete metaphysical basis for D .

But there doesn't seem to me to be any good reason to think that (D-MB) holds of necessity. There are two ways that (D-MB) can be false. First, a primitive disposition would show that (D-MB) is false, since a primitive disposition isn't grounded in anything, and if it's not grounded in anything, then it is not even partially grounded in a property of the disposed object. Such dispositions have no complete metaphysical basis; *a fortiori*, they have no x -complete metaphysical basis. Call such dispositions 'wholly ungrounded'. Second, a grounded disposition also shows that (D-MB) is false so long as the disposition isn't at least partially grounded in any property of the disposed object. Such dispositions have a complete metaphysical basis but no x -complete metaphysical basis. Call such dispositions ' x -ungrounded'.

It is true that the Humean doesn't countenance any wholly ungrounded hypothetical properties such as dispositions, but it is far from clear what the argument is for doing so. No doubt the Humean would like there not to be any wholly ungrounded dispositions for the sake of ideological parsimony, but when it comes to how the world is, we don't always get what we want. It seems possible that there could be wholly ungrounded dispositions; it's not too hard to imagine the world turning out that way. But what should the Humean think about x -ungrounded dispositions? I suppose the Humean

will have no problem with them so long as they are ultimately grounded in categorical properties. We'll return to this question after we look at an example.¹⁸⁵ We'll first consider an example of an *x*-ungrounded disposition and then an example of a wholly ungrounded disposition.

Recall the *Resolute sorcerer* example for Chapter Two section 2.6. The glass factory produces glasses that come off an assembly line. All the glasses are intrinsic duplicates, and if you were to pick one of them up and drop it, it would break. However, a sorcerer, for whatever reason, decides to take a special interest in one of the glasses. Since we'd be incapable of doing damage to the glass, it seems that it is indestructible. The glass has the dispositional property *indestructibility*. Yet there is no *x*-complete metaphysical basis for the disposition. I'm assuming in this case that the way the sorcerer protects the glass doesn't involve any intrinsic change to the glass. So here is an example of an *x*-ungrounded disposition. The glass doesn't have an *x*-complete metaphysical basis even though the disposition is still at least partially grounded in the sorcerer's determination to protect the glass.

Some might wonder whether such protection would have to involve a change in the laws of nature. Perhaps so. For those who think the laws of nature are metaphysically necessary, this example will be metaphysically impossible. For the Humean, however, the laws are not necessary,¹⁸⁶ and the laws have no bearing on how the world turns out. Instead, the laws are determined by how the world turns out. So the

¹⁸⁵There is also the question of whether the Humean will countenance a grounding relation. Humeans deny necessary connections in nature (see Chapter Four §4.1), but a property that grounds necessitates the property it grounds. This is something some Humeans might be willing to accept. It's worth noting that Lewis (1983, 358) eschewed any sort of ontological dependence.

¹⁸⁶See Lewis 1997, 147-48.

Humean cannot resist the case by appealing to laws. So long as there is a possible world with such a sorcerer, it is a possibility. If our world turns out to be a world with such a sorcerer, then the laws will be different from what we thought they were.

Examples are easy to come by when the laws of nature are obviously broken. Consider a marble factory that produces duplicate marbles. Each one of the marbles is disposed to drop to the ground when released. But a sorcerer decides always to ensure that one marble in particular never drops to the ground when released. Instead it is disposed to remain in place when released. There is no *x*-complete metaphysical basis for the disposition even though it is at least partially grounded in the sorcerer.

Such examples of *x*-ungrounded dispositions are counterexamples to (D-MB). The metaphysical functionalist is incapable of making sense of such dispositions. The protected glass has a disposition but not according to the metaphysical functionalist, since the glass lacks the property *having a metaphysical basis*. The marble has a disposition but not according to the metaphysical functionalist, since it lacks the property *having a metaphysical basis*. Counterfactualism has no problem with such cases. The glass's disposition is the property *being an x such that x doesn't break in a suitable proportion of striking cases*. And the marble's disposition is the property *being an x such that x remains in place in a suitable proportion of releasing cases*. A disposition is distinct from its metaphysical basis, and there doesn't seem to be any reason why an object can't have a disposition without having an *x*-complete metaphysical basis, unless one thinks the laws of nature are necessary. This creates a substantial problem for metaphysical functionalism.

