

# Dispositions

James Michael Bucknell

Master of Arts Columbia University, New York  
Bachelor of Arts (Honours) University of Sydney

A thesis in fulfillment of the requirements for the degree of Doctor of Philosophy



School of Humanities and Languages  
Faculty of Arts and Social Sciences

March 2015



## **Abstract**

Dispositions have moved from being regarded with suspicion to playing a central role in metaphysics. Yet despite much recent work, there is little consensus on the semantics of dispositional terms used to make ascriptions (such as “ $x$  is fragile”) and the metaphysics of dispositional properties (such as fragility).

This thesis proposes that key, competing theories of dispositions mistake and conflate how we identify, designate and talk about dispositions and dispositional terms for the nature of dispositions and the meaning of dispositional terms when they argue that:

- a) dispositions are extrinsic properties of their bearers (Boyle 1666)
- b) all properties are purely dispositional (Bird 2007)
- c) all properties are purely categorical (there are no dispositional properties) (Armstrong in AMP 1996)
- d) dispositional and categorical properties are separate and distinct properties (Prior, Pargetter and Jackson 1982).

In so doing these theories make unwarranted and unsupported ontological conclusions about dispositions.

The thesis traces the principal source of this confusion and conflation to a reliance on the counterfactual analysis of dispositions that wrongly encourages the conflation of a disposition (say fragility) with its manifestation (shattering). There is good reason to hold that the counterfactual analysis of dispositions is false — the truth of a counterfactual statement (such as “if  $x$  were dropped  $x$  would break”) is neither necessary nor sufficient for the truth of a dispositional ascription (such as “ $x$  is fragile”).

## **Table of Contents**

<b>CHAPTER ONE — INTRODUCTION AND CHAPTER OUTLINE</b>	<b>6</b>
INTRODUCTION	6
CHAPTER OUTLINE	7
<b>CHAPTER TWO — DISPOSITIONAL CONCEPTS</b>	<b>14</b>
2.1 THE COUNTERFACTUAL ANALYSIS OF DISPOSITIONS	15
2.2 INDEPENDENCE OF DISPOSITION AND MANIFESTATION	28
2.3 DISPOSITIONS ARE CATEGORICAL	30
<b>CHAPTER 3.1 — THE DISTINCTION BETWEEN FIXING THE REFERENCE OF A TERM AND GIVING ITS MEANING</b>	<b>32</b>
3.1.1. MODAL DIFFERENCES IN THE WAY NAMES AND DEFINITE DESCRIPTIONS DESIGNATE THE SAME ENTITY	34
3.1.2 THE DISTINCTION BETWEEN FIXING THE REFERENCE OF A TERM AND GIVING ITS MEANING	39
3.1.3. PROBLEMS ARISE WHEN WE CONFLATE AND MISTAKE THE MANNER WE FIX THE REFERENCE OF A TERM WITH ITS MEANING	49
<b>CHAPTER 3.2 — THE PREDICATE PROPERTY DISTINCTION</b>	<b>55</b>
3.2.1 THE NATURE OF PROPERTIES	56
3.2.2 PREDICATE PROPERTY DISTINCTION — ARGUMENTS THAT PREDICATES AND PROPERTIES ARE NOT CORRELATED ONE-TO-ONE	62
3.2.3 WHAT PROPERTIES EXIST? SCIENCE AND LAWS OUR BEST GUIDE	75
<b>CHAPTER 4.1 — THE DISTINCTNESS THESIS</b>	<b>79</b>
4.1.1 PRIOR, PARGETTER AND JACKSON’S MODAL ARGUMENT FOR THE DISTINCTNESS THESIS	81
4.1.2 PRIOR, PARGETTER AND JACKSON’S MULTIPLE REALISATION ARGUMENT FOR THE DISTINCTNESS THESIS AND RIVES’ DEFENCE	92
4.1.3 WHY WE SHOULD REJECT MULTIPLY REALISATION ARGUMENTS FOR THE DISTINCTNESS THESIS	101
<b>CHAPTER 4.2 — PURE POWERS AND DISPOSITIONAL ESSENTIALISM</b>	<b>111</b>
4.2.1 PURE POWERS AND DISPOSITIONAL ESSENTIALISM — INTRODUCTION	112
PURE POWERS VIEW	113
4.2.2 ARGUMENTS FOR PURE POWERS AND DISPOSITIONAL ESSENTIALISM	131
4.2.3 ARGUMENTS AGAINST PURE POWERS	154
<b>CHAPTER 4.3 — CATEGORICALISM</b>	<b>163</b>
4.3.1 ARMSTRONG’S CATEGORICALIST ACCOUNT OF PROPERTIES	165
4.3.2 TRUTHMAKER ARGUMENT FOR CATEGORICALISM	166
4.3.3 PROBLEMS WITH CATEGORICALISM	178
<b>CHAPTER 4.4 — DISPOSITIONS ARE NOT EXTRINSIC PROPERTIES</b>	<b>186</b>
4.4.1 THE INTRINSIC EXTRINSIC DISTINCTION	188
4.4.2 SMITH’S ARGUMENT THAT DISPOSITIONS ARE RELATIONAL AND EXTRINSIC PROPERTIES OF THEIR BEARERS	190

<b>4.4.3. MCKITRICK’S ARGUMENTS THAT DISPOSITIONS ARE EXTRINSIC PROPERTIES OF THEIR BEARERS</b>	<b>200</b>
<b>4.4.4 MOLNAR ON BOYLE’S KEY-AND-LOCK ARGUMENT FOR RELATIONAL, EXTRINSIC PROPERTIES</b>	<b>205</b>
<b>DISPOSITIONS — CONCLUSION</b>	<b>218</b>
<b>REFERENCES</b>	<b>223</b>

## **Chapter one — introduction and chapter outline**

### **Introduction**

Dispositions and powers are central to our understanding of how the world is and what it is for an entity to possess a property. Despite their importance, dispositions have been viewed with deep suspicion. It was feared that dispositions introduce suspect concepts such as possibility and potentiality into the world and that to countenance their existence is to venture beyond what could be verified. These worries have largely been allayed in recent decades. Philosophers have developed a robust modal semantics in terms of possible worlds and we are no longer bound fast by verificationist concerns about ontology outstripping evidence. This has allowed dispositions and powers to take their place at the centre of metaphysics and our understanding of causation, laws of nature and modality. Despite this, there is little consensus on the correct way to understand dispositional properties and dispositional ascriptions and terms. Major, competing accounts of dispositions suffer serious objections.

My contribution to the debate on dispositions is to trace the source of many of these problems to a range of confusions and conflations that stem from a faulty semantics of dispositions based around the counterfactual analysis of dispositions. The central claim of this thesis is that a number of key, competing theories of dispositions mistake and conflate how we fix the reference of dispositional terms for the nature of dispositions and the meaning of dispositional terms when they argue that:

- e) Dispositions are extrinsic properties of their bearers (Boyle 1666)
- f) Properties are purely dispositional (Bird 2007)
- g) Properties are purely categorical (there are no dispositional properties) (Armstrong in AMP 1996)
- h) Dispositional and categorical properties are separate and distinct properties (Prior, Pargetter and Jackson 1982)

There is good reason to hold that the counterfactual analysis of dispositions is false — the truth of a counterfactual statement (such as “if  $x$  were dropped  $x$

would break”) is neither necessary nor sufficient for the truth of a dispositional ascription (such as “ $x$  is fragile”). This leads me to claim that counterfactuals are useful for fixing the reference of dispositional terms, but do not give the meaning of these terms. The counterfactual analysis of dispositions also wrongly encourages the conflation of a disposition (say fragility) with its manifestation (shattering). This in turn encourages the view that dispositions are conditional and somehow potential, when it is only the manifestation and manifestation conditions of a disposition that are conditional and potential.

The central claims of this thesis rest upon a distinction between the way we talk about the world and how the world is. In particular, I argue that it is wrong to confuse the manner in which we fix the reference of dispositional terms for the meaning of those terms. Similarly, it is wrong to confuse the way in which we pick out and identify properties using dispositional and categorical language for the way these properties are. I conclude that the accounts of dispositions mentioned above employ a false semantics of powers to make unwarranted ontological claims about the nature of dispositions and properties.

## **Chapter outline**

### **Chapter two — the counterfactual analysis of dispositions, independence and categorical dispositions**

In chapter two I introduce a number of concepts that are central to understanding dispositional properties and dispositional ascriptions and terms. I make three claims. My principal claim is that the counterfactual analysis of dispositions is false. I argue that dispositional ascriptions, such as “ $x$  is fragile”, cannot be analysed in terms of counterfactual statements such as “if  $x$  were struck  $x$  would break”. I note that finks, mimics and masks show the counterfactual analysis of dispositional ascriptions is false. They show that the truth of a counterfactual is neither necessary nor sufficient for the truth of a dispositional ascription: There are objects that would shatter upon being struck that are not fragile, and there are objects that are fragile that would not shatter upon being struck.

Secondly, I argue for the independence of a disposition and its manifestation. I show dispositions can exist in the absence of their manifestation. For example, the Ming vase on level two of the Morven Brown building is fragile even when it is not shattering. Indeed the vase need never shatter, yet it still remains fragile. As such, powers and dispositions are ontologically independent of their manifestation.

Thirdly, I show that the independence of a disposition and its manifestation entails that dispositions are categorical, in the sense of being non-conditional properties of their bearers. To say that an object is fragile is to say that it possesses an actual property. The manifestation and manifestation conditions of a disposition may well be conditional, but the disposition itself is not conditional.

Later in the thesis (chapter four), I show that misunderstanding these concepts and distinctions underpins numerous arguments and claims about the nature of dispositions and dispositional ascriptions and terms.

### **Chapter three — the distinction between fixing the reference of a term and giving its meaning, and the claim that predicates and properties are not isomorphic**

In chapter three I argue for a general distinction between word making and world making. The chapter is divided into two sections. In section one, I introduce Kripke's distinction between rigid and non-rigid designators to show how different terms can be used to pick out and talk about what is one and the same thing. I also use Kripke's distinction between rigid and non-rigid designators to explore his contrast between fixing the reference of a term and giving its meaning. In the next chapter, I use this distinction to show that counterfactuals are useful for fixing the reference of dispositional terms but do not give their meaning.

In section two of the chapter I discuss the relation between words and the world. I present an array of arguments to demonstrate that predicates and properties are



not isomorphic and conclude that we cannot argue from the satisfaction of a predicate to the existence of a corresponding property. This chapter acts as a bridge between chapter two, where I present a number of dispositional concepts, and chapter four, where I show that confusions between predicates and properties and reference fixing and meaning lead philosophers to make unwarranted ontological and semantic claims about the nature of dispositions and dispositional ascriptions.

Following this I also argue that the manner in which entities are identified and picked out — be it by rigid or non-rigid designators — is not revelatory of the nature of those entities or the meaning of dispositional and property terms. I contend that the way something is picked out and designated is just that — a way of picking something out. To think otherwise is to assume the terms and phrases we use to pick out dispositions and properties are disguised descriptions.

#### **Chapter four — accounts of dispositions**

In chapter four I examine four accounts of the nature of dispositions and properties. I show how the misapplication of a faulty semantics of dispositions based on the counterfactual analysis of dispositions and a failure to distinguish between rigid and non-rigid designators underpins unwarranted ontological claims about dispositions and properties. I conclude that these accounts present arguments that are either invalid or unsound and so fail to establish the truth of their claims about the nature of dispositional properties and dispositional ascriptions and terms.

##### **4.1 Distinctness thesis**

In this chapter I examine Prior, Pargetter and Jackson's (1982) adaption of Kripke's (1980) modal argument against the identity of mental states and brain states to defend the Distinctness Thesis — that a disposition or power and its causal basis are distinct properties. I show their argument is unsound.

We see that on the counterfactual definition of dispositions put forward by Prior, Pargetter and Jackson, breaking (or breaking upon being dropped) is a rendered

a necessary property of fragility. Hence, breaking (or breaking upon being dropped) is not a contingent property of fragility and therefore cannot serve as an epistemic counterpart capable of explaining away our intuition that “fragility  $\neq$  molecular bonding  $\alpha$ ”. From this Prior, Pargetter and Jackson conclude that a disposition and its causal basis are distinct properties.

It is noted that Prior, Pargetter and Jackson are aware that mimics undermine their counterfactual analysis of dispositions and hence their argument for the distinctness thesis. I argue that Prior, Pargetter and Jackson’s attempts to defend the counterfactual analysis of dispositions against mimics introduces a contingent feature of fragility and so undermines Prior, Pargetter and Jackson’s modal argument for the Distinctness Thesis. Prior, Pargetter and Jackson’s defence of the counterfactual analysis is also seen to entail, contrary to their intentions, the existence of relational and extrinsic dispositions.

I conclude that at the heart of Prior, Pargetter and Jackson’s problem is a confusion between how we pick out the reference of a disposition — using counterfactuals — and the disposition itself. They confuse language we use to talk about properties with the meaning of dispositional terms and the nature of dispositional properties and draw the unwarranted ontological conclusions that the categorical and the dispositional are two distinct properties.

## **4.2 Pure powers and dispositional essentialism**

In this chapter I explore the pure powers view and dispositional essentialist accounts of properties. The chapter is divided into three sections. Section one introduces the pure powers view — properties are solely or purely dispositional — and shows how it entails dispositional essentialism and the necessity of causal laws.

In section two, I examine two arguments proffered by Bird (2007) for dispositional essentialism and the existence of pure powers. The first is an argument to the best explanation. Bird claims that to deny dispositional essentialism (and so adopt categoricalism) is to forego an adequate account of

properties and causal laws. I argue that Bird fails to show dispositional essentialism provides a superior account of properties and fails the test by which arguments to the best explanation are judged. I show the second argument is an *a posteriori* argument from science. The findings of particle physics suggests that fundamental particles are simple, pointlike and lacking in structure. This is thought to support dispositional essentialism's claims that powers are purely dispositional and possess essences. I show that this line of reasoning commits the headless women fallacy and so should be rejected. It is also argued that the use of solely dispositional terms, such as "spin" and "charge", to characterise and talk about the properties of fundamental particles entails that these properties are solely dispositional. I show that to draw such a conclusion is to confuse and conflate how we talk about the world for the nature of the world. The properties of fundamental particles are characterised using dispositional terms and discovered using dispositional means. However, I argue that it is wrong to conclude that these properties are therefore purely dispositional. I conclude that these arguments fail to support Bird's claim that the properties of fundamental particles are pure powers with dispositional essences.

Part three of this chapter presents criticism of the pure powers view. I examine three regress arguments that arise due to the relational nature of properties as pure powers. I argue that the individuation regress demonstrates the pure powers view is incoherent and so should be rejected.

### **4.3 Categoricalism**

In chapter 4.3 I examine Armstrong's claim that all properties are categorical. This is the claim that properties are solely categorical or qualitative and the denial that there are any irreducible dispositions and powers. The chapter is divided into three sections. In section one I introduce Armstrong's categoricalist account of properties. He argues that powers are identical to and reducible to categorical properties.

In section two I examine arguments for categoricalism. I note that Armstrong's claim that all properties are categorical is motivated by his commitment to the truthmaker principle and the rejection of intentionality, which he finds in

dispositions. I show that Armstrong's arguments for categoricism are unsound. He confuses how we pick out the reference of dispositional terms, via counterfactuals, for the meaning of those terms and also conflates the manifestation of a disposition for the disposition itself when he claims that dispositions introduce intentionality into the world.

In section three of this chapter, I look at problems and complications with categoricist accounts of dispositions and ask whether they provide an adequate account of properties. These problems include a tension in Armstrong's account of how categoric properties account for dispositions, claims that purely categoric properties are unknowable, and assertions that there are no purely categoric properties — that all properties involve dispositionality. I argue that these objections can be met by a proponent of categoricism and that they provide no reason to reject categoricism. Nonetheless, I show Armstrong fails to provide any sound arguments for why we should accept that all properties are categoric.

I conclude that categoricism is right to claim that just because we make dispositional ascriptions and use a language of dispositional properties in talking about the world it does not follow that there are dispositional properties. Dispositional terms do not describe irreducible dispositional properties or states of affairs. Instead, I argue dispositional ascriptions are just ways of talking about and designating categoric properties. However, categoricism makes the mistake of taking categoric ascriptions and concepts to mirror reality. I contend that categoricism fails to apply the same skepticism about dispositional talk to categoric talk and is led into making unwarranted ontological implications based on language, when it is claimed that all properties are purely categoric.

#### **4.4 Powers as extrinsic properties**

In this final chapter, I show that A.D. Smith (1977), Jennifer McKittrick (2003) and Robert Boyle (1666) conflate the manifestation and manifestation conditions of a disposition (which may well be extrinsic) with the disposition itself when they argue that dispositions are extrinsic properties of their bearers. I also show that

McKittrick is wrong to conclude that a key has two different powers, one intrinsic and one extrinsic, on the basis that she can designate a key's power to open a door in two ways, one rigidly and one non-rigidly. I also construct an argument based on Molnar (2003) demonstrating that even if dispositions are extrinsic properties, they are nonetheless founded upon and reducible to intrinsic properties of their bearers.

Ultimately, it is concluded that failures to distinguish between (a) how we fix the reference of dispositional terms and the meaning of those terms and (b) how we talk about the world and how the world is, lead these accounts discussed in chapter four to make unwarranted claims about the nature of dispositional properties and dispositional terms and ascriptions. Their arguments are invalid or unsound and give us no reason to accept their claims about dispositions.

## **Chapter two — Dispositional concepts**

### **2.1 The counterfactual analysis of dispositions**

- Problems posed by finks, mimics, masks and antidotes
- Reformed Conditional Analysis
  - RCA overcomes problems posed by finks
  - RCA overcomes problems posed by mimics
  - RCA cannot answer problems posed by masks and antidotes
- Further attempts to save the conditional analysis — Choi's defence of SCA
  - Choi committed to extrinsic dispositional properties
- Ultimate argument against conditional analysis — non-dyadic dispositions
- Counterfactual are useful for fixing the reference of dispositional terms, but do not give the meaning of these terms

### **2.2 Independence of disposition and manifestation**

- A disposition and its manifestation are ontologically distinct.

### **2.3 Dispositions are categorical**

- The manifestation of a disposition is conditional, but the disposition itself is not conditional

## **Introduction**

In this chapter I introduce three dispositional concepts. Later in the thesis (chapter four) I argue that a range of claims about the nature of dispositional properties and ascriptions are motivated by a series of misunderstandings related to these concepts. My principal claim in this chapter is that the counterfactual analysis of dispositions is false. I argue that dispositional ascriptions, such as “ $x$  is fragile”, cannot be analysed in terms of counterfactual statements such as “if  $x$  were struck  $x$  would break”. Rather, counterfactuals are useful for picking out and fixing the reference of dispositional terms, but do not give the meaning of those terms. I also argue that a disposition is ontologically independent and distinct from its manifestation. For example, an object may be fragile independently of its breaking. Finally, I show that dispositions are categorical, non-conditional properties of their bearers. To say that an object is fragile is to say that it possesses an actual property now. The manifestation of a disposition may well be conditional, but the disposition itself is not conditional.

### **2.1 The counterfactual analysis of dispositions**

Attempts have been made to analyse and define dispositions in terms of counterfactual conditionals. For example, here is Prior, Pargetter and Jackson’s definition of fragility, using what Lewis calls the simple conditional analysis (SCA) (Lewis 1997:143):

“But what makes fragility a disposition is that it is right to define ‘ $x$  is fragile’ as ‘If  $x$  were dropped at  $t$ ,  $x$  would break at  $t + \delta$ .’” (Prior, Pargetter and Jackson 1982:254)

However, the existence of finks, mimics, masks and antidotes show that the truth of a counterfactual statement is neither necessary nor sufficient for the truth of a dispositional ascription.<sup>1</sup> Dispositions cannot be defined and analysed in terms of counterfactual statements.

---

<sup>1</sup> On the counterfactual analysis, counterfactuals are used to supply truth conditions for dispositional statements. However, as Isaac Levi (2003) argues, counterfactuals lack truth values and so are incapable of providing truth values for dispositional ascriptions. A number of other philosophers also argue that counterfactuals lack truth values. Alan Hajek (unpublished) holds that most counterfactuals are false. While John Mackie (1973) contends counterfactuals are condensed arguments, capable of being valid, but not true.

### **Problems posed by finks, mimics, masks and antidotes**

The mechanism of finkish dispositions is such that the stimulus conditions for the manifestation of a disposition are also the conditions for an entity or lose a disposition, and so ensure that the disposition is not manifested. That is, finkish dispositions are those that cease to exist upon the instantiation of the disposition's characteristic stimulus. There are also reverse finks in which a stimulus conditions brings into existence a disposition.

Martin (1994) introduces the electro-fink and reverse electro-fink examples. An electro-fink is a device connected to a (dead) wire that makes the wire live if it is touched by a conductor:

“Consider now the following case. The wire referred to in (A) is connected to a machine, an *electro-fink*, which can provide itself with reliable information as to exactly when a wire connected to it is touched by a conductor. When such contact occurs the electro-fink reacts (instantaneously, we are supposing) by making the wire live for the duration of the contact. In the absence of contact the wire is dead. For example, at  $t_1$ , the wire is untouched by any conductor, at  $t_2$  a conductor touches it, at  $t_3$  it is untouched again. The wire is dead at  $t_1$ , live at  $t_2$ , and dead again at  $t_3$ . In sum, the electro-fink ensures that the wire is live when and only when a conductor touches it.” (Martin 1994:2-3)

Martin concludes that the electro-fink examples demonstrates that:

“Consequently the conditional [If the wire is touched by a conductor then electrical current flows from the wire to the conductor] is not logically sufficient for the power ascription of which it is meant to be the analysans.” (Martin 1994:3)

The electro-fink example shows that the truth a counterfactual statement is not sufficient for the truth a dispositional ascription.

The electro-fink on reverse cycle makes a live wire dead when touched by a conductor:



“We turn a switch on our electro-fink so as to make it operate on a reverse cycle, as it were. So the wire is dead when and only when a conductor touches it. At all other times it is live.” (Martin 1994:3)

George Molnar provides a real-world example of Martin’s reverse electro-fink in the form of a circuit breaker:

“A non-imaginary example is an electrical safety cut-out switch which turns off the current in a wire (=the base) when an earthed conductor touches the wire, thus preventing anybody getting a shock from the wire (=the disposition). At time  $t$ , it is true the wire is live (=disposition) although the conditional ‘If one were to touch the wire at  $t$  one would get an electric shock’ is false, thanks to the safety switch.” (Molnar 2003:90)

In these two examples, the wire is live, yet the counterfactual “If the wire is touched by a conductor then electrical current flows from the wire to the conductor” is false. We have a true dispositional ascription, yet false counterfactual. This shows that the truth of a counterfactual is not necessary for the truth of a dispositional ascription or the possession of a dispositional property.

### **Masks and antidotes**

Masks and antidotes also show that counterfactuals are unsuited for analysing and defining dispositional terms and ascriptions. The mechanism of masks and antidotes is such that they prevent the manifestation of a disposition not by removing the disposition before it can manifest, as in the case of finks, but by blocking or disrupting the process that leads to a disposition’s manifestation. Johnston (1992) describes a situation in which a fragile cup has its disposition to shatter “masked” by packing foam. While Bird (1998) uses the term “antidote” to describe a situation in which a poisonous substance is ingested but fails to kill as an antidote has also been ingested:

“Many dispositions have what I call *antidotes*. An object  $x$  is disposed to display response  $r$  under stimulus  $s$ . At time  $t$  it receives stimulus  $s$  and so in the normal course of things, at some later time  $t'$ ,  $x$  gives response  $r$ ... An antidote to the above disposition would be something which, when applied before  $t'$ , has the effect of breaking the causal chain leading to  $r$ , so that  $r$  does not in fact occur. Thus one can ingest a lethal dose of

poison, yet not die if a suitable antidote is administered soon enough. (For instance, the antidote to arsenic poisoning is dimercaprol, which, incidentally, is also known as British Anti-Lewisite.)” (Bird 1998:228)

Toby Handfield (2009) provides a clear, everyday example of a mask/antidote: “My pot plant is disposed to dry out if left in the sun. The attempted analysis in terms of a counterfactual would be:

Were this pot plant left in the sun, it would dry out  
As it happens, the pot plant is left in the sun, but I mask this disposition by diligently watering it.” (Handfield 2009:7)

The dispositional ascription is true — the pot plant has the disposition to dry out. Yet the counterfactual — were this pot plant left in the sun, it would dry out — is false. The pot plant’s disposition to dry out is masked by Handfield’s diligent watering. This example of a masked disposition shows that the truth of a counterfactual is not necessary for the truth of a dispositional ascription.

### **Mimics**

Mimics show that the truth of a counterfactual is not sufficient for the possession of a disposition or power and that dispositions cannot be analysed and defined in terms of counterfactual statements. Lewis’ Hater of Styrofoam provides an example:

“When a Styrofoam dish is struck, it makes a distinctive sound. When the Hater of Styrofoam hears this sound, he comes and tears the dish apart by brute force. So, when the Hater is within earshot, styrofoam (sic.) dishes are disposed to end up broken if struck. ... Are they [Styrofoam dishes] fragile? To say so would be at best a misleading truth, and at worst an outright falsehood.” (Lewis 1997:153)

As Lewis notes, the Styrofoam dish is not fragile, but nonetheless, due to the actions of the Hater of Styrofoam, it mimics the actions of a fragile entity. The counterfactual “if this Styrofoam cup were struck, it would shatter” is true. Yet the dispositional ascription — that the Styrofoam cup is fragile — is false. True counterfactual, yet false dispositional ascription. This mimic shows that the truth of a counterfactual is not sufficient for the possession of a disposition or power.

### **Reformed Conditional Analysis**

In response to such finks, mimics, masks and antidotes, Lewis declares the simple conditional analysis of dispositions is “simple indeed — but false” (Lewis 1997a:143). He proposes replacing it with the reformed conditional analysis RCA:

“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  $r$ .” (Lewis 1997:157)

### **The reformed conditional analysis overcomes problems posed by finks**

The RCA successfully overcomes problems posed by finks to the counterfactual analysis of dispositions. As noted above, finkish dispositions are those dispositions that cease to exist (or come into being) upon the instantiation of the disposition's characteristic stimulus. For example, the fragility of a vase is finkish if the striking of the vase causes the vase to lose its fragility (and so not shatter). The problem posed by these finkish dispositions is that the dispositional ascription “the vase is fragile” is true, yet the counterfactual “if this vase were struck it would break” is false.

The RCA successfully rules out finkish dispositions with the requirement that:

if  $x$  were to undergo stimulus  $s$  at time  $t$  and retain property  $B$  until  $t'$ ...

Finkish dispositions are precisely those dispositions that do not retain property  $B$  until  $t'$ . The vase is not fragile according to RCA, because it fails to retain the causal basis  $B$  that would jointly be an  $x$ -complete cause of the vase's shattering.

### **The reformed conditional analysis overcomes problems posed by mimics**

The RCA also avoids problems posed by mimics to the counterfactual analysis of dispositions. The problem that mimicked dispositions pose to the counterfactual analysis is that, in the case of the Styrofoam dish, the dish is not fragile, yet the

counterfactual “if this Styrofoam dish were struck it would end up broken” is true (due to the actions of the Hater of Styrofoam). We have a false dispositional ascription, yet a true counterfactual.

The RCA successfully rules out mimicked dispositions with the requirement that:

*x*'s having of *B* [an intrinsic property that *x* has] would jointly be an *x*-complete cause of *x*'s giving response *r*.”

There is no intrinsic property *B* of the Styrofoam dish that would (with the striking of Styrofoam dish) be a jointly *x*-complete cause of the Styrofoam dish shattering. Rather, the cause of the Styrofoam dish ending up broken involves the actions of the Hater of Styrofoam, which is extrinsic to the Styrofoam dish, and so is ruled out by the RCA's requirement that some intrinsic property *B* that the Styrofoam dish has is responsible for its ending up broken.

### **The reformed conditional analysis cannot answer problems posed by masks and antidotes**

The RCA successfully deals with problems that finks and mimics pose to a counterfactual analysis of dispositions. However, the RCA cannot overcome problems posed by masks and antidotes. Consider Johnston's cup packed in foam. The cup is fragile, yet the counterfactual “if this cup were struck it would shatter” is false. We have a true dispositional ascription, yet a false counterfactual. To overcome the problem that Johnston's masked cup presents to the counterfactual analysis, the RCA would have to contain provisions and restrictions that in some manner ruled out the actions of the antidote, just as the RCA ruled out the actions of finks and mimics.

On the RCA, change in the intrinsic properties of the bearer of the disposition rules out finks. But in this case, the case of mask and antidotes, there is no change in the intrinsic properties of the cup. The packing foam does not change the intrinsic properties of the cup, the bearer of the disposition. Bird notes that this is the very point of masks and antidotes (Bird 1998:228). Unlike finks, masked and antidote-d entities retain their disposition and its causal basis. This lack of change in the intrinsic properties of the cup means that the antecedent of the conditional:

if (for some intrinsic property  $B$  and time  $t'$ ) *the cup* were to undergo stimulus  $s$  at time  $t$  and retain property  $B$  until  $t'$

is satisfied. Yet the consequent:

then  $s$  and *the cup's* having of  $B$  would jointly be an x-complete cause of *the cup's* giving response  $r$

is not satisfied. The counterfactual is thereby false. Yet the dispositional ascription is true. The RCA fails to save the counterfactual analysis from problems posed by masks and antidotes that show the truth of a counterfactual is not necessary for the truth of a dispositional ascription.

### **Further attempts to save the conditional analysis — Choi's defence of the simple conditional analysis**

Even with the modifications and restrictions contained in the RCA, conditional statements are shown to be not suitable for analysing and defining dispositions. As has been shown, the truth of a counterfactual conditional statement is neither necessary nor sufficient for the truth of a statement making a dispositional ascription.

Despite these counterexamples, Choi nonetheless defends the counterfactual analysis of dispositions by defending the SCA (Choi 2005, 2008). According to Choi, the SCA is not wrong. Rather it is our intuition about what is and is not fragile that is wrong. That is, in Choi thinks we are wrong about the dispositional ascriptions we make. Take the case of the fragile vase packed in protective foam. The problem for the SCA is that the counterfactual “if the vase were struck, then it would break” is false, yet the vase is supposedly fragile. That is, the problem for the counterfactual analysis is that we have a true dispositional ascription, yet a false counterfactual statement. Choi attempts to save the SCA not by strengthening the counterfactual but instead by denying that that the vase is fragile. Choi contends that a fragile vase loses its fragility when packed in protective foam. In other words, Choi attempts to save the counterfactual analysis by claiming, in this case, that we have a false dispositional ascription and a false counterfactual statement.

In the case of the Styrofoam dish, the problem for the SCA is that the counterfactual “if the dish were struck, then it would break” is true, yet the dish is not fragile. We have a false dispositional ascription and a true counterfactual statement. Choi overcomes this problem for the SCA by claiming the Styrofoam dish is fragile when in the presence of the Hater of Styrofoam. By so doing Choi aligns the truth values of the dispositional ascription and the counterfactual statement — both are now true.

### **Choi committed to extrinsic dispositional properties**

Choi’s defence of the counterfactual analysis of dispositions commits him to the existence of extrinsic dispositions. In claiming the cup packed in foam is not fragile and the Styrofoam dish in the presence of the Hater of Styrofoam is fragile, Choi asserts that these objects gain and lose dispositions without any change in their intrinsic properties. The intrinsic properties of the cup remain unchanged before and after being enclosed in packing foam. Yet its disposition changes. According to Choi, the cup is fragile when not encased in protective packing and not fragile when so encased. Similarly, the intrinsic properties of the Styrofoam dish remain unchanged before and after being in the presence of the Hater of Styrofoam. Yet its dispositions change. The Styrofoam dish, according to Choi, is fragile when in the presence of the Hater of Styrofoam and not fragile when not in the presence of the Hater of Styrofoam. The salient point here is that these objects change their dispositions without any change in their intrinsic properties.

The implication of objects changing dispositions without any change in their intrinsic properties is that Choi is committed to claiming that dispositions are extrinsic properties of their bearers. He claims in general that:

“most ordinary dispositions are extrinsic dispositions.” (Choi 2008:171)

In particular, he claims the disposition fragility is an extrinsic property of its bearer:

“Fragility is not a nomically intrinsic disposition.” (Choi 2008:171)

It is easy to see that the non-fragility of the vase packed in foam is an extrinsic dispositional property, on both the duplicate and independence criteria of intrinsic.

Duplicates def — F is an intrinsic property of *a* iff there is no exact duplicate of *a* that is not F. (Langton and Lewis 1998)

Independence def — F is an intrinsic property of *a* iff *a*'s having F is independent of the existence or non-existence of any *b* that is distinct from *a*. (Molnar 2003)

Let us look at the vase example. An exact duplicate of the vase may lack the protective foam packing and so be fragile. Hence, being non-fragile is not an intrinsic property of the vase on the duplicate criterion. The non-fragility of the vase is also not independent of the existence or non-existence of the protective packing foam, that is distinct from the vase. Hence, the non-fragility of the vase is not an intrinsic property of the vase on the independence criterion for intrinsicity.

Similarly, the fragility of the Styrofoam dish is also an extrinsic property of the Styrofoam dish on Choi's account. An exact duplicate of the Styrofoam dish may lack the presence of the Hater of Styrofoam (or any other mimic) and so not shatter upon struck. Hence, being fragile is not an intrinsic property of the Styrofoam dish. It must therefore be an extrinsic property. The fragility of the Styrofoam dish is not independent of the existence or non-existence of the Hater of Styrofoam. Hence, the fragility of the Styrofoam dish is not an intrinsic property of the Styrofoam dish, and so must be extrinsic on the independence criterion.

Ultimately, Choi's defence of the counterfactual analysis entails or rests upon the claim that dispositions are extrinsic properties of their bearers. According to Choi, objects can gain and lose dispositions and powers without any change in the intrinsic properties of the bearer of the disposition. This may well be consistent with the SCA, and so save it from problems posed by finks, mimics, masks and antidotes. However, it is false. As I argue in chapter 4.4, dispositions are intrinsic properties of their bearers. Choi's defence of the counterfactual

analysis and the SCA gets the nature of dispositional properties wrong. Just as we should reject claims that dispositional properties are extrinsic, so too we must reject Choi's defence of the Simple Counterfactual Analysis of dispositions.

Molnar aptly captures what the SCA gets wrong and what the RCA gets right when he presents the issue in terms of loss of intrinsicity:

“An obvious problem with NCA<sup>2</sup> is that the conditional does not seem to be saying anything about what it is, *in the object*, that makes the response follow from the stimulus. Suppose that every time a stimulus *s* occurs, the Diety, having so resolved, causes the object *x* to give the response *r*. How would that show that *x* has a power to manifest *r*? ...NCA is suitable for an occasionalist metaphysics but not for the attribution of intrinsic dispositional properties to objects. Powers are intrinsic properties of their owners. Because it leaves this feature of powers out of the analysis, the definiens of NCA is not sufficient for the definiendum.” (Molnar 2003:84-85)

The SCA fails to capture the intrinsicity of dispositional properties and so fails to provide an adequate analysis of dispositions. Molnar teases out why the SCA is wrong — it commits one to the absurdity of an occasionalist metaphysics and its attendant account of causation. Lewis' RCA is right to include a provision that a disposition is an intrinsic property of its bearer, and so represents a significant advance on the SCA. Nonetheless, as the case of masks and antidotes show, despite this improvement, the RCA still fails to provide an adequate analysis of dispositional ascriptions.