What should Humeans think about such cases? They don't think the laws of nature are necessary, so they can't object on those grounds. I suppose that the Humean will have no problem with *x*-ungrounded dispositions so long as they require no primitive dispositions, or primitive hypothetical properties in general. In both examples the complete metaphysical basis will include properties of the sorcerer, but it's not clear what exactly those properties are and whether they'll include any primitive hypothetical properties.

Let's now consider an example of a wholly ungrounded disposition. But what is a wholly ungrounded disposition like? This question is not interestingly different from the question, what is a grounded disposition like? Recall that the grounding relation enables us to distinguish two questions: "what is a disposition?" and "what is a disposition grounded in?". We can first determine what dispositions are and then we can wonder whether they are grounded in anything and, if so, what they are grounded in. Whether or not a disposition is grounded doesn't change what dispositions are. It changes only whether they are taken as primitive. The counterfactualist's view fits quite well with this way of looking at things. A wholly ungrounded disposition is a counterfactual property that isn't grounded in anything else. Metaphysical functionalism runs into trouble here because it builds metaphysical bases into what dispositions are. The problem with metaphysical functionalism is that it excludes the possibility of wholly ungrounded dispositions. Whether there are wholly ungrounded dispositions is an interesting question. Our account of dispositions shouldn't force an answer to the question, however. In other words, whether there are wholly ungrounded dispositions should be

beholden to the world, not our account of what dispositions are. Considering an example of a wholly ungrounded disposition will help make these issues more clear.

Manley (2012, 330-332) considers one such example when he argues for modalism.¹⁸⁷ Consider a universe made up entirely of p particles. Suppose that all p particles are categorical duplicates. However, some p particles repel other p particles when they are near them, and they do so in a variety of different situations and places. Thus, some p particles have the property *being such that, if they were near p particles, they would repel them*. Call this *de re* counterfactual property ' G '. Some p particles have G but others do not, despite the fact that they are categorical duplicates. Let's also stipulate that G is wholly ungrounded. Intuitively it seems that the particles that have G are disposed to repel other p particles when near them, since they repel p particles when near them in a variety of different situations. Call this disposition ' D '.

Here is another counterexample to (D-MB). The p particles with G have a disposition, but the disposition seems to be wholly ungrounded.¹⁸⁸ Not only is D not at least partially grounded in any property of the particles with G , it doesn't seem to be even partially grounded in any properties. It is wholly ungrounded. This poses a problem for metaphysical functionalism. Since the particles with G don't have a metaphysical basis, neither do they have the property *having a metaphysical basis*. This means that these particles have no disposition, but intuitively they do have a disposition. No such problem arises for counterfactualism. Counterfactualism is able to make good on the intuition that

¹⁸⁷It's worth noting that Manley doesn't explicitly take the functionalism he's arguing against to be metaphysical functionalism.

¹⁸⁸Suppose we thought that D is *sui generis* and grounded in G . This is a way of avoiding commitment to a wholly ungrounded disposition (but we'd be stuck with a primitive counterfactual property). As stated in Chapter One, I'm assuming that dispositions are not *sui generis*: I think we can say what dispositions are. All other things being equal, it's better to say what dispositions are.

all the particles that have G also have D , since D just is G . It matters little whether D or G is grounded in anything.¹⁸⁹

I think the best way to think about dispositions is first to consider what dispositions are and then to consider what, if anything, dispositions are grounded in. This is the approach counterfactualism takes. Dispositions are identified with a counterfactual property and then the counterfactualist can ask whether that property is grounded in anything. Metaphysical functionalism takes a different approach. The metaphysical functionalist first considers what a disposition is grounded in as concerns the disposed object and then says that a disposition is the property *having an x -complete metaphysical basis* for the disposition. The approach seems misguided to me when considering any disposition, grounded or not, but the misguidedness of the approach becomes especially apparent in the case of wholly ungrounded dispositions, since they have no x -complete metaphysical basis.

5.7. Final Thoughts

I claimed in Chapter Four that anyone who attempts to reduce dispositions to actual perfectly natural properties will either fail to reduce them or misidentify dispositions or both. In Chapter Four we saw how the standard views (by themselves) fail to completely reduce dispositions, and I believe in this Chapter we've seen that the standard views have misidentified what dispositions are. It is not a surprise that the standard views fail on both counts, since their account of what dispositions are is so intermingled with reducing

¹⁸⁹In Chapter Three §3.5 we considered whether metaphysical bases just are causal bases. I said there that the two can come apart in fundamental particle cases. Do the disposed p particles have a causal basis? It seems the only candidate will be G . Not all accounts of causation can make sense of a counterfactual property being causally relevant, but for those that can, we have a case of a disposed object with no metaphysical basis but with a causal basis.

them. Reducing dispositions seems to involve bases, and that is exactly what the standard views use in saying what dispositions are. I would like to think that this dissertation has given some reason to think that the two issues are importantly different and that it is a mistake to intertwine them so. Once we keep straight what dispositions are and how they are reduced, we're more likely to succeed on both fronts. Or better: we'll be more likely to succeed in saying what dispositions are, and we'll be more likely not to make the mistake of thinking dispositions are reduced when they are not.

References

- Armstrong, David (1968), *A Materialist Theory of Mind* (London: Routledge & Kegan Paul).
- Armstrong, David (1973), *Belief, Truth and Knowledge* (Cambridge: Cambridge University Press).
- Armstrong, David (1978a), *Nominalism and Realism: Universals and Scientific Realism*, Vol. 1 (Cambridge: Cambridge University Press).
- Armstrong, David (1978b), *A Theory of Universals: Universals and Scientific Realism*, Vol. 2 (Cambridge: Cambridge University Press).
- Armstrong, David (1997), *A World of States of Affairs* (Cambridge: Cambridge University Press).
- Bennett, Karen (2011), "By Our Bootstraps," *Philosophical Perspectives*, 25: 27-41.
- Bird, Alexander (2007), *Nature's Metaphysics, Laws and Properties* (Oxford: Clarendon Press).
- Blackburn, Simon (1990), "Filling in Space," *Analysis*, 50: 62-65.
- Bonevac, Daniel, Josh Dever and David Sosa (2006), "The Conditional Fallacy," *Philosophical Review*, 115: 273-316.
- Bonevac, Daniel, Josh Dever and David Sosa (2011), "The Counterexample Fallacy," *Mind*, 120: 1143-1158.
- Borghini, Andrea and Neil Williams (2008), "A Dispositional Theory of Possibility," *Dialectica*, 62: 21-41.
- Bricker, Phillip (2006), "The Relation between General and Particular: Entailment vs. Supervenience," in *Oxford Studies in Metaphysics*, Volume 2 edited by D. Zimmerman (New York: Oxford University Press), 251-288.
- Caplan, Ben (2011), "Ontological Superpluralism," *Philosophical Perspectives*, 25: 81-114.