### **The ultimate argument against the counterfactual analysis — non-dyadic dispositions**

It has been shown that both the SCA and RCA fail to provide an adequate analysis and definition of dispositional ascriptions. This in itself does not rule out some form of conditional analysis being suitable for capturing dispositional

---

<sup>2</sup> Molnar uses the term “naive conditional analysis” (NCA) for what Lewis calls the simple conditional analysis.



ascriptions. Perhaps all that is needed is further tweaking, strengthening and reforming of the conditional. However, this line of reasoning is misguided. A more fundamental problem befalls any conditional analysis of dispositions. As Maier (unpublished) and Molnar (2003:85-87) note, the formal nature of counterfactuals renders them unsuitable for analysing and defining dispositions. No tweaking, strengthening or reforming of the conditional can save the counterfactual analysis of dispositions.

Counterfactuals statements are dyadic in form. Counterfactuals include both an antecedent (that includes the stimulus conditions) and a consequent (that includes the manifestation conditions) when analysing dispositions. For example, fragility is analysed as:

If this glass were struck it would break

And solubility is analysed as:

If this sugar lump were placed in water it would dissolve

The dyadic nature of counterfactuals, despite problems with finks, mimics, masks and antidotes, is at least formally suited for analysing such dyadic disposition as fragility and solubility.<sup>3</sup> However, not all dispositions are dyadic, there are also monadic dispositions. That is, there are dispositions that lack a stimulus condition. These dispositions are formally unsuitable for analysing in terms of dyadic counterfactuals.

For example, Maier mentions the disposition of an uranium atom to decay. Maier notes that intuitively this is not a disposition to decay when certain conditions obtain, it is rather a disposition to decay simpliciter (Maier draft:2). Molnar also turns to particle decay to provide an example of a dyadic disposition lacking any stimulus conditions:

---

<sup>3</sup> It is an open question whether counterfactuals are formally adequate for capturing even supposedly dyadic dispositional ascriptions. Prior (1985:5-11) argues that “*x* is fragile” lacks a definite truth value on the grounds that the dispositional predicate “fragile” is incomplete. According to Prior, the complete predicate contains at least two argument places. The (more) complete predicate will typically include background conditions (say the temperature of the object) and the nature of the stimulus conditions (say the strength with which the object is struck). Prior leaves open the possibility that the dispositional predicate contains more than two argument places and so may not be suitable for capturing with a dyadic counterfactual. See chapter 4.3 for more discussion of Prior’s claim that the dispositional predicate is incomplete.

“The muon has the capacity to decay into an electron, a neutrino, and an antineutrino. This power is exercised during the muon’s very short average life ( $22 \times 10^{-6}$ s), without there being anything external to stimulate or trigger the decay.” (Molnar 2003:85)

These two examples show that counterfactuals are formally unsuited for analysing dispositions, as they cannot capture monadic dispositions that lack stimulus conditions.

Molnar identifies another class of monadic dispositions that have unconditional manifestations: continuously manifesting powers. As an example, Molnar mentions rest mass (according to General Relativity):

“Massive objects are spontaneously manifesting their gravitational power in continuous interaction with space-time.” (Molnar 2003:87)

These dispositions are exercised for as long as they exist. When they cease to exercise they cease to exist. Most importantly, there are no stimulus conditions, no toggle to turn them on and off (Molnar 2003:87-87). Monadic dispositions cannot be analysed, defined or reduced to dyadic counterfactuals. As such, we must conclude that counterfactuals by their very form are unsuitable for analysing dispositions.

In defence of the counterfactual analysis it might be claimed that these apparent cases of monadic dispositions actually possess internal stimulus or trigger and so are really dyadic dispositions in disguise. Molnar rules out such a reply for two reasons. Firstly, he notes that leptons are absolute simples and so incapable of possessing any such internal trigger for its decay. Secondly, any internal trigger for such a particle’s decay would itself require a trigger and thereby generate a regress, one that, as Molnar argues, is vicious:

“Suppose it were found, empirically, that the apparently spontaneous disintegration of some complex object, for example, an unstable atomic nucleus, is triggered by some internal mechanism. Then the problem of spontaneous manifestation would be pushed further back, from the *seeming* spontaneity of the nuclide disintegration to the *really* spontaneous operation of the internal mechanism that triggers it.” (Molnar 2003:86)

Molnar convincingly demonstrates that this possible response fails. The existence of monadic dispositions shows that counterfactuals, whether they be simple, sophisticated, reformed or otherwise are unable to analyse or define dispositions.

### **Counterfactuals are useful for fixing the reference of dispositional ascriptions**

The counterfactual analysis of dispositions has been shown to be false. Despite this, counterfactuals may still play some role in understanding dispositional ascriptions and properties. Lewis argues that counterfactuals are able to provide a rough-and-ready generalisation of dispositions:

“Though wrong as an analysis, the simple conditional analysis remains true as a rough and ready generalization: fragile things that are struck do for the most part break, and those that are unstruck would for the most part break if they were struck.” (Lewis 1997:149)

The ability of counterfactuals to provide a rough-and-ready generalisation leads Heil to suggest that counterfactuals are useful, yet defeasible, way for picking out and fixing the reference of dispositional terms (Heil 2003:195-96).

Following these remark by Lewis and Heil, I argue (in chapters three and four) that counterfactuals are useful for picking out and fixing the reference of dispositional terms but do not the give the meaning of dispositional terms. It is a central claim of this thesis, developed in chapter three and argued for in detail in chapter four, that prominent accounts of dispositions make false or unsubstantiated claims about the nature of dispositions and dispositional ascriptions when they mistake the way in which we fix the reference of dispositional terms for the meaning of those terms. Despite the falsity of the counterfactual analysis it nonetheless has a strong influence on attempts to give an account of the semantics and metaphysics of dispositions.

### **It is wrong to analysis dispositions in terms of conditionals and causation — dispositions are more basic**

One possible response to the falsity of the counterfactual analysis of dispositions is to view dispositions as more basic and reverse the order of explanation and

reduction. Maier does just this when he suggests that counterfactuals can be reduced to disposition:

“the logical form of disposition ascriptions is somewhat more general than that of counterfactuals. This suggests a natural thought: that counterfactuals may be reduced to disposition ascriptions.” (Maier unpublished:2)

Elsewhere Bird argues that dispositions are more basic than causation. Hence, we are wrong to seek a causal analysis of dispositions via counterfactuals. Instead, he makes dispositions basic and argues for an analysis of causation in terms of dispositions (Bird 2007:32). His position is discussed in chapter 4.2.

## **2.2 Independence of disposition and manifestation**

This concludes my discussion of the counterfactual analysis of dispositions. I now turn to examine two dispositional concepts that are related to the counterfactual analysis. When not fully understood, these concepts are apt to lead one to confuse and conflate how we pick out and fix the reference of dispositional terms for the meaning of those terms and so lead one to mischaracterise the semantics and metaphysics of dispositions.

The counterfactual analysis of dispositions makes explicit mention of a disposition’s stimulus and manifestation conditions and thereby encourages us to view a disposition’s stimulus and manifestation conditions as part of the dispositional ascription.<sup>4</sup> This in turn encourages the false view that a disposition is in some manner ontologically dependent upon and connected to its manifestation.

---

<sup>4</sup> While the counterfactual analysis of dispositions may encourage one to confuse and conflate a disposition and its manifestation, the counterfactual analysis is nonetheless compatible the independence of disposition and manifestation, as Molnar (2003:84) argues:

“Can one analyse a power as a bridging relation conditionalized on the occurrence of a stimulus event [as the counterfactual analyse does]? ... The thought behind it seems to be the following. Since an object can have a power without manifesting it, for the manifestation to occur something additional to, something over and above, the object’s having the power seems to be required. That something additional is an event that triggers or stimulates the occurrence of the manifestation. So the power can be analysed as that which *would* stand in the bridging relation to the manifestation *if* the stimulus occurred. If we add that the having of a power by its bearer is usually independent of the occurrence of the stimulus, then the analysis may be claimed to accommodate Independence.” (Molnar 2003:84)

However, such a view is mistaken. Powers and dispositions can exist in the absence of their manifestation. For example, the salt sitting in my cupboard is soluble right now, even when it is not dissolving. The salt's disposition of solubility exists independently of its manifestation. Token independence of a disposition and its manifestation seems obvious and undeniable. The Ming vase on level two of the Morven Brown building is fragile right now, even when it is not shattering. Indeed, the vase need never shatter, yet it still remains fragile. Type independence of a disposition and its manifestation also holds. A world in which salt (as a type) never came in contact with water (or any other liquid) and so never dissolved could still be a world in which salt is soluble. It is only a contingent matter that in this world salt has been immersed in water and so dissolved.

Why would anyone confuse and conflate a disposition with its manifestation? Mumford contends that empiricist, verificationist and anti-realist assumptions that refuse to separate evidence from ontology are at fault (Mumford 1998:ch3). Verificationist principles entail that a disposition just is its observable events, namely its manifestation. The manifestation of disposition is the most obvious sign an object possesses a certain disposition. As such, we can use the manifestation as a way to identify and re-identify objects that possess certain dispositions. There is nothing wrong with doing so. However, it is wrong to confuse and conflate the manifestation of a disposition with the disposition itself. It is wrong to confuse and conflate breaking with fragility. Armstrong describes this mistaken conflation of disposition and manifestation as a propensity to:

“...project into the disposed things a ghostly image of the manifestation of the disposition, even when it is not manifested.” (Armstrong, Martin, Place 1996:93)

Independence demonstrates that a disposition and its manifestation are not the same thing. To confuse and conflate the two can lead to the mischaracterisation of the nature of dispositions. For example, in chapter 4.4 I argue that confusing and conflating the manifestation or manifestation conditions, which are extrinsic

to the bearer of a disposition, for the disposition itself underpins a range of arguments that dispositions are extrinsic properties of their bearers.

### **2.3 Dispositions are non-conditional**

I now turn to the third dispositional concept that I wish to discuss: The fact that dispositions are non-conditional.<sup>5</sup> When we make a dispositional ascription we are making a claim about how something is right now. To say that a vase is fragile is to ascribe an actual property to the vase, one that the vase possesses right now. It is only the manifestation of a disposition that is conditional and potential. Dispositions and powers are actual, categorical and unconditional, only their manifestation is conditional and potential.

To claim that dispositions are non-categorical and conditional is to confuse and conflate a disposition and its manifestation. The manifestation is conditional. The breaking of the fragile vase is conditional on the vase being struck. The dissolving of the sugar is conditional on it being placed in water. However, the manifestation is not the disposition. As was just argued, a disposition and its manifestation are independent and distinct. Once we are aware of this, the temptation to view dispositions as conditional melts away.

I do not claim that anyone explicitly asserts that dispositions are conditional. Rather, I go on to argue that certain accounts of dispositions are lead astray by the counterfactual analysis to conflate a disposition and its manifestation and so implicitly hold that dispositions are conditional. For example, I argue in chapter 4.3 that the conditional nature of manifestations has been used to falsely claim that dispositions themselves are mere potencies and so somehow suspect as they go beyond the actual into the realm of the merely possible.

### **Conclusion**

---

<sup>5</sup> Dispositional properties are often contrasted with categorical properties. The debate on dispositions uses the term “categorical” in two ways. “Categorical” is used to mean non-conditional as well as structural. Structural properties include size and shape. An example of a structural property is being three-sided. On the non-conditional reading, dispositions are categorical properties. They are not categorical on the structural reading of categorical.

The principal claim of this chapter is that the counterfactual analysis of dispositions is false. Dispositional ascriptions, such as “ $x$  is fragile”, cannot be analysed in terms of counterfactual statements such as “if  $x$  were struck  $x$  would break”. I also showed that a disposition is ontologically independent and distinct from its manifestation. An object may be fragile independently of its breaking. Finally, I showed that dispositions are categorical, non-conditional properties of their bearers. To say that an object is fragile is to say that it possesses an actual property now. The manifestation of a disposition may well be conditional, but the disposition itself is not conditional.

My aim in discussing these concepts is to lay the foundation for my argument that accounts of dispositions make false and unwarranted claims about the nature of dispositional properties and dispositional ascriptions. Mistakes and misunderstandings concerning the counterfactual analysis, independence and that dispositions are not conditional underpin and motivate a range of claims about dispositions I show, in chapter four, to be unsupported and false. I now turn to the next chapter where, following Kripke, I argue for a distinction between fixing the reference of a term and giving the meaning of that term and for a distinction between predicates and properties.

## **Chapter 3.1 — The distinction between fixing the reference of a term and giving its meaning**

### **3.1.1 Modal differences in the way names and definite descriptions designate the same entity**

Names are rigid designators. Definite descriptions may be non-rigid designators.

- **Challenge to the distinction between names and definite descriptions — the “actually” operator**
  - The “actually” operator can be used to rigidify definite descriptions
  - the “actually” operator fails to capture the semantics of definite descriptions.
- **Names not the only rigid designators**
  - Kripke extends his account of rigid designators beyond names to natural kinds terms such as “gold”, species terms such as “tigers” and natural phenomena terms such as “heat”
- **Are dispositional terms rigid designators?**
  - Prior’s arguments that dispositional terms are rigid
  - Lewis’ argument against rigid designators.

### **3.1.2 Distinction between fixing the reference of a term and giving its meaning**

- **How we fix the reference of a term**
  - We can use a contingent, accidental property of Benjamin Franklin, namely that he invented bifocals, to fix the reference of “Benjamin Franklin”.
- **To fix the reference of a term is not to give its meaning**
  - “Benjamin Franklin” does not mean “The inventor of bifocals”. Non-rigid designators are not synonyms for and do not give the meaning of the names and natural kind terms that they pick out the reference of.



- **Linguistic division of labour — can we overcome the distinction between reference fixing and giving the meaning of a term?**
  - Experts, such as scientists can tell us what falls under the extension of a term. However, they do not fix the extension of a term and they cannot tell us the meaning of a term.
- **Designators are not revelatory or informative**
  - Designators, be they rigid or non-rigid, are just that — ways of designating an entity. They are not informative, revelatory or definitive.

### **3.1.3 Problems arise when we conflate and mistake the manner we fix the reference of a term with its meaning**

- **Confusing and conflating the way heat feels to us with the nature of heat**
  - Example of heat — to mistake the manner in which we fix the reference of “heat” with the meaning of “heat” leads us to mischaracterise the nature of heat and to mistakenly hold that theoretical identity statements, such as “heat = molecular motion” are contingent.
- **What happens when we confuse and conflate the way we fix the reference of a dispositional term or ascriptions with its meaning**
  - For example, we can use the manifestation of a disposition to fix the reference of a disposition. However, to confuse the manifestation — which is conditional and extrinsic — with the disposition itself leads to us to mistakenly hold that dispositions are conditional and extrinsic properties.

## **Introduction**

This chapter is concerned with language, meaning and the world. It is divided into two sections. In section one, I introduce Kripke's distinction between rigid and non-rigid designators. I use Kripke's distinction between rigid and non-rigid designators to explore his contrast between fixing the reference of a term and giving its meaning. There will be little novel or new in my account of Kripke. Rather, I hope that what is novel and new is my application of his ideas to shed light on that nature of dispositional properties and ascriptions. Following this, in section two I discuss the relation between words and the world. I argue that predicates and properties are not isomorphic and that we cannot argue from the satisfaction of a predicate to the existence of a corresponding property.

This chapter acts as a bridge between chapter two, where I presented a number of dispositional concepts, and chapter four, where I show that confusions (identified in this chapter) between predicates and properties and reference fixing and meaning lead philosophers to make unwarranted ontological and semantic conclusions about the nature of dispositions and dispositional ascriptions.

### **3.1.1. Modal differences in the way names and definite descriptions designate the same entity**

Kripke notes that names and definite descriptions provide us with two ways of designating the one and the same thing. We can use proper names such as "Gough Whitlam" and "Sydney" to designate Gough Whitlam and Sydney, respectively. We can also use definite descriptions, such as "the twenty-first prime minister of Australia" and "the most-populous city in Australia" to designate those same things — Gough Whitlam and Sydney, respectively.

However, Kripke notes there is a difference, a modal difference, in the way in which names and definite descriptions designate. Names rigidly designate; the name "Gough Whitlam" designates, or picks out, the same thing — Gough Whitlam — in all possible worlds. While definite descriptions may non-rigidly designate. The definite description "the twenty-first prime minister of Australia"

may designate or pick out different objects in different worlds. In the actual world, it designates Gough Whitlam. However, someone else may have been the twenty-first prime minister of Australia. Gough Whitlam may have died from a tiger snake bite as a child and so never contested the 1972 Australian election, or Billy McMahon may have been wildly popular with the voting public and retained power for the Australian Liberal Party.

Kripke's distinction has great intuitive appeal. We understand and regularly make statements of the type "Gough Whitlam may have lost the 1972 election and not been the twenty first prime minister of Australia" but not "Gough Whitlam may have not been Gough Whitlam". The modal distinction between rigid and non-rigid designators is able to account for this difference.

The distinction between rigid and non-rigid designators has implications for transworld identity and identity statements. As the above remark hints, one implication of this is that rigid designators are necessary — they hold in all possible worlds. "Gough Whitlam" designates Gough Whitlam in all possible worlds. There is no world in which Gough Whitlam is not Gough Whitlam. While non-rigid designators such as "the twenty first prime minister of Australia" may designate different objects in different worlds and as such being the twenty-first prime minister of Australia is a contingent property of the object it designates — true in some worlds, false in some worlds. Gough Whitlam is the twenty-first prime minister of Australia in this world, but there is at least one world in which Gough Whitlam is not the twenty-first prime minister of Australia.

### **A challenge to the modal distinction between names and definite descriptions — the "actually" operator**

This modal distinction between names and definite descriptions has been challenged. The definite descriptions "the twenty-first prime minister of Australia" may very well pick out different people in different worlds and so be non-rigid. However, "the actual twenty-first prime minister of Australia" is Gough Whitlam. It designates the same person in every possible world and so is a rigid designator. In general, adding the "actually" operator to a non-rigid definite

description “the F” turns it into a rigid designator (“the actual F”). That is, the “actually” operator renders definite descriptions rigid, just like names. As such, the “actually” operator undercuts the supposed modal differences, based on rigidity, between names and definite descriptions and so undercuts the claim that names are not definite descriptions.

While the “actually” operator may remove the modal difference between names and definite descriptions, it does so at the expense of creating a further, serious modal problem — it introduces necessity where there is none. If we rigidify the definite description “the twenty-first prime minister of Australia” by adding the “actually” operator to make “the actual twenty-first prime minister of Australia”, then it is true in all possible worlds that “Gough Whitlam is the actual twenty-first prime minister of Australia”. Which is just to say, it is necessary that Gough Whitlam is the actual twenty-first prime minister of Australia. But that is false. It is a contingent matter that Gough Whitlam won the 1972 Australian federal election. Using the “actually” operator to make a definite description rigid simply fails to capture the semantics of definite descriptions. It makes necessary what is contingent. As such, we should reject such rigidified definite descriptions and with it any challenge it supposedly presents to the modal distinction between names and definite descriptions.

### **Names not the only rigid designators**

So far, I have used Kripke’s account of names and definite descriptions to elucidate the distinction between rigid and non-rigid designators. Kripke extends his account of rigid designators beyond names to natural kinds terms such as “gold” and “atomic number 79”, species terms such as “tigers” and natural phenomena terms such as “heat”, “lightning” and “pain”. He holds that these terms pick out and designate the same thing in all possible worlds.

Just as we can designate names in a number of different ways so too we can designate natural kinds and natural phenomena in a number of different ways. For example, both the rigid designator “tiger” and the non-rigid designator “large carnivorous quadrupedal, tawny in colour with blackish transverse stripes

and white belly” designate the natural kind tigers. “Tiger” picks out the same kind — tigers — in all possible worlds, while the non-rigid designator uses a set of contingent feature of tigers to pick out tigers in this world, but does not pick out tigers in every world.

### **Are dispositional terms rigid designators?**

Can Kripke’s account of names as rigid designators be extended to property terms, such as dispositional terms “fragility” and “negative charge”? Prior certainly think so. She takes it for granted that property terms are rigid designators when she contends that:

“But to treat dispositional predicates as non-rigid designators is to surrender any claim on their being property names.” (Prior 1985:76)

Prior provides two arguments in support of her claim that properties terms are rigid designators. Her first argument rests upon Kripke’s claim that possible worlds are not given qualitatively, but specified:

“The first is the argument that the similarities picked out by dispositional predicates seem every bit as good as those similarities picked out by ‘establishment’ property predicates. Take ‘redness’ or ‘being red’. As Kripke has pointed out we do *not* ask: ‘How do we know that this quality (in another possible world) is that of redness?’ It is simply assumed that we can make transworld property identifications. But then the similarities picked out by dispositional predicates are every bit as good as those picked out by predicates like ‘redness’.” (Prior 1985:77)

Here is Kripke’s statement of that position:

“So, we do not begin with worlds (which are somehow supposed to be real, and whose qualities, but not whose objects, are perceptible to us), and then ask about criteria of transworld identification; on the contrary, we begin with the objects, which we *have*, and can identify, in the actual world. We can then ask whether certain things might have been true of the objects.” (Kripke 1980: 53)

That is, when we say “Nixon might have lost the election” we specify we are talking about *that* man. We do not have a list of qualitative properties, such as being jowly, owning a dog named “checkers” etc. and then look at other worlds

and find who satisfies those properties, declare that person to be Nixon and then see if he lost the election. The point here is that possible worlds are not qualitatively determined. They are specified.

However, the fact that possible worlds are specified and not given qualitatively does not in itself tell us what terms are or are not rigid designators. Kripke's point may be viewed as conditional. It shows that if something is a rigid designator, then its identity across worlds is specified and not determined qualitatively. But that is not to show that properties, such as "redness" or "fragile", are rigid designators. A separate argument is needed to establish that claim.

Prior's second argument that property terms are rigid designators rests upon the claim that rigid property terms are necessary for the transworld identity of individuals:

"If we treat property predicates as non-rigid designators, we lose the ability to identify individuals across possible worlds." (Prior 1985:77)

Prior's reasoning here ignores the point made in the previous argument — that possible worlds are specified, not given qualitatively. Consider the individual Ranger Bob. We can use a description such as "the guy over there wearing khaki shorts" to fix the reference of "Ranger Bob" as Ranger Bob in this world. But once we have fixed the reference of Ranger Bob, he can lose these qualities that were used to fix his reference. Ranger Bob can be still be Ranger Bob, even in worlds where he lacks the property of being a wearer of khaki shorts. We do not need "khaki" or "shorts" to pick out the same property in other worlds in order to be able to make meaningful statements about Ranger Bob in other worlds. The point here is that the individual Ranger Bob can have transworld identity independently of any properties used to fix his reference in this world. Hence, Prior is wrong to argue that property terms are rigid designators on the grounds that rigid property terms are necessary for the transworld identity of individuals. Prior's two arguments fail to support her claim that property terms are rigid designators.

### **3.1.2 The distinction between fixing the reference of a term and giving its meaning**

I have introduced the distinction between rigid and non-rigid designators with the intent of explicating the distinction between fixing the reference of a term and giving its meaning. This distinction is central to my claim, set out in chapter four, that arguments in favour of leading theories of dispositions are unsound or invalid as they mistake the way in which we fix the reference of a term for the meaning of that term.

#### **How we fix the reference of a term**

One significant implication of Kripke's distinction between rigid and non-rigid designators is that we can, and often do, use contingent, accidental properties of an entity that are non-rigid designators to fix and pick out the reference of a term. That is, we often use contingent, accidental properties of an entity to designate and determine what it is we are talking about. Kripke provides an example of reference fixing:

“... although ‘heat’ is a rigid designator, the reference of that designator was determined by an accidental property of the referent, namely the property of producing in us the sensation S [the sensation of heat].”

(Kripke 1980:152)

We use the sensation of heat, the way heat feels to us, which is an accidental and contingent feature of heat, to fix and pick out the reference of “heat” (a rigid designator). Similarly, we can use “the teacher of Alexander”, a non-rigid designator, to fix and pick out the reference of Aristotle, just as we can use “the fastest shearer in Australia” to fix and pick out the reference of Jackie Howe.

Kripke's insights on reference fixing via accidental, contingent features of an entity have bearing on dispositions. I argued in chapter two that the manifestation of a disposition is independent of the disposition itself, and as such the manifestation is an accidental and contingent property of a disposition, one that it need not have in every possible world. A world in which no vase is dropped or struck and so never breaks can still be a world in which vases are

fragile. I also argued in chapter one that the conditional or counterfactual analysis of dispositions is false. The truth of a dispositional ascription, such as “ $x$  is fragile”, is independent of the truth of any corresponding conditional or counterfactual, such as “if  $x$  had been struck, then  $x$  would have broken”. The truth of such conditionals and counterfactuals is at best an accidental and contingent property of a dispositional ascription.

Despite certain properties being accidental and contingent features of dispositions and dispositional ascriptions, we can, and do, use them to fix and pick out the reference of dispositional terms and identify dispositional properties. The manifestation of dispositions and the truth of certain counterfactuals and conditionals provide what Heil describes as “a defeasible, rough-and-ready way to pick out dispositions” (Heil 2003:195-96). There is no great mystery as to why we use such accidental and contingent properties to fix the reference of dispositional terms and identify dispositional properties — they are often the most obvious and easily observable external signs that an object possesses a disposition. When we want to determine if a tennis ball is fit for play and possesses the power of elasticity, we simply throw it against the ground and see if it manifests the disposition of elasticity to our liking when it bounces back.

### **To fix the reference of a term is not to give its meaning**

In exploring the distinction between fixing the reference of a term and giving its meaning I will examine how rigid and non-rigid designators are related to each other. This is a question of how non-rigid descriptions (such as “the teacher of Alexander”) are associated with rigidly-designating names (such as “Aristotle”) when they designate one and the same thing, namely Aristotle. I show that descriptions and other non-rigid designators can fix the reference of names and natural kind terms. However, such non-rigid designators are not synonyms for and do not give the meaning of the rigidly designating names and natural kind terms that they pick out the reference of.



Kripke is at pains to stress that “to fix the reference is not to give a synonym” (Kripke 1980:15). He wishes to cleave a sharp distinction between fixing the reference of a term and giving the meaning of that term:

“One should bear in mind the contrast between the... perhaps contingent properties carried by a term, given by the way its reference was fixed, and the analytic (and hence necessary) properties a term may carry, given by its meaning. For species, as for proper names, the way the reference of a term is fixed should not be regarded as a synonym for the term.” (Kripke 1980:135)

Elsewhere Kripke notes that in some cases:

“A referent is determined by a description, by some uniquely identifying property, what the property is doing in many cases of designation is not giving a synonym, giving something for which the name is an abbreviation; it is, rather, fixing the reference. It fixes the reference by some contingent marks of the object. The name denoting that object is then used to refer to that object, even in referring to counterfactual situations where the object doesn’t have the properties in question.” (Kripke 1980:106-107)

We can use non-rigid designators to fix the reference of a term — be they proper name terms (such as “Aristotle” and “Benjamin Franklin”), natural kinds terms (such as “gold” and “tigers”) or natural phenomena terms (such as “heat” and “lightning”). However, these reference fixing, non-rigid designators do not give the meaning of these terms.

The mechanism of reference fixing runs as follows — a description, say “the teacher of Alexander”, is used to fix the reference of the term “Aristotle” by identifying the referent Aristotle as the thing that satisfies the description in the actual world. The term “Aristotle” then refers to that same thing — Aristotle — in all worlds, regardless of whether or not the description “the teacher of Alexander” is true of Aristotle in those other worlds.

The modal distinction between rigid and non-rigid designators explains why reference-fixing descriptions and phrases do not give meaning of the terms they fix the reference of. “Aristotle”, a rigid designator, designates the same entity in all possible worlds. While “the teacher of Alexander”, a non-rigid designator does not designate the same entity in every world. In this world, “the teacher of Alexander” may well designate Aristotle, but in some worlds it designates someone other than Aristotle. As such, there is a world in which “Aristotle” designates Aristotle but “the teacher of Alexander” does not designate Aristotle. This shows that “Aristotle” does not mean “the teacher of Alexander”.

To put this point another way, Aristotle can lose any accidental, contingent properties, such as those used to fix his reference, and still be Aristotle. Hence, “the teacher of Alexander” cannot mean the same thing as “Aristotle”. Just because two designators “Aristotle” and “the teacher of Alexander” designate one and the same thing in this world, and just because we can use “the teacher of Alexander” to pick out and fix the reference of “Aristotle”, it does not follow that these two terms mean the same thing.

There are two points I wish to stress here. One, we can use a contingent property of Aristotle — that he taught Alexander — to determine what the name “Aristotle” refers to. Two, the description we used to fix the reference of the term “Aristotle” is not definitive of “Aristotle”. That is, “Aristotle” and “the teacher of Alexander” are not synonyms. The two terms “Aristotle” and “the teacher of Alexander” both designate Aristotle, but do not mean the same thing. There is a counterfactual situation in which “the teacher of Alexander” is not Aristotle, but no situation in which “Aristotle” is not Aristotle. Hence “Aristotle” cannot mean “the teacher of Alexander”.

Similar modal arguments show that the distinction between reference fixing and meaning also applies to natural kind terms (such as “tiger” and “gold”) and natural phenomena terms (such as “heat” and “lightning”). We can use the non-rigid designator “large carnivorous quadrupedal, tawny in colour with blackish transverse stripes and white belly” to fix the reference of the natural kind term

“tiger”. However, what makes a tiger a tiger is the possession of a certain DNA, not having four legs, stripes and a white belly. Being a large carnivorous quadrupedal, tawny in colour with blackish tranverse stripes and white belly is a contingent property of tigers. These are merely surface features of tigers. There are possible worlds in which a tiger has three legs and no stripes. That is, there are possible world in which entities have the DNA of tigers, but are not large carnivorous quadrupedal, tawny in colour with blackish tranverse stripes and white belly. Indeed we do not need to contemplate possible worlds to see this. There are, or were, three-legged tigers in the actual world.<sup>6</sup> It follows that if something can be a tiger and not be four legged, then “tiger” does not mean “large carnivorous quadrupedal, tawny in colour with blackish tranverse stripes and white belly”. In this world, “large carnivorous quadrupedal, tawny in colour with blackish tranverse stripes and white belly” and “tiger” may refer to the same entity, namely the natural kind tiger. However, in different counterfactual situations or different possible worlds, they would pick out different entities. Hence, “large carnivorous quadrupedal, tawny in colour with blackish tranverse stripes and white belly” and “tiger” cannot mean the same thing.

These cases show that the relationship between non-rigidly designating terms, such as descriptions, and rigidly designating terms, such as names, is such that even when they designate one and the same thing, they nonetheless do not mean the same thing. One point I want to take from this is that ways in which we designate entities and fix the reference of terms is not revelatory and informative. The phrase “large carnivorous quadrupedal, tawny in colour with blackish tranverse stripes and white belly” and “tiger” both designate tigers. And the former phrase can be used to fix the reference of tigers. However, this reveals nothing about the nature of tigers. Nor does not tell us what makes a tiger a tiger.

I wish to apply this point to dispositional terms and properties and argue that the manner in which we fix the reference of dispositional terms does not give the meaning of dispositional terms. Similarly, the manner in which we identify

---

<sup>6</sup> In 2007, a camera trap set inside an Indonesian national park photographed a three-legged Sumatran tiger. It is believed the tiger lost the lower half of its right front leg when escaping a snare.

dispositional properties does not tell us what is it that makes, say, a fragile object fragile.

How do we pick out and fix the reference of dispositional terms? We can use both the counterfactual, non-rigid designator “if  $x$  had been struck, then  $x$  would have broken” and the rigid designator “fragile” to pick out and designate the one and the same property, namely fragility. In chapter two, I argued that the counterfactual analysis of dispositions is false. The truth of a counterfactual is neither necessary nor sufficient for the truth of a dispositional ascription. As such, “ $x$  is fragile” cannot be defined as, and does not mean, “if  $x$  had been struck, then  $x$  would have broken”. Despite these failings, such counterfactuals may nonetheless prove useful as a defeasible, rough-and-ready way to pick out the reference of dispositional terms (Heil 2003:195-96). We can use the counterfactual “if  $x$  had been struck, then  $x$  would have broken” as a rough-and-ready way to pick out the reference the reference of “fragile”.

Similarly, the manifestation of a disposition, despite being ontologically separate and distinct from the disposition itself, is useful for identifying dispositional properties. Despite the fact that breaking is a contingent, surface feature of fragile objects, we can nonetheless use such behaviour as a defeasible, rough-and-ready way to identify fragile objects. But we should be aware that breaking is not what fragility is. If as argued in chapter two, if a vase is fragile independently of its breaking, then breaking is a contingent feature or fragility. Dispositional manifestations — such as breaking, dissolving and repelling other liked charged particles are merely contingent surface features and signs of the properties of fragility, solubility and negative charge, respectively. As such, to identify dispositions via their manifestation does not reveal the nature of those dispositions. The manner in which we pick out and fix the reference of dispositional terms and identify dispositional properties is not revelatory and informative of the meaning of dispositional terms and the nature of dispositional properties.

**Linguistic division of labour — overcoming distinction between reference fixing and giving the meaning of a term.**

One possible response to Kripke's claim that to fix the reference of a term is not to give its meaning is to turn to experts. It might be argued that experts in the area to which a term belongs, such as scientists with knowledge of say DNA or atomic structure, have some special linguistic competence such that the manner in which they fix the reference of a terms would give the meaning of that term. We would then defer to experts in determining the meaning of such terms, in what Putnam has dubbed the "linguistic division of labour" (Putnam 1975). In so doing, we would bridge the gap that Kripke draws between fixing the reference of a term and giving its meaning.

For example, the reference of the term "tiger" is fixed as a certain DNA by zoologists with knowledge of the DNA of tigers. The reference of the term "gold" is fixed as "atomic number 79" by geologists and those with expertise in atomic structure. The reference of the term "salt" is fixed as "NaCl" by chemists. On this account of the linguistic division of labour, I may continue to rely upon the contingent, surface features of gold, such as its colour and sheen to determine whether the grains in my gold pan are gold or not. However, when I use the term "gold" what I mean is determined by geologists. "Gold" means "substance with atomic number 79" and not anything along the lines of "yellow, lustrous metal". On such a picture of reference fixing, there is, *pace* Kripke, no distinction between the way in which the reference of a term is fixed and the meaning of that term because the reference of the term is fixed using essential properties that make the thing referred to what it is.

However, such a response will not bridge the semantic gap between fixing the reference of a term and giving its meaning. Kripke (1988) admits that, in the case of natural kind terms, experts such as scientists do have a special ability to determine what things are what:

"It is of course true that the experts have a special capacity that we don't have for telling whether something is or is not gold. That is among other things what makes them experts." (Kripke 1988:244)

Experts are useful for determining whether something is a tiger, gold or salt. That is, scientists can tell us whether an entity falls under the extension of the term “tiger”, “gold” or “salt”.

However, as Kripke notes, it does not follow that experts have any special semantic authority or role. To determine whether something is gold is not to determine the meaning of “gold”. Kripke makes this point when he points out that:

“The experts provide no help as far as actually determining the extension of the term. They only help us find out after a while which things actually fall into the extension of the term...The presence of the experts in is no way crucial to the term having a determinate extension” (Kripke 1988:244)

To back up his point, Kripke uses an example from Putman. He notes that in the time of the Ancient Greeks “gold” had the same extension as it does now, despite the complete lack of experts on the atomic nature of gold in Ancient Greece (Kripke 1988:244). The point here is that no one, experts or otherwise, fixes the extension and thus meaning of natural kind terms such as “tiger”, “gold” and “salt”. Experts, such as scientists, can tell us what falls under the extension of a term. However, they do not fix the extension of a term and they cannot tell us the meaning of a term.

### **Designators are not revelatory or informative**

It may seem strange that we fix the reference of a term using non-rigidly designating descriptions that are not synonyms of that term and that do not give its meaning. Why use accidental, contingent properties of an entity to identify it? Why not use rigid designators to fix the reference and an entity via its necessary and essential properties? In answer to the first question, such contingent properties are often surface features that are more apparent and accessible to us than the necessary and essential properties of an entity. In answer to the second question, rigid designators are no more revelatory than non-rigid designators, and so there is no reason to favour them over non-rigid designators in fixing the reference of a term.