- Choi, Sungho (2008), "Dispositional Properties and Counterfactual Conditionals," *Mind*, 117: 1-48.
- Choi, Sungho (2009), "The Conditional Analysis of Dispositions and the Intrinsic Dispositions Thesis," *Philosophy and Phenomenological Research*, 78: 568-590.
- Choi, Sungho (2011), "What is a Dispositional Masker?" *Mind*, 120: 1159-1171.
- Contessa, Gabriele (2012), "Do Extrinsic Dispositions Need Extrinsic Causal Bases?" *Philosophy and Phenomenological Research*, 84: 622-638.
- Contessa, Gabriele (2013), "Dispositions and Interferences," *Philosophical Studies*, 165: 401-419.
- Correia, Fabrice (2011), "On the Reduction of Necessity to Essence," *Philosophy and Phenomenology Research*, 84: 639-653.
- Cowling, Sam (forthcoming), "Ideological Parsimony," *Synthese*.
- Crane, Tim, ed. (1996), *Dispositions: A Debate*, (New York: Routledge).
- Crisp, Thomas (2007), "Presentism and the Grounding Objection," *Noûs*, 41: 90-109.
- Cross, Troy (2005), "What is a Disposition?" *Synthese*, 144: 321-341.
- Cross, Troy (2012), "Recent Work on Dispositions," *Analysis Reviews*, 72: 115-124.
- Ellis, Brian (2001), *Scientific Essentialism* (Cambridge: Cambridge University Press).
- Ellis, Brian, (2002), *The Philosophy of Nature: A Guide to the New Essentialism* (Chesham: Acumen).
- Fine, Kit (1994), "Essence and Modality," *Philosophical Perspectives*, 8: 1-16.
- Fine, Kit (2001), "The Question of Realism," *Philosophers' Imprint*, 1: 1-30.
- Gillett, Carl (2003), "The Metaphysics of Realization, Multiple Realizability, and the Special Sciences," *The Journal of Philosophy*, 3: 591-603.
- Goodman, Nelson (1983), *Fact, Fiction, and Forecast*, 4th edition, 1955 (Cambridge, MA: Harvard University Press).

- Hall, Ned (2010), "David Lewis's Metaphysics," *Stanford Encyclopedia of Philosophy*, <http://plato.stanford.edu/entries/lewis-metaphysics>; "Reduction," supplement, <http://plato.stanford.edu/entries/lewis-metaphysics/reduction.html>.
- Hauska, Jan (2008), "In Defence of Causal Bases," *Australasian Journal of Philosophy*, 86: 23-43.
- Heil, John (2005), "Dispositions," *Synthese*, 144: 343-356.
- Heller, Mark (1998), "Property Counterparts in Ersatz Worlds," *The Journal of Philosophy*, 95: 293-316.
- Isaacs, Alan, ed. (2000), *Oxford Dictionary of Physics*, 4th edition (Oxford: Oxford University Press).
- Johnston, Mark (1992), "How to Speak of the Colors," *Philosophical Studies*, 68: 221-263.
- Kim, Jaegwon (1990), "Supervenience as a Philosophical Concept," *Metaphilosophy*, 21: 1-27.
- Kripke, Saul (1980), *Naming and Necessity* (Cambridge, MA: Harvard University Press).
- Langton, Rae and David Lewis (1998), "Defining 'Intrinsic'," *Philosophy and Phenomenological Research*, 58: 333-345.
- Lewis, David (1966), "An Argument for the Identity Theory," *The Journal of Philosophy*, 63: 17-25.
- Lewis, David (1968), "Counterpart Theory and Quantified Modal Logic," *The Journal of Philosophy*, 65: 113-126.
- Lewis, David (1972), "Psychophysical and Theoretical Identifications," *Australian Journal of Philosophy*, 50: 249-258.
- Lewis, David (1973a), "Causation," *The Journal of Philosophy*, 70: 556-567.
- Lewis, David (1973b), *Counterfactuals* (Oxford: Blackwell Publishing).
- Lewis, David (1979), "Counterfactual Dependence and Time's Arrow," *Noûs*, 13: 455-476.
- Lewis, David (1980), "Mad Pain and Martian Pain," in *Readings in the Philosophy of Psychology*, Volume I edited by N. Block (Cambridge, MA: Harvard University Press), 216-222.

- Lewis, David (1983), "New Work for a Theory of Universals," *Australian Journal of Philosophy*, 61: 343-377.
- Lewis, David (1986a), *On the Plurality of Worlds* (Malden, MA: Blackwell Publishing).
- Lewis, David (1986b), *Philosophical Papers II* (Oxford: Oxford University Press).
- Lewis, David (1986c), "Events," in his *Philosophical Papers II* (Oxford: Oxford University Press), 241-269.
- Lewis, David (1994a), "Reduction of Mind," in *A Companion to Philosophy of Mind* edited by S. Guttenplan (Oxford: Blackwell Publishers), 412-431.
- Lewis, David (1994b), "Humean Supervenience Debugged," *Mind*, 103: 473-490.
- Lewis, David (1997), "Finkish Dispositions," *The Philosophical Quarterly*, 47: 143-158.
- Lewis, David (1999), *Papers in Metaphysics and Epistemology* (Cambridge: Cambridge University Press).
- Lewis, David (2004), "Causation as Influence," in *Causation and Counterfactuals* edited by J. Collins, N. Hall and L.A. Paul (Cambridge, MA: MIT Press), 75-106.
- Lewis, David (2008), "Ramseyan Humility," in *Conceptual Analysis and Philosophical Naturalism*, edited by D. Braddon-Mitchell and R. Nola (Cambridge, MA: MIT Press), 203-222.
- Loewer, Barry (2001), "From Physics to Physicalism," in *Physicalism and its Discontents*, edited by C. Gillett and B. Loewer (Cambridge: Cambridge University Press), 37-56.
- Lowe, E. J. (2006), *The Four-Category Ontology* (Oxford: Oxford University Press).
- Manley, David and Ryan Wasserman (2007), "A Gradable Approach to Dispositions," *The Philosophical Quarterly*, 57: 68-75.
- Manley, David and Ryan Wasserman (2008), "On Linking Dispositions and Conditionals," *Mind*, 117: 59-84.
- Manley, David and Ryan Wasserman (2011), "Dispositions, Conditionals, and Counterexamples," *Mind*, 120: 1191-1227.
- Manley, David (2012), "Dispositionality: Beyond the Biconditionals," *Australasian Journal of Philosophy*, 90: 321-334.

- Martin, C. B. (1993), "Power for Realists," in *Ontology, Causality and Mind: Essays in Honour of D. M. Armstrong*, edited by J. Bacon, K. Campbell and L. Reinhardt (Dordrecht: Kluwer), 175-186.
- Martin, C. B. (1994), "Dispositions and Conditionals," *The Philosophical Quarterly*, 44: 1-8.
- Martin, C. B. and John Heil (1999), "The Ontological Turn," *Midwest Studies in Philosophy*, 23: 34-60.
- McKittrick, Jennifer (2003a), "The Bare Possibility of Bare Dispositions," *Philosophy and Phenomenological Research*, 66: 349-369.
- McKittrick, Jennifer (2003b), "A Case for Extrinsic Dispositions," *Australasian Journal of Philosophy*, 81: 155-174.
- McKittrick, Jennifer (2005), "Are Dispositions Causally Relevant?" *Synthese*, 144: 357-371.
- McKittrick, Jennifer (2009), "Dispositions, Causation and Reduction," in *Dispositions and Causes*, edited by T. Handfield (Oxford: Oxford University Press), 31-64.
- Mellor, D. H. (1974), "In Defense of Dispositions," *The Philosophical Review*, 83: 157-181.
- Mellor, D. H. (1982), "Counting Corners Correctly," *Analysis*, 2: 96-97.
- Mellor, D. H. (2000), "The Semantics and Ontology of Dispositions," *Mind*, 109: 757-780.
- Merricks, Trenton (2003), "The End of Counterpart Theory," *The Journal of Philosophy*, 100: 521-549.
- Molnar, George (2003), *Powers: A Study in Metaphysics*, edited by S. Mumford (Oxford: Oxford University Press).
- Mumford, Stephen (1998), *Dispositions* (Oxford: Oxford University Press).
- Mumford, Stephen (2006), "The Ungrounded Argument," *Synthese*, 149: 471-89.
- Mumford, Stephen (2007), "Filled in Space," in *Dispositions and Causal Powers*, edited by M. Kistler and B. Gnassounou (Burlington, VT: Ashgate Publishing), 67-80.