Consider gold. Gold is the element with the atomic number 79. An entity is gold if and only if it has atomic number 79. However, in most cases we identify and re-identify gold by its lustrous colour and sheen, by its density and malleability (say, by biting it). These contingent properties are useful for identifying and re-identifying gold because they are properties of gold that are accessible and apparent to us, even if they are not what the gold actually is and even if “gold” does not mean something like “dense, lustrous, malleable yellow metal”. The atomic number possessed by gold may well be a necessary, essential property of gold, however determining atomic structure is a highly technical and complicated process that most people would have no idea how to perform. Despite its necessity, the atomic number is an opaque and often inaccessible property of gold.

The way we characterise dispositions and properties, object, species and natural kinds is influenced, shaped and distorted by what these entities present to us in an easily accessible way and also by our interests. The interests of a hapless bushwalker confronted by a snake may be different from those of a philosopher or biologist. The contingent but outward markings, aggressiveness and venomousness of a snake are very relevant to the hapless bushwalker even if they are not what makes, say, the eastern brown snake what it is. The essential properties of an eastern brown snake, namely its DNA, may be more important to the scientist and philosopher.

It might be thought that rigid designators, because they pick out the same entity in all worlds, are more informative and revelatory than non-rigid designators that may pick out and designate different entities in different possible worlds. However, this is not the case, rigid designators are not any more revelatory than non-rigid designators. The ability to use rigid designators, to understand sentences and utterances containing rigid designators does not give us knowledge about the object that it designates. We can use “gold” to rigidly designate gold without knowing that gold has the atomic number 79. We can use and

understand both the terms “gold” and “atomic number 79” without knowing that they designate one and same substance.

We can tell a similar epistemic story for the non-rigid designators “the morning star” and “the evening star”. We can use “the morning star” to non-rigidly designate Venus without knowing that Venus is the morning star. We can use and understand both the non-rigid terms “the morning star” and “the evening star” without knowing that they designate one and the same entity — Venus. Just as it was an *a posteriori* discovery that gold has the atomic number 79, so too it was an *a posteriori* discovery that the morning star is Venus. In these respects, rigid designators are no more informative or revelatory than non-rigid designators.

As a result, there is no reason for bias against using non-rigid designators to pick out the reference of terms, nor any reason to prefer rigid designators. The way an entity is designated and referred to — be it rigidly or non-rigidly — is just that, a way of designating and referring to something. Whether a name, description or term designates the same or different entities in different worlds it nonetheless is still merely a designator and does not reveal the meaning of the referring term or the nature of the entity referred to.

Historically, the fact that names as rigid designators are not revelatory has led to confusion and misunderstanding. For example, the non-revelatory nature of rigid designators lead Quine to mistakenly declare that identity statements between names are not necessary. Quine rightly noted that it was an empirical, *a posteriori* discovery that “Everest” and “Gaurianker” both name and designate the one and the same object — Mount Everest. It is an *a posteriori* discovery because the rigidly-designating terms “Everest” and “Gaurianker” are not revelatory. Semantic competence with these terms does not enable one to know *a priori* that they designate and refer to one and the same object. However Quine wrongly concluded that because it was an empirical, *a posteriori* discovery that “Everest is Gaurianker” is true it must therefore be a contingent truth. The non-revelatory nature of names, coupled with Quine’s mistaken belief that the *a posteriori* is



contingent, lead him to wrongly declare that identity statements between names are not necessary.

What is the significance of this for dispositions and powers? Determining whether or not dispositional terms, ascriptions and related counterfactuals statements are rigid or non-rigid designators does not offer a way of gaining knowledge, insight or understanding of dispositional terms or the nature of dispositions. One implication is that the quest to understand the nature of dispositions and dispositional terms is not simply a quest to determine if they are rigid or non-rigid designators. The way a disposition or power is designated and referred to, be it rigidly or non-rigidly, is just that, a way of designating and referring to dispositions and powers. Whether a name, description, term or counterfactual designates and refers to the same or different dispositions in different worlds makes no difference here. It is still merely designating a disposition or power and does not reveal the meaning of a dispositional term or the nature of the dispositional property referred to. What is important is that we recognise the distinction between fixing the reference of a term and giving its meaning and do not confuse and conflate the two. I now turn to look at what goes wrong when we do confuse and conflate fixing the reference of a term and giving its meaning.

### **3.1.3. Problems arise when we conflate and mistake the manner we fix the reference of a term with its meaning**

We have seen that to fix the reference of a term is not to give its meaning. We may use contingent surface features of, say, gold, such as its yellowness, to identify the substance gold and to fix the reference of the term “gold”, but, as Kripke notes, the contingent, surface features associated with and used to identify and fix the reference of a term should not be considered as definitive of that term. Kripke provided two reasons why this is so. One, the contingent surface features of a kind, such as the yellowness of gold, may not actually be features of the kind in question — it may be false that gold is actually yellow. Kripke argues that peculiar properties of the atmosphere may cause an optical illusion that makes gold appear to be yellow, when in fact it is blue (Kripke 1980:118). Secondly,

even if gold is yellow, it is not definitive of the kind gold. There may be a substance that has all the identifying marks we attribute to gold, such as yellowness etc., but is not gold. Fool's gold is often cited as just such an example.<sup>7</sup>

### **Confusing and conflating the way heat feels to us with the nature of heat**

Problems arise when we confuse and conflate contingent surface features by which we identify entities with the entity itself. For example, take the case of heat. We identify heat and fix the reference of the term "heat" by the sensation that heat causes in us. That is, we identify heat and fix the reference of the term "heat" by the fact that it is whatever in this world that affects our senses in a certain way. However, the sensation of heat, the way heat feels to us, is a contingent, surface feature of heat. A world in which humans are insensitive to heat would not be a world in which heat did not exist. As such, the term "heat" does not mean "whatever causes the sensation of heat" and heat is not whatever causes the sensation of heat.

What are the consequences of confusing and conflating contingent surface features by which we identify entities with the entity itself? Most obviously, in the case of heat, to do so is to mischaracterise the nature of heat and the meaning of "heat". It is to take "heat" to mean "whatever causes the sensation of heat" and it is to take heat to be whatever causes the sensation of heat. But the consequences do not stop there. It leads us to misunderstand the modality of identity statements. Consider the identity statement "heat is the motion of molecules". It is, if true, necessarily true. But it is contingent matter that heat feels the way it does to us. It is a contingent matter that heat causes the sensation of heat in us. Heat may have caused humans to hear a ringing in their ears or produced no effect at all on our nervous system. So conflating heat with the sensation of heat, a contingent property of heat, leads us to mistakenly hold that "heat is the motion of molecules" is a contingent identity statement. It is a contingent matter that the

---

<sup>7</sup> I find this a bad example. One would have to be astonishingly foolish to confuse the two substances. Nonetheless, Kripke's point stands — there may be some substance with all the surface, identifying features of gold that is not gold.

motion of molecules causes us to have the sensation of heat, but it is not a contingent matter that heat is the motion of molecules.

**What happens when we confuse and conflate the way we fix the reference of a dispositional term or ascriptions with its meaning**

How do these issues play out for dispositional properties and dispositional terms? Here is one example. In chapter two I argued that dispositions are categorical properties, in the sense that dispositional properties are not conditional properties (“categorical” just means non conditional). To say a vase is fragile is to say that it is actually fragile right now. What is conditional is the manifestation of the disposition. In the case of fragility, breaking or shattering is conditional upon being struck or dropped. But the disposition itself is not conditional. To hold that dispositions are conditional and not categorical properties is to mistake the manifestation of a disposition — which may be useful for identifying dispositions and fixing the reference of dispositional terms — for the disposition itself. The independence of a disposition and its manifestation, argued for in chapter two shows that it is wrong to take the manifestation as part of the disposition and wrong to argue from the conditional nature of the manifestation to the conditional nature of the disposition.

For another example, consider the claim that dispositions are extrinsic properties of their bearers. Arguments that dispositions are extrinsic properties, looked at in chapter 4.4, rest upon the claim that the manifestation of a disposition is an extrinsic property of the disposed object. However, to conclude the disposition itself is extrinsic is to confuse the manifestation for the disposition. This is to confuse the manner in which we identify dispositions and fix the reference of dispositional terms, via a disposition’s manifestation, for the nature of the disposition itself.

These are just two examples of arguments making substantial ontological claims about the nature of dispositional properties that conflate the manner in which a dispositional property is identified and picked out — via its manifestation in these cases — with the nature of the dispositional property itself. The issue is explored more fully in chapter four. Here I have merely introduced the distinction

between how we talk about the world and how the world is and shown that a failure to appreciate the distinction leads us to mischaracterise and misunderstand dispositional properties and dispositional ascriptions. By paying careful attention to the distinction between the manner in which the reference of dispositional terms are fixed and their meaning I hope to dissolve a number of misconceptions, and shed light upon nature of dispositional ascriptions and dispositions.

It is worth asking why we would make such confusions. The contingent and accidental surface features that we use to fix the reference of a term, that we use to identify and re-identify an object, species or substance may well be considered so important that we are apt to take them to be essential and necessary properties. The colour and lustre of gold is considered such an important and defining property of gold that we are apt to conflate the colour and lustre of gold with gold itself. For Kripke, Hitler's evilness is considered such a key property that it is hard not to take it as definitive:

“When I hear the name ‘Hitler’, I do get an illusory ‘gut feeling’ that it’s sort of analytic that the man was evil.” (Kripke 1980:75)

In another example, Kripke argues that the sensation of heat is regarded as such a central feature of heat that we are apt to take it to be heat itself:

“At any rate, we identify heat and are able to sense it by the fact it produce in us a sensation of heat. It might here be so important to the concept [of heat] that its reference is fixed in this way, that if someone also detects heat by some sort of instrument, but is unable to feel it, we might want to say, if we like, that the concept of heat is not the same even though the referent is the same.” (Kripke 1980:131)

As important as these properties may appear to be, they are nonetheless not necessary or essential:

“To me Aristotle’s most important properties consist in his philosophical work, and Hitler’s in his murderous political role; both, as I have said, might have lacked these properties altogether. Surely there was no logical fate hanging over either Aristotle or Hitler which made it in any sense

inevitable that they should have possessed the properties we regard as important to them; they could have had careers completely different from their actual ones. Important properties of an object need not be essential... and an object could have had properties very different from its most striking actual properties we use to identify it.” (Kripke 1980:77)

Similarly, in the case of dispositions, the manifestation of disposition is seen as so important and striking a property that we are apt to mistakenly take it to be definitive of dispositional terms and a necessary or essential property of dispositional properties.

### **Conclusion**

I have used the distinction between rigid and non-rigid designators to explicate and motivate a distinction between fixing the reference of a term and giving its meaning. This is a distinction between how we refer to things and how things are, which is part of a more general distinction between word making and world making.

I have shown that we can fix the reference of and designate the one and the same entity in different ways using both rigid and non-rigid designators. I also followed Kripke to argue that the manner in which we fix the reference of dispositional terms does not give the meaning of those terms. We can fix the reference of dispositional terms, such as “fragile”, by determining its extension using counterfactual phrases, such as “if  $x$  were struck, then  $x$  would shatter”. What things are fragile? Those things that would break upon struck. But once we have fixed the reference, we then use the term “fragile” rigidly.

The salient point here is that once we have fixed the reference of the term “fragile” using, say, the counterfactual analysis, fragile things need not satisfy the counterfactual analysis. The existence of finks, mimics and masks shows that fragile things need not break upon being struck. The truth of the counterfactual statement “if  $x$  were struck, then  $x$  would break” is neither necessary nor sufficient for the truth of a dispositional ascription “ $x$  is fragile”. The reason this is relevant is because in chapter four I use the distinction between fixing the reference of dispositional terms and giving their meaning to show that arguments

that make substantial claims about the nature of dispositions are invalid or unsound.

In the next section of this chapter I continue to press the distinction word making and world making when I argue that predicates and properties are not isomorphic. I conclude that the existence of a dispositional predicate does not entail the existence of a corresponding dispositional property.

## Chapter 3.2 — The predicate property distinction

### 3.2.1 The nature of properties

- **Two ways to be a realist about properties**
  - To be realist about a domain is to hold that properties corresponds to the predicates used to talk about that domain
  - The domain in question is mind-independent
- **Properties and sameness — what it means to admit properties**
  - Universals — sameness as strict identity
  - Tropes — sameness as exact similarity
- **Universals versus tropes**
  - Tropes as substitutes for universals

### 3.2.2 Predicate property distinction

Predicates and properties are not correlated one-to-one. The satisfaction of a predicate is no guide to what properties there are.

- **General arguments that predicates and properties are not isomorphic:**
  - There are unknown properties to which no predicates correspond
  - “Is a game” applies to objects by virtue of a family resemblance among the objects, not in virtue of having the same property
  - Co-denoting non-synonymous predicates that apply to the same object by virtue of a single trope/property of that object.
  - Predicates can be generated out of other predicates and sentences, up to many order of infinity. But they do not seem to correspond to an equal number of tropes or properties
  - There are infinite real numbers. Yet in principle no language capable of human use possesses an infinite number of expressions
  - Paradoxical predicates
- **Specific argument that dispositional predicates and properties are not isomorphic**
  - Categorical predicates that denote dispositional properties
  - Dispositional predicates that denote categorical properties

### 3.3.3 What properties exist?

If the predicates we use and the concepts we hold are no guide to the existence properties, then how do we decide what properties exist?

- **Science and laws our best guide**
  - Armstrong and Mellor — science and laws are our best guide.
  - Epistemic humility
- **Sparse, as opposed to an abundant theory of properties**

## **Introduction**

In this section I explore the relation between predicates and properties. I argue that predicates and properties are not isomorphic (they are not correlated one-to-one) and that what properties exist is not determined by the predicates that truly apply to objects. That is, the satisfaction of a predicate is no guide to what properties exist. The claims made here are more general statements of some of the remarks made in the previous section — that the manner in which talk about dispositions and fix the reference of dispositional terms is not to be confused with the nature of dispositional properties and meaning of dispositional terms and ascriptions.

This bifurcation between dispositional and categorical predicates and ascriptions on the one hand, and properties, on the other hand, will be returned to throughout the thesis to explain how accounts of dispositions go astray. Specifically, I charge that the distinctness thesis, categoricalism, the pure powers view and the claim that there are extrinsic powers all mistake how we talk about and fix the reference of properties (using dispositional and categorical ascriptions) for the way properties are and the meaning of dispositional ascriptions.

### **3.2.1 The Nature of properties**

#### **Property realism**

Before examining the relationship between predicates and properties, I will say a few words about what it means to be a realist about properties. This thesis assumes property realism — that properties exist. If you are a nominalist and anti-realist about properties, then I will not seek to convince you otherwise.<sup>8</sup>

---

<sup>8</sup> Armstrong (1978aA and 1989 sec.1-3) argues extensively and convincingly against nominalism and anti-realism about properties.

Molnar provides a pithy argument against nominalism and for property realism, based on casual explanation. According to the nominalist, *a* is F if *a* belongs to the extension of “F”. This may well provide a truthmaker for the claim that “*a* is F”. However, Molnar notes that the nominalist then faces a Euthyphro question:

“Do some things freeze when cooled to zero degrees because they satisfy the predicate ‘freezes when cooled to zero degrees’, or do these things satisfy the predicate ‘freezes when cooled to zero degrees’ because they in fact freeze when cooled to zero degrees? Once formulated the question looks easy to answer. Surely *a* belongs to the extension ‘F’ because of some property or properties it has, and not conversely.” (Molnar 2003:23-24)



Rather, my aim is to give an account of dispositional ascriptions and properties, not to argue for the existence of properties themselves.

Heil distinguishes between two types of realism. One conception holds that to be realist about a domain (say, value) is to hold that properties correspond to the predicates used to talk about that domain:

“On this conception, a realist about value must suppose that normative predicates designate genuine properties (or...are analyzable into predicates that themselves designate genuine properties).” (Heil 2003:23)

Heil elaborates:

“We can ask, are you a realist about states of mind, or colour, or consciousness? You are, it would seem, only if you think that possessing a particular state of mind, or being red, or feeling pain is a matter of something’s possessing a genuine property answering to the predicate in question. These properties will be shared by every object to which the predicate applies.” (Heil 2003:24)

The very point of this section is to specifically reject such an account of the relation between predicates and properties.<sup>9</sup> I argue that predicates and properties do not correspond one-to one. There are predicates to which no property corresponds. As such, I reject this definition of realism.

The second concept of realism that Heil identifies contends that to be realist about a domain is to hold that the domain in question is mind-independent. On this account, to be a realist about, say, colour is to contend that colour is mind independent. I am a realist about properties in this second sense. I hold that properties are (for the large part) mind-independent entities, while predicates are language-dependent entities that express concepts, which are mental entities.

### **Properties and sameness**

---

<sup>9</sup> I do not assert that Heil holds such an account of the relation between predicates and properties. Heil explicitly rejects the claim that predicates and properties are correlated one-to-one. Rather, I merely use Heil to introduce such a view.

Oliver (1996:20) notes that one condition that any account of properties must preserve is that:

“...different particulars can have the very same property.” (Oliver 1996:20)

For example, say particular *a* has property F and particular *b* has property F (and *a* and *b* are distinct) then both *a* and *b* possess the same property. There are two main contenders for an account of properties:

1. Properties as universals
2. Properties as tropes

Their chief difference between these two views lies in how they account for the sameness of properties in different particulars.

I briefly sketch these two theories of properties with the aim of providing an explicit account of what it means to say that two or more particulars have the same property. The notion of sameness of property plays a central role in my argument that predicates and properties are not isomorphic. As such, it is important to be clear on what sameness of property amounts to. It should be noted that my account of dispositions is largely independent of the truth of any particular theory of properties.

### **Universals — sameness as strict identity**

For universals theory, sameness of property means strict identity. Here is Armstrong’s characterisation of properties as universals:

“The Realist about universals will take these properties seriously (or will at least take certain selected properties seriously). The realist will say that these properties are really there in the world, as constituents of things, and will take their sameness, where two different things have the same property, to be a matter of strict identity. Two different things have the same constituent: horseness or whatever.” (Armstrong 1989:7)

Properties as universals can be wholly present in more than one place at the same time. Universals are wholly present in their instances. As such, more than one thing can have the same, identical property *qua* universal. If *a* is F and *b* is F (and *a* and *b* are distinct), then *a* and *b* instantiate an identical property. In terms of F-

ness, *a* and *b* are identical. For example, if being a lemon is a property, then exactly the same property of lemon-ness is wholly present in each and every lemon. As a result, all lemons are identical in respect of being lemons. To reiterate, according to universals theory to have the same property is to have identical properties. It is in this respect that sameness of property represents identical properties.

### **Tropes — sameness as exact similarity**

Trope theory accepts properties as particular, non-repeatable property instances.<sup>10</sup> Tropes have singular occurrences, in contrast to universals that are able to occur multiple times. It follows that sameness of properties *qua* tropes cannot amount to strict identity, as it does for properties *qua* universals. This is because they are non-repeatable property instances. Property instances cannot be present in more than one particular. At best, tropes are perfect duplicates and exactly similar, but they cannot be identical. These property instances or tropes are the same in that they form classes of exactly similar property instances. To be the same trope is to be member of the one class and to be a member of a class is to be exactly similar.

For example, consider electrons. They have the property of being negatively charged. According to trope theory, each electron instantiates or possesses its own particular, non-repeatable property instance of negative charge. These tropes or property instances of negative charge are perfect duplicates. They are exactly similar. However, unlike universals, they are not identical. Rather, these instances of negative charge are members of a class of exactly similar property instances. To say that objects, such as electrons share or possess the same property, such as negative charge, is to say that these objects instantiate or possess different property instances that are members of the same class. That is, properties, such as negative charge and lemon-ness are classes of exactly similar tropes. To be a member of this class is what it is to be the property of negative

---

<sup>10</sup> For trope theory see Stout (1930); Williams (1953), (1966); Seargent (1985); Simons (1994); Heil (2003); Bacon (1995); Campbell (1990); Mertz (1996) and Molnar (2003).

charge or lemon-ness, and to be a member of the class is to be a perfect duplicate and exactly similar.

### **Universals versus tropes**

Trope theory countenances resemblance (or class membership) as a primitive and unanalysable concept (see Armstrong, Martin, Place 1996:98 and Molnar: 2003:24). It is far from ideal to have such primitive concepts reside at the heart of a theory. Nonetheless, Molnar, a trope theorist, is undeterred, charging rival theories with positing even more obscure primitive concepts:

This [primitive resemblance] seems admissible since the concept of trope-resemblance is intuitively much clearer than the primitives of the alternative theories.” (Molnar 2003:24)

Molnar charges universals theory with relying upon the primitive concept of type-instantiation and nominalism with relying upon the primitive concept of object resemblance.

Attempts to account for (or dismiss, in the case of nominalism) the problem of one over many admit unanalysable, primitive concepts at their heart. But is Molnar right to claim that trope resemblance is less obscure? Degree of obscurity seems itself rather obscure.

Fortunately, I do not need to adjudicate between universals and trope theory. My argument that properties and predicates are not isomorphic does not turn on whether properties are universals or sets of exactly resembling property instances. Also, it appears there may be little to choose between the two theories.

Armstrong, the chief proponent in modern times of a universals theory of properties, contends that equivalence classes of exactly resembling tropes can be substituted for universals and vice versa. He views trope theory as a genuine contender for an ontology of properties:

“So tropes can fill in for universals. Wherever the Universals theory postulates a universal, the Trope theory can substitute an equivalence class of exactly resembling tropes. Equally, of course, wherever the trope

theory postulates an equivalence class of exactly resembling tropes, the Universals theory can substitute a universal.” (Armstrong 1989:122-23) Armstrong goes so far as to suggest that differences between universals and trope theories are merely differences in styles of ontological bookkeeping:

“Provided you abandon uninstantiated universals (good riddance, I say), and provided Universals theorists and Trope theorists coordinate their views on just what properties and relations the world contains, it is easy to pass back and forth between the theories.... You get a construction that will do almost all the work that universals do, without having to postulate them. Paradise on the cheap!” (Armstrong 1989:122)

Heil, a proponent of tropes, agrees with Armstrong. Heil holds that modes (tropes) can do the work of universals:

“My contention is that similarity among modes can do the job universals are conventionally postulated to do.” (Heil 2003:12)

While Molnar, also a proponent of trope theory, expresses similar sentiments, but with universals subordinated to tropes:

“The fact that the particular property instances fall into natural groups (types) is to be explained by the exact resemblance of the tropes to one another. Universals are kosher if, but only if, we think of them, in a deflationary way, as just being equivalence classes of exactly resembling tropes.” (Molnar 2003:24)

Oliver is not convinced that paradise can be had on the cheap. He accuses Armstrong of “losing his metaphysical nerve” when Armstrong supposedly admits that these two theories of properties are merely “systematically different ways of saying the same thing” (Oliver 1996:12). Oliver claims that trope theory and universals theory may well be equivalent in the sense of equally well playing the same roles. However, he questions whether this entails that differences between the two systems are only apparent:

“It may be that the equivalent systems cannot be distinguished with respect to their ability to play a certain role, but if we can say something

about the different natures of the elements of the equivalent systems, then this difference is hard to explain away.” (Oliver 1996:13)

I think Oliver’s criticism is misguided. Armstrong does not assert that the two theories are “systematically different ways of saying the same thing”. Rather, Armstrong’s claim is that with trope theory:

“You get a construction that will do almost all the work that universals do.” (Armstrong 1989:122)

For Armstrong, a trope theory is merely a viable option to universals theory, it is a “close second”:

“[The resemblance version of the trope theory] is a close second to the first choice, which is a realism about universals.... As race commentators in Australia say, daylight is third...” (Armstrong 1989:119)

As mentioned, little in my account hangs on whether we accept a trope theory or universals theory of properties or whether the two theories are equivalent. The important point is to understand what each theory is committed to, particularly with respect to the notion of sameness of properties. In discussing arguments against predicate property isomorphism in the next section, I use sameness of property in the sense of strict identity. However, the trope theorist’s characterisation of sameness in terms of exactly similar property instances can be substituted without effecting any of the arguments presented.

### **3.3.2 Predicate property distinction — arguments that predicates and properties are not correlated one-to-one**

We use predicates, which are language-dependent entities to express concepts, which are mental entities. Properties are (for the most part) language- and mind-independent features of the world. Given this bifurcation between predicates and properties, it would seem highly surprising if not downright improbable that predicates and properties are correlated one-to-one. There are a host of arguments to support this intuition.

Molnar (2003:25-28) lists six reasons to hold that predicates and properties are not isomorphic:<sup>11</sup>

1. There are unknown properties to which no predicates correspond
2. The predicate “is a game” applies to objects by virtue of a family resemblance among the objects, not in virtue of having the same property
3. There are co-denoting non-synonymous predicates that apply to the same object by virtue of a single trope/property of that object.
4. Predicates can be generated out of other predicates and sentences, up to many order of infinity. But they do not seem to correspond to an equal number of tropes or properties
5. There are infinite real numbers. Yet in principle no language capable of human use possesses an infinite number of expressions
6. Paradoxical predicates.

I will use these six reasons as a starting point to argue against predicate property isomorphism. These serve as reasons for rejecting two weaker theses:

1. the thesis that there is one property for every predicate
2. the thesis that there is one predicate for every property

### **There are unknown properties to which no predicates correspond**

The first reason Molnar gives for rejecting predicate property isomorphism comes from Armstrong (1978:12-14), who uses the limited reach of human knowledge to claim there are omnitemporally unknown properties to which no predicates correspond. It would be the height of human vanity to suppose that all properties across all time are known to us and to assume we had a predicate for each of them.

### **“Is a game”**

Wittgenstein (1988), in discussing the nature of language, famously employs games to illustrate his notion of family resemblance. The predicate “is a game” applies to a range of entities, but there is no single, common property shared by

---

<sup>11</sup> For further arguments against predicate property isomorphism see also Mellor (1997); Armstrong (1978), (1989a), (1989b); Heil (2003:22-30) and Bird (2007:ch3).

all games. Rather there is a family resemblance among the entities that we call games<sup>12</sup>.

Molnar notes that predicates such as “is a game”:

“...apply to many objects by virtue of a family resemblance among the objects and not by virtue of each of them having one member of a set of exactly resembling tropes.” (Molnar 2003:26).

From this Molnar concludes that predicates and properties are not isomorphic.

Armstrong also thinks that predicates that apply to objects due to a family resemblance show that predicates and properties do not “line up in any simple way” (Armstrong 1989:85). Armstrong characterizes Wittgenstein as an “antimetaphysician” who sought to dissolve rather than solve the problem of universals:

“He [Wittgenstein] seems to have thought that what he said about family resemblance was (among other things) a step towards getting rid of the problem [of universals]. But I think that the real moral of what he said is only that predicates and universals do not line up in any simple way.” (Armstrong 1989:85)

Wittgenstein convincingly argues that there is no universal or property of gamehood. However, we clearly have a predicate “is a game”. It follows that predicates and properties cannot be isomorphic. What predicates exist is no guide to what properties exist.

The predicate “is jade” provides a clear and striking example that predicates and properties are not correlated one-to-one. Just as the one predicate “is a game” applies to a range of different objects that do not share a common property in virtue of which they are games, so too the predicate “is jade” applies to a range of

---

<sup>12</sup> Heil explains family resemblance between properties and our willingness to apply a single predicate to a diverse range of objects in terms of “less-than perfect-similarity”. Heil notes that:

“By virtue of possessing similar-but-not-precisely-similar properties, red objects possess similar-but not-precisely-similar ‘causal powers’ or dispositionalities, and so behave (colourwise) in similar-but-not-precisely-similar ways. It is not surprising, then, that we see red objects as similar and find it natural to group them under a single predicate.” (Heil 2003:27-28)



minerals, namely jadeite and nephrite, that do not share a common property in virtue of which they are jade.

“Is jade” truly applies to two different minerals; jadeite and nephrite. However, “is jade” does not apply to jadeite and nephrite in virtue of these entities possessing any common property. Rather there is a family resemblance among jadeite and nephrite objects. This resemblance lead people at one point to mistakenly conclude that jadeite and nephrite were one and the same mineral. Science has shown this to be wrong. Jadeite and nephrite are two distinct minerals, not one. Nonetheless, we can still truly apply the predicate “is jade” to both jadeite and nephrite because the satisfaction of a single predicate does not require a corresponding single property in virtue of which it applies. This shows that what properties there are is not determined or fixed by what predicates apply to objects. To deny this is to deny that jadeite and nephrite are distinct minerals. That is plainly false and untenable.

The same point can be made about the dispositional predicates of everyday macroscopic objects, such as “is fragile”, “is soluble” and “is toxic”. Many different entities are toxic. There are chemical toxicants, such as lead, mercury and chlorine gas. Biological toxicants include bacteria and viruses. While physical toxicants include coal dust and asbestos fibres. The range of toxic substances is extremely diverse. The predicate “is toxic” truly applies to all these diverse entities in virtue of them possessing certain properties, but it does not apply in virtue of them possessing a single common property. In other words, there is no single, common property of toxicity shared by toxic substances corresponding to the predicate “is toxic”. This shows there is no one-to-one correspondence between the predicate “is toxic” and a property of toxicity. The property of toxicity shows that what properties there are is not determined or fixed by what predicates truly apply to objects.

The examples of games, jade and toxicity make it clear that predicates and properties are not correlated one-to-one. One attempt to avoid this conclusion claims that such properties have a unity as higher-level functional properties. In

the parlance of functionalism, it is said that properties such as games, jade and toxicity are multiply realised by a diverse range of properties. Nonetheless, they share a single common higher-level functional property, and so predicates and properties can be correlated one-to-one at the functional level. I argue this tactic fails.<sup>13</sup>

One glaring problem with the functional response here is that jade is not a functional property. We can certainly describe jade as being multiply realised by two chemically distinct materials: jadite and nephrite. However, multiple realisability does not entail functionalism. Jade, unlike, say a thermostat or a possum trap, is not individuated by the causal role it plays. What makes something jade is that it has the chemical composition of jadeite or nephrite, not the role it plays.

What about the toxicity? Toxicity is multiply realised and we can certainly give a functional description of toxicity in terms of its causal role — its role in harming an organism. But what reason do we have for thinking to be toxic is a higher-level functional property and not merely a functional description? As the case of jade makes clear, multiple realisation of a property does not entail functionalism. So the fact that toxicity is multiply realised by lead, viruses and coal dust etc. is not sufficient for toxicity to be a functional property.

We can meaningfully use the predicate “is toxic” and truly apply it to objects without the need to invoke functional properties and countenance higher levels of reality. As John Heil notes:

“Everyday talk of levels — levels of descriptions, levels of explanation — is unobjectionable. We can describe sociology and psychology as higher-level sciences, chemistry as lower-level sciences. Trouble arises when philosophers introduce levels of reality corresponding to levels thought of in this way.” (Heil 203:73)

---

<sup>13</sup> There are a number of well-known problems with functionalism. There is the problem of causal relevance — how could items at higher levels feature in casual transactions? These are also problems with inter-level relations — what is it for these higher-level items to depend on and be determined by the items at lower levels?

One should not posit the existence of entities without good reason. To cast toxicity as a higher-level functional property, as opposed to merely a higher-level of description or explanation, and so countenance hierarchical levels of reality is unnecessary. If toxicity is multiply realised by objects that do not share a common property in virtue of which they are toxic, as the functionalist readily admits, then what reason do we have to hold that there is a common property in virtue of which toxic objects are toxic? Is that we employ a single predicate “is toxic”? It seems perverse to insist in the face of multiple realisation that there is a common property in virtue of which toxic objects are toxic.

The functionalist fails to find the sought after common property at the level of being where multiple realisation occurs. To save their intuition that there is common property, they turn to functionalism and add a supposed higher level of being and posit a unity for toxicity, pain, fragility etc. at this higher level.

The only reason I can see for insisting, in the face of multiple realisation, that there is a common property in virtue of which toxic objects are toxic is if one assumes that to every predicate there is a corresponding property. But what reason is there for holding such a view of properties and predication? As I have shown, multiple realisation is no reason. The example of jade shows that multiple realisation does not entail functionalism. I showed multiple realisation argues for the opposite conclusion. Multiple realisation is the admission that there is no single common property.

### **Co-denoting, non-synonymous predicates**

Frege famously distinguished between the sense and reference of terms in order to account for how there can be non-trivial true identity statements (Frege 1980). The sense reference distinction shows that different (that is, non-synonymous) terms or phrases, such as “the morning” and “the evening star”, can designate the same thing, namely — Venus (Frege 1980).

Similarly, there are co-denoting non-synonymous predicates that apply to the same object by virtue of a single property of that object. As Molnar (2003:26)

notes, Campbell (1980:25) provides an example of two non-synonymous predicates — “is the shape of a ball-bearing” and “is spherical” — that may truly apply to one and the same property. This shows that the satisfaction of separate and distinct predicates need not entail there are two corresponding separate and distinct properties. It shows the satisfaction of a predicate is not a sufficient condition for the existence of a corresponding property. It also demonstrates that there can be more than one way to designate or pick out the same entity. This point was stressed in the previous section’s discussion of Kripke.

**Predicates can be generated out of other predicates and sentences, up to many order of infinity.**

Molnar holds that the previous point about co-denoting non-synonymous predicates can be generalised to present a “very objectionable feature of isomorphism” (Molnar 2003:26). Molnar claims that:

“Predicates can be generated out of other predicates and out of sentences, in accordance with accepted formation rules, up to many orders of infinity (at least one infinite set for corresponding to each generative operation, such as disjunction, double negation, sentence abstraction, etc.” (Molnar 2003:26)

The problem here, according to Molnar, is that:

“The expressions so obtained are mostly non-synonymous, but they do not seem to correspond to an equal number of tropes.” (Molnar 2003:26)

Molnar’s objection is that we can generate many orders of infinite non-synonymous predicates, without, it seems, an equal number of corresponding properties. Hence, predicates and properties are not isomorphic.

It may well seem reasonable to assume that there are not many orders of infinite properties. However, Molnar’s first objection to isomorphism contends there are “omintemporally unknown properties” (Molnar 2003:25). Could these “omintemporally unknown properties” amount to many orders of infinity? Moreover, Molnar fifth criticism of isomorphism, one that we have not yet looked at, explicitly argues there “an uncountable infinity of properties” (Molnar 2003:26).

I am not so sure the problem Molnar identifies here is solely a matter of numbers and a question of whether or not there are an infinite number of properties to match the infinite number of predicates we can generate. Despite these misgivings, I think that Molnar is right to take issue with our ability to so easily and endlessly generate predicates — the problem is that we can generate predicates in accordance with formation rules with total disregard for whether there is any reason to think there is a corresponding property. We can build the most elaborate castles in the air using predicates, completely unconstrained by how the world is, completely oblivious to what properties there are. The issue is not with the amount of predicates generated, but with the unconstrained, arbitrary manner in which they are created. If predicates can be generated without regard for how the world is, independently of any thought for what properties there are or may be, then there is very good reason to hold that properties and predicates are not isomorphic.

### **Disjunctive and negative universals (properties)**

The existence of negative and disjunctive predicates also shows that predicates and properties are not isomorphic. There are disjunctive predicates — such as “is a wallaby or is a kangaroo” and negative predicates — such as “is not a potoroo”. We can generate disjunctive and negative predicates in accordance with formation rules. However, Armstrong convincingly argues there are no disjunctive or negative properties. If Armstrong is correct, then there are predicates to which no properties correspond. This shows predicates and properties cannot be isomorphic.

Armstrong argues that a disjunction of properties is not itself a disjunctive property. By a disjunctive property Armstrong means a disjunction of universals. The same point can be couched in terms of tropes. I will use the more neutral term “property” where appropriate. Armstrong provides two arguments for rejecting disjunctive properties.