- Newton, Isaac (1952, orig. 1704), *Opticks: Or a Treatise on the Reflections, Refractions, Inflections, and Colours of Light* (New York: Dover).
- Plantinga, Alvin (1987), "Two Concepts of Modality: Modal Realism and Modal Reductionism," *Philosophical Perspectives*, 1: 189-231.
- Prior, Elizabeth, Robert Pargetter and Frank Jackson (1982), "Three Theses About Dispositions," *American Philosophical Quarterly*, 19: 251-257.
- Prior, Elizabeth (1982), "The Dispositional/Categorical Distinction," *Analysis*, 2: 93-96.
- Prior, Elizabeth (1985), *Dispositions* (Aberdeen: Aberdeen University Press).
- Quine, Willard V. (1948), "On What There Is," *Review of Metaphysics*, 2: 21-38.
- Rosen, Gideon (2006), "The Limits of Contingency," in *Identity and Modality*, edited by F. MacBride (Oxford: Oxford University Press), 13-39.
- Rosen, Gideon (2010), "Metaphysical Dependence: Grounding and Reduction," in *Modality: Metaphysics, Logic and Epistemology*, edited by B. Hale and A. Hoffman (Oxford: Oxford University Press), 109-136.
- Ryle, Gilbert (2000), *The Concept of Mind* (Chicago: University of Chicago Press).
- Schaffer, Jonathan (2003), "Is There a Fundamental Level?" *Noûs*, 37: 498-517.
- Schaffer, Jonathan (2004), "Two Conceptions of Sparse Properties," *Pacific Philosophical Quarterly*, 85: 92-102.
- Schaffer, Jonathan (2008), "Causation and the Laws of Nature: Reductionism," in *Contemporary Debates in Metaphysics*, edited by T. Sider, J. Hawthorne, and D. Zimmerman (Malden, MA: Blackwell Publishing), 82-108.
- Schaffer, Jonathan (2009), "On What Grounds What," in *Metametaphysics: New Essays on the Foundations of Ontology*, edited by D. Chalmers, D. Manley and R. Wasserman (Oxford: Oxford University Press), 347-383.
- Sider, Theodore (2001), *Four Dimensionalism: An Ontology of Persistence and Time* (Oxford: Clarendon Press).
- Sider, Theodore (2003), "Reductive Theories of Modality," in *The Oxford Handbook of Metaphysics*, edited by M. Loux and D. Zimmerman (Oxford: Oxford University Press), 180-208.

- Sider, Theodore (2008), "Beyond the Humphrey Objection" (unpublished paper) accessed on 12/1/10 at http://tedsider.org/papers/counterpart_theory.pdf.
- Sider, Theodore (2011), *Writing the Book of the World* (Oxford: Clarendon Press).
- Shoemaker, Sidney (1980), "Causality and Properties," in *Time and Cause: Essays Presented to Richard Taylor*, edited by P. van Inwagen (Reidel: Dordrecht), 109-135.
- Vetter, Barbara (2012), "On Linking Dispositions and Which Conditionals?" *Mind*, 120: 1173-1189.
- Vetter, Barbara (2014), "Dispositions Without Conditionals" *Mind*, 123: 129-156.

Appendix: Named Sentences

This appendix contains a list of all the sentences displayed throughout this dissertation.

STEP ONE	Connect dispositions with manifestations and stimulus conditions.
STEP TWO	Connect manifestations and stimulus conditions with counterfactuals.
STEP THREE	Connect counterfactuals with counterparts and possible worlds.

For any object x and any disposition D , there is a stimulus condition S and a manifestation M such that

(LSO) x has D iff x is disposed to manifest M when subject to S .

For any object x and any disposition D with stimulus condition S and manifestation M ,

(SCA) x is disposed to manifest M when subject to S iff x would manifest M if x were subject to S .

For any object x and any disposition D with stimulus condition S and manifestation M ,

(SCAD) x has D iff x would manifest M if x were subject to S .

For any object x and any disposition D with stimulus condition S and manifestation M , there is an intrinsic property B such that

(SCAD-CB) x has D iff x has B and, were x subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M .

For any object x , and any disposition D with stimulus condition S and manifestation M , there is a property B such that

(SCA-CB-role) x has B and B plays the CB-role for D iff B is an intrinsic property of x and, were x subject to S , x 's having B and being

subject to S would jointly be an x -complete cause of x 's manifesting M .

For any object x and any disposition D with stimulus condition S and manifestation M ,
(LCA) x is disposed to manifest M when subject to S iff there is an intrinsic property B such that x has B before x is subject to S and, were x to retain B and be subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M .

For any object x and any disposition D with stimulus condition S and manifestation M ,
(LCAD) x has D iff there is an intrinsic property B such that x has B before x is subject to S and, were x to retain B and be subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M .

For any object x and any disposition D with stimulus condition S and manifestation M ,
(PCA) x is disposed to manifest M when subject to S iff x would manifest M in some suitable proportion of S -cases.

For any object x and any disposition D with stimulus condition S and manifestation M ,
(PCAD) x has D iff x would manifest M in some suitable proportion of S -cases.

For any object x and any disposition D with stimulus condition S and manifestation M , there is an intrinsic property B such that
(PCAD-CB) x has D iff x has B and, were x subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M in some suitable proportion of S -cases.

For any object x and any disposition D with stimulus condition S and manifestation M and causal basis role CB -role, there is a property B such that
(PCA-CB-role) x has B and B has CB -role iff B is an intrinsic property of x and, were x subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M in some suitable proportion of S -cases.

For any object x and any disposition with stimulus condition S and manifestation M ,
(PCA-Step 3) x would manifest M if x were subject to S at a world α (relative to a set of accessible worlds Γ ordered by some similarity relation) iff either

- (1) at no world w in Γ does x have a counterpart that is subject to S at w , or
- (2) there is at least one world w in Γ such that a counterpart of x is subject to S at w , and a suitable proportion of x 's counterparts in Γ that are subject to S also manifest M .

For any object x and any disposition D with stimulus condition S and manifestation M ,

(PCAD-Step 3) x has D at a world α (relative to a set of accessible worlds Γ ordered by some similarity relation) iff either

- (1) at no world w in Γ does x have a counterpart that is subject to S at w , or
- (2) there is at least one world w in Γ such that a counterpart of x is subject to S at w , and a suitable proportion of x 's counterparts in Γ that are subject to S also manifest M .

For any object x and any disposition D with stimulus condition S and manifestation M ,

(PCAD-CB-Step 3) x has D at a world α (relative to a set of accessible worlds Γ ordered by some similarity relation) iff either

- (1) at no world w in Γ does x have a counterpart that has a property B and is subject to S at w , or
- (2) there is at least one world w in Γ such that a counterpart of x has a property B and is subject to S , and a suitable proportion of counterparts of x that have a property B and are subject to S in Γ also manifest M .

For any object x , any property B and any disposition with stimulus condition S and manifestation M ,

(CB-role-Step 3) B is a property of x and were x subject to S , x 's having B and being subject to S would jointly be an x -complete cause of x 's manifesting M in some suitable proportion of S -cases at a world α (relative to a set of accessible worlds Γ ordered by some similarity relation) iff either

- (1) at no world w in Γ is B instantiated by an object that is subject to S at w , or
- (2) there is at least one world w in Γ such that B is instantiated by an object that is subject to S , and a suitable proportion of objects that instantiate B and are subject to S in Γ also manifest M .

(PPJ-CB)

“the property or property-complex of the object that, together with [the stimulus condition of the disposition] is

the causally operative sufficient condition for the manifestation [of the disposition].” (Prior, Pargetter and Jackson 1982, 251)

- (CA1) There is a causal relation between events.
- (CA2) All manifestation events are caused.
- (CA3) For every manifestation event there is a property of the disposed object that plays a causal role in bringing about that manifestation.
- (CA4) Only intrinsic properties of disposed objects can play causal roles in bringing about the manifestation.
- (CA4*) Only properties of disposed objects that aren’t too unnatural can play causal roles in bringing about the manifestation.