The first argument rests upon the fact that disjunctive properties are not identical. Armstrong ask us to consider two objects:

“One has charge C but lacks mass M. The other lacks charge C but has mass M. So they have the disjunctive property having charge C or having mass M. But surely that does not show that, in any serious sense, they thereby have something identical? The whole point of a universal [property] is that it should be identical in its different instances.”

(Armstrong 1989:82)

If having charge C or mass M is a property, then all objects that possess charge C or having mass M property must possess identical properties (on universals theory) or exact duplicates (on trope theory). However, as Armstrong demonstrates, they clearly do not. One object may possess charge C, another object may possess mass M. Which is to say they do not possess the same property.

The second reason to deny that a disjunction of properties is itself a property is related to causation. The Eleatic stranger in Plato’s *Sophist* declares:

“I am proposing as a mark to distinguish real things, that they are nothing but power.” (Plato 1935:247d–e)

Armstrong adopts what is known as the Eleatic Principle to contend that casual power is the mark of being.<sup>14</sup> This leads him to argue:

“There is some very close link between universals and causality. The link is of this nature. If a thing instantiates a certain universal, then, in virtue of that, it has the power to act in a certain way. For instance if a thing has a certain mass, then it has the power to act upon the scalepan of a balance, or upon scales in a certain way. Furthermore, different universals bestow different powers.” (Armstrong 1989:82)

Armstrong applies this point to dismiss disjunctive properties:

“Now suppose a thing has charge C but lacks mass M. In virtue of charge C, it has certain powers to act. For instance, it repels things with like charge. Possession of the disjunctive property C or M adds nothing to its

---

<sup>14</sup> The Eleatic stranger in Plato’s *Sophist* contends that casual power is the mark of being (Plato 1935:247d–e). Kim (1993:202) refers to the principle as “Alexander’s Dictum”.

powers. This suggests that while C may be a genuine universal, C or M is not.” (Armstrong 1989:83)

The lack of disjunctive properties demonstrates for Armstrong that “there is no automatic passage from predicates (linguistic entities) to universals” (Armstrong 1989:84). There are disjunctive predicates, yet there are no disjunctive properties. Hence, the satisfaction of a predicate is not sufficient for the existence of a corresponding property. Armstrong concludes:

“The expression ‘having charge C or mass M’ is a perfectly good predicate. It could apply to, or be true of, innumerable objects. But as we have seen, this does not mean that there is a property corresponding to this predicate.” (Armstrong 1989:84-85)

Armstrong also argues there are no negative properties, despite there being negative predicates, such as “is not hot” or “is not mass M”. He contends that the lack or absence of a property is not itself a property. For example, a horse is not a donkey. This is because horses lack the property of donkeyness, not because horses possess the property of not-donkeyness. It seems that we can account for negative predicates and the truth of statements such as “a horse is not a donkey” without the need for negative properties. As such, we have no reason to posit their existence. Negative properties appear to be unnecessary and an ontological extravagance. “Positive” properties are all that are required.

In arguing that there are no negative properties, Armstrong makes recourse to identity and causation. In the first case, Armstrong denies that objects possessing a supposedly negative property, such as lacking charge C, thereby possess anything identical and so concludes that negative properties are not genuine properties:

“Is there really something in common, something identical, in everything that lacks charge C? Of course, there might be some universal property that just happened to be coextensive with lacking charge C. But that lack does not seem to be a factor found in each thing that lacks charge C.” (Armstrong 1989:83)

Causal considerations also count against the existence of negative properties for Armstrong. He notes that:

“It is a strange idea that lacks or absences do any causing. It is natural to say that a thing acts in virtue of positive factors alone.” (Armstrong 1989:83)

Armstrong notes that our language may suggest otherwise. For example, he points out that we say things like “lack of water caused his death” (Armstrong 1989:83). However, Armstrong does not think such language is a reliable guide to the causal factors at play here and so should not be considered a counterexample.

### **Infinite real numbers**

Molnar’s fifth reason against predicate property isomorphism adapts an argument by M.C. Bradley (1979:12-13). It requires that we accept the use of the real number system in physics. Molnar gives an example that leads to the existence of “an uncountable infinity of properties”:

“a particle passing through each of the points of a real line segment will have non-denumerably many properties.” (Molnar 2003:26)

This presents a problem according to Molnar: there is not the time to generate an uncountable infinity of expressions and predicates to denote non-denumerably many properties, and so predicates cannot be matched to properties. Predicates and properties cannot be isomorphic in this case.

Another example of uncountably many properties can be found in classical field theory. This example comes from Chris Swoyer (Swoyer 1996:144). He points out that each value of a physical magnitude is a determinate property. In classical field theories such properties as gravitational potentials vary continuously as we move away from the source of the field and so yields uncountably many properties. Once again, we cannot generate the required corresponding predicates. Hence, there are properties to which no predicates correspond.

### **Paradoxical predicates**

Lastly, Molnar points to paradoxical predicates to which no property corresponds (Molnar 2003:26). He provides an example:



“Is a property to which no property corresponds.”

This predicate corresponds to a property only if it does not. It follows that the predicate does not correspond to any property.

### **Specific argument that dispositional predicates and properties are not correlated one-to-one**

The arguments presented above provide ample reason to conclude that there is not a property for every predicate and there is not a predicate for every property. These are general argument against predicate property isomorphism. Specific arguments can also be found against any one-to-one correspondence between dispositional predicates and properties. Argument one above suggests that there are not only omnitemporally unknown properties, but also omnitemporally unknown power predicates.

The fourth argument above can be applied to dispositions to claim that we can generate new dispositional predicates at will with no regard for whether there is any corresponding property. Molnar cites Quine as noting that the “dispositional idiom” involves:

“the general technique of applying the suffix ‘-ile’ or ‘-able’ to verb stems...” (Quine 1973:11 see also Quine 1960:223-24)

The adding of these suffixes generates a dispositional ascription and suggests we can do so at will. For example, we can generate many dispositional ascriptions for just the one song, say “Green Onions” by Booker T and the MGs. The song can be likeable, listenable, diggable, danceable, playable, copy-able, transposable, laudable, recognizable, hearable, analyzable, debatable, objectionable, ponderable, identifiable and so on. A copy of the record itself is purchaseable, returnable, saleable, discountable, collectible, transferable, recordable, broadcastable, playable, throwable, breakable, bendable, stackable, recyclable, carryable, findable, stealable, bootleggable, biteable, packable, sortable and so on. This seems to be merely a word making game based on how certain suffixes are used in English. Perhaps one could stand their ground and claim there are properties for every application of the “able” or “ile” suffix.

However, there seems to be clear cases where our ability to generate predicates is no guide to what properties there are. We can use categorical predicates to pick out and refer to dispositional properties and dispositional predicates to pick out and refer to categorical properties. Alexander Bird provides examples of such cases:

“A non-dispositional predicate may refer to an essentially dispositional property: ‘...has that property which is my favourite natural property’ is a non-dispositional predicate that denotes electrical charge...” (Bird 2007: 44)

The non-dispositional predicate “...has that property which is my favourite natural property” picks out and refers to the dispositional property of electrical charge.

Bird also provided an example of a dispositional predicate denoting a categorical property:

“Likewise, if Armstrong is correct all properties are categorical. But a dispositional predicate may denote such a property [a categorical property]; the dispositional predicate denotes the categorical property in virtue of the dispositional role it happens, contingently, to play in this world.” (Bird 2007: 44-45)

The fact that we can use dispositional language to pick out and refer to categorical properties and categorical language to pick out and refer to dispositional properties provides a clear illustration that the manner in which we employ dispositional ascriptions is no guide to the nature of the properties referred to.

The arguments of this section show that the satisfaction of a predicate is no guide to what properties exist. This section has argued that for a given predicate there may well be none, one or many properties in virtue of which the predicate applies. While for a given property there may be one, none or many predicates that apply in virtue of that property.

This bifurcation between dispositional and categorical predicates and ascriptions on the one hand and properties on the other hand will be returned to throughout the thesis to explain how accounts of dispositions go astray. Specifically, I charge that the Distinctness Thesis, Categoricalism, the Pure Powers view and the claim that there are extrinsic powers all mistake how we talk about and fix the reference of properties (using dispositional and categorical ascriptions) for the way properties are.

I hope it obvious that my remarks on the relation between predicates and properties and dispositional predicates and ascriptions and properties specifically have parallels with my remarks in the previous section on Kripke's distinction between fixing the reference of a term and giving its meaning. Just as Kripke warned us not to confuse and conflate the manner in which we fix the reference of a term with the meaning of that term, so too we must not confuse and conflate the predicates and ascriptions we use to refer to properties with the nature of those properties. This concludes my discussion of the predicate property distinction. However, before moving to the next chapter, I will address the question of what properties exist.

### **3.2.3 What properties exist? Science and laws our best guide**

So far, I have worked to draw a distinction between language and ontology. I have said quite a bit about how language fails to inform us about what properties exist and how the world is. If our predicates and ascriptions are not a reliable guide to what properties exist, then what is? If the predicates we use and the concepts we hold are no guide to the existence of corresponding properties, then how do we decide what properties exist? Armstrong addresses this issue:

“...I do not think there is an infallible way of deciding what are the true universals [properties]. It seems clear that we must not look to semantic considerations. Those who argue to particular universals from semantic data, from predicates to a universal corresponding to that predicate, argue in a very optimistic and unempirical manner. I call them *a priori*

realists. Better, I think, is *a posteriori* realism. The best guide that we have to just what universals there are is total science.” (Armstrong 1989:87)

Armstrong believes there is reason to think that physics is the fundamental science. And if this is correct, then:

“such properties as mass, spin, charge, extension, duration, space-time interval, and other envisaged by physics may be the true monadic universals.” (Armstrong 1989:87)

However, he stresses that “any identification of universals remains rather speculative”. (Armstrong 1989:87)

Mellor expresses similar views, giving science and laws the job of revealing what properties exist. For Mellor, those predicates that feature in law statements are those that correspond to properties:

“And this gives us reason to think that the simple predicates we use in our law statements — e.g. those ascribing masses, temperatures, energies, chemical and biological kinds, mental states and kinds of sensations — correspond to properties.” (Mellor 1997:266)

As such, statements of laws are a guide as to what properties exist. However, like Armstrong, Mellor expresses a degree of epistemic humility about our knowledge of properties. We may be wrong about what properties exist for two reasons. One, the laws we hold may turn out to be wrong. Two, the discovery of new laws may show that predicates we thought were simple are actually complex.

### **Sparse, as opposed to an abundant theory of properties**

Molnar thinks one lesson to be drawn from the fact that predicates and properties are not isomorphic is that we should adopt what David Lewis (1999:8-55) calls a sparse, as opposed to an abundant theory of properties (Molnar 2003:27). Lewis uses Armstrong’s account of universals to illustrate a sparse theory of properties. Armstrong’s theory of universals is a sparse theory of properties in that there are only those universals which ground similarity and the causal powers of those particulars which instantiate them:

“A distinctive feature of Armstrong’s theory is that universals [properties] are sparse. There are the universals there must be to ground the objective

resemblance and the causal powers of things, and there is no reason to believe in any more.” (Lewis 1999:12)

It is important to note that the distinction between sparse and abundant properties is not simply one of the absolute numbers of properties. A sparse theory of properties could include uncountable many properties, such as in the two examples mentioned in argument six against isomorphism.

Lewis goes on to introduce an abundant theory of properties:

“Any class of things, be it ever so gerrymandered and miscellaneous and indescribable in thought and language, be it ever so superfluous in characterizing the world, is nevertheless a property. So there are properties in immense abundance.” (Lewis 1999:12)

Lewis elaborates on this noting abundant properties role or lack of role in resemblance and causation:

“Because properties are so abundant, they are indiscriminating. Any two things share infinitely many properties, and fail to share infinitely many others. That is so whether the two things are perfect duplicates or utterly dissimilar. Thus properties do nothing to capture the facts of resemblance. That is work more suited to the sparse universals. Likewise, properties do nothing to capture the causal powers of things. Almost all properties are causally irrelevant, and there is nothing to make the causally relevant ones stand out from the crowd. Properties carve reality at the joints — and everywhere else as well.” (Lewis 1999:13)

On this characterization by Lewis, it is clear that the arguments given above against predicate property isomorphism argue for a sparse theory of properties in some form.

We can see that there are numerous and convincing reasons to conclude that predicates and properties are not correlated one-to-one and that what properties exist is not determined by the predicates that truly apply to entities. The relevance of this is that the manner in which talk about dispositions and the predicates we apply in discussing dispositions is often not a reliable guide to what dispositions exist and their nature. In the next chapter, I look at four accounts of

the nature of dispositions and apply what has been discussed so far about the relation between language and the world and about reference fixing and meaning to show that arguments presented in support of these accounts fail to establish the truth of their conclusions and give us no reason to accept that dispositions are as these accounts claim them to be.

## Chapter 4.1 — The distinctness thesis

**Distinctness thesis:** a disposition or power (say fragility) is distinct from its causal bases (say, molecular bonding  $\alpha$ ).

### 4.1.1 Prior, Pargetter and Jackson's modal argument for the distinctness thesis

- Introduction
- Prior, Pargetter and Jackson's argument for the distinctness thesis
  - Kripke's modal argument
  - Prior, Pargetter and Jackson's adaption of Kripke's modal argument
- Finks and mimics show that the counterfactual definition of dispositions is false
- Prior, Pargetter and Jackson's attempt to overcome finks and mimics
  - The reply to the Evil Demon mimic entails the existence of a contingent, epistemic counterpart for fragility
  - The reply to the Evil Demon mimic entails extrinsic causal basis
- Conclusion — Prior, Pargetter and Jackson's modal argument for distinctness thesis is unsound

### 4.1.2 Prior, Pargetter and Jackson's multiple realisation arguments for the distinctness thesis and Rives' defence

- Prior, Pargetter and Jackson's multiple realisation argument for the distinctness thesis
- Mumford argues token-token identity of dispositions and bases is compatible with the multiple realisation of dispositional types and does not entail the distinctness thesis
- Rives' argument that dispositional tokens are multiply realised
  - Rive's argument that tokens are multiply realised rests upon two premises:
  - Token of *being fragile* would survives changes to atoms a.-a.
  - The causal basis of being fragile — molecular bonding  $\alpha$  — would

not survive changes to atoms  $a_1$ - $a_n$ .

- *Being fragile* is tied to  $V$  — argument one that that being fragile would survive changes to atoms  $a_1$ - $a_n$ 
  - Problem: Begs the question
- The Causal Theory of Properties — argument two that being fragile would survive changes to atoms  $a_1$ - $a_n$ 
  - Problem: Dispositions are causally impotent and cannot enter into causal relations.
- Rives' argument that the causal basis of the token of *being fragile* would not survive changes to atoms  $a_1$ - $a_n$ 
  - Problem: Causal Theory of Properties entails, contrary to Rive's claim, that the causal basis of being fragile would survive changes to atoms  $a_1$ - $a_n$
- Conclusion — Rives' argument that dispositional tokens are multiply realised is unsound

#### **4.1.3 Why we should reject multiply realization arguments for the distinctness thesis**

- Empirical considerations appear to support the claim that dispositions are multiply realised
- Multiply realised entities such as pain are as diverse and disparate as the disjunct of their realising properties
- Arguments that there are no disjunctive properties
- Dispositional properties are species and structure-specific
- Conclusion — Prior, Pargetter and Jackson and Rives have failed to provide adequate grounds for the distinctness thesis.

#### **Conclusion**



### **4.1.1 Prior, Pargetter and Jackson's modal argument for the distinctness thesis**

#### **Introduction**

This chapter is concerned with Prior, Pargetter and Jackson's (1982) two arguments in defence of the distinctness thesis — the claim that a disposition or power (say, fragility) and its causal basis (say, molecular bonding  $\alpha$ ) are distinct and separate properties.<sup>15</sup> The chapter is divided into three sections. Section one introduces Prior, Pargetter and Jackson's (1982) modal argument for the distinctness thesis. It is an adaption of Kripke's (1980:146ff.) modal argument against the identity of mental states and brain states. I show Prior, Pargetter and Jackson's argument is unsound. I identify the source of Prior, Pargetter and Jackson's error in their false, counterfactual analysis of dispositions. Section two examines Bradley Rives' (2005) defence of Prior, Pargetter and Jackson's (1982) multiple realisation argument for the distinctness thesis. Rives argues that dispositional tokens (not just types) are multiply realised by different causal basis tokens and so, by transitivity of identity, a disposition and its causal basis must be distinct. I show his argument is unsound — he fails to establish the truth of two of key premises. Section three draws on Kim (1992) to criticise the very project of multiple realisation arguments to argue that properties are distinct.

I conclude that Prior, Pargetter and Jackson's arguments that a disposition and its causal basis are distinct is underpinned by their commitment to a faulty semantics of dispositions in the form of the counterfactual analysis of dispositions. At the heart of their problem is that counterfactuals are useful for picking out and fixing the reference of dispositional terms, but fail to give the meaning of those dispositional terms. Prior, Pargetter and Jackson confuse the language we use to talk about properties with the meaning of those property terms and the property itself and in doing so make unwarranted ontological conclusions that a

---

<sup>15</sup> The example of a causal basis given here is what is generally considered to be categorical or qualitative property. However, the distinctness thesis is neutral on the question of whether the causal basis is a dispositional or categorical property. Yet Prior, Pargetter and Jackson (1982) also hold the impotence thesis (that is, dispositions are not causes of their manifestations). It follows that the causal basis cannot be dispositional, as this would render it causally inefficacious and so incapable of playing the role of a causal basis.

disposition and its causal basis are two distinct properties. Furthermore, Prior, Pargetter and Jackson's attempts to defend the counterfactual analysis of dispositions only serves to: (a) undermine Prior, Pargetter and Jackson's modal argument for the distinctness thesis and (b) entails, contrary to Prior, Pargetter and Jackson's intentions, the existence of relational and extrinsic dispositions.

### **Kripke's modal argument**

In the third lecture of *Naming and Necessity* Kripke (1980) extends his treatment of names as rigid designators to natural kinds terms (such as "gold"), species names (such as "tigers") and terms for natural phenomena (such as "heat" and "light") to argue that "pain = c-fibres firing" is necessarily false while "heat = mean molecular kinetic energy" is necessarily true (Kripke 1980:146-55). As noted in chapter three, Kripke argues that identity statements involving rigid designators, such as "pain = c-fibres firing" and "heat = mean molecular kinetic energy" are necessary — necessarily true if true, and necessarily false if false. In both the cases of pain and heat we have an intuition that the supposed identity does not hold and is contingent. It seems we can imagine pain without c-fibres firing and heat without mean kinetic energy. A crucial move in Kripke's argument that "pain = c-fibres firing" is necessarily false revolves around whether our intuitions here are reliable. Kripke spends much of *Naming and Necessity* arguing that our modal intuitions are unreliable, so we need to tread carefully.

Kripke's modal argument is well known and will not be presented in detail. Rather, I will concentrate on the role that contingent features and epistemic counterparts play in the argument, as this is relevant to my criticism of Prior, Pargetter and Jackson's argument for the distinctness thesis. Our intuition that heat may occur without mean molecular kinetic energy is unreliable. Why? Because, as Kripke argues, heat possesses a contingent feature — the way heat feels us to, the sensation heat causes in us — that serves as an epistemic counterpart of heat and is capable of explaining away our intuition of contingency (Kripke 1980: 128-131). The significant point here is that we confuse the sensation of heat with heat itself. In (mistakenly) imagining a world where heat occurs without mean molecular kinetic energy, we are (really) imagining a

world where the phenomenon associated with heat — say a certain prickly feeling of the skin — occurs without mean molecular kinetic energy. This contingent feature of heat — how heat feels to us — accounts for our intuition that heat may occur in the absence of molecular kinetic energy without having to admit that heat and molecular kinetic energy are contingently related.

Kripke argues that things are different for the identity statement “pain = c-fibres firing”. Our intuition here that there is a possible world where pain occurs without c-fibres firing cannot be explained away in the manner of heat and mean molecular kinetic energy. Why? It is because we feel pain if and only if we are in pain. Pain, unlike heat, lacks a contingent feature — a way pain feels to us but is not pain — able to serve as an epistemic counterpart of pain and account for our intuition that pain may occur without c-fibres firing. Without this contingent feature, our intuition that pain may occur without c-fibres firing cannot be explained away, and as such we have no reason to doubt our intuition that pain is not identical to c-fibres firing.

The point I wish to stress here is that Kripke’s modal argument that two entities are distinct works in some cases but not in others. His modal argument that two entities are distinct works in cases where there is no contingent feature capable of serving as an epistemic counterpart to explain away our intuition that the identity in question does not hold. If there is a contingent feature capable of serving as an epistemic counterpart and explaining away our intuition that the identity in question does not hold, then Kripke’s modal argument that two entities are distinct fails.

### **Prior, Pargetter and Jackson’s adaption of Kripke’s modal argument**

I now turn to Prior, Pargetter and Jackson’s (1982) adaption of Kripke’s modal argument:

“[I]f ‘fragility (being fragile) = having  $\alpha$  (say)’ is true, it is necessarily so, and if false, necessarily so... But there are worlds where fragile objects do not have  $\alpha$ , for it is contingent as to what the causal basis of a disposition is. Hence there are worlds where ‘fragility = having  $\alpha$ ’ is false for the

decisive reason that the extension of fragility and being  $\alpha$  differ in that world; and therefore by rigidity it is false in all worlds, including the actual world.” (Prior, Pargetter and Jackson 1982:253-54)

The question as to whether we should accept Prior, Pargetter and Jackson’s conclusion that “fragility = having  $\alpha$ ” is false in all worlds and that a disposition and its causal basis are distinct properties turns on whether dispositions, such as fragility, are like heat (and possess a contingent feature capable of explaining away our intuition that heat can occur without mean molecular kinetic energy) or like pain and lacking any such contingent feature. <sup>16</sup>

We find Prior, Pargetter and Jackson explicitly contrasting heat with fragility when they argue that external signs are not definitive of heat but are definitive of fragility:

“Be this the right or the wrong view for heat (and water *et al.*), it is the wrong view for fragility (and elasticity *et al.*).

“The cornerstone of the Kripke-Putnam view is that it is wrong to define “ $x$  is hot” as “ $x$  is such that...” where the dots are filled with some favoured specification of the external signs of heat. For it is not disputed that in some possible worlds it is objects with calorific fluid and not mean kinetic energy which display these external signs of heat.

---

<sup>16</sup> Prior, Pargetter and Jackson’s argument rests on the claim that dispositional terms such as “fragility” and property terms such as “ $\alpha$ ” are rigid designators. I do not challenge this claim, but note that Prior’s (1985) argument for the rigidity of such terms is unconvincing. Prior argues that if property predicates (which include dispositional predicates) are non-rigid, then there could be no transworld identity of individuals:

“If we treat property predicates as non-rigid designators, we lose the ability to identify individuals across possible worlds” (Prior 1985:77)

Her argument rests upon a mistaken account of individuals and transworld identity. We do not identify individuals in other world by their properties, as Prior claims. Names, objects and individuals are not introduced by description, by their “property predicates”, as Prior suggests. Rather, in counterfactual situations we stipulate the object we are talking about. As Kripke notes:

“(1) Generally, things aren’t ‘found out’ about a counterfactual situation, they are stipulated; (2) possible worlds need not be given purely qualitatively, as if we were looking at them through a telescope.” (Kripke 1980:50)

Elsewhere he further elaborates on this point:

“I can refer to the table before me, and ask what might have happened to it under certain circumstances; I can also refer to its molecules. If, on the other hand, it is demanded that I describe each counterfactual situation purely qualitatively, then I can only ask whether *a table*, of such and such a color, and so on, would have certain properties; whether the table in question would be *this table*, table T, is indeed moot, since all reference to objects, as opposed to qualities, has disappeared.” (Kripke 1980: 52)

“But what makes fragility a disposition is that it is right to define ‘x is fragile’ as ‘If  $x$  were dropped at  $t$ ,  $x$  would break at  $t + \delta$ ’. And it is not disputed that a causal basis of an object which is such that if it is dropped it breaks, may vary from world to world.” (Prior, Pargetter and Jackson 1982:254)

Heat possesses “external signs of heat” that are not definitive of “heat”. As such, these non-definitive, contingent signs of heat may be possessed by objects that are not hot without undermining the claim that “heat = mean molecular kinetic energy” is true in all possible worlds. However, the signs of fragility — breaking upon being dropped — are definitive of “fragility” and so are necessary features of fragile objects. If there are objects that would break upon being dropped yet lack the causal basis  $\alpha$ , then it follows that “fragility = having  $\alpha$ ” is false in all possible worlds. In defining “fragility” counterfactually, Prior Pargetter and Jackson deny that fragility possesses a contingent feature capable of accounting for our intuition that “fragility = having  $\alpha$ ” is false.

Prior, Pargetter and Jackson’s modal argument for the distinctness thesis is valid. However, it is unsound. Their premise that dispositions, such as fragility, are defined in terms of counterfactual statements is false. That is, Prior, Pargetter and Jackson are wrong when they claim:

“But what makes fragility a disposition is that it is right to define ‘x is fragile’ as ‘If  $x$  were dropped at  $t$ ,  $x$  would break at  $t + \delta$ ’.” (Prior, Pargetter and Jackson 1982:254)

### **Finks, masks, antidotes and mimics show the counterfactual analysis of dispositions is false**

As pointed out in chapter two, the simple conditional analysis of dispositions in terms of counterfactuals, as propounded by Prior, Pargetter and Jackson, is “simple indeed — but false” (Lewis 1997a:143). C.B. Martin’s (1994) electro-fink and reverse electro-fink examples illustrate that the counterfactual analysis of dispositions is. George Molnar provides a real-world example of a Martinian reverse-electro fink:

“A non-imaginary example is an electrical safety cut-out switch which turns off the current in a wire (=the base) when an earthed conductor touches the wire, thus preventing anybody getting a shock from the wire (=the disposition). At time  $t$ , it is true the wire is live (=disposition) although the conditional ‘If one were to touch the wire at  $t$  one would get an electric shock’ is false, thanks to the safety switch.”(Molnar 2003:90)

The wire is live, yet the counterfactual “if one were to touch the wire at  $t$  one would get an electric shock” is false. We have a true dispositional ascription, yet false counterfactual. This shows that the truth of a counterfactual is not necessary for the truth of a dispositional ascription such as “ $x$  is live”.

Mimics show that the truth of a counterfactual is not sufficient for the truth of a dispositional ascription. Lewis’ Hater of Styrofoam provides a whimsical example:

“When a styrofoam dish is struck, it makes a distinctive sound. When the Hater of Styrofoam hears this sound, he comes and tears the dish apart by brute force. So, when the Hater is within earshot, styrofoam dishes are disposed to end up broken if struck. ... Are they [Styrofoam dishes] fragile? To say so would be at best a misleading truth, and at worst an outright falsehood.” (Lewis 1997:153)

The counterfactual “if this Styrofoam cup were struck, it would shatter” is true. Yet the dispositional ascription — that the Styrofoam cup is fragile — is false. We have a true counterfactual, yet false dispositional ascription. This shows that the truth of a counterfactual is not sufficient for the possession of a disposition or power.

Finks and mimics (as well as mask and antidotes) demonstrate that the counterfactual analysis of dispositions is false — the truth of a counterfactual is neither necessary nor sufficient for the possession of a disposition. Contrary Prior, Pargetter and Jackson’s claims, dispositions, such as fragility, cannot be defined in terms of counterfactual statements such as “If  $x$  were dropped at  $t$ ,  $x$  would break at  $t + \delta$ ”. The falsity of the counterfactual analysis of dispositions shows that Prior, Pargetter and Jackson’s modal argument for the distinctness thesis is

unsound. Prior, Pargetter and Jackson's modal argument gives us no reason to accept their conclusion that a disposition and its causal basis are distinct.

The falsity of the counterfactual analysis of dispositions means that breaking upon being dropped is not a necessary feature of fragile objects. There are fragile objects that may fail to break upon being struck. For example, a glass figurine is fragile. But will not shatter when struck if packed in foam and double-boxed. There are also non-fragile objects that would break upon being struck. For example, a tennis ball dipped in liquid nitrogen would shatter upon being dropped. Similarly a steel beam is not fragile, but would shatter upon being struck with a massive force. This shows that the property of breaking upon being struck is a contingent, accidental feature of fragile objects. This contingent feature of fragility provides us with an epistemic counterpart of fragility able to explain away our (false) intuition that a dispositions, say, fragility may occur without its causal basis, say, molecular bonding  $\alpha$ , without having to admit a disposition and its causal basis are distinct. With this Prior, Pargetter and Jackson's argument for the distinctness thesis collapses.

Prior, Pargetter and Jackson's modal argument for the distinctness thesis rests upon a faulty semantics of dispositional terms and ascriptions. The counterfactual "If  $x$  were dropped at  $t$ ,  $x$  would break at  $t + \delta$ " may well point to a very important and significant feature of fragile objects — that they tend to break upon being dropped — that is useful for fixing the reference of dispositional terms such as "fragility". But it is not what the term "fragility" means and it is not what fragility is. We can use such counterfactuals to identify fragile objects and to pick out and fix the reference of dispositional terms. However, to confuse and conflate how we fix the reference of dispositional terms for the meaning of those terms leads us to make unwarranted and false ontological claims about the nature of dispositions. This is precisely the mistake that Prior, Pargetter and Jackson make when they define dispositions counterfactually and then argue that a disposition and its causal basis are distinct properties.

Prior, Pargetter and Jackson, in defining dispositions counterfactually, mistakenly confuse and conflate the “external signs” of a disposition — namely, a fragile object’s breaking upon being dropped — with the disposition itself. In doing so, Prior, Pargetter and Jackson make the very mistake that they charge Kripke and Putman with warning against:

“The cornerstone of the Kripke-Putnam view is that it is wrong to define ‘x is hot’ as ‘x is such that...’ where the dots are filled with some favoured specification of the external signs of heat.” (Prior, Pargetter and Jackson 1982:254)

### **Prior, Pargetter and Jackson’s attempt to overcome finks and mimics**

Prior, Pargetter and Jackson are not blind to finked and mimicked dispositions and the problems they pose for the counterfactual definition of fragility. Here is Prior, Pargetter and Jackson’s own Evil Demon mimic:

“Suppose we have a cup made of toughened glass. It is not fragile. Now suppose the Evil Demon take a dislike to the glass and sets himself to ensure that it will be shattered by a lightning bolt should it be knocked over at any time. Then it is true of the cup at any  $t$  that should it be knocked, it would break at  $t + \delta$ . But it isn’t fragile.”(Prior, Pargetter and Jackson 1982:252)

Thanks to the dastardly machinations of the Evil Demon, the counterfactual is true — the glass would shatter if knocked, yet the dispositional ascription is false — the toughened glass is not fragile. True counterfactual, yet false dispositional ascription. But how can this be? According to Prior, Pargetter and Jackson’s counterfactual definition of dispositions the glass must be fragile.

Prior, Pargetter and Jackson respond to this apparent contradiction by denying that the counterfactual is true. That is, they deny that the glass disliked by the Evil Demon would *really* break. This seems rather improbable, given that Prior, Pargetter and Jackson accept that if the glass is knocked, then it would *shatter* (after being hit by a lightning bolt delivered by the Evil Demon). To resolve the



apparent contradiction, Prior, Pargetter and Jackson draw a distinction between “ways of breaking and ways of breaking”:

“What we need to say instead is that there are ways of breaking and ways of breaking, and being struck by lightning is not part of the pair definitive of fragility. The cup has a dispositional property all right... — but not that properly described as fragility.” (Prior, Pargetter and Jackson 1982:252)

Prior, Pargetter and Jackson elaborate on their concept of “the pair definitive of fragility”:

“For each disposition we can specify a pair of antecedent circumstances and manifestations which together determine the disposition under discussion. In the case of fragility, the pair is (roughly) <knocking, breaking>, in the case of water solubility the pair is <putting in water, dissolving>...” (Prior, Pargetter and Jackson 1982:251)

### **The reply to the Evil Demon mimic entails the existence of an epistemic counterpart of fragility**

Prior, Pargetter and Jackson appear to have introduced a second definition of dispositions, based upon the “pair definitive of fragility”, namely <knocking, breaking> for fragility and <putting in water, dissolving> for solubility. As the toughened glass example makes clear, the counterfactual definition of fragility and the pair definitive of fragility definition are not equivalent — their extensions differ. On the counterfactual definition the glass is fragile — it would shatter if knocked. Yet according to the “pair definite of fragility” definition the glass is not fragile. Regardless of the merits of Prior, Pargetter and Jackson’s distinction between ways of breaking and ways of breaking, the result — two non-equivalent definitions of fragility — is clearly undesirably for Prior, Pargetter and Jackson.

The distinction between “ways of breaking and ways of breaking” causes another problem for Prior, Pargetter and Jackson. According to Prior, Pargetter and Jackson, the glass disliked by the Evil Demon has every appearance of breaking (it shatters or would shatter when knocked), yet is not an instance of breaking. With this, Prior, Pargetter and Jackson admit it is possible for something to have

every appearance of being fragile — namely, shattering or shattering upon being knocked — yet not be an instance of fragility. The distinction between ways of breaking and ways of breaking gives rise to an accidental, contingent feature of fragility and as such provides an epistemic counterpart of fragility. This renders their modal argument for the distinctness Thesis unsound.

### **The reply to the Evil Demon mimic entails extrinsic causal basis**

Prior, Pargetter and Jackson's defense of the counterfactual definition of dispositions presents a further problem. Their distinction between ways of breaking entails the existence of extrinsic, relational dispositions. Regardless of how well-founded Prior, Pargetter and Jackson's distinction is between ways of breaking and ways of breaking, and regardless of what type of supposed breaking occurs in the Evil Demon example, Prior, Pargetter and Jackson admit there is a disposition at play here:

“The cup has a dispositional property all right... — but not that properly described as fragility.” (Prior, Pargetter and Jackson 1982:252)

Prior, Pargetter and Jackson further claim that it is a necessary truth that dispositions possess a causal basis. They describe the causal basis as the “such that” responsible for the disposition's manifestation, given appropriate stimulus conditions:

“If dispositions must have causal bases, then any object with disposition must have a property — the basis — responsible for it being such that if ..., then .... The property is that ‘such that.’ ”(Prior, Pargetter and Jackson 1982:252)

In the Evil Demon example, being disliked by the Evil Demon is a “such that” and part of casual basis of the glass' disposition:

“*x* does have a ‘such that.’ It is disliked by the Evil Demon and that is a highly relevant ‘such that’ in the circumstances.” (Prior, Pargetter and Jackson 1982:252)

The problem here is that “being disliked by the Evil Demon” is both a relational and extrinsic property (on both the duplicate and independence criteria of

intrinsic).<sup>17</sup> This is a problem for Prior, Pargetter and Jackson as they hold that a disposition's causal basis is intrinsic:

“We have however pointed to one way of arguing for a view of this kind [that the causal basis is categorical or intrinsic], namely by arguing that only categorical or intrinsic properties can form non-redundant parts of causally sufficient operative conditions.”(Prior, Pargetter and Jackson 1982:253)

Contrary to these explicit claims, Prior, Pargetter and Jackson's treatment of the Evil Demon example commits Prior, Pargetter and Jackson to the existence of extrinsic and relational dispositions and causal bases. The faulty semantics of the counterfactual analysis and definition of dispositions leads Prior, Pargetter and Jackson to contradiction a major plank of their account of dispositions.