For any object x and any disposition D with causal basis role *CB-role*, there is a property B such that

- (D-CB) x has D iff x has B and B has *CB-role* for D .

For any object x and any disposition D ,

- (D-MB) x has D iff x has some property B that is the x -complete metaphysical basis for D .

- (A) The wire is live iff it is disposed to conduct electricity when touching the conductor.
- (A') The wire is live iff it is disposed to conduct electricity when touching the conductor *in the absence of finks*.
- (B) The wire is disposed to conduct electricity when touching the conductor iff it would conduct electricity if it were touching the conductor.
- (C) The wire is live iff it would conduct electricity if it were touching the conductor.
- (D) The wire is disposed to conduct electricity when touching the conductor iff the wire has an intrinsic property B before the wire touches the conductor and, were the wire to retain B and touch the conductor, the wire’s having B

along with its touching the conductor would jointly be the wire-complete cause of the wire's conducting electricity.

- (E) The wire is live iff the wire has an intrinsic property *B* before the wire touches the conductor and, were the wire to retain *B* and touch the conductor, the wire's having *B* along with its touching the conductor would jointly be the wire-complete cause of the wire's conducting electricity.
- (F) A drug is (lethally) poisonous iff the drug is disposed to kill when ingested.
- (F') A drug is (lethally) poisonous iff the drug is disposed to kill when ingested *without its antidote*.
- (F'') A drug is (lethally) poisonous iff the drug is disposed to kill when ingested *without its antidote and without an enabler*.
- (G) A drug is disposed to kill when ingested iff the drug has an intrinsic property *B* before the drug is ingested and, were the drug to retain *B* and be ingested, the drug's having *B* along with its being ingested would jointly be the drug-complete cause of the drug's killing.
- (G') A drug is disposed to kill when ingested *without its antidote* iff the drug has an intrinsic property *B* before the drug is ingested and, were the drug to retain *B* and be ingested, the drug's having *B* along with its being ingested would jointly be the drug-complete cause of the drug's killing.
- (H) A drug is poisonous iff the drug has an intrinsic property *B* before the drug is ingested and, were the drug to retain *B* and be ingested, the drug's having *B* along with its being ingested would jointly be the drug-complete cause of the drug's killing.
- (I) The wire is disposed to conduct electricity when touching the conductor iff it would conduct electricity in some suitable proportion of touching-the-conductor cases.
- (J) The wire is live iff it would conduct electricity in some suitable proportion of touching-the-conductor cases.

- (K) A drug is disposed to kill when ingested iff the drug would kill in some suitable proportion of ingesting cases.
- (L) A drug is poisonous iff the drug would kill in some suitable proportion of ingesting cases.
- (1) x is fragile iff x would break if dropped in C .
- (2) x is fragile iff x would break if dropped in the C s.
- (2.1) x is fragile iff were x in some case or other among the C s, x would break.
- (2.2) x is fragile iff for some case among the C s, if x were dropped in that case, x would break.
- (2.3) x is fragile iff for every case among the C s, if x were dropped in that case, x would break.
- (3) If kangaroos had no tails, they would topple over.
- (4) Kangaroos have no tails $\square \rightarrow$ Kangaroos topple over.
- (5) If the winner had not bribed the judge, then he would not have won.
- (6) The winner did not bribe the judge $\square \rightarrow$ The winner did not win.
- (7) x did not bribe the judge $\square \rightarrow x$ did not win.
- (8) $(\exists x)(Rx \ \& \ (Gx \ \square \rightarrow \ Cx))$.
- (9) $(\forall x)(Dx \equiv (Sx \ \square \rightarrow \ Mx))$.
- (10) If Jones were an honorable man, he would confess.