### **Conclusion — Prior, Pargetter and Jackson's modal argument for the distinctness thesis is unsound**

Prior, Pargetter and Jackson's modal argument for the distinctness thesis is faced with a dilemma. The first horn of the dilemma arises from their counterfactual definition of dispositions. This counterfactual definition serves Prior, Pargetter and Jackson well in their argument for the distinctness thesis in that it rules out a contingent feature of fragility capable of explaining away our intuition that a disposition and its causal basis are distinct. However, finks, masks and mimics show that their “simple” counterfactual definition of dispositions is false. On this first horn their argument for the distinctness thesis is unsound. The second horn of the dilemma arises from attempts to meet these objections to the counterfactual analysis by drawing a distinction between ways of breaking and ways of breaking. Unfortunately, this distinction between ways of breaking introduces an accidental, contingent feature of fragility and as such provides an epistemic counterpart of fragility. This renders their modal argument for the distinctness thesis unsound. On both horns the modal argument for the distinctness thesis is unsound. Prior, Pargetter and Jackson's modal argument fails to provide any reason to accept their claim that a disposition and its causal basis

---

<sup>17</sup> These two criteria for intrinsicness are discussed at length in chapter 4.4. See also Humberstone (1996).

are distinct. At the heart of Prior, Pargetter and Jackson's problems lies a faulty semantics of dispositions in the form of their counterfactual definition of dispositions. Attempts to avoid counterexamples to the counterfactual definition and save the definition only serves to produce more problems.

#### **4.1.2 Prior, Pargetter and Jackson's multiple realisation argument for the distinctness thesis and Rives' defence**

Prior, Pargetter and Jackson prosecute a second argument for the distinctness thesis, based on the claim that dispositions are multiply realised by different causal bases. This section is divided into two parts. In the first part, I introduce Prior, Pargetter and Jackson's multiple realisation argument. Mumford (2008) demonstrates that the multiple realisation of dispositional types, as argued for by Prior, Pargetter and Jackson, is compatible with the token-token identity of dispositional property-instances and causal bases property-instances. In the second part, I examine Bradley Rives' (2005) defence of Prior, Pargetter and Jackson's (1982) multiple realisation argument that a disposition or power and its causal basis are distinct against Mumford's token-token response. Rives argues that dispositional tokens are multiply realised by different causal basis tokens (not merely types) and so, by transitivity of identity, must be distinct. I show his argument is unsound. It fails to establish the truth of two key premises. I conclude that Prior, Pargetter and Jackson's multiple realisation argument provides no reason to accept their claim that a disposition and its causal basis are distinct.

Prior, Pargetter and Jackson's multiple realisation argument for the distinctness thesis is familiar in form from the philosophy of mind (see Putnam 1967). Prior, Pargetter and Jackson note that:

“It is empirically plausible that certain dispositions have different causal bases in different objects.”(Prior, Pargetter and Jackson 1982:253)

For example, the causal basis of *being fragile* in glass panes may be, say, molecular bonding  $\alpha$ . While the causal basis of *being fragile* in shellac records may be, say, crystalline structure  $\beta$ . This leads Prior, Pargetter and Jackson to conclude:

“We cannot say that both being fragile = having molecular bonding  $\alpha$ ,

and that being fragile = having crystalline structure  $\beta$ ; because by transitivity we would be lead to the manifestly false conclusion that having molecular bonding  $\alpha$  = having crystalline structure  $\beta$ .” (Prior, Pargetter and Jackson 1982:253)

### **Mumford’s token-token response**

Stephen Mumford, in an argument also familiar in form from the philosophy of mind (see Fodor 1974), appeals to token-token identity to argue against the distinctness thesis (Mumford 2008:157-162). Mumford shows that the multiple realisation of dispositional types identified by Prior, Pargetter and Jackson is compatible with the token-token identity of dispositional property-instances and causal bases property-instances:

“Being D [a dispositional predicate term] need not be the same, in every case, as being C [a causal basis predicate term] as long as each instance of the disposition is identical to some instance of a categorical [causal] base.”(Mumford 2008:159)

Prior, Pargetter and Jackson’s claim that a dispositional type, such as fragility, is multiply realised by different causal bases does not preclude that particular tokens of *being fragile* are identical with particular causal basis tokens.

Prior, Pargetter and Jackson assume that if a disposition is identical with its causal basis in one instance, then it must be identical in all instances. Mumford rejects this assumption. Viewed this way, the dispute here is about whether properties (and relations) are, as Prior, Pargetter and Jackson claim, universals and so identical across different instances or, as Mumford claims, properties are tropes and so non-repeatable particulars that are not identical across different particulars. I will not engage with this debate here. There is vast literature on the matter.<sup>18</sup> However, I pointed out in chapter 3.2, Armstrong (1989), the chief contemporary proponent of a universals theory of properties, suggests that differences between universals and trope theories are merely differences in styles of ontological bookkeeping. Leaving this issue aside, I turn to Rives’ defense of

---

<sup>18</sup> For a discussion of tropes and universals see Armstrong (1978, 1989, 1997), Bacon (1995) and Campbell (1981).

the distinctness thesis.

### **Rives' argument that dispositional tokens are multiply realised**

Rives (2005) defends the distinctness thesis against Mumford's token-token response by arguing that dispositional tokens are multiply realised. I conclude that his argument is unsound.

In arguing that dispositional tokens are multiply realised, Rives asks us to consider a vase V. He claims that:

- i. V
- ii. V's token of *being fragile*
- iii. The causal relations V enters into

would all would survive changes to atoms a<sub>1</sub>-a<sub>n</sub> (some of V's constituent atoms). At the same time, Rives' claim that:

The causal basis of *being fragile* — *having molecular bonding*  $\alpha$

would not survive these changes. Rives' claims about vase V can be represented as follows:

<b>Before changes to atoms a<sub>1</sub>-a<sub>n</sub></b>		<b>After changes to atoms a<sub>1</sub>-a<sub>n</sub></b>
A. Vase V	=	Vase V
B. Causal relations of V	=	Causal relations of V
C. Token of <i>being fragile</i>	=	Token of <i>being fragile</i> (disposition)
D. Molecular bonding $\alpha$	≠	Molecular bonding $\beta$ (causal basis)

Rives sets out to describe a case in which the same dispositional token of *being fragile* is multiply realised by two different causal bases tokens — *having molecular bonding*  $\alpha$  and *having molecular bonding*  $\beta$ . After changes to atoms a<sub>1</sub>-a<sub>n</sub>, the same token of *being fragile* possesses a different causal basis. His argument is valid. If the token of *being fragile* remains the same while its causal basis changes, then it follows that being fragile is multiple realised. However, Rives' argument is not sound. In particular, Rives's argument fails to establish the truth of two key premises:

- i. the token of *being fragile* would survive changes to atoms a<sub>1</sub>-a<sub>n</sub>.
- ii. that molecular bonding  $\alpha$  would not survive changes to atoms a<sub>1</sub>-a<sub>n</sub>.

***Being fragile is tied to V* — argument one that that being fragile would survive changes to atoms  $a_1$ - $a_n$**

Rives offers two arguments that the token of *being fragile* would survive changes to atoms  $a_1$ - $a_n$ . The first rests on the claim that being fragile is tied to V. The second relies upon the Causal Theory of Properties.

Rives' argues that the token of *being fragile* would survive changes to atoms  $a_1$ - $a_n$  on the grounds that *being fragile* is tied to V and V would survive changes to  $a_1$ - $a_n$ :

“We have assumed that V would survive the replacement of [atoms]  $a_1$ - $a_n$  with exactly similar atoms, and since the existence of the instance of being fragile is tied to V, we have assumed that the instance of being fragile would survive the replacement.”(Rives 2005:22)

That is, Rives argues:

(P1) V would survive changes to atoms  $a_1$ - $a_n$ .

(P2) The token of *being fragile* is tied to V

Therefore:

(C1) The token of *being fragile* would survive changes to atoms  $a_1$ - $a_n$ .

The argument is invalid. To see why, we turn to Rives' remarks on sameness, survival and identity.

Rives prefaces his argument that dispositional tokens are multiply realised with remarks on change and sameness:

“Consider a particular vase V. Like any other ordinary object, V will survive changes in its make-up. It will, for example, remain the same vase even after a piece of it breaks off and is replaced.” (Rives 2005:22)

V will also remain the same vase after changes to atoms  $a_1$ - $a_n$  — that is, after atoms  $a_1$ - $a_n$  are replaced with exactly similar atoms (Rives 2005:22). The salient point here is that for Rives there is identity over time. As Rives has claimed, ordinary objects, such as vases, can change properties over time and yet “survive” and “remain the same”. There is debate and disagreement over the mechanics of how to account for identity over time, whether it be in terms of endurance or perdurance. Rives does not declare his hand on this matter and nothing in the debate turns on it. All that matters is that there is identity over

time.

Let us return to Rives' argument. The fact that V can remain the same and survive changes in its make-up (for example, changes to atoms  $a_1$ - $a_n$  or having a piece of it break off and be replaced) shows that V can lose properties that are tied to V and yet still remain V.<sup>19</sup> In that case, all V's survival entails is that a sufficient number or type of properties of V survive for V to be the same.<sup>20</sup> To assume that one of these surviving properties is the token of *being fragile* is to assume what needs to be proven. Rives argument that the token of *being fragile* survives changes to atoms  $a_1$ - $a_n$  because it is tied to V, and V survives, begs the question. This argument of Rives' fails to establish the truth of the premise that the token of *being fragile* would survive changes to atoms  $a_1$ - $a_n$ .

### **The Causal Theory of Properties — argument two that being fragile would survive changes to atoms $a_1$ - $a_n$**

Rives presents a second argument that the token of being fragile would survive changes to atoms  $a_1$ - $a_n$  of V. It rests upon the casual theory of properties. Rives follows Mumford (Mumford: 1998: 162) in assuming that sameness of causal roles and relations entails sameness of property:

“According to the causal theory, which Mumford himself accepts (1998:123-125), properties are individuated by the causal powers they potentially contribute to the particulars in which they are instantiated... the main idea is simple: properties are individuated by the causal power they bestow upon the particulars that have them.” (Rives 2005:24)

In Mumford's own words:

---

<sup>19</sup> It appears Rives uses the “tied-to” relation to make the point that tropes or property instances are, unlike universals, non-transferable. This is what Rives has to say:

“Phrases like ‘this particular weight of this particular apple’ denote property-instances, and suggest that their existence is tied to the very particulars (in this case, apples) that have them. Property-instances are, to use C.B. Martin's phrase, non-transferable.” (Rives 2005:fn 11)

The “tied-to” relation specifies that nothing else, be it another apple or otherwise, can have the same trope of weight that this particular apple possesses. Similarly, any property tied to V, such as the property instance of being fragile, is simply a non-transferable property. V may still gain or lose a property that is tied to it, such as being fragile.

<sup>20</sup> Rives notes that there is a question of how much of V could be replaced while still remaining the same vase (Rives 2005:fn9). Rives does not settle this question and it is not one that we need to settle here. The salient fact remains — V can lose some of its properties and yet survive and be same.



“This is itself a dispositional criterion of property instance identity insofar as it stipulates that any two tokens with all the same causal roles are identical, and therefore are just the same token.”(Mumford 1998:162)

Rives employs the causal theory of properties to argue that the token of *being fragile* is one and the same property before and after changes in atoms a<sub>1</sub>-a<sub>n</sub>. He first claims that the vase V is fragile and that it enters into the same causal relations before and after changes in atoms a<sub>1</sub>-a<sub>n</sub>.

“[T]he vase will look, feel, and behave in exactly the same way it does in the actual world.” (Rives 2005:22)

Given the Casual Theory of Properties, it follows that the token of being fragile is the same after changes in atoms a<sub>1</sub>-a<sub>n</sub>. We can see that the argument is valid:

(P3) V is fragile (assumption)

(P4) V enters into same causal relations before and after changes in atoms a<sub>1</sub>-a<sub>n</sub>(assumption)

Therefore:

(P5) The token of *being fragile* enters into same causal relations before and after changes in atoms a<sub>1</sub>-a<sub>n</sub> (P3, P4)

(P6) Sameness of causal roles and relations entails sameness of properties (Causal Theory of Properties)

Therefore:

(C2) The token of *being fragile* is one and the same property before and after changes in atoms a<sub>1</sub>-a<sub>n</sub>. (P5, P6)

While the argument is valid, it is nonetheless unsound. Premise P4 is false. Rives, following Prior, Pargetter and Jackson, endorses the impotence thesis: dispositions are causally impotent with respect to their manifestation (Prior, Pargetter and Jackson 1982:251, Rives 2005:24-27). For Prior, Pargetter and Jackson and Rives it is the causal basis of a disposition that is causally potent. If dispositions are causally impotent, then they do not enter into any causal roles or relations. That is just what it means to be causally impotent. If dispositions do not enter into any causal roles or relations, then, according to the Causal Theory of Properties, there are no grounds for the identity or individuation of these

dispositional properties. Specifically, the impotence thesis entails that there are no grounds for the identity or individuation of the token of *being fragile* possessed by V. As such, the impotence thesis entails the falsity of P2 — that the token of *being fragile* enters into same causal relations before and after changes in atoms a-a. The token of *being fragile* does not enter into any causal relations. Rives has not merely failed to establish the truth of premise P4, his arguments show that P2 is false.

Rives is quite aware that the impotence thesis is, at least on the face of it, incompatible with the Causal Theory of Properties:

“The objection, then, is that the proponent of the argument cannot claim both that dispositions contribute no causal powers to particulars and that they nevertheless exist.” (Rives 2005:26-27)

Rives’ solution appeals to “potential” causal powers. He argues that properties are to be:

“individuated by the causal powers they [properties] potentially contribute to particulars.” (Rives 2005:26-27)

The result is supposed to lead to a situation where:

“Perhaps there are reasons for thinking that in some circumstances, we ought to take a dispositional property, and not its categorical base, to be contributing causal powers.” (Rives 2005:27)

Rives’ conclusion is clear — in some circumstances dispositional properties contribute causal powers. In some circumstances dispositions are causally efficacious and so not impotent. Rives dissolves the apparent incompatibility between the causal theory of properties and the impotence thesis by simply denying the impotence thesis. This is rather a curious move to make for someone whose stated aim is to defend the impotence thesis (Rives 2005:19).

Prior, Pargetter and Jackson argue that the impotence thesis follows from the conjunction of the causal thesis and the distinctness thesis:

“By the Causal Thesis, any disposition (and thus fragility) must have a causal basis. The causal basis is a sufficient explanation of the breaking as far as the properties of the object are concerned. But then there is nothing

left for any other properties of the object to do. By the distinctness thesis the disposition is one of these other properties, ergo the disposition does nothing.” (Prior, Pargetter and Jackson 1982:255)

For Prior, Pargetter and Jackson, The impotence thesis is not open to rejection. The impotence thesis is a necessary consequence of the conjunction of the causal thesis and the distinctness thesis.

Rives provides his own “metaphysically precise version of the argument” for the impotence thesis that does not mention the distinctness thesis and instead makes recourse to parsimony in the form of Occam’s Razor (Rives 2005:25-26):

(P7) “If a disposition D is realized by a categorical property C, then the set of causal powers that individuates D is a proper subset of the set that individuates C.”

(P8) “In taking inventory of the causal powers of particulars, then, we need not mention dispositional properties.”

(P9) “Occam’s Razor demands that we do not posit anymore causally efficacious properties than we need in order to account for the causal powers of particulars.”

Therefore:

(C3) “We should therefore conclude that dispositions are causally impotent.”

Appeal to the principle of parsimony (and not the distinctness thesis) appears to free Rives from accepting the impotence thesis as necessary. Parsimony merely suggests that entities should not be multiplied beyond necessity and so leaves open the possibility of causally potent dispositions, so long as they are not an unnecessary multiplication of entities. Rives does not set out what these circumstances would be, but instead notes that his argument does not rule out such a possibility.

Regardless of the merits of Rives’ “metaphysically precise” argument for the impotence thesis, it does nothing to undermine Prior, Pargetter and Jackson’s argument for the impotence thesis. Rives, like Prior, Pargetter and Jackson, is committed to both the distinctness thesis and the Causal Thesis, and so is also

committed to the impotence thesis (see Rives 2005:fn1). So long as Rives holds both the distinctness thesis and the Causal Thesis he cannot also claim, by recourse to potential powers, parsimony or otherwise, that there are circumstances under which dispositions are not impotent.

Rives' cannot employ the Causal Theory of Properties to argue that the token of being fragile would survive changes to atoms  $a_1$ - $a_n$  while also holding the impotence thesis. Yet he cannot reject the impotence thesis while also holding the Causal Thesis and the distinctness thesis. He explicitly states he is committed to all three theses. In attempting to defend his claim that the token of being fragile would survive changes to atoms  $a_1$ - $a_n$  Rives builds an inconsistency into the very pillars of his account of dispositions.

**Rives' argument that the causal basis of the token of *being fragile* would not survive changes to atoms  $a_1$ - $a_n$**

As noted above, in claiming that dispositional tokens are multiply realised by different causal bases, Rives attempts to argue for two premises:

- i. the token of *being fragile* would survive changes to atoms  $a_1$ - $a_n$ .
- ii. the causal basis of the token of *being fragile* would not be the same before and after changes to atoms  $a_1$ - $a_n$ .

I have shown that Rives fails to establish the truth of the first premise. I now argue that the causal theory of properties undercuts the second premise: Rives' claim that the causal basis of the token of *being fragile* would not be the same before and after changes to atoms  $a_1$ - $a_n$ .

Rives asserts that before changes to the atoms  $a_1$ - $a_n$ , V possesses the causal basis *having molecular bonding  $\alpha$*  and that after changes to the atoms  $a_1$ - $a_n$ , V possesses the causal basis *having molecular bonding  $\beta$* . If, as Rives claims, these are different properties, then, on the causal theory of properties, they will differ in their causal effects and relations. However, according to Rives, V enter into the same causal roles and relations before and after changes to the atoms  $a_1$ - $a_n$ , regardless of whether V instantiates *having molecular bonding  $\alpha$*  or *having molecular bonding  $\beta$* :

“In W, the vase will look, feel, and behave in exactly the same way that it

does in the actual world.”(Rives 2005:22)

It follows, by the Causal Theory of Properties, that *having molecular bonding  $\alpha$*  and *having molecular bonding  $\beta$*  are one and the same property. Rives does not merely fail to support his claim that the causal basis of the token of *being fragile* would not be the same before and after changes to atoms  $a_1$ - $a_n$ . Rather, a central principle of his — the Causal Theory of Properties — entails the falsity of this premise.

### **Conclusion — Rives’ argument that dispositional tokens are multiply realised is unsound**

Rives (2005) attempts to defend Prior, Pargetter and Jackson’s (1982) distinctness thesis against Mumford’s token-token response by arguing that dispositional tokens, like types, are multiply realised by different casual bases. I have shown that his argument is unsound. Rives not only fails to establish the truth of two key premises:

- i. the token of *being fragile* would survive changes to atoms  $a_1$ - $a_n$ .
- ii. that molecular bonding  $\alpha$  would not survive changes to atoms  $a_1$ - $a_n$ .

he is committed to their falsity. I have shown that his argument for premise (i) — that the property-instance of *being fragile* survives changes to atoms  $a_1$ - $a_n$  — is invalid. I have also shown that Rives’ commitment to the Causal Theory of Properties entails, contrary to his claims, that premise (ii) is false. Rives provides no reason to hold that dispositional tokens, such as being fragile, are multiply realised. As such, he has failed to defend Prior, Pargetter and Jackson’s argument for the distinctness thesis against Mumford’s token-token response.

### **4.1.3 Why we should reject multiply realisation arguments for the distinctness thesis**

So far, Prior, Pargetter and Jackson’s claim that dispositional types are multiply realised has not been directly challenged. Rather, Mumford sidestepped the issue, pointing out that token identity of dispositions and causal bases is compatible with the multiple realisation of dispositional types and so does not entail the distinctness thesis. In this section, I attack the very project of multiple realisation arguments. I use an argument from Kim (1992) based on an analogy

with jade to claim the dispositions of macro objects such as fragility and solubility are not single properties and as such there is no single property to be multiply realised.

Prior, Pargetter and Jackson appear to be on strong empirical grounds when they claim that a disposition is realised by multiple causal bases. The dispositions and powers of everyday macro objects, such as, say, fragility, solubility and elasticity, are wide-ranging and broad groupings. Ming vases, glass panes, ecological systems and spider webs are all fragile. Yet it would be highly surprising to discover that such diverse and disparate entities all possess the one and same causal basis. Fragility has every appearance of being multiply realised. A similar story can be told about solubility. Sugar and salt differ in molecular structure, yet both possess the same dispositional property of solubility. Hence, the property of solubility appears to be multiply realised.

**Multiply realised entities such as pain are as diverse and disparate as the disjunct of their realising properties**

Kim thinks appearances are deceptive in these cases (Kim 1992:3). He contends we have not fully appreciated the implications of multiple realisation. When followed far enough, the implication is that pain (or any multiply realised entity, such as fragility or solubility) has no more unity than the group of entities that realise it. In other words, if pain is multiply realised, then pain is not a single, unitary property.

Kim uses an analogy with jade to make his point that pain is as disjunctive and diverse a property as its realising bases. Remember, jade is not a mineral kind, rather jade is two distinct minerals — jadeite and nephrite.

“If pain is nomically equivalent to N [a disjunct  $N_h$ ,  $N_r$ , and  $N_m$ ], the property claimed to be wildly disjunctive and obviously nonnomic, why isn't pain itself equally heterogeneous and nonnomic as a kind? Why isn't pain's relationship to its realization bases,  $N_h$ ,  $N_r$ , and  $N_m$  analogous to jade's relationship to jadeite and nephrite?” (Kim 1992:15)

Just as jade is multiply realised by both jadeite and nephrite and so is not a single property, so too pain is multiply realised and is not single property.

Kim also dismisses functionalist responses to multiple realisation. The point of multiple realisation arguments, and the functionalist response, is that pain has more than one property that meets the functional specification of pain. The need for a functional account of pain is an admission that pain is a disjunction of similar yet distinct properties and not a single property. As Kim notes:

“Thus, on the construal of mental properties as second-order [functional] properties, mental properties will in general turn out to be disjunctions of their physical realization bases. It is difficult to see how one could have it both ways — that is, to castigate  $N_h \vee N_i \vee N_m$  as unacceptably disjunctive while insisting on the integrity of pain as a scientific kind.”

(Kim 1992:15)

According to Kim’s line of reasoning here, if fragility is multiply realised, then fragility is as diverse, disparate and disjunctive a property as the group of properties that realise fragility. To claim that fragility is multiply realised, as Prior, Pargetter and Jackson do, is to admit that fragility is not a single, unitary property. However, if pain is not a single, unitary property, then there is no property of pain to be multiply realised, just as there is no single property of single property of jade.

### **Arguments that there are no disjunctive properties**

So far, Kim has argued multiply-realised entities, such as fragility, are as diverse and disparate as the disjunction of properties that realise them. The next step is show why such a diverse and disparate disjunction of properties is not itself a property and, as such, to show why fragility and other multiply-realised properties are not real properties.

Armstrong, a well-known critic of disjunctive properties, starts by noting that by a disjunctive property he means a disjunction of (property) universals (Armstrong 1989a:82ff; 1989b:114-15 ). Armstrong asks us to consider the disjunctive property having charge C or mass M. Now consider two objects: One has charge

C but lacks mass M, the other has mass M but lacks charge C. Both objects possess the disjunctive property having charge C or mass M. From this Armstrong concludes:

“But surely that does not show that, in any serious sense, they thereby have something identical? The whole point of a universal [aka a property], however, is that it should be identical in all different instances.”  
(Armstrong 1989a:82 )

Armstrong’s argument may appear limited in its scope to only those that view properties as universals and identical in all their instances. However I think his argument has broader appeal to any theory of properties that involves sameness, similarity or identity, be it in terms of universals, tropes or otherwise. A trope theorist can meaningfully ask if two objects resemble each other. Trope theorists explain particular property instances falling into natural groups or types in terms of exact resemblance which is a primitive concept. The fact that resemblance is a primitive concept for the trope theorist does not preclude questions of whether two entities resemble each other.

Armstrong provides another argument, based on “powers to act”, against disjunctive properties:

“Now suppose a thing has charge C but lacks mass M. In virtue of charge C, it has certain powers to act. For instance, it repels things with like charge. Possession of the disjunctive property C or M adds nothing to its powers. This suggests that while C may be a genuine universal [property], C or M is not.” (Armstrong 1989a:82)

Here Armstrong ties properties to powers. Charge C is a genuine property in virtue of its powers. But the disjunctive property C or M adds no more powers and hence is not a property.

We also find Heil (2003:40) and Kim (1992:11-12) arguing against disjunctive properties and kinds respectively, on the ground they are not projectible. Kim asks us to consider jade. Take the claim:

(L) Jade is green

Is this a law? There are two marks of lawlikeness:



- i. Supports counterfactuals
- ii. Projectible

Jade is green satisfies (i). It supports the counterfactual “If something was jade, then it would be green”. Why? Because both jadeite and nephrite are green.

But jade is green is not projectible. Kim’s argues:

“For we can imagine this: on re-examining the records of past observations, we find, to our dismay, that all the positive instances of (L), that is, all the millions of observed samples of green jade, turn out to have been samples of jadeite, and none of nephrite! If this should happen, we clearly would not, and should not, continue to think of (L) as well confirmed.” (Kim 1992:12)

Kim sees this failure of projectibility as a part of a more general problem with disjunctive properties — they do not guarantee similarity of instances falling under them. In the jade example, our observations merely confirm that jadeite is green, not that jade is green.<sup>21</sup>

In the above discussion I have treated a disjunctive property as a disjunction of properties. What if we take the disjunction  $N_h, N_i, N_m$  as the single physical substrate of pain, say  $N$ . In such a case, fragility is not realised by the disjunction of properties  $N_h$  or  $N_i$  or  $N_m$ . Rather fragility is realised by  $N$  a single property, a single disjunctive property. Let us put aside doubts about the very existence or intelligibility of such singular disjunctive properties.<sup>22</sup> Even if we accept such suspect properties, they are of no help to Prior, Pargetter and Jackson in defending the multiple realisation of dispositions. If fragility is realised by a single disjunctive property, then fragility is not multiply realised. Rather, it is realised by one property.

---

<sup>21</sup> Kim also sees closure as a problem for disjunctive properties:

“The point about disjunctive properties is best put as a closure condition on properties: the class of properties is not closed under disjunction (presumably, nor under negation). Thus, there may well be properties  $P$  and  $Q$  such that  $P$  or  $Q$  is also a property, but its being so doesn't follow from the mere fact that  $P$  and  $Q$  are properties.” (Kim 1992:13)

<sup>22</sup> Kim and Armstrong have argued that a disjunction of properties is not a property. If a disjunction of properties is not a property, then it is not a singular property. Heil goes so far as to declare that such a single disjunctive property is an oxymoron (Heil 2003:40 fn1).

So far it has been argued that multiply-realised entities, such as fragility, are as diverse and disparate as the disjunction of properties that realise them. I have now argued that a disjunction of properties is not itself a property. It follows that supposedly multiply-realised dispositional properties such as fragility and solubility are not single unitary properties and as such there is no such single property as fragility to be multiply realised.<sup>23</sup> Multiply-realised structure-unrestricted dispositions of macro objects, such as fragility and solubility are too diverse and disparate to be real, single properties. This serves as a general criticism of all multiple realisation arguments and so is an argument against Prior, Pargetter and Jackson's claim that dispositional types are multiply realised. Structure-unrestricted dispositional types, such as fragility, are not multiply realised because fragility is not a real, single property. A crucial premise in Prior, Pargetter and Jackson's multiple realisation argument for the distinctness thesis is false — fragility is not multiply realised. Prior, Pargetter and Jackson's multiple realisation argument for the distinctness thesis is unsound and gives us no reason to hold that a disposition and its causal basis are distinct.

### **Species and structure-specific identities**

As Kim notes, his argument against multiply-realisation arguments does not entail there are no pains, only that there are no species-unrestricted pains (Kim 1992:25). For Kim, mental properties are species-specific. There is, say, human pain, Martian pain, canine pain etc.<sup>24</sup> Presumably, when we reach properties

---

<sup>23</sup> Lewis, in defending his account of causation, also expresses similar misgivings about the unity of dispositions. He claims that the dispositions and powers of macro objects (such as fragility and solubility) are inefficacious because they are "too unnatural a property, too disjunctive...to figure in the conditions of occurrence of any event". (Lewis 1983:370 fn29).

<sup>24</sup> The claim that mental properties are species or structure specific does not originate with Kim. Lewis(1969) argues that reductive identities are always domain-specific. Lewis (1983) also uses "sophisticated functionalism" to argue for structure-specific reductions and to defend type identity of mental states and physical states.

In Lewis(1976) we find similar sentiments. Lewis argues that powers and abilities are not unrestricted. Rather, abilities and powers are tied to the notion of what is compossible with certain facts. That is, they are relative to a certain domain of facts, fixed by the context. For example, relative to one set of facts, Lewis can speak Finnish:

"An ape can't speak a human language – say, Finnish – but I can. Facts about the anatomy and operation of the ape's larynx and nervous system are not compossible with his speaking Finnish. The corresponding facts about my larynx and nervous system are compossible with my speaking Finnish." (Lewis 1976 232)

However, Lewis' speaking Finnish is not compossible with another, more inclusive, set of facts:  
 But don't take me along to Helsinki as your interpreter. I can't speak Finnish. My speaking Finnish is compossible with the facts considered so far, but not with further

that are not multiply realised we have reached the relevant specificity of species or structure.

Similarly, the supposed multiple realisation of dispositions, such as, say, solubility and fragility does not entail there are no fragile objects. Rather multiple realisation shows no properties answer to such general, structure-unrestricted dispositional concepts as solubility and fragility, at least at the macro level. Rather, there are structure-restricted dispositional concepts such as, say, sugar-solubility, salt-solubility etc. These are local reductions or identities to the physical mechanisms of a given structure-type. It is up to the empirical sciences to determine what these structure-types are. The significant point is that these structure-specific properties are not multiply realised.

This concludes my argument that Prior, Pargetter and Jackson's multiple-realisation argument fails to establish that a disposition and its causal basis are distinct. I now turn to the question of why Prior, Pargetter and Jackson draw the wrong conclusion from the multiple realisation of fragility. That is, why do Prior, Pargetter and Jackson insist, in the face of multiple realisation, that fragility is a single property? Heil contends that multiple-realisation arguments, and concomitant appeals to functionalism, are underpinned by the Picture Theory. Heil (2003:5) claims that metaphysics, at least since Kant, has been influenced by an implicit adherence to the picture theory of representation:

“As I conceive of it, the Picture Theory is not a single, unified doctrine, but a family of loosely related doctrines. The core idea is that the character of reality can be ‘read off’ our linguistic representations of reality...A corollary of the Picture Theory is the idea that to every meaningful predicate there corresponds a property.” (Heil 2003:6)

---

facts about my lack of training. What I can do relative to one set of facts, I cannot do, relative to another, more inclusive, set. Whenever the context leaves it open which facts are to count as relevant, it is possible to equivocate about whether I can speak Finnish.” (Lewis 1976 232)

It would seem to follow that the powers and dispositions of an object are determined by what facts count as relevant and that objects only possess powers and dispositions relative to a certain set of facts. So long as the set of facts is not fully specified, these abilities and powers may be equivocal.

According to this corollary of the picture theory, if a single predicate “fragile” truly applies to a number of entities, then there must be a corresponding single, common property of fragility possessed by these entities. However, as argued in chapter 3.2, predicates and properties are not isomorphic. The picture theory is false: We cannot “read off” the character of reality from our linguistic representation of the world as the picture theory demands.

We do not need to hunt for any such implicit assumptions to find what underpins Prior, Pargetter and Jackson claim that fragility is a single unitary property. The counterfactual definition of dispositions explicitly motivates Prior, Pargetter and Jackson claim that fragility is a single property common to all and only fragile objects. To analyse dispositional terms such as “fragile” on the grounds of inputs (that is stimulus conditions) and outputs (that is, manifestations) is to group together a range of entities on the grounds that they would exhibit similar behavior under similar circumstances. The counterfactual definition of dispositions drives Prior, Pargetter and Jackson’s claim that fragility is a single property common to all and only fragile entities. However, the counterfactual definition is false. There are object that would shatter if struck that are not fragile and there are fragile objects that would not shatter if struck. This is just to say that the truth of a counterfactual statement is neither necessary nor sufficient for an entity to possess a particular disposition.

The false counterfactual definition of dispositions groups together a diverse range of entities do not share any single common property, such as fragility or solubility. Just as we cannot move from the fact that we truly apply a single predicate to a range of objects to the conclusion that these objects possess a single, common property, so too we cannot move from the fact that a counterfactual statement is true of a range of entities to the conclusion that these objects possess a single, common dispositional property. A false semantics of dispositions in the form of the counterfactual definition of dispositions motivates Prior, Pargetter and Jackson’s multiple realisation argument for the distinctness thesis by grouping together a diverse range of objects as being fragile that do not share a single common property of fragility.

## **Conclusion**

This chapter has looked at two arguments by Prior, Pargetter and Jackson for the distinctness thesis, the claim that a disposition and its causal basis are distinct properties. Section one showed that Prior, Pargetter and Jackson's modal argument for the distinctness thesis is unsound. I argued that a faulty semantics of dispositional terms and ascriptions, in the form of the counterfactual definition of dispositions, underpins their modal argument. Sections two and three looked at multiple-realisation arguments by Prior, Pargetter and Jackson and Rives for the distinctness thesis. I argued, following Mumford, that Prior, Pargetter and Jackson's argument that dispositional types are multiply realised does not entail the distinctness thesis and so is invalid. I also pointed out that Rives' argument in defence of Prior, Pargetter and Jackson is unsound. Finally, I used Kim to criticise the very program of multiple-realisation arguments. I argued that multiple-realisation arguments demonstrate there is no single unitary property of fragility to be multiply realised.

At the heart of arguments for the distinctness thesis is a confusion between how we talk about the world and how the world is. Prior, Pargetter and Jackson's multiple realisation argument for the distinctness thesis mistakenly groups together a diverse range of entities on the grounds that a certain counterfactual statement is true of them. They then use the fact that this diverse range of entities does not share a common causal basis to claim that a disposition and its causal basis are distinct. However, this is to mistake the way we pick out and refer to dispositional properties for the way these properties are. In particular, the false counterfactual definition of dispositions used by Prior, Pargetter and Jackson confuses the manner in which we fix the reference of dispositional terms for the meaning of those terms. This faulty semantics of dispositions underpins both their modal argument and multiple realisation argument for the distinctness thesis. Counterfactual statements are useful as a defeasible, rough and ready way to pick out dispositions. But to think that these counterfactuals give the meaning of dispositional terms and ascriptions is a mistake. It is a mistake that leads Prior, Pargetter and Jackson to make unwarranted and unsupported claims about the

nature of dispositions. Prior, Pargetter and Jackson fail to provide any reason to conclude that a disposition and its causal basis are distinct.

## Chapter 4.2 — Pure powers and dispositional essentialism

### 4.2.1 The pure powers view

- Dispositional essentialism
- Essentially dispositional powers are necessary
- Laws of nature are metaphysically necessary
  - What laws are there?
  - Finks show laws admit exceptions and so are not necessary

### 4.2.2 Arguments for pure powers and dispositional essentialism

- Bird's argument to the best explanation for dispositional essentialism
  - Categoricalism provides an inadequate account of properties
    - First epistemic arguments against categorical accounts of properties — permutation argument
    - Second epistemic arguments against categorical accounts of properties — duplication argument
      - These arguments are metaphysical, not epistemic and they beg the question
  - Categoricalism provides an inadequate account of laws
    - Regularity theory account of laws
      - Dispositional essentialism open to same criticism
    - Nomic necessitation account of laws
      - Dispositional essentialism open to same criticism
  - Criticism of argument to the best explanation
- Arguments from science for dispositional essentialism
  - Particle physicists have not found structure in fundamental particles
    - Headless woman fallacy
  - Physicists uses only dispositional terms
    - Conflates the way we fix the reference of dispositional terms for the meaning of those terms

### 4.2.3 Arguments against pure powers

- Truth-making regress
- Epistemic regress
- Individuation regress
  - Bird's response: powers modelled as graphs

### 4.2.1 Pure powers and dispositional essentialism — introduction

This section explores the pure powers view and dispositional essentialist accounts of properties. It is divided into three parts. Part one introduces the pure powers view — properties are solely or purely dispositional — and shows how it entails dispositional essentialism and the necessity of causal laws.

Part two examines two arguments for dispositional essentialism and the existence of pure powers. The first is an argument to the best explanation. Bird (2007) claims that to deny dispositional essentialism (and so adopt categoricism) is to forego an adequate account of properties and causal laws. I argue that Bird fails to show dispositional essentialism provides a superior account of properties and fails the test by which arguments to the best explanation are judged. The second is an *a posteriori* argument from science. The findings of particle physics suggests that fundamental particles are simple, pointlike and lacking in structure. This is thought to support dispositional essentialism's claims that powers are purely dispositional and possess essences. I show that this line of reasoning commits the headless women fallacy (Armstrong 1968) and so should be rejected. It is also argued that the use of solely dispositional terms, such as “spin” and “charge”, to characterise and talk about the properties of fundamental particles entails that these properties are solely dispositional. To draw such a conclusion is to confuse and conflate how we talk about the world for the nature of the world. The properties of fundamental particles are characterised using dispositional terms and discovered using dispositional means. However, it is wrong to conclude that these properties are therefore purely dispositional. I conclude that these arguments fail to support Bird's claim that the properties of fundamental particles are pure powers with dispositional essences.

Part three presents criticism of the pure powers view. I examine three regress arguments that arise due to the relational nature of properties as pure powers. I argue that the individuation regress shows the pure powers view is incoherent and so should be rejected. I conclude that we should reject the pure powers view of dispositions.



## Pure powers view

The pure powers view can be simply stated: Properties are solely or purely powers in that properties are nothing more than their power to effect and be affected by other properties. Properties are purely dispositional.

Paradigm examples of pure powers are the properties of fundamental particles, such as the mass, charge and spin of an electron.<sup>25</sup> On the pure powers view, the property of negative charge is nothing more than the power it confers, nothing more than how it acts upon and interact with other properties. Specifically, there is nothing more to the property of negative charge than repelling like charged entities and attracting oppositely charged entities.

Given that properties are nothing more than their power to effect and be affected by other properties, it follows that the pure powers view is a relational view of properties. As Bird notes:

“According to dispositional essentialism [pure powers] properties have distinct natures, given by their relations with other properties.” (Bird 2007:3)

The nature of a property is determined solely by its relations with other properties, by how it acts and interacts with other properties. The nature of a these other properties are in turn nothing over and above their relations, their actions and interactions, with other properties, and so on. On the pure powers view, the nature and identity of properties appears to involve a regress. In section 3 of this chapter I ask whether this is indeed a regress and whether it is vicious.<sup>26</sup>

---

<sup>25</sup> Bird refers to as these as “fundamental properties of physics” (Bird 2007:5). While Ellis and Lierse refer to them as properties of “the most fundamental kinds of things” (Ellis and Lierse 1994:29).

<sup>26</sup> Jennifer McKittrick argues for “bare powers”, a closely related view to pure powers, and one that stresses the ungrounded nature of powers (McKittrick 2003b). The bare powers view contrasts itself with categoricism, which argues that powers and dispositions possess categorical causal bases. It is important to note that the bare powers view rejects *distinct* bases, and not bases *tout court*. In this, the bare powers view appears to differ from the pure powers view, which rejects causal bases *tout court*, as bases would constitute something over and above the causal powers that property confers on its bearer. It is also worth noting that the bare powers view leaves open the possibility that a disposition or power, say, D, is self-grounded, in that D is ontologically sufficient for its own nature and being. In other words, the bare powers view leaves open the possibility that dispositions can be their own causal bases (McKittrick 2003b:fn28 358). That is, it leaves open the

The pure powers view denies that a property has a nature that determines how it acts. Rather, how a property acts and interacts with other properties determines its nature. In this, pure powers may be contrasted with the impure powers of macroscopic objects, such as the solubility of sugar. Sugar has a nature — a certain molecular structure — that explains how it acts and interacts with other objects and properties. The weak intermolecular bonds of sugar explain why sugar forms a solution when placed in water.

There are at least three variants of the pure powers view. They differ as to what properties are counted as pure and essential powers. The first is dispositional monism or pan-dispositionalism. It contends that all genuine properties are powers. As powers are pure, it follows that all genuine properties are pure powers. Prominent exponents include Popper (1959), Shoemaker (1980, 1998) and Mellor (1974).

A second variation is natural kind dispositional essentialism. It claims the properties of fundamental objects and natural kinds are pure powers (and so essentially dispositional). Bird (2007) is the chief proponent of natural kind dispositional essentialism. It should be noted that pan-dispositionalism collapses into natural kind dispositional essentialism if the domain of genuine properties is restricted to the properties of fundamental objects and natural kinds.

The third variation of the pure powers view, expounded by Ellis (2001) and Ellis and Lierse (1994), is known as Weak Essentialism or the mixed view. Its chief claim is that the properties of fundamental properties (such as the charge, spin and mass of electrons) are pure powers. While higher-order objects (such as macroscopic objects including chairs, tables and trees, etc.) possess properties that are not pure powers.

### **Dispositional essentialism**

---

possibility that a bare disposition has no causal basis in any further properties beyond the disposition (McKittrick 2003b; Molnar 2003:137; Bauer 2010).

In advocating that powers are pure, Bird (2007) and Ellis and Lierse (1994) are committed to dispositional essentialism. Bird characterises dispositional essentialism as follows:

“To say that a property has a dispositional essence or is essentially dispositional is to say first that that property has some essence that may be characterised dispositionally.” (Bird 2007:45)

Bird makes two claims here about properties: one, that properties possess essences or essential natures and two, that these essential natures are dispositional. It follows that properties are individuated by their dispositional essences. We can elaborate on these central claims of dispositional essentialism by noting that the properties of fundamental objects, such as the charge, mass and spin of electrons are causal properties. As such, dispositional essentialism may be recast as claiming that properties possess essential causal roles and are individuated by their causal roles. I will refer to this view as property dispositional essentialism.

To put these claims in more concrete terms, let us consider charge. If the ontology of dispositional essences includes charge, and charge has the causal role of repelling like charges, then repelling like charges is essential to the property of charge and is what makes charge the property it is, rather than some other property. Furthermore, there is nothing more to property of charge than this causal role of repelling like charges.

Bird also characterises dispositional essential properties in terms of their stimulus-response conditions (Bird 2007:7). Accordingly, we may represent properties as such:

$$D(S,M)$$

where D stands for disposition, S for stimulus and M for manifestation. This brings out the point that the causal role and identity of a property is given by its stimulus and manifestation conditions. The essential nature and identity of disposition D is constituted by, fixed and exhausted by the stimulus and manifestation conditions it enters into. For example, the property of fragility is

constituted by and has its essential nature fixed by its stimulus conditions of dropping and its manifestation condition of breaking.

We can represent the fact that the stimulus-response relation holds between these three properties of fragility (F), dropping (P) and breaking (B) as:

SR[(F,P),B]

To characterise properties in terms of their stimulus-response conditions brings out the relational, networked nature of properties. In the case of fragility, there are three properties at play — the disposition fragility, the stimulus condition being dropped, and the manifestation condition breaking or shattering — that are linked to each other by the stimulus-response relation. These properties of fragility, being dropped and breaking or shattering are constituted by and have their essential nature fixed by the stimulus-response conditions they enter into — that is, by their relation with other properties. These properties in turn are constituted by and have their essential nature fixed by the stimulus-response conditions they enter into, and so on. What it is to be a property is to be part of a vast network of other properties:

“Think of all the natural properties and all the SR-relations they enter into with respect to each other. They form a vast network. Each property p has a position in that network. That position will be one that uniquely identifies the property p [on the condition this structure is asymmetrical].” (Barker and Smart 2012:717)

Ellis and Lierse (1994) extend dispositional essentialism to also include objects and object kinds. They claim that fundamental objects and kinds, not merely properties, possess dispositional essences. That is, both fundamental properties (such as charge) and fundamental objects (such as electrons) possess their powers essentially:

“What makes something an electron, for example, is its causal powers, capacities and propensities. An electron is not some thing which can be identified independently of these. On the contrary, what an electron is disposed to do, e.g., how it is disposed to interact with fields and other particles, is what makes it the kind of thing it is. A particle is an electron if

and only if it is disposed to behave as an electron does. Its dispositional properties are of its essence.” (Ellis and Lierse 1994:32-33)

According to Ellis and Lierse, the essence of an electron — what makes an electron an electron — is determined by its causal powers, by the causal role it plays and how it acts and interacts with other entities. I will refer to this view as object dispositional essentialism in order to distinguish it from the property dispositional essentialism advocated by Bird.

### **Dispositional essences are necessary**

Both property and object dispositional essentialism entails necessity. If a property’s powers are essential, as property dispositional essentialism contends, then these powers are also necessarily possessed by that property. Likewise, if an object or object kind’s properties are essential, as object dispositional essentialism contends, then these properties are also necessary properties of the object or object kind. This follows from the general principle that essence entails necessity.<sup>27</sup> As Bird notes, in the case of property dispositional essentialism:

---

<sup>27</sup> As noted above, the relationship between essence and necessity is such that if *a* is essentially F, then *a* is necessarily F. However, the converse does not hold as a general principle. All essential properties of an object are necessary properties, but not all necessary properties of an object are essential properties of that object. There may be necessary properties (possessed by an object in all possible worlds that it exists) that do not constitute an object’s identity. Kit Fine (1994) provides two examples of necessary but accidental (that is, non-essential) properties. In the first example, Fine argues that membership in the singleton set {Socrates} is necessary but not essential to Socrates:

“Consider, then, Socrates and the set whose sole member is Socrates. It is then necessary, according to standard views within modal set theory, that Socrates belongs to singleton Socrates if he exists; for, necessarily, the singleton exists if Socrates exists and, necessarily, Socrates belongs to singleton Socrates if both Socrates and the singleton exist. It therefore follows according to the modal criterion that Socrates essentially belongs to singleton Socrates.

“But, intuitively, this is not so. It is no part of the essence of Socrates to belong to the singleton. Strange as the literature on personal identity may be, it has never been suggested that in order to understand the nature of a person one must know to which set she belongs. There is nothing in the nature of a person, if I may put it this way, which demands that he belongs to this or that set or which demands, given that the person exists, that there even be any sets.” (Fine 1994:4-5)

“Essentially dispositional properties are ones that have the same dispositional character in all possible worlds.” (Bird 2007:44)

To possess the same dispositional character in all possible worlds is just to possess those dispositional characteristics necessarily.

We can make a similar argument for necessity in the case of object dispositional essentialism. We may define essential and necessary properties as follows:

DF essent: F is an essential property of *a* iff being F constitutes the identity of *a*.

DF nec: F is a necessary property of *a* iff *a* has F in all possible world in which *a* exists.

It is clear from these definitions that essence entails necessity for object dispositional essentialism. If F is an essential property of *a* and so constitutes the identity of *a*, then it follows that all possible worlds in which *a* exists must also be worlds in which *a* is F, thereby satisfying our definition of necessity.

---

In the second example Fine argues that it is necessary, but not essential, that Socrates and the Eiffel Tower are distinct:

“Consider two objects whose natures are unconnected, say Socrates and the Eiffel Tower. Then it is necessary that Socrates and the Tower be distinct. But it is not essential to Socrates that he be distinct from the Tower; for there is nothing in his nature which connects him in any special way to it.” (Fine 1994:5)

This shows there is a distinction between essence and necessity. It shows that “essential” and “necessary” are not interchangeable terms.

However, Bird suggests there is no such distinction between necessary and essential properties at the level of fundamental properties, where powers are dispositional essences and pure. For Bird, at the level of fundamental properties, *a* is necessarily F if and only if *a* is essentially F. He contends that it is only at the level of non-fundamental properties that it is not the case that if *a* is necessarily F, then *a* is essentially F:

“Since there is a distinction between necessarily and essentially, there could in theory be properties that are necessarily dispositional but not essentially dispositional. In fact I think that being aqueous necessarily confers the power to dissolve salt on its instances, but does not have that character essentially. But I doubt any fundamental properties are like this.” (Bird 2007:98 fn64)]

Heil makes a further argument that property dispositional essentialism entails the necessity of dispositional essences. Heil views Bird's commitment to necessary powers and dispositional essentialism as following from the purity of powers. Heil argues that if properties are purely powers, then properties and powers cannot co-vary and so are identical and necessary:

“If properties are powers [and so are dispositional essences], however, there could be no question of its being contingent that a given property confers a given power; if all there is to the property is the power it confers, there is no prospect of powers and properties varying independently...”  
(Heil 2003:75-76)

Heil is surely right to conclude that property kinds and powers kinds cannot vary independently and so are necessary, on the assumption that all there is to a property is the pure power it confers. This claim is no more than the necessity of identity — a property *is* the pure power it confers.

### **Laws of nature are metaphysically necessary**

Dispositional essentialism, in both its property and object forms, also entails the metaphysical necessity of causal laws. Arguments for the necessity of causal laws put forward by both Bird and Ellis and Lierse are based on two fundamental claims:

- i. The causal powers that a property confers on its instances (or that a property confers on an object) are essential (and so necessary) to the property or object. (Dispositional essentialism)
- ii. The causal laws describe the causal powers associated with properties (or objects possessing properties).

It follows from these two premises that causal laws are necessary.<sup>28</sup> This argument for the metaphysical necessity of causal laws is only as strong as the

---

<sup>28</sup> It is worth noting that the dispositions and powers of fundamental objects are causal powers. As such, this argument for the necessity of laws is an argument only for the necessity of *causal* laws. If there are laws of nature that are not causal, then this argument fails to establish that they are necessary.

premise that properties have their associated causal powers (in the case of property dispositional essentialism) or that objects have the properties they do essentially and necessarily (in the case of object dispositional essentialism). That is, the argument for the necessity of causal laws is only as strong as the arguments for dispositional essentialism.

Ellis and Lierse (1994) argue that object dispositional essentialism entails necessary causal laws. Their argument assumes the transworld identity of powers. It has the form of a *reductio ad absurdum* and starts by assuming the negation of what it intends to prove — that laws of nature are contingent:

(P1) If the laws of nature are contingent then there are possible worlds where particulars can have different dispositions to the ones they have in the actual world. (Proposition)

(P2) The dispositions of fundamental kinds, such as electrons, cannot vary from world to world without loss of identity of the fundamental kind.

(Object dispositional essentialism)

Therefore:

(C1) There cannot be a possible world where the laws of nature differ from the actual laws. (P1, P2, reduction)

Therefore:

(C2) The laws of nature are necessary.

This argument appears to be valid. If premise P2 — which is simply a statement of object dispositional essentialism — is true, then it follows that the laws of nature are necessary.

Ellis has a second argument for the necessity of causal laws based on object dispositional essentialism (Ellis 2002:1-5):

(P1) The essential properties of a natural kind could not be otherwise.

(Object dispositional essentialism)

(P2) Laws are concerned with the essential properties of natural kinds.

(Proposition)

(C) So too the laws of nature could not be otherwise. (P1, P2)



To flesh this argument out with an example, consider the natural kind electron and its essential property of being negatively charged. Things could not be otherwise — if the entity in question is not negatively charged, then it is not an electron. This is a statement of object dispositional essentialism as applied to fundamental objects. But how do we move from this statement of dispositional essentialism to the necessity of causal laws? That work appears to be left to P2 and the “concerned with” relation. Laws are “concerned with” the essential properties of natural kinds. Being “concerned with” is a rather vague relation. But it is clear what is intended — in some sense, laws “flow from” or are fixed by natural kind properties and this guarantees that the “could not be otherwise” nature of the essential properties of natural kinds applies to laws.

We find a similar argument in Bird, claiming that property dispositional essentialism entails metaphysically necessary laws of nature:

“According to this view [property dispositional essentialism] laws are not thrust upon properties, irrespective, as it were, of what those properties are. Rather the laws spring from within the properties themselves. The essential nature of a property is given by its relations with other properties. It wouldn’t be that property unless it engaged in those relations. Consequently those relations cannot fail to hold (except by the absence of the properties altogether, if that is possible). The laws of nature are thus metaphysically necessary.” (Bird 2007:2)

Bird’s argument here sheds light on the crux of the argument for necessary laws of nature — once the essential nature of properties is fixed (as decreed by property dispositional essentialism), then so too are the laws of nature. And just as the essential nature of properties is necessary, so too are the laws of nature. Bird considers this commitment to necessary causal laws as a virtue of the pure powers view, as we shall see below in the next section.

Bird has made dispositions and powers the cement of the universe and by so doing has produced an anti-Humean ontology and account of causation and laws. Laws are not independent of the character of the properties they govern.

Rather, laws are dependent upon and determined by the essentially dispositional natures of properties.

Dispositional essentialism provides an ontologically deflationary account of laws. Laws are not an ontologically addition on top of potencies possessing dispositional essences. Rather, once you assume dispositional essentialism then nothing more is needed for the existence of laws. This lead David Yates to describe the dispositional essentialist account of laws as providing “an ontological free lunch” (Yates 2013:105). Mumford goes one step further, calling for the “outlawing of laws” on the grounds that we only need posit dispositional essences (Mumford 2008:216-238).

Mumford rejects laws for at least two reasons. One reason for outlawing laws is that they are redundant. If powers with dispositional essences explain and govern the existence of regularities, then there is no work for laws to do. Laws are otiose and redundant. To countenance the existence of laws and thus claim that laws explain and govern regularities is to accept that these regularities are overdetermined. Both laws and dispositional essences explain and govern regularities.

Bird denies that there is a problem of overdetermination. He claims laws are supervenient features of the world — they supervene on the dispositional essences of powers — and that this saves laws from redundancy:

“My response was that even if potencies do govern, that doesn’t require us to exclude laws. Laws in my view supervene on potencies, and so exist if potencies do.” (Bird 2007:202)

I find Bird’s response unconvincing. His appeal to the supervenience of laws upon potencies may well give us reason to hold that laws exist. However, it does not address the issue of overdetermination. This is because the claim that laws and dispositional essences co-vary, as stipulated by the supervenience relation, has nothing to say about the governing role of laws.

A second reason for outlawing laws relates to their explanatory role. It is thought that real, genuine laws should explain and govern. However, Mumford argues that if laws are nothing more than or supervene upon the essences of properties, as dispositional essentialism contends, then they cannot in turn explain or govern those properties.<sup>29</sup> The principle appealed to here is that something cannot explain or govern itself. Rather, there must be some metaphysical distance between the *explanandum* and *explanans*, between what governs and what is governed.

Bird thinks Mumford's claim — that something may not explain or govern that which it supervenes upon — is too strong (Bird 2007:196). He tentatively asserts that in virtue of this supervenience relation, laws are able to play an explanatory and governing role

“Indeed, it is not obvious that this supervenience relation prevents laws from having at least an explanatory function, and, depending on what you think ‘governing’ amounts to, perhaps a governing role also.” (Bird 2007:202)

Bird backs his claim with an example of supervenience with governance:

“Let us imagine that F determines or governs G but does not supervene on G. Now consider the mereological sum of F and G. Clearly F supervenes on that sum but determines part of it.” (Bird 2007:196)

Bird's claim that laws supervene on dispositional essences leads him to describe laws as epiphenomenal:

“The dispositional essentialist view will regard the motor and cement of the universe as residing ultimately not in the laws themselves but rather in the dispositional nature of properties. The laws are, in a sense, epiphenomenal.” (Bird 2007: 47)

It seems Bird views the supervenience relation — *A* supervenes upon *B* iff there cannot be an *A*-difference without a *B*-difference — as having parallels with

---

<sup>29</sup> Mumford employs the same argument that Bird (2007:ch.4) levels against the Lewisian-Humean regularity account of laws — that because such laws are identical with regularities they cannot explain those regularities or their instances. That is, laws cannot be constituted by what they explain or govern.

epiphenomenalism's claim that mental events are caused by physical events, yet have no effects upon any physical events. But if this is the case, then it is hard to see how laws are supposed to explain or govern. Epiphenomenal mental events do not explain or govern physical events. Bird does qualify his claim that laws are epiphenomenal with the remark "in a sense". Maybe we should not take Bird's epiphenomenal comparison too literally.

Nonetheless, I think Bird's epiphenomenal remark points to a problem with his use of the supervenience relation to explain the relation between dispositional essences and laws. Supervenience is a particularly weak relation, too weak to ground Bird's requirement that laws have an explanatory or governing role. Bird is caught in a bind. He wishes to make the relation between dispositional essences and laws weak enough to avoid that problem that something cannot be constituted by what they explain or govern. However, the relation needs to be strong enough to be explanatory. If the relation is too weak, then laws will not be able to explain or govern. Supervenience appears to be too weak a relation to met this requirement.

Why not follow Mumford and outlaw laws? As we will see below, for Bird a crucial argument for dispositional essentialism is that it provides a robust account of laws. According to Bird, dispositional essentialism provides a superior account of laws to Armstrong's nomic necessitarian and Lewisian-Humean regularity account of laws. If Bird follows Mumford and outlaws laws, then he must forgo his argument to the best explanation for dispositional essentialism.

### **What laws are there?**

We have looked at numerous arguments that dispositional essentialism entails necessary causal laws. What would a world of necessary laws look like? Bird sketches various possibilities.

On the assumption that at least some properties, namely the sparse, fundamental properties, have dispositional essences, partial necessitarianism about laws follows:

(PNL) At least some of the laws of nature are metaphysically necessary

This would result in a mixed view of laws: some laws are metaphysically necessary and explained as a consequence of dispositional essences, while some laws are not necessary and are explained as a consequence of say, regularity among properties or nomic necessitation between universals. Bird describes this mixed view of two classes of laws as “an untidy metaphysic” (Bird 2007:48). He suggests we embrace a unified account of laws:

(U) Whatever it is, the true account of fundamental laws is a unified account

If we take Bird’s suggestion and accept that a true account of fundamental laws is indeed unified, then (on the assumption that the laws of nature are fundamental laws or derivable from fundamental laws) a commitment to partial necessitarianism about laws becomes a commitment to full necessitarianism about laws:

(FNL) All the laws of nature are metaphysically necessary

There are two versions of full necessitarianism about laws:

- i. weak necessitarianism
- ii. strong necessitarianism

Weak necessitarianism holds that the laws that exist in any possible world are necessary, but denies that every possible law need exist in every possible world. For example, if P is a law, then P is a necessary law. However, there may be worlds where P does not hold. As such, there may be worlds with different laws and hence different properties (given that laws “flow” from properties possessing dispositional essences).

Strong necessitarianism contends that laws are (i) necessary and (ii) hold in all possible worlds. This means that all possible worlds are indistinguishable with regards to what laws there are (and therefore also indistinguishable with regards to properties and dispositional essences). Bird characterises strong necessitarianism as committed to the claim that “any possible property [and so law] is actual” (Bird 2007:51).

While Bird’s intent is easy to grasp — any possible law and any possible property is actual — it is nonetheless a slightly misleading claim. To characterise strong necessitarianism in terms of possible properties and laws is to assume what strong necessitarianism denies. According to strong necessitarianism, there are no properties or laws that exist in some worlds and not in others. That is, there are no possible laws or properties, only necessary laws and properties. It appears that strong necessitarianism about laws is too strong to ground or account for the semantics of Bird’s characterisation of strong necessitarianism.

Is strong necessitarianism too strong? In everyday talk we use conditionals such as “if kangaroos had no tails, then they would topple over” to conceptualise the role that tails plays in keeping kangaroos upright. Similarly, science uses such talk of possible properties and entities as a way to conceptualise and explore the nature and interactions of properties and entities. Strong necessitarianism is too strong to make sense of our semantics for our talk about possible laws and properties.

**Problem for necessary laws — finks show laws admit of exception and so are not necessary**

As mentioned in chapter two, Martin (1994) introduces finks to argue against the conditional analysis of dispositions. A disposition is finkish when the stimulus conditions for its manifestation are the very conditions that may cause the object to lose or gain the disposition in question. Finks show that the truth of a counterfactual is neither necessary nor sufficient for the truth of a dispositional ascription. The existence of finks also entails that laws admit exceptions and so are not necessary. For example, suppose it is a necessary causal law that all vases shatter upon being struck. A fragility-finked vase will not shatter upon being

struck and so is a counterexample to the supposed law that necessarily all vases break upon being struck.

Bird is rightly concerned that if finks exist, then it shows laws admit exceptions and so are not necessary (Bird 2007:60ff). If laws are not necessary, then Bird's dispositional essentialist account of powers and dispositions cannot be true. Bird responds by arguing that only non-fundamental properties and powers are finkable. At the level of fundamental properties and powers there are no finks. As such, finks pose no challenge to dispositional essentialism. At the heart of Bird's argument is the claim that finks require dispositional bases and a temporal space between stimulus and manifestation.

Bird describes a finked property as involving the following machinations:

“Let D, S and M be instances of a potency and its characteristic stimulus and manifestation in some object  $x$ . A case of finkishness would have to operate like this. The object  $x$  with D receives stimulus S. However, before manifestation M can occur,  $x$  is caused by a finkish intervention to lose D and so fails to manifest M.” (Bird 2007:60-61)

The salient point here is that, according to Bird, finks operate in the temporal space between stimulus S and manifestation M.

This temporal gap arises due to the existence of causal bases in non-fundamental dispositions. Bird fleshes out this account of how dispositions are realised with an example:

“For in such a case the manifestation of the [non-fundamental] disposition will be a result of process involving its more-or-less complex causal basis — when for example the breaking of a vase is the outcome of forces, stresses and cracks spreading throughout the vase.” (Bird 2007:61)

In this case, the causal basis gives rise to “stresses and cracks spreading throughout the vase”. These stresses and cracks presumably take time and so are not instantaneous. Moreover, they occur after the striking but before the

shattering, and so open the supposedly required temporal gap between stimulus and manifestation in which the fink may operate. For Bird the existence of a causal basis is the source of non-fundamental dispositions having non-instantaneous manifestations.

A necessary (and perhaps sufficient) condition for a disposition to be finkish is that an entity can gain or lose the dispositional power in question. Bird admits this is possible at the fundamental level:

“electrons can be spin-up or spin-down and they can be caused to change from the one to the other.” (Bird 2007:60)

This leads Bird to admit there “might be room for finkishness of fundamental properties.” (Bird 2007:60).

However, Bird rules out such a possibility on the grounds that fundamental properties are pure powers lacking causal bases and therefore lacking the time gap between stimulus and manifestation in which a fink may operate:

“But in the case of a fundamental property which by definition has no causal basis, it becomes mysterious why there should be a time gap between stimulus and manifestation...” (Bird 2007:61)

For Bird, change in properties at the fundamental level is instantaneous. There is no time gap for finks to emerge. This leads Bird to declare that finkishness is not possible for fundamental properties, and so finks provide no reason to hold that causal laws are not necessary.

I think Bird is wrong in his characterisation of finks. I counter that if the manifestation can be instantaneous with the stimulus conditions, as Bird contends, then so too can the actions of a fink. The general issue here is that any mechanism employed to rule out finks, such as instantaneous manifestation given the stimulus conditions, is also available to finks. If the manifestation can be instantaneous with the stimulus, then so too can the actions of the fink, which is just a different manifestation given the same stimulus conditions.



All that is required for the existence of finks is that an entity can gain or lose a power or disposition. Bird admits this is possible at the fundamental level. If an object can gain or lose a power and do so instantaneously, as Bird admits happens at the fundamental level, then an object can lose its power, for whatever reason, at the very instant of the stimulus condition. That would ensure the stimulus did not result in the expected manifestation, which is just to say the power is finked.

Bird's argument fails to rule out finks at the level of fundamental properties. Nonetheless, I think there is still reason to hold that the dispositional essentialist's account of properties is immune from finks and so there is no reason to doubt that causal laws are necessary.

How would a supposedly finked property look on the dispositional essentialist account? According to dispositional essentialism,  $D(S,M)$  gives the nature and identity of a property. If the property  $D$  were finked, then the same stimulus conditions  $S$  would result in a different manifestation condition, say  $M'$ , giving us  $D(S,M')$ . However, this description cannot be correct. The nature and identity of a property is fixed by its stimulus-response conditions, that is, by the causal roles it enters into. It follows that this supposedly finked property  $D(S,M')$  is actually a different property, say  $D'(S,M')$ . It appears that properties are immune from finking on conceptual grounds. Given the dispositional essentialist's definition of a property, it is not possible for a property to have the same stimulus conditions and different manifestation conditions and remain the same property. For this reason, fundamental properties cannot be finked.

Although fragility is not a fundamental property, it can still serve as an example to make this point. According to dispositional essentialism, the dispositional essence of a property is fixed by how it acts and interacts with other properties. Specifically, the nature and identity of the property fragility is fixed by its stimulus and manifestation conditions of striking and breaking, respectively. That means that any property that has the stimulus condition striking but lacks the manifestation conditions breaking is simply not an example of fragility, finked or otherwise. Rather, it is by definition a different property. If dispositional essences

determine the identities of properties, then how a thing acts and interacts determines its identity. Anything that does not act by breaking upon being struck simply is not fragile. This shows that fragility (imagined as a fundamental property with a dispositional essence for this example), by definition cannot be finked. Fundamental properties are not finkable and as such finks pose no threat to the dispositional essentialist's claim that causal laws are necessary.

The discussion of finks brings out an interesting point about the nature of dispositional essences and the necessity of causal laws. Dispositional essences and causal laws are supposed to be metaphysically necessary. However, the discussion of finks suggests that this necessity is conceptual. By definition a property cannot have a dispositional essence different to the dispositional essence it has.

Mumford (2008:ch10.8) also charges that dispositional essentialism is committed to conceptual, rather than metaphysical, necessity, but for reasons unrelated to the analysis of finks. Mumford argues that for Ellis and Lierse the necessity of a fundamental entity's dispositional essence and behaviour is conceptual, not metaphysical:

“While it is certainly true that an electron would not be an electron if its behaviour were different from the behaviour it has in the actual world, this necessity is purely conceptual.” (Mumford 2008:237)

He contends that Ellis and Lierse make a scope distinction mistake when arguing for the metaphysical necessity of dispositional essences and causal laws:

“The Ellis/Lierse view involves a misunderstanding of the scope of the logical necessity involved. From the conceptual necessity

$$\Box \forall x(x \text{ is an electron} \leftrightarrow x \text{ has behaviour } B)$$

it does not follow, for any particular  $x$ , that  $x$  has behaviour  $B$  necessarily. That a particular possesses any disposition is logically contingent even though some particulars, such as electrons, would not have been classed as such if they had different behaviour. To deny this would be to claim

that an electron's behaviour is dictated by logic and, presumably, physics is a trivially analytic human folly." (Mumford 2008:237)

Given this scope distinction mistake, Mumford thinks the move that Ellis and Lierse make from dispositional essentialism to the necessity of physical laws is contentious and unnecessary (Mumford 2008:237).

#### **4.2.2 Arguments for pure powers and dispositional essentialism**

So far I have introduced the pure powers view and shown it to entail dispositional essentialism and the necessity of causal laws. I now turn to examine two arguments for pure powers and dispositional essentialism:

- i. the argument to the best explanation
- ii. the argument from science.

Bird's argument to the best explanation contends that dispositional essentialism provides a more robust account of properties and laws than categoricism (the denial of dispositional essentialism). I show that arguments claiming that dispositional essentialism provides a more robust account of properties and laws fail to establish the truth of their conclusions. I then demonstrate that even if we ignore these problems, Bird's argument to the best explanation fails the cost benefit analysis by which we judge such arguments. I conclude that Bird's argument to the best explanation fails to give us any reason to accept that properties are purely dispositional.

There are two arguments from science. The first argues from the fact that particle physics has not found structure in fundamental particles to the conclusion that fundamental particles are simple and so their properties must be purely dispositional. This argument commits the headless woman fallacy and so should be rejected. The second argument from science argues from the fact that particle physics employs only dispositional terms to characterise the properties of fundamental particles to the conclusion that the properties of fundamental particles are purely dispositional. This argument confuses the manner in which we talk about properties with the nature of these properties. I conclude that arguments for the existence of pure powers and dispositional essentialism fail to

establish the truth of their conclusions. That is, these arguments fail to give any reason to hold that the properties of fundamental particles are purely dispositional.

### **Bird's argument to the best explanation for dispositional essentialism**

As just noted, Bird employs an argument to the best explanation in favour of dispositional essentialism. He argues that dispositional essentialism provides a more robust account of both properties and causal laws than categoricalism (the denial of dispositional essentialism) and so should be accepted.

Bird employs two supposedly epistemic arguments in an attempt to show that categoricalism provides an inadequate account of properties. I demonstrate that the issue here is metaphysical not epistemic. The issue is over whether the nature of a property is exhausted by the causal role it occupies. Bird assumes that it is. But this is to assume what needs to be proved. Following this, Bird argues that categoricalism fails to give an adequate account of causal laws and so should be rejected in favour of dispositional essentialism. I show that the criticisms Bird levels against both regularity and nomic necessitation accounts of laws also befall dispositional essentialist accounts of causal laws. Putting these problems aside, I conclude that Bird's argument to the best explanation in favour of dispositional essentialism fails the cost benefit analysis by which we judge arguments to the best explanation and so gives us no reason to accept that properties are purely dispositional.

### **Categoricalism provides an inadequate account of properties**

Let us now turn to Bird's two epistemic arguments that categoricalism fails to give an adequate account of properties. Bird defines categoricalism in negative terms as the denial of dispositional essentialism (Bird 2007:ch4). Categoricalism is the view that the fundamental natural properties lack dispositional, nomic and causal essences. Categorical properties possess powers and enter into nomic and causal causal relations with other properties, just as do properties with dispositional essences. However, the powers and relations possessed by

categorical properties are not necessary, but contingent and non-essential. Bird provides an example of categorical properties and their powers:

“Properties are categorical in the following sense: they have no essential or other non-trivial modal character. For example, and in particular, properties do not, essentially or necessarily, have or confer any dispositional character or power. Being made of rubber confers elasticity on an object, but it does not do so necessarily. Being negatively charged confers on objects the power to repel other negatively charged objects, but not necessarily. In other possible worlds rubber objects are not elastic, negatively charged objects attract rather than repel one another.” (Bird 2007:67)

In this world, according to categoricalism, the property of being negatively charged confers the power to repel other negatively charged objects. But in another world, with different, contingent laws, being negatively charged confers the power to attract rather than repel other negatively charged objects.

The fact that “properties do not, essentially or necessarily, have or confer any dispositional character or power” leads Bird to declare that:

“the transworld identity of universals [properties] does not supervene on their qualitative properties, where now ‘qualitative’ means powers.” (Bird 2007:72)

The powers that properties possess are contingent and so the nomic and causal relations they enter into are also contingent. As a result, the powers and nomic and causal relations that properties possess fail to individuate and give the identity of properties. For this reason, Bird proclaims that categorical properties lack any non-trivial modal character. All there is to the identity and nature of a categorical property is its identity with itself and its distinctness from other properties. This means categorical properties are all essentially alike and differ only in their mutual distinctness. This is a thin notion of a property, one that according to Robert Black renders properties “intrinsically inert and self-contained” (Black 2000 in Bird 2007:67).

Such “thin” properties are termed “quiddities”. Bird regards it as a shortcoming of categoricalism that properties are quiddities and so fail to account for the

transworld identity of properties.<sup>30</sup> In particular, Bird contends that quiddities lead to epistemic problems.

Categoricalism's commitment to quiddities makes the transworld identity of properties independent of any of the features in virtue of which we are capable of detecting them. According to categoricalism, the nature and identity of a property is independent of, and so not determined by, its causal roles. However, any feature of a property that renders it detectable and so knowable will be part of its causal role. It follows that if categoricalism is true, the identity of properties is independent of any features by which we can detect and know such properties. It follows that we cannot detect or know any properties. However, Bird counters that we do have knowledge of properties, and so categoricalism must be false. Bird mounts two sceptical arguments against categoricalism: the permutation argument and the duplication argument.

### **Epistemic argument one — the permutation argument against categoricalism**

Bird adapts Chisholm's (1967) argument against haecceitism — the claim particulars lack essential properties, and hence that the transworld identity of particulars does not supervene on their qualitative features — and applies it to quiddities.

Chisholm notes that if particulars are haecceities, then particulars can swap properties and still retain their identity. In such a case, there is a possible world  $w_p$  that differs from the actual world  $w_a$  in that in  $w_p$  Adam has all the properties possessed by Noah in  $w_a$  and Noah in  $w_p$  has all the properties possessed by Adam in  $w_a$ . These worlds are qualitatively indistinguishable. Despite being different worlds, we cannot know who is Adam or Noah and we cannot know which world we are in,  $w_a$  or  $w_p$ .

---

<sup>30</sup> Lewis manages to provide an account of modality — an account of possibility and necessity — without recourse to transworld identity of particulars. Particulars exist only in one world, but have counterparts in other worlds. For example, it is not Nixon that is, say, the emperor of Ethiopia in some possible world, but Nixon's counterpart. However, Lewis does not extend his counterpart theory to properties or universals. Properties do have primitive transworld identity for Lewis and so can exist across possible world. This raises the question of whether a modal realism with counterpart properties is a live possibility. Perhaps transworld identity of properties is not necessary for an adequate account of modality.

Bird applies this argument to quiddities. Just as particulars conceived as haecceities can swap all their properties and still retain their identity, so too properties as quiddities can swap all their powers and retain their identities:

“If... the quidditist conception of properties is that they have primitive identity, identity that is completely independent of their powers, then there should be no reason why we cannot swap powers without swapping universals — or swap universals without swapping powers.” (Bird 2007:74)

In such a case, there is a possible world  $w_p$  that differs from the actual world  $w_a$  in that in  $w_p$  mass plays the charge role and charge plays the mass role. Despite being different worlds,  $w_a$  and  $w_p$  are indistinguishable with respect to the causal roles of their properties. As a result, we cannot know which property plays the charge role and cannot know which world we are in. Bird thinks our intuitions show there is something wrong with  $w_p$  (Bird 2007:75). He holds that  $w_p$  is just the actual world with the names “charge” and “mass” swapped (Bird 2007:75). Which leads him to conclude, that just as we should reject haecceitism, so too we should reject quidditism.

### **Epistemic argument two — Bird’s duplication argument against categoricism**

Bird’s second skeptical/epistemological argument against categoricism is a version of the replacement argument. Bird asks:

“If identity is independent of powers, why shouldn’t two properties possess the same powers in the same world.” (Bird 2007:76)

Bird envisages a case in which two different properties, say, charge and mass, possess the same powers:

“...two properties entering into entirely parallel causal roles and nomic relations. I.e. let F and G be properties, and let it be the case that for every other property H, it is a law that Fs are Hs iff it is a law that Gs are Hs, and so on. If this were the case, then F and G would be indistinguishable — where there seemed to be one law there would in fact be two.” (Bird 2007:76)

Bird uses this example to draw a skeptical conclusion about our knowledge of properties (Bird 2007:76-77). If quidditism were correct we would not know whether we are in  $w_1$  (where there is only one property responsible for its being such that if a force is applied then a corresponding acceleration would result) or  $w_2$  (where two or more properties are responsible for its being such that if a force is applied then a corresponding acceleration would result).

Bird also uses reference fixing problems to press his skeptical conclusion against categoricism (Bird 2007:77). If two fundamental properties play the inertial mass role, as in the duplication example, then there is no unique reference for the term “inertial mass” and so the term fails to refer. To see this how this problem arises for categoricism, we will follow Lewis in defining such fundamental terms such as “inertial mass” using the Ramsey-sentences of the theories they feature in (Lewis 1990). “Inertial mass” will then mean something akin to “the unique actual occupant of the inertial mass role”. However, in the duplication example above, there is no unique actual occupant of the inertial mass role — two properties, charge and mass, occupy the inertial mass role. As such, “inertial mass” fails to refer. This raises the skeptical problem that, on the categoricist account of properties as quiddities, we cannot know that any causal role is uniquely occupied and so cannot know that any property term refers.

These skeptical problems lead Bird to conclude that we should reject categoricism’s account of properties and powers in terms of quiddities in favour of dispositional essentialism.

Yates (2013) summarises Bird’s epistemological arguments as an anti-sceptical *modus tollens*:

“(1) If categoricism is true, we cannot know which property occupies the [say] charge role; (2) we can know which property occupies the charge role; so categoricism is false.” (Yates 2013:96)

Lewis, a proponent of categoricism, denies the conclusion that categoricism is false by denying premise two (Lewis 2009). That is, Lewis denies that we can know the fundamental properties of nature and argues instead for what he calls



“Ramseyan humility” (Lewis 2009). In the case of the replacement argument, Lewis accepts that we cannot tell whether we are in  $w_a$  or  $w_p$ .

At the heart of his argument for epistemic humility concerning the fundamental properties is his claim that just because we know that a certain property role is occupied it does follow that we know what property or power occupies that role:

“To be the ground of a disposition [say] is to occupy a role, but it one thing to know that a role is occupied, another thing to know what occupies it. The point generalizes. Being the ground of a certain disposition is only one case among many of role-occupancy. There are a variety of occupied roles, among them nomological roles and others as well. Quite generally, to the extent that we know of the properties of things only as role-occupants, we have not yet identified those properties. No amount of knowledge about what roles are occupied will tell us which properties occupy which roles.” (Lewis 1990:204)

Bird regards Lewis’ epistemic humility as too high price to pay for maintaining quidditism and categoricism. He thinks we should reject categoricism on the grounds that it provides a metaphysics of properties that condemns us to the necessary ignorance of properties (Bird 2007:78).

Dispositional essentialism avoids Lewisian epistemic humility about fundamental properties not by expanding our knowledge of properties beyond that proscribed by Lewis’ epistemic humility but rather by truncating our account of what a property is. Lewis claims that we can know that a certain property role is occupied, but denies that we know what property or power it is that occupies that role. For dispositional essentialism, a property just is its causal role. As such, for dispositional essentialism, to know that a certain property role is occupied is to know what property or power occupies that role. Bird avoids epistemic humility about properties by holding an account of properties that collapses the distinction that Lewis draws between knowing that a certain property role is occupied and knowing what property or power it is that occupies that role. For dispositional essentialism a property just is its (causal) property role.

The point I want to stress here is that Bird and Lewis are in agreement: both agree we can know that a certain property role is occupied. However, they disagree about whether the nature and identity of a property is exhausted by the causal role it occupies. As such, the disagreement is not epistemic, as Bird claims, rather it is metaphysical. Bird's supposedly epistemic argument against categoricalism turns out to be a metaphysical disagreement about the nature of properties. The disagreement is about whether or not the nature of a property is exhausted by the causal role it plays. The epistemic argument only gains traction by assuming dispositional essentialism, by assuming that there is no more to a property than its causal role, and so cannot be used as an argument against categoricalism without facing the charge of begging the question. As such, Bird's supposedly epistemic argument does not provide any reason to hold that categoricalism fails to provide an adequate account of properties.

### **Categoricalism provides an inadequate account of laws**

Bird argues that both well-known categoricalist account of laws — (i) the regularity view and (ii) the nomic necessitation view — fail to give an adequate account of laws and so categoricalism should be rejected in favour of dispositional essentialism. I show that the criticisms Bird levels against both regularity and nomic necessitation accounts of laws also befall dispositional essentialist accounts of causal laws. As such, Bird fails to provide any reason to favour the dispositional essentialist account of laws over categoricalist accounts.

### **The regularity view of laws**

In the case of the regularity view, Bird argues it is unable to ascribe explanatory power to laws and so fails as an adequate account of laws.

The regularity view, as espoused by Lewis, contends that laws are regularities that supervene on the vast mosaic of local matters of fact, where these local matters of fact are categorical properties (Lewis 1994). On this account, laws are general facts of the form that all instances of the property F are instances of the property G. The law that, say, all diamonds are hard is a general fact that supervenes on the fact that all instances of diamonds are instances of hardness. The nature of the supervenience relation is such that once the arrangement of

particular local facts is fixed, namely, the fact that all instances of diamonds are instances of hardness, then the law that all diamonds are hard is fixed as a result.

However, laws are meant to be explanatory and not merely reports of local matters of fact. They are meant to explain both (i) their instances (why, say, this instance of a diamond is hard) and (ii) the regularities in the world (they should explain why, say, all diamonds are hard).

Unfortunately, Bird argues, the regularity view of laws cannot fulfil this explanatory task. His argument rests upon the assumption that:

“facts may explain other facts but they cannot explain themselves.” (Bird 2007:86)

The basic idea here is easy to appreciate. The cricket ball striking the window and the window breaking are two distinct events and facts. As such, the one can explain the other. The fact that the ball strikes the window explains the fact that the window breaks. However, a fact cannot explain itself. The fact that the ball strikes the window does not explain the fact that the ball strikes the window.

Bird asks us to consider a gemstone that is very hard. He holds the simplest explanation available of the gemstone’s hardness is that the stone is a diamond and that it is a law that diamonds are hard. However, if this law is a regularity, as Lewis asserts, then Bird claims it will not be able to explain the gem’s hardness.

“Would it be explanatory to cite the regularity that all diamonds are hard? One instance of this regularity is the fact that this diamond is hard. But by our assumption [that facts cannot explain themselves] it cannot explain itself. So does the remainder of the regularity provide the explanatory power? No, since all that the remainder says is that other diamonds are hard. The fact that some other diamond is hard does not explain why this diamond is hard.” (Bird 2007:86)

The problem as Bird sees it is that regularities (and hence laws) supervene on their instances and so are not distinct facts. On the assumption that “facts may explain other facts but they cannot explain themselves”, it follows that no regularity can explain its incidences of that regularity.

In particular, the fact that all diamonds are hard is a regularity that supervenes on, and so is not distinct from, the instances of diamonds that are also instances of hardness. Hence, the regularity that all diamonds are hard cannot explain why a particular instance of a diamond is also an instance of hardness.

Laws are supposed to explain why a particular instance of a diamond is hard (and also why it is a law that all diamonds are hard). However, as Bird argues, the regularity view of laws cannot fulfil these roles. As such, according to Bird we must conclude that the regularity view cannot ascribe explanatory power to laws, and so the regularity view fails to provide an adequate account of laws. Bird has argued that categoricalism gives an inadequate account of laws, and so we should reject categoricalism.

**Dispositional essentialism is also open to the same criticisms that (i) no regularity can explain its instances and (ii) that it gets the direction of explanation the wrong way around**

A problem with this argument is that dispositional essentialism is open to the very same objection that Bird has leveled against categoricalism. As Bird admits, the dispositional essentialist's account of laws may be viewed as a regularity account of laws (Bird 2007:89). In this case, laws are regularities that hold in virtue of the dispositional essences of properties. Given that Bird holds no regularity can explain its instances, he is forced to concede that laws are not explanatory on a dispositional essentialist account of laws. Instead, he claims it is potencies (that is, powers as dispositional essences) that are explanatory:

“Thus although talk of explaining things with laws is strictly mistaken, that is harmless enough because associated with each law is a potency (or set of potencies) that does (or do) provide all the explanation required.”  
(Bird 2007:90)

Let us accept Bird's claim that potencies (or sets of potencies) are explanatory. Dispositional essentialism is thereby able to explain why an instance of a diamond is also an instance of hardness and also why all diamonds are hard.

However, dispositional essentialism still fails to provide an account of how laws are explanatory. Bird starts his criticism of Lewis' categorical regularity view of laws by declaring laws must be explanatory:

“Laws have an explanatory capacity. They explain their instances, indeed they explain the regularities we find in nature.” (Bird 2007:86)

Yet he finishes by concluding that for dispositional essentialism laws are not explanatory:

“The dispositional essentialist regularity theory must concede that its laws do not explain...” (Bird 2007:90)

Bird is faced with a dilemma. If laws do not need to be explanatory, then Bird's argument that categoricalism should be rejected because it does not provide an adequate account of laws, on the grounds that they are not explanatory, fails. However, if laws do need to be explanatory, then dispositional essentialism come up short. On Bird's account of dispositional essentialism, laws are epiphenomenal and not explanatory. Properties are explanatory on Bird's account, not laws.

Bird further criticises the regularity view on the grounds that it gets the direction of explanation the wrong way around.

“Lewis's Humean supervenience claim says that laws depend on the pattern of their instances and other matters of particular fact (things possessing properties). This seems to get the relationship between laws and matters of particular fact the wrong way round. It is laws that direct or explain the matters of particular fact, not vice versa.” (Bird 2007:1)

Once again, Bird is open to the same criticism that he levels against the regularity account of laws. On the dispositional essentialist account it is not laws that direct or explain the instances, but vice versa. Laws are epiphenomenal. The dispositional essences (that is, potencies) are the engines of explanation. As a result, the direction of explanation, and the relationship between laws and matters of particular fact, is also the “wrong way round”, just as it is for categoricalism. Dispositional essentialism has no advantage over categorical regularity accounts of laws when it comes to explanatory content.

### **Nomic necessitation account of laws**

Bird turns his attention to the second well-known categoricist account of laws — the nomic necessitation view. Bird argues that David Armstrong's (1983) nomic necessitarian conception of laws is committed to a vicious regress and so should be rejected. However, Barker and Smart (2012) show that Bird's dispositional essentialist account of necessary causal laws also faces the very same vicious regress levelled against Armstrong.

Armstrong contends that a law is a relational state of affairs, expressed as  $N[F,G]$ , where  $N$  is a second-order relation with relata that are first-order properties  $F$  and  $G$  (considered as universals), such as having-mass-of one kilo or having negative charge. The relation  $N[F,G]$  necessitates the patterns of instantiation of  $F$ s and  $G$ s. However, it is a contingent matter that the properties (as universals)  $F$  and  $G$  enter into an  $N$ -relation.

Bird asks how is  $N[F,G]$  meant to necessitate that every  $F$  is  $G$ ? He asks what necessitates the connection between  $N[F,G]$  and every  $F$  is  $G$ ? Bird claims that the  $N$  relation is contingent and as such attempts to necessitate the connection between  $N[F,G]$  and every  $F$  is  $G$  leads to an infinite regress. This leads Bird to conclude that we should reject categoricist's nomic necessitarian account of laws.

Bird notes that Armstrong's  $N$ -relation is a universal property and so must be categorical. As a categorical property, it is not part of  $N$ 's essential nature to have any necessitating role. That means the identity of properties (as universals) is not fixed by the causal/nomological roles they play or the  $N$ -relations they enter into with other properties. The significant point here is that it is possible for the  $N$ -relation connection not to hold.  $N$  could have different roles in different possible worlds. In which case,  $N[F,G]$  may hold at some world  $w$ , but it need not be the case that every  $F$  is  $G$  holds in this world.

Bird argues that for the relation to hold, Armstrong needs a higher, third-order relation:

“What Armstrong needs, in other words, is a third-order relational fact,  $N^*[N,R]$ , where  $N^*$  is a third-order relation standing between the  $N$ -relation and  $R$ , a relation such that wherever  $R[F,G]$ , it is simply analytically true that Every  $F$  is  $G$ .” (Bird 2005:150)

But this only pushes the problem up a level. We now need to explain this third-order necessitation, by positing a fourth-order property  $N^{**}$ , and similarly a fifth-order property  $N^{***}$  and so on *ad infinitum*. This infinite hierarchy of  $N$ -relations fails to explain the source of the necessity in question, as Bird argues, and so generates a vicious regress for Armstrong’s account of laws.

“In the necessitation hierarchy  $N_n$  is supposed to have certain quasi-modal and explanatory properties, but it can have them only if they are conferred upon it by some  $N_{n+1}$  that has precisely the same kind of quasi-modal and explanatory properties. If so the source of this modality and explanatory force has not been located. There is nothing in the hierarchy that generates these features. In each case they are passed on from the higher-order  $N$  to the lower-order  $N$ , but we have no explication of whence they come.” (Bird 2007:94)

### **Dispositional essentialism open to same criticism**

Barker and Smart argue that Bird’s dispositional essentialist account of laws also suffers a vicious regress in accounting for the necessity of laws (Barker and Smart 2012). For Bird, the essential nature, identity and modal roles of a property are fixed by the stimulus-response relations it enters into with other properties. For example, the essential nature of *fragility* is constituted by the stimulus and response relations of dropping and shattering, respectively. The fact that the stimulus-response relation holds between the properties *fragility*, *being dropped* and *shattering* can be represented as:

$SR[(F,D),S]$

where  $F$ =fragility,  $D$ =dropped, and  $S$ =shattering. Barker and Smart present the necessitation that Bird requires of laws as:

“SRN: If  $SR[(F,D),S]$  obtains in any metaphysically possible world  $w$ , then every  $x$  that is  $F$  and  $D$  in  $w$ , is (or will tend to be)  $S$  in  $w$ .” (Barker and Smart 2012:719).

Barker and Smart (2012) ask where the necessitation found in Bird's account comes from?

“But in virtue of what does this necessitation between the second-order fact,  $SR[(F, D), S]$ , and the first-order patterns of tendency hold? This is, effectively, the same question that leads us on Bird's [that is, Armstrong's] regress. To explain the necessitation in SRN, we need a third-order fact to link  $SR[(F, D), S]$  to the tendency between particular concrete events. Bird is hoist by his own petard.” (Barker and Smart 2012:720).

Bird's SR relation is a second order relation, just like Armstrong's nomic N relation. Just as Armstrong requires a further higher-level relation to account for the necessity it imposed on the lower-level relation between properties (as universals), so too Barker and Smart argue Bird's second-order SR relation requires a further higher-level relation to account for the necessity of the lower-level relation.

Why does Bird fail to notice his account of laws faces the same regress as Armstrong? Barker and Smart claim that Bird confuses the role that necessity plays in his account of modality. They note that there are three points at which necessity can enter Bird's account of laws:

- A. First-order (events/states of affairs) causally *necessitate* other first-order states.
- B. Second-order facts, like  $SR[(F, D), S]$  *necessitate* patterns of instantiation amongst first-properties.
- C. Properties may *by necessity* have modal roles (like those specified in B).

According to Barker and Smart, Bird's mistake is to confuse B and C and hold that the necessity found in C gets rid of the necessity found in B.

“He [Bird] thinks that by showing properties essentially have certain modal roles (by dint of relational constitution) he has dispensed with the kind of necessity we require at B. But that's false, since modal roles are defined by this kind of necessity.” (Barker and Smart 2012:722)

The very regress that Bird charges Armstrong with in accounting for the necessity of laws has been shown to infect Bird's dispositional essentialist account of necessary laws. The requisite necessity that Bird seeks is not accounted for by



adding higher-level relations and so the regress is vicious. As such, dispositional essentialism is on the same footing as the nomic necessitarian account of laws. They both fail to provide an adequate account of laws. Dispositional essentialism thereby has no advantage over categoricism in accounting for the necessity of causal laws.

### **Criticism of the argument to the best explanation**

It has been shown that dispositional essentialism does not provide a better explanation of properties and laws than its denial, categoricism. Bird's arguments that dispositional essentialism provides a better, more robust account of properties was shown to be circular. While the arguments Bird ranged against categoricist accounts of laws were shown to also rule out the Disposition Essentialist account of laws. There is no argument to the best explanation in favour of dispositional essentialism. Bird fails to provide any reason to accept his claim that properties are pure powers and possess dispositional essences.

I now want to put these problems aside to show that even if we accept Bird's claim that dispositional essentialism does provide a more robust account of properties and laws, it nonetheless still fails as an argument to the best explanation in favour of dispositional essentialism. Arguments to the best explanation are judged on a cost-benefit analysis. A good argument to the best explanation is one that, according to Mumford, is "wealth-creating" and "inflationary" (Mumford 2005:432). Unfortunately, Ellis and Bird's arguments for dispositional essentialism fail any such cost-benefit analysis. The problem is that the supposed benefits of dispositional essentialism in accounting for properties and laws are nothing more than the initial assumptions of dispositional essentialism.

Bird's argument to the best explanation claims that if we assume dispositional essentialism and take it as primitive that the properties of fundamental particles are dispositional essences and necessary, then this provides a robust account of some troubling metaphysical issues concerning causal laws and properties. The

first thing worth noting is that to assume essences and necessity as primitive features of an ontology is a big assumption.

We know the cost — assuming necessity as a primitive. What are the benefits? And are they wealth creating and inflationary? Let us look at Bird's account of causal laws. As noted above, Bird is quite explicit that dispositional essentialism provides an ontologically deflationary account of laws. Laws are not an ontological addition on top of potencies possessing dispositional essences. Once dispositional essentialism is assumed then nothing more is needed for the existence of necessary laws. As such there is no cost benefit to be found here for dispositional essentialism in its account of metaphysically necessary laws. The benefits are nothing more than the costs.

The case is no better for properties. Bird claims that dispositional essentialism provides an account of the transworld identity of properties, something that categorical properties as quiddities fails to do. However, the transworld identity of properties is nothing more than the assumption that properties possess dispositional essences and so are necessary. In other words, Bird assumes primitive transworld identity of properties in formulating the dispositional essentialist position. To claim that properties have transworld identity is just to claim that properties are necessary. As such, there is no cost benefit to be found in dispositional essentialism's account of properties.

As the examples above illustrate, the supposed robustness gained is nothing more than the robust necessity that was assumed to get dispositional essentialism going in the first place. I conclude that Bird's argument to the best explanation in favour of dispositional essentialism fails the cost benefit analysis by which we judge such arguments and so gives us no reason to accept dispositional essentialism.

### **Argument from science for dispositional essentialism**

I now turn to the second argument advanced in favour of dispositional essentialism — the argument from science. Particle physics suggests that the

fundamental particles, such as quarks and electrons, are pointlike and simple, lacking parts and structure (Kane 1995). Proponents of pure powers (and dispositional essentialism) believe these findings support their cause in two ways. Firstly, it is thought that if fundamental particles are simple and lack structure, then there is no structure to ground the powers of fundamental particles and these powers must therefore be pure, bare and ungrounded. I show that this line of reasoning commits the headless women fallacy and so should be rejected. Secondly, it is noted that science uses only dispositional terms, such as “spin” and “charge”, to characterise the properties of fundamental particles. The fact that particle physics only uses dispositional terms to talk about these properties is thought to entail that these properties are solely dispositional. However, to draw such a conclusion is to confuse and conflate how we talk about the world for the nature of the world. I conclude that the argument from science fails to support Bird’s claim that the properties of fundamental particles are purely dispositional essences.

### **Particle physics supports the existence of pure powers — physicists have not found structure in fundamental entities**

Let us turn to the first reason for thinking the findings of particle physics support the existence of pure powers and dispositional essentialism. Particle physics finds no structure at the level of fundamental entities, despite using projectile energies over a hundred thousand times greater than those at which structure might have been expected to appear, and despite the best efforts of particle physics, electrons and quarks continue to behave like entities without structure. Science suggests subatomic particles are simple. If subatomic particles are simple, then, it is reasoned, their properties must be pure powers.

Gordon Kane (1995) notes that science has historically revealed more and more fine-grained matter. For example:

“...[I]n the nineteenth century, the chemical elements (oxygen, carbon, silver, etc.) were each found to have a smallest recognizable unit, those units were named atoms. More research early in the twentieth century revealed that those atoms had structure (a nucleus at the center,

surrounded by electrons)... Then it was learned that the nucleus contained protons and neutrons and, in the 1960s, that protons and neutrons contained quarks.” (Kane 1995:5)

But recent experiments, Kane points out, have found no deeper structure:

“Historically, every significant increase in projectile energy has led to the discovery of a deeper level of structure. For over half a century larger and larger machines called accelerators have been built in order to probe matter with increasingly energetic projectiles — electrons and other particles. The most recent experiments on electrons and quarks have used projectile energies over a hundred thousand times greater than those at which structure might have appeared if history were going to repeat itself once more.” (Kane 1995:9)

This leads Kane to suggest “that the historical search for smaller constituents may have ended” and that the fundamental particles are simple, pointlike and lack structure (Kane 1995:10).

A number of philosophers take these findings of particle physics to show the powers and dispositions of fundamental particles are pure and bare.<sup>31</sup> For example, McKittrick declares that:

“Our best scientific theories posit properties which are bare dispositions.”  
(McKittrick 2003b:356)

Ellis and Lierse echo similar sentiments. They take it that science shows the fundamental particles cannot be categorical and must be purely dispositional:

“There is one argument against categorical realism, however, which appears to be decisive. This is the argument from science. With few exceptions, the most fundamental properties that we know about are all dispositional. They are of the nature of powers, capacities and propensities.” (Ellis and Lierse 1994:32)

Blackburn also contends that science shows properties are purely dispositional when he declares that:

---

<sup>31</sup> See Molnar (2003:133-34), Ellis and Lierse (1994:32), McKittrick (2003b:356), Strawson (1980:280) and Blackburn (1990:255)

“...[S]cience finds only dispositional properties, all the way down.”  
(Blackburn 1990:255)

The reasoning here is easy to see, if fundamental particles are simple and lack structure, then there is no structure to ground the powers of fundamental particles and these powers must be pure, bare and ungrounded. The issue is simple — the powers and dispositions of fundamental particles cannot be explained in terms of deeper structure as science shows there is no deeper structure. Dispositions and powers are therefore thought to be pure and baseless.<sup>32</sup> The Argument from Science appears to offer empirical evidence that rules out grounding via compositional structure.

I will examine two possible responses to this argument. One response is to challenge the claim that the conclusion (that science rules out powers grounded via compositional structure) follows from the findings of particle physics. It may be objected that the argument from science for structureless properties falls foul of Armstrong’s headless woman fallacy. Armstrong notes that not seeing a woman’s head is not the same as seeing that the woman has no head.

Armstrong’s states his argument in more general terms:

“What the example shows is that... it is very natural for human beings to pass from something that is true: ‘I do not perceive that X is Y’ to something that may be false ‘I perceive that X is not Y’.” (Armstrong 1968:48)

In the case at hand, we cannot move from “experience does not reveal structure in subatomic particles” to the claim that “experience reveals subatomic particles lack structure”. In other words, our inability to discover structure at the subatomic level does not license the claim that we discover no structure at the subatomic level. This would be an invalid pattern of inference. The truth of the premise that science has not discovered structure at the subatomic level does not force the conclusion that science has found no structure at the subatomic level. It is possible to accept the premise and deny the conclusion. As such, the argument

---

<sup>32</sup> Versions of this structureless argument for pure powers can be found in Blackburn (1990), Broad (1925), Goodman (1954), Harre (1986), Harre and Madden (1975), Martin (1993, 2008), Molnar (1999, 2003), Mumford (2006), Psillos (2006), and Strawson (1980).

from science for simple, structureless subatomic properties (and thus pure powers) is not a deductively valid argument.

The argument from science was introduced as an empirical argument for the simplicity of subatomic properties. Kane takes the argument to be empirical, noting that it cannot prove the simplicity of subatomic properties:

“Of course, we can never prove that smaller subdivisions will not be found if a future supercollider can probe to smaller distances. But we have seen that matter had already been probed to distances far smaller than where structure might have occurred, so perhaps we do know the final constituents.” (Kane 1995:107)

In this case, we run up against the problem of induction. As Karl Popper (1959) argues, scientific theories are not confirmed or verified. Instances of not finding structure in subatomic particles do not support or confirm the claim that all subatomic particles lack structure. At best theories can be falsified or “corroborated”. The theory that the properties of subatomic particles are pure may well count as corroborated in that it has been subjected to rigorous testing without falsification. However, corroboration should not be confused with evidential support.

A second response to the argument from science is to accept that the argument from science rules out the grounding of powers via compositional structure and instead argue there are other forms of grounding powers which are categorical. Neil Williams (2011) argues that powers are grounded via a supervenient notion of structure, which is categorical. In which case powers are not pure.

“Here the categorical properties are instantiated by the same object which is characterized dispositionally, without moving to a lower level of constituent entities. The ‘lower’ level is a level of properties: the dispositional properties of the object supervene on the categorical properties of the object. The structure is a supervenient structure.”

(Williams 2011:83)

Williams holds that the argument from science may well rule out the grounding of powers via compositional structure, but says nothing against such grounding

via categorical supervenient structures. This leads Williams to conclude that so long as the supervenient sense of structure remains an open possibility, the argument from science for pure powers fails:

“It does not follow from the lack of compositional structure that there is no possible grounding structure: the supervenient sense remains an open possibility. Hence the argument [from science] fails.” (Williams 2011:83)

Psillos (2006) provides another account of non-compositional structure using symmetries. According to Psillos, symmetries are categorical structures of a system of particles. These symmetries are categorical properties and account for and ground powers and dispositions of subatomic particles. The existence of these symmetries, and thereby the categorical grounding of dispositions, is compatible with the argument from science. As such, the argument from science fails to rule out non-pure powers at the subatomic level.

A significant move in Psillos’ argument is that symmetry is a categorical structure of a system of particles. This holistic, system-based account finds resonance in contemporary scientific debate that suggests the powers and dispositions of fundamental particles are holistic and belong to whole systems of entities.<sup>33</sup> On this account, powers such as spin and charge are properties of a whole system. They are not powers of individual constituents or types of constituents. Electrons, understood as a type, do not possess charge. Rather charge is possessed by a system as a whole. It is only systems that possess powers. Contemporary science not only does not support the pure powers view, it suggests quite the opposite — that powers are not pure.<sup>34</sup>

### **Physicists use only dispositional terms**

A second reason advanced for thinking that the findings of particle physics support the existence of pure powers and dispositional essentialism is that physics uses only dispositional terms in characterising the properties of fundamental entities:

---

<sup>33</sup> See Healey (1991) and Teller (1986), Williams (2011:75 fn10)

<sup>34</sup> Harre (1986) introduces a similar holistic notion of “ultra-grounding”. Powers and dispositions are grounded in a holistic system-based account of powers.

“The terms physicists use to characterize the fundamental physical entities are dispositional: ‘spin’, ‘charge’, ‘mass’, and so on are all overtly dispositional terms. And not only are these terms *prima facie* dispositional (in that they strike one as concerning what the fundamental entities can and will do) — the same conclusion can be drawn from a closer examination of their use and interpretation within contemporary physics. For instance, ‘charge’ names the disposition to produce electromagnetic fields, and ‘spin’ the disposition to contribute to the total angular momentum of a system.” (Ellis 2002:47)

Not only are the terms physics uses to characterise the properties of fundamental entities dispositional, the very scientific method employed to discover and characterise these properties is also dispositional. The manner in which we probe and detect the nature and properties of subatomic particles using accelerators is in terms of how such entities act and interact when hit with an energetic projectile, such as a stream of electrons. Kane uses an analogy to demonstrate the dispositional nature of scientific method used to explore subatomic particles:

“For example, if you throw a small steel pellet at a peach, it will bounce off. If you shoot the pellet at high speed (therefore at higher energy) it will penetrate the peach, but bounce off the pit. So you can learn that peaches have pits without cutting into them. You could even learn the size of the pit by studying which pellets went all the way through and which ones bounced.” (Kane 1995:8-9)

When we probe and explore the nature of subatomic particles in terms of how they act and interact it is in terms of their dispositional properties. The very method of investigation is dispositional.

Williams argues that scientific methodology, at least as it applies to the fundamental particles, is dispositional:

“The only access we have to the unobservable entities of microphysics is through their responses to various tests. We are restricted, as it were, to poking and prodding at them with bombardments, and ‘seeing’ (through instruments) how they react. This informs us about the reactions,



responses, and outputs that the fundamental entities produce in response to testing; it tells us what behaviour the entities exhibit.” (Williams 2011:77-78)

The salient point here is that scientific methodology has only one mode of characterising and exploring the properties of fundamental entities: the dispositional. So the fact that science tells us that the fundamental particles are dispositional is not a reflection on the nature of the world and the nature of fundamental particles. Rather it is a reflection on the methodology of science. The dispositional characterization of the fundamental particles and their powers is an inescapable consequence of the methodology used. As a result, the solely dispositional characterisation of the fundamental particles and their powers provides no evidence that these entities are solely dispositional. Even if the properties of fundamental entities are categorical, particle physics would still use dispositional methods to explore them and characterise them in dispositional terms.

Williams suggest that the dispositional nature of scientific methodology not only shows that science does not support the claims of dispositional essentialism, it also argues for epistemic humility about the nature of fundamental properties:

“The nature of scientific practice in microphysics leaves us unable to say (with any confidence) what the intrinsic natures of the properties of the fundamental entities are really like. Because the dispositional characterization applied to the fundamental entities is an inescapable consequence of the methodology, that the characterization is exclusively dispositional provides no evidence that the fundamental properties are exclusively dispositional — even if that happens to be the case.” (Williams 2011:79)

It has been shown that our use of dispositional terms to characterise the properties of subatomic particles, and the fact that these properties are discovered and identified by dispositional, scientific method does not entail that these properties are purely dispositional. To think otherwise is to mistake the way we characterise and discover these properties for the nature of these properties.

As noted in chapter three, Kripke shows that it is a mistake to take the manner in which we fix the reference of a term for the meaning of the term. It would appear dispositional essentialism mistakenly conflates the manner in which we fix and characterise the reference of property terms for the meaning of these terms and draws unwarranted ontological conclusions from this conflation. It is a mistake for dispositional essentialism to hold that just because we have no qualitative or categorical language or manner of probing and exploring these properties that they must be purely dispositional and cannot be categorical.

This section has looked at two arguments put forward in support of dispositional essentialism — the argument to the best explanation and the argument from science. The argument to the best explanation fails to support Bird's claim that properties are pure powers possessing dispositional essences. Bird does not succeed in arguing that dispositional essentialism provides a more robust account of properties and laws than its categoricalism, the denial of dispositional essentialism. The very criticisms that Bird levels against categoricalism were shown to also befall dispositional essentialism. Furthermore, Bird's argument to the best explanation fails the cost benefit analysis by which we judge such arguments.

The argument from science also fails to support Bird's claim that properties are pure powers possessing dispositional essences. It has been shown that our use of dispositional terms to characterise the properties of subatomic particles, and the fact that these properties are discovered and identified by dispositional, scientific method does not entail that these properties are purely dispositional. To think otherwise is to mistake the way we characterise and discover these properties for the nature of these properties.

### **4.2.3 Arguments against pure powers**

So far, in section one, I introduced the pure powers view and showed it entails dispositional essentialism and the necessity of causal laws. In section two I looked at arguments in support of dispositional essentialism and demonstrated they

failed to establish that the properties of fundamental particles are pure powers with dispositional essences. In this section I look at three regress arguments that threaten dispositional essentialism. I conclude that the individuation regress poses a serious problem. It shows dispositional essentialism is incoherent and so should be rejected.

As noted earlier in this chapter, dispositional essentialism is a relational account of properties. According to dispositional essentialism, properties are nothing more than their power to effect and be affected by other properties (such as their stimulus and manifestations conditions). As such, properties are nothing more than their relation with other properties and so the dispositional essentialist account of properties is relational. The nature of a property is determined solely by its relations with other properties. It also appears to involve a regress. A property is nothing more than its power to effect and be affected by other properties, which in turn are nothing more than their power to effect and be affected by other properties, and so on.

There are at least three versions of the regress argument. The truth-making regress argues that dispositional ascriptions are made true by facts about their manifestations, which in turn are made true by their manifestations, and so on. The epistemic regress argues that disposition ascriptions are known through their manifestations, which in turn are known through their manifestations, and so on. While the individuation regress argues that disposition ascriptions are individuated by their manifestations, which in turn are individuated by their manifestations, and so on.

### **Truth-making regress**

Simon Blackburn (1990) argues that a world of pure powers leads to a vicious regress about truth and so is incoherent:

“To conceive of all the truths about a world as dispositional is to suppose that a world is entirely described by what is true at neighbouring worlds. And since our argument was *a priori*, these truths in turn vanish into truths about yet other neighbouring worlds, and the result is that there is no truth anywhere.” (Blackburn 1990:64)

Blackburn's premise that:

“To conceive of all the truths about a world as dispositional is to suppose that a world is entirely described by what is true at neighbouring worlds” rests upon two crucial assumed premises: (i) dispositions are analysed counterfactually and (ii) counterfactuals are made true by what happens at neighbouring worlds.

We may represent this argument in the following manner:

(P1) Science finds only dispositional properties

(P2) Dispositions are analysed counterfactually

(P3) Counterfactuals are made true by what happens at neighbouring worlds

(P4) What is true at neighbouring worlds is a matter of what dispositions there are in that world, which in turn are made true by what happens at yet other neighbouring worlds.

Therefore:

(C) A world containing just dispositional properties is incoherent.

Blackburn's argument rests upon the false counterfactual analysis of dispositions. Martin has shown that the truth of a counterfactual is neither necessary nor sufficient for the possession of a disposition (Martin 1994). If dispositions are not analysed counterfactually, then there is no reason to claim that dispositional ascriptions are made true by what happens at neighbouring worlds and so the regress cannot get started. Premise (P2) is false and as such Blackburn's argument that dispositional essentialism is incoherent is unsound. Blackburn fails to establish the truth of his conclusion that a world containing just dispositional properties is incoherent.

### **Epistemic regress**

Richard Swinburne (1980:316-19) argues that a world of pure powers leads to a regress that precludes us from knowing what property anything has. Here is the regress: knowledge of a property requires knowledge of its manifestation, which is itself a property, and so in turn requires knowledge of its manifestation, and so

on. This leads to an infinite chain without any property being known. Hence the regress is vicious. Here is Swinburne's argument:

“One can recognize that objects have powers only if one can recognize when such changes have occurred...[T]o recognize that changes have occurred, one has to recognize properties. But if properties are nothing but potentialities for contributing to causal powers, we have a vicious infinite regress.” (Swinburne 1980:317)

Bird argues that we can stop the regress and thus have knowledge of properties:

“It therefore seems as if we can only know any property if this regress ends somewhere with a property which is not a potency but is something else, and colours or colour qualia seems instances of such non-potency, categorical properties. But in fact the epistemological chain can end with a property which while a potency is itself a state of knowledge (or other epistemic state) concerning other potencies. There is no further regress since there is no requirement that to be in a state of knowledge one must know that one is in such a state...” (Bird 2007:135)

Bird argues that the regress identified by Swinburne stops when it reaches observation, in the form of colours and colour qualia in this case. For the dispositional essentialist, colours are not categorical properties. So the regress is not halted by the existence of categorical properties. Rather, Bird makes recourse to a distinction between knowing  $x$  and knowing that you know  $x$  to use observation to stop the regress. Troy Cross shows how this distinction halts the regress:

“Of course, these regress-halting observations are themselves dispositions, like everything else, but we detect their contents not be first detecting that we are having the observation. Rather, the observation *already* is a detection of its contents. The epistemic regress stops, in other words, when it runs through epistemic states themselves.” (Cross 2012:2)

With this move Bird stops Swinburne's regress and so saves dispositional essentialism.

### **Individuation regress**

The third and most troubling argument against dispositional essentialism is Lowe's individuation regress argument (Lowe 2010). Lowe argues that dispositional essentialism fails to provide an adequate account or criterion for the individuation of properties. The argument starts by assuming that properties as powers are individuated, at least partly, by their manifestation. Lowe then argues:

“But...the manifestation of powers themselves always consist simply in the acquisition of *further powers*. This seems to raise the threat of a vicious circularity (or else an infinite regress) in the individuation of powers...”  
(Lowe 2010:8)

The idea here is that the manifestation of a property as a power is itself a property and so its identity consists in the manifestation of further properties, and so on. This leads to a regress. It is either circular or vicious and so shows that the claim properties are pure powers is incoherent.

Bird contends that the real problem of circularity that critics such as Lowe level against dispositional essentialism turns on the relational nature of dispositional essences:

“Dispositional essences are relational — the essence of a property is a relation to other properties. If essences fix identity, as Aristotle says, then the identity of a property is determinate only if the properties to which its essence relates themselves have determinate identity. And that is just what is ruled out by circularity.” (Bird 2007:137)

Bird embraces the relational nature of the identity of properties (Bird 2007:139). He responds to the individuation regress by appealing to structuralist considerations in the form of graph theory to argue that the identity of properties

can be determined relationally. In outline Bird's argument is simple and direct. In detail it is complex and technical. Here is the argument in outline:

1. properties as pure powers can be modelled using graphs
2. graphs are able to determine the identity of their relational elements, so long as the graph is asymmetrical.

From this Bird concludes that pure powers are capable of being individuated.

A graph is a mathematical structure, consisting of a set of vertices connected by edges, used to model relations between entities. A graph is an ordered pair  $G = (V, E)$  comprising a set  $V$  of vertices or nodes together with a set  $E$  of edges or lines, which are two-element subsets of  $V$ . Bird declares that the thesis under discussion, one that he defends is this:

(S) The identity and distinctness of the elements of a set  $E$  of entities supervene on the instantiations of some relation  $R$  (or set of relations  $\{R_i\}$ ) on the elements of  $E$ .

Bird holds that by appeal to graph theory we can show that a set of  $R$ -relations on  $E$  is sufficient to determine the identities of each element of  $E$ . The idea here is that the identity and distinctness of the vertices of a graph can supervene on the structure of the graph.

For this to work the graph must be asymmetrical. If the graph is symmetrical, then, as Bird explains, the graph will not determine the identity of its entities:

“It can be easily seen that [if the graph is symmetrical] a rotation of  $180^\circ$  will take all the vertices onto different vertices yet leave the structure unchanged. Consequently the structure of this graph fails to determine the identity of its vertices.” (Bird 2007:140)

What is required, Bird notes, for a graph to be able to determine the identity of its relational elements is that it be asymmetrical:

“Such a graph would have no way of swapping vertices while leaving structure unchanged. Which is to say that the structure determines the identity of the vertices — the structure itself distinguishes each vertex from every other vertex; i.e. the identity of vertices supervenes on the set of instantiations of the edge relation.” (Bird 2007:139)

The idea is that properties as powers can be modelled or represented on a graph that is able to determine the identity of its relational elements, so long as the graph is asymmetrical. Properties as powers are individuated by their position in the power structure of which they are a part. Bird summarises and concludes his argument against the identity regress:

“[I]t remains the case that there are graphs that represent possible structures of pure potencies that have the property that the identity and distinctness of the vertices supervene on the structure of manifestation and stimulus relations. We may confidently conclude therefore that the regress objection can be answered. There may be structures of potencies that are circular (or that involve infinitely many potencies) but that is no obstacle to the identities of those potencies being fully determined by the asymmetric pattern of those structures.” (Bird 2007:146)

Bird has produced an elegant argument to claim that relational entities, such as pure powers, can be individuated by structural elements.

However, Bird’s recourse to graphs and structure is thought to be an inadequate response to the individuation regress for a number of reasons. I look at four. For one, as Lowe (2010) and Cross (2012:304) argue, the whole dispositional structure is not individuated by anything and so, according to Bird’s own criterion, the dispositional structure as a whole lacks identity and is indeterminate. While it may seem odd that the structure itself lacks identity and is indeterminate, its lack of identity does not seem to rule out the structure’s ability to individuate properties in the structure.

Another problem is epistemic. On Bird’s structuralist, graph account, knowledge of one property would require knowledge of the whole structure of dispositions.



This leads to the sceptical conclusion that we cannot have any knowledge of the fundamental properties, something Bird is at pains to deny. While this may be a problem for Bird, it is not fatal for dispositional essentialism if one is happy to embrace epistemic humility about such properties, as Lewis does.

A third problem is that Bird now appears to have two criteria for the identity and individuation of properties as powers. On one criterion properties are individuated by their position in the power structure. On another criterion properties are individuated by the stimulus response relations they enter into. Perhaps these two criteria amount to the same thing. However, it is certainly far from obvious that they are the same. The defender of dispositional essentialism needs to explicitly show that there are not now two different account of how properties are individuated. Without such an argument there are real concerns about the coherence of Bird's position.

The fourth and most serious problem is that symmetrical dispositional structures, that is, structures that would fail to individuate properties, are possible. The problem here is that there is no reason to think that the power structure in any world is actually asymmetrical. It could be that all worlds possess symmetrical power structures. In which case properties as pure powers would not be individuated. As Lowe notes:

“It surely will not do to proclaim as an *a priori* truth that the power structure of any possible world must exhibit symmetries which permit the assignment of each power in that world to a unique position in that structure.” (Lowe 2010:19)

Bird's problem here is not that he is wrong to claim that asymmetrical graphs and structures are capable of individuating properties as pure powers and giving them identity. Rather, the issue is that there is no reason to hold that such asymmetrical structures must exist. There is nothing to rule out the possibility of a world of symmetrical power structures in which the notion of properties as pure powers is incoherent on the grounds that such properties could not be individuated. This is a serious problem for Bird and counts as a strong reason to reject the dispositional essentialist account of properties as pure powers possessing dispositional essences.

## **Conclusion**

Dispositional essentialism (at least in the guise of pan-dispositional) claims that all real properties are pure powers possessing dispositional essences. Dispositional essentialism is right to reject a dualist account of categorical and dispositional properties, as advocated by Prior, Pargetter and Jackson. Instead it provides a monist, unitary account of properties. However, it is wrong to claim that properties are solely and purely dispositional. As was shown, arguments advanced in support of dispositional essentialism give us no reason to accept such an account of properties. Bird's argument to the best explanation was shown to fail the cost benefit analysis upon which arguments are judged. The criticism he levelled against categoricalist accounts of properties and laws were shown to also befall dispositional essentialism. The argument from science rested on the claim that particle physics finds only simple, pointlike, structureless entities at the subatomic level. However, as the headless women argument illustrates, not finding structure is not the same as finding there is no structure. While the argument from science may fail to establish the truth of dispositional essentialism, it nonetheless motivates and underpins dispositional essentialism. Bird argued science uses dispositional terms to characterise the properties of subatomic particles and uses dispositional methodology to identify these properties. Dispositional essentialism is motivated by a confusion between the manner in which we characterise and identify the reference of properties and power terms with the meaning of those terms. Dispositional essentialism wrongly draws conclusions about the nature of properties and dispositions based on how we identify and talk about properties and dispositions.

Not only is there little reason to accept dispositional essentialism, there is also strong reason to reject such an account of properties. The individuation regress poses a serious problem for dispositional essentialism that Bird cannot overcome. It shows dispositional essentialism is incoherent and so should be rejected.

## **Chapter 4.3 — Categoricalism**

### **4.3.1 Armstrong's categoricalist account of dispositions**

- Dispositions are reducible to and identical to categorical properties
- The identity between dispositions and categorical properties is contingent (as the laws of nature are contingent)

### **4.3.2 Motivations and arguments for categoricalism**

- Truthmaker argument for categoricalism:
  - Statement of truthmaker principle
  - Dispositions entail counterfactuals
  - Counterfactuals not made true by counterfactual facts, as they do not exist
  - Truthmaker cannot be a dispositional properties as dispositions involve unacceptable intentionality and so do not exist
  - Truthmaker must be categorical property
- Problem with the truthmaker argument for categoricalism
  - Dispositions do not entail counterfactuals
  - Dispositions are not intentional
  - Criticism of truthmakers — cannot account for negative truths

### **4.3.3 Criticism of categoricalism**

- Armstrong has two incompatible accounts of dispositions
  - Dispositions identical to categorical properties
  - Dispositions identical to categorical properties plus laws
- All categorical properties are also dispositional
- No epistemic access to causally inert properties

## **Introduction**

This chapter is concerned with categoricism, the claim that properties are solely categorical or qualitative and the denial that there are any irreducible dispositions and powers. The chapter is divided into three sections. Section one introduces Armstrong's categoricist account of properties. He argues that powers are identical to and reducible to categorical properties.

Section two examines arguments for categoricism. Armstrong's claim that all properties are categorical is motivated by his commitment to the truthmaker principle and rejection of intentionality, which he finds in dispositions. It is shown that Armstrong's arguments for categoricism are unsound. He confuses how we pick out the reference of dispositional terms, via counterfactuals, for the meaning of those terms and also conflates the manifestation of a disposition for the disposition itself.

Section three looks at problems and complications with the categoricist account of dispositions and asks whether it provides an adequate account of properties. These problems include a tension in Armstrong's account of how categorical properties account for dispositions, claims that purely categorical properties are unknowable, and that assertion that there are no purely categorical properties — that all properties involve dispositionality. I argue that these objections can be met by a proponent of categoricism and that they provide no reason to reject categoricism. At the same time, Armstrong fails to provide any sound arguments for why we should accept that all properties are categorical.

I conclude that categoricism is right to claim that just because we make dispositional ascriptions and use a language of dispositional properties in talking about the world it does not follow that there are dispositional properties. Dispositional terms do not describe irreducible dispositional properties or states of affairs. Instead, dispositional ascriptions are just ways of talking about and designating categorical properties. However, categoricism makes the mistake of taking categorical ascriptions and concepts to mirror reality. They fail to apply the same skepticism about dispositional talk to categorical talk and are make

unwarranted ontological implications based on language when they claim that all properties are purely categorical.

#### **4.3.1 Armstrong's categoriclist account of properties**

In explicating categoricism, I concentrate on Armstrong's account of categoricism.<sup>35</sup> Armstrong argues that all properties are solely categorical or qualitative. In doing so he denies there are any irreducible dispositions or powers. Rather, dispositions and powers are explained in terms of, identical to and reducible to categorical properties. For example, a sugar cube's possessing the dispositional property of solubility is explained in terms of the sugar cube possessing a certain molecular structure understood as a categorical, non-dispositional property of the sugar. Furthermore, the sugar's solubility is identical to and reducible to these categorical, non-dispositional properties of the sugar.

The identity between dispositions and categorical properties is contingent, according to Armstrong. There are worlds indistinguishable from our world in terms of categorical properties, yet possessing different dispositions and powers. In this world solubility may be identical with and reducible to a certain microstructure, but there are other worlds in which sugar has the same microstructure, yet is not soluble.

Armstrong denies that the identity of dispositions and categorical properties is an identity of property constitution, such as the *a posteriori* necessary identification of, say heat with the motion of molecules, or of light with electromagnetic radiation (Armstrong, Martin and Place 1996:39). Rather, Armstrong uses the functional notion of playing a causal role to argue for contingent identity. He uses the identity of genes with (sections of) DNA molecules as a model for the contingent identification of dispositions and categorical properties:

“Genes are, by definition, those entities which play the prime causal role in the transmission and reproduction of hereditary characteristics. At least

---

<sup>35</sup> Two chief proponents of categoricism are Armstrong (1969, 1996) and Lewis (1997). Armstrong provides the most sustained and detailed defence of categoricism, and so I concentrate on his account.

in some possible world whose laws of nature differ from the actual world, something other than DNA might have played the causal role of genes. But in fact sections of DNA play that role. So genes are (are identical with) sections of DNA.”(Armstrong, Martin and Place 1996:39)

Armstrong then applies this account of contingent identity to the case of brittleness and its categorical microstructure:

“In the same way, other microstructures may have played the brittleness causal role in the glass, at least in a world whose laws of nature differ from the actual world. But it is a contingent truth that the brittleness causal role is played by this microstructure, i.e. that the brittleness of this glass is (is identical with) this microstructure.” (Armstrong, Martin and Place 1996:39)

Given the laws of nature are contingent, as Armstrong argues they are, it is a contingent matter that the microstructure in question plays the brittleness role in this world. In a world with different laws, the same microstructure may play a different casual role and so not be brittle. Hence, the identity of a disposition and its causal, categorical basis is contingent. What becomes apparent here is that dispositional terms, such as “brittleness”, are non-rigid designators for Armstrong. “Brittleness” may pick out different categorical properties in different worlds.

Armstrong’s account of the contingent identification of dispositions and categorical properties appears to run contrary to his claim that powers are identical to and reducible to categorical properties. If the same categorical property can have different powers in a world with different laws, then it follows that powers are not identical with categorical properties. Armstrong appears to have two different accounts of the identity of dispositions. On one account powers are identical to and reducible to categorical properties. On the other, powers are identical to and reducible to categorical properties *plus* causal laws. I return to this issue below in section three.

#### **4.3.2 Truthmaker argument for categoricism**

Armstrong's argument in Armstrong, Martin and Place (1996) that dispositions and powers are identical to and reducible to categorical properties rests upon three key planks:

- i. His commitment to the truth-maker principle
- ii. The belief that dispositional ascriptions entail counterfactual statements
- iii. The rejection of intentionality.

I show that all three of these key planks is open to challenge and as such his argument is unsound and so gives us no reason to accept that all properties are categorical. Here is a summary of the argument:

(P1) For every true contingent statement there must be something in the world which makes the statement true (Truthmaker principle)

(P2) Dispositional ascriptions entail counterfactual statements.

(Counterfactual analysis of dispositions)

(P3) Counterfactual statements entailed by dispositional ascriptions must have a truthmaker. (P1, P2)

(P4) The truthmaker for a counterfactual statement is not a counterfactual state of affairs, as there are no counterfactual states of affairs.

(Assumption)

(P5) The truthmaker must be a property of the disposed object and so must be either a dispositional or categorical property. (Assumption)

(P6) The truthmaker for a counterfactual statement is not a dispositional property, as there are no dispositional properties. (Assumption)

Therefore,

(C1) The truthmaker for a counterfactual statement entailed by a dispositional ascription must be a categorical property. (P3, P5, P6)

As it stands this argument is valid.

Let us look at the argument in detail. The truthmaker principle introduced in (P1) holds that:

“For every true statement, or at least for every true contingent statement, there must be something in the world which makes the statement true.”

(Armstrong, Martin and Place 1996:15)

Armstrong also refers to the truth-maker principle as the “principle of an ontological ground” (Armstrong, Martin and Place 1996:15). This characterisation brings out the point that a truth-maker is supposed to provide an ontological ground for the truth of a statement. Armstrong finds the truth-maker principle to be “fairly obvious once attention is drawn to it” but admits he does not know how to argue for it any further (Armstrong 1989a:89).

Armstrong also holds, as noted in (P2), that dispositional ascriptions entail counterfactual statements:

“It is uncontroversial that this statement [‘This glass is brittle’ said truly of an unstruck glass] entails a counterfactual statement along these general lines: If this glass had been suitably struck, then this striking would have caused the glass to shatter.” (Armstrong, Martin and Place 1996:15)

Applying the truthmaker principle, Armstrong asks what makes a counterfactual statement entailed by dispositional ascription true?<sup>36</sup> He asks, what is its ontological ground? (Armstrong, Martin and Place 1996:15).

One “very bad answer”, according to Armstrong, is that the counterfactual statement is made true by a counterfactual state of affairs or fact such as (Armstrong, Martin and Place 1996:15):

“...[T]he state of affairs that if, contrary to fact, the glass had been suitably struck, then this striking would have caused the glass to break.” (Armstrong, Martin and Place 1996:15)

Armstrong does not explicitly state why this would be a very bad answer. However, it seems clear enough what the problem is. Truthmakers are states of affairs or facts. However, a counterfactual “fact” is by definition contrary to fact and so does not exist. By definition there can be no counterfactual facts to serve as truthmakers for true counterfactual statements.

After rejecting counterfactual facts, Armstrong instead looks for the required truthmaker among the properties of the unstruck glass. He assumes that the

---

<sup>36</sup> The claim that counterfactuals require truthmakers has been denied by Isaac Levi (2003) on the grounds that counterfactuals do not possess truth values.



properties of the glass are either dispositional or categorical properties. He then argues that the dispositional properties of the unstruck glass cannot serve as truthmakers for counterfactuals entailed by dispositional ascriptions on the grounds that dispositional properties do not exist. His argument that there are no dispositional properties has the form of a *modus tollens* (and so is valid).

(P7) Dispositional properties entail there is intentionality in the ultimate structure of the universe.

(P8) There is no intentionality in the ultimate structure of the universe.

Therefore,

(C2) There are no dispositional properties. (P7, P8 *modus tollens*)

In support of premise (P7), Armstrong uses the independence of a disposition and its manifestation to argue that dispositions would introduce intentionality into the world:

“For suppose that a thing has, in addition to its purely categorical features, active and passive powers and dispositions. It is obviously not a necessary truth, indeed it is not true at all, that every active and passive power of a particular is always manifested at some point in the existence of the particular. Consider then an object that has a particular power, but does not manifest it at any time. Given that this power is a non-categorical property, or is the non-categorical side of the property, then the power ‘points’ to a categorical manifestation of the power, but the manifestation *never exists*.” (Armstrong, Martin and Place 1996:16)

Franz Brentano (Brentano 1924:124f) identifies two criteria for identifying intentionality.<sup>37</sup> One criterion is that the intentional state or object is directed to something beyond itself. The second criterion is that the object or state directed

---

<sup>37</sup> Brentano (1924:124f) uses the notion of intentionality to mark off the mental from the non-mental:

“Every mental phenomenon is characterized by what the Scholastics of the Middle Ages called the intentional (or mental) inexistence of an object, and what we might call, though not wholly unambiguously, reference to a content, direction toward an object...” (Brentano 1924:88)

More recently, a number of philosophers, including Place (Armstrong, Martin and Place 1996:19-32) and Molnar (2003:60-81), have questioned Brentano’s distinction by arguing that the physical, in the form of dispositional properties or states, are “directed” towards other objects (their manifestation) that need not exist and so are intentional. See also Chisolm (1967).

at need not exist. For Armstrong, as the quote above makes clear, a disposition that is never manifested points beyond itself to a manifestation that does not exist and so, he concludes, dispositions are intentional.

Armstrong rules out intentional entities such as dispositions on the grounds that intentionality entails an objectionable, inferior level of potential being:

“Armstrong<sup>38</sup> finds irreducible dispositions very mysterious. The dispositional property points to, or is pregnant with, a certain manifestation. Yet in the case considered, at no point in the whole history of the world does this manifestation occur. It is this that prevents one taking the disposition as a relation to its manifestation... Yet somehow the irreducible disposition involves the manifestation. It would appear that we have a second, inferior, level of being: merely potential being. With his teacher John Anderson, Armstrong is extremely reluctant to postulate such a second level of being.” (Armstrong, Martin and Place 1996:91)

Armstrong here argues for premise (P8): There is no intentionality in the ultimate structure of the universe. When combined with premise (P7), this forces the conclusion (C2) that there are no dispositional properties. This conclusion is used to support premise (P6): That the truthmaker for a counterfactual statement is not a dispositional property, as there are no dispositional properties.

Having ruled out dispositional properties as truthmakers, Armstrong concludes that categorical properties supply the ontological grounding for counterfactual statements entailed by dispositional ascriptions:

“...[T]he truthmaker for the true counterfactual should be sought in purely categorical properties of the glass: such things as the molecular structure of the glass.” (Armstrong, Martin and Place 1996:16)

This concludes the overview of Armstrong’s truthmaker argument for categoricism. However, it is worth noting that Armstrong’s account of

---

<sup>38</sup> This is Armstrong speaking here. The three authors of (Armstrong, Martin and Place 1996) refer to themselves in the third person.

categorical properties as truthmakers is complicated by his claims that strong laws of nature are also as part of the truthmaker for true attributions of dispositions:

“Armstrong accepts the need for truthmakers for true attributions of unmanifested dispositions. But he suggests that non-dispositional properties of the disposed thing plus ‘strong’ laws of nature linking these non-dispositional properties may be sufficient truthmakers.” (Armstrong, Martin and Place 1996:91-92)

These two apparently different truthmakers — on the one hand categorical properties and on the other hand, categorical properties *plus* laws of nature — mirror the two apparently different accounts of the identity and reducibility of dispositions mentioned above. As noted above, I return to this issue in section three below.

### **Problems with the truthmaker argument that all properties are categorical**

I now turn to problems with Armstrong’s argument that all properties are categorical. I show Armstrong is wrong to claim dispositional ascriptions entail counterfactual statements. I also argue Armstrong is wrong to assert dispositions are intentional. Finally, I challenge Armstrong’s assertion that all true contingent statements require a truthmaker. This leads me to conclude that his truthmaker argument that all properties are categorical is unsound and so gives us no reason to accept that all properties are categorical. I argue that Armstrong’s commitment to the (false) counterfactual analysis of dispositions leads him to misunderstand the implications of the independence of a disposition and its manifestation when he argues that disposition as are intentional.

### **Dispositional ascriptions do not entail counterfactual statements**

Finks, mimics, masks and antidotes show that Armstrong is wrong to claim that dispositional ascriptions entail counterfactual statements. As noted in chapter two, Martin’s electro-fink and reverse electro-fink examples illustrate that the truth of a dispositional ascription is neither necessary nor sufficient for the truth of a corresponding counterfactual statement. As such, Armstrong is wrong to

claim that a dispositional ascriptions, such as “This glass is brittle”, entail a corresponding counterfactual statement, such as, “If this glass had been struck, then this striking would have caused the glass to shatter”. Premise (P2) — the claim that dispositional ascriptions entail counterfactual statements — is false and so Armstrong’s argument that all properties are categorical is unsound.

However, it appears that Armstrong’s truthmaker argument for categoricalism can be recast without making reference to his (false) claim that dispositions entail counterfactual statements. Armstrong may simply ask: what is the truthmaker for a statement making a dispositional ascription? For example, what is the truthmaker for “This glass is fragile”? Such a move would allow Armstrong’s argument to proceed without introducing the troublesome, false semantics of the counterfactual analysis of dispositions.

### **Dispositions are not intentional**

A more serious problem resides in Armstrong’s claim that dispositions are intentional. As noted above, Armstrong uses the independence of a disposition and its manifestation to argue that dispositions are intentional objects. Powers and dispositions can exist in the absence of their manifestation. As such, powers and dispositions are ontologically independent of their manifestation.<sup>39</sup> Token independence seems obvious and undeniable. The Ming vase on level two of the Morven Brown building is fragile even when it is not shattering. It need never shatter, yet it still remains fragile. Type independence of a disposition and its manifestation also holds. A world in which salt (as a type) never came in contact with water (or any other liquid) and so never dissolved could still be a world in which salt is soluble. Another way of making the point is that it is only a contingent matter that in this world salt has been immersed in water and so dissolved. That means there is a possible world indistinguishable from our world

---

<sup>39</sup> Independence seems so obvious that it is worth asking why anybody would deny that a disposition and its manifestation are ontologically distinct and independent. Why would someone confuse and conflate a disposition with its manifestation? Mumford contends that empiricist, verificationist and anti-realist assumptions that refuse to separate evidence from ontology are at fault (Mumford 1998:ch3). Verificationist principles entail that a disposition just is its observable events, namely its manifestation.

accept that no sample of salt has ever come in contact with water and dissolved. In such a world salt would still be soluble.

Armstrong is correct to claim a dispositions and its manifestation are independent. However, he draws the wrong lesson from independence when he argues that dispositions are intentional. Armstrong uses the fact that a disposition can exist independently of its manifestation to claim that a disposition is directed or points beyond itself to its unrealised, and so non-existent, manifestation and is thereby intentional.

The ontological independence of a disposition and its manifestation shows that a disposition is a fully formed and respectable property independently of its manifestation. The lesson to drawn from this is that dispositions do not point beyond themselves. Dispositions are ontologically self-contained in that their existence is not dependent on anything else such as manifestations. A disposition can exist while its manifestation does not and so is not directed at anything. This shows, *pace* Armstrong, that dispositions need not involve the manifestation and do not point beyond themselves to what does not exist and so are not intentional. Even if Armstrong is right to state that manifestations involve a second, inferior, level of merely potential being this does not entail that dispositions introduce such merely potential being into the world. A disposition and its manifestation are ontologically distinct and so a disposition has no ontological commitment to the existence of any merely potential being in the form of an unrealized manifestation. A disposition stands fully formed and ontologically whole independently and distinct from any manifestation and its supposedly inferior level of being.

A faulty semantics of dispositional ascriptions, in the form the counterfactual analysis of dispositions, may have lead Armstrong astray here. The counterfactual statement “If this glass had been struck, then this striking would have caused the glass to shatter” makes mentions of the disposition’s manifestation — its shattering — and so encourages one to mistakenly think the manifestation is part of the dispositional ascription and dispositional property.

In using independence to attribute intentionality to dispositions it appears Armstrong has conflated a way in which we characterize and identify dispositions — conditionally, with reference to their possible manifestation — for the disposition itself. This leads him to wrongly consider the manifestation to be part of the disposition. In doing so Armstrong runs afoul of his own warning not to project the ghost of the manifestation into the disposition.

“what more natural, then, when we turn to the metaphysics of dispositionality, than to project into the disposed thing a ghostly image of the manifestation of the disposition, even when it is not manifested?”

(Armstrong, Martin and Place 1996:93)

Yet again, it appears that a faulty semantics of dispositions, in the form of the counterfactual analysis, has lead us astray in our understanding of the nature of dispositions and properties. Independence shows Armstrong fails to establish that dispositions introduce intentionality into the world and so he has given us no reason to accept the truth of premise (P6) — that the truthmaker for a counterfactual statement entailed by a dispositional ascription is not a dispositional property. We therefore have no reason to accept the conclusion of his argument that all properties are categorical.

### **Criticism of the truthmaker principle**

Further problem beset Armstrong’s argument for categoricism. The prime motivation of Armstrong’s argument for categoricism — the truthmaker principle — has been questioned on the grounds it is not generalizable. There are true negative existential statements, such as “There are no Artic penguins” for which there appear to be no truthmakers.

As noted above, Armstrong finds the truth-maker principle to be “fairly obvious once attention is drawn to it” but admits he does not know how to argue for it any further (Armstrong 1989a:89). Lewis (1992 in Lewis 1999:203-204) remarks that it is easy to believe that some truths have truthmakers, such as the existential truth that there are dogs. Dog Harry makes it true (as long as Harry is essentially

a dog, and so could not have existed without being a dog) (1992 in Lewis 1999:203).

However, the existence of negative truths, such as “there are no penguins in the Artic”, poses a problem for the truthmaker principle. What are the truthmakers for negative truths? One suggestion is that for every negative statement (such as, “there are no penguins in the Artic”) there exists a positive state of affairs that is incompatible with, and so cannot co-exist with, there being penguins in the Artic. Molnar argues that such an account fails on the grounds that a statement of incompatibility (such as “p is incompatible with the existence of penguins in the Artic”) is a negative statement and so fails to provide an adequate reductive explanation. Incompatibility is a relation between two states when it is *not* possible for them to obtain together.

“We can only explain the truth of  $\neg p$  by reference to the truth of p if q is incompatible with p. For the explanation to work, ‘p is incompatible with q’ must be true. But this is a negative statement. Explanations of negative truths by incompatibility cannot succeed as reductive explanations because such explanations themselves rely on a negative statement.” (Molnar 2000:74)

Another suggestion is that negative truths are made true by lack of truthmakers. That is, the claim “there are no penguins in the Artic” is true not because of the existence of something, but rather because something does not exist — namely a counterexamples does not exist to there being no penguins in the Artic. Both Lewis and Molnar argue this commits one to the existence of negative facts. Lewis argues:

“...to say that a negative existential is true for lack of truthmakers is the same as to say that it’s true because there aren’t any false-makers. The demand for truthmakers might lead one into ontological seriousness about lacks, but not vice versa.” (Lewis 1992 in Lewis 1999:204)

While Molnar reasons:

“If negative existential truths are not to count as true without the benefit of anything that exists making them true, it had better be claimed that

there really exist such items as lacks, absences, or more generally, negative states of affairs. The lesson to be learnt here is that truths that are true for lack of false-makers are made true by negative facts! If absences are to work for us as truthmakers, we have to take them ontologically seriously.” (Molnar 2000:75)

Absence of truthmakers cannot serve as truthmakers for negative statements as they would have to postulate negative facts. Molnar argues we should reject negative facts on the grounds they are acausal and mysterious.

Armstrong responds to the problem of truthmakers for negative existential statements by positing “totality facts”:

“Now we are in a position to consider negative existential truths. Let it be true that *a* is not F. What makes it true? ...Given that *a* is G and is H and that this is the totality of *a*’s properties, then it is entailed that *a* is not F.” (Armstrong 1989b:96)

The fact that there are polar bears, Artic foxes, narwhales, snowshoe hares etc. in the Artic cannot serve as a truthmaker for the negative existential truth “There are no penguins in the Artic”. The existence of these animals does not rule the existence of Artic penguins. But if we add a further fact that this is the totality of things in the Artic, then these facts would entail the truth of, and so serve as the truthmaker for, the statement “There are no penguins in the Artic”.

There are two problems with Armstrong’s appeal to totality facts. Firstly, Molnar argues that totality facts are negative facts:

“The abiding difficulty of TF [totality facts] is that a totality fact is not a positive fact at all... Totality statements state the non-existence of certain entities, they state ‘no more facts’.” (Molnar 2000:81-82)

That polar bears, Artic foxes, narwhales, snowshoe hares etc. are all there is in the Artic is the same state of affairs as there being nothing that is both a polar bear, Artic fox, narwhale, snowshoe hare, snow goose etc. and not in the Artic (Molnar 2000:81). We have already rejected negative facts and states of affairs and so we must reject totality facts.



Both Lewis and Molnar (2000:84) raise a further problem with Armstrong's appeal to totality facts — they are incompatible with Armstrong's combinatorialism. Lewis notes that:

“The idea [of combinatorialism] was that anything can coexist with anything, yet these totality facts have as their very *raison d'être* to refuse to coexist with other facts. (Lewis 1992 in Lewis 1999:205)

A totality fact is incompatible with and cannot co-exist with the facts that it rules out. That's exactly the point of using such a truthmaker. However, it violates the claim that anything can coexist with anything, as propounded by Armstrong's combinatorialism.

Despite its strong intuitive appeal, there is good reason to hold the truthmaker principle as an ontological principle for the grounding of statements cannot be generalised. Nonetheless, Lewis thinks there is something right about Armstrong's demand for truthmakers:

“Yet it [Armstrong's demand for truthmakers] is not altogether wrong. I think it is an overreaction to something right and important and underappreciated. What's right, roughly speaking, is that truths must have things as their subject matter. The special case of a negative existential is the exception that proves the rule.” (Lewis 1992 in Lewis 1999:206)

For Lewis the “kernel of truth” in truthmaking is that propositions have a subject and as such their truth or falsity is dependent in some sense on how the world is, on its subject matter. Lewis caches this out in terms of supervenience: the truth of proposition supervenes on its subject.

I have argued that we should reject all three planks upon which Armstrong's argument for categoricism rests. I have shown that: dispositional ascriptions do not entail counterfactual statements, dispositions do not introduce intentionality into the world, and the truthmaker principle is not generalisable as an ontological grounding of true statements. Categoricism may well be true. However, Armstrong's argument that all properties are categoric is unsound and so gives

us no reason to accept categoricism. I showed that a false semantics of dispositions, in the form of the counterfactual analysis of dispositions, underpins Armstrong's claims that dispositions entail counterfactual statements and that dispositions introduce intentionality and merely potential being into the world.

### **4.3.3 Problems with categoricism**

I now turn to three criticism of categoricism. One criticism claims Armstrong has two incompatible accounts of dispositions. A second criticism is that there are no purely categorical properties, that all categorical properties are also dispositional. A third criticism argues that categorical properties are epistemically inaccessible and we therefore have no reason to posit their existence. I argue that Armstrong's categoricist account of properties and powers can fend off these objections and conclude they provide no reason to reject categoricism.

#### **Armstrong has two incompatible accounts of dispositions**

As noted in section one, Armstrong appears to have two different and incompatible accounts of dispositional properties. On one account dispositions are identical with and reducible to categorical properties. In particular:

“...[T]he brittleness of this glass is (is identical with) this microstructure.”  
(Armstrong, Martin and Place 1996:39)

On the other hand, Armstrong's account of the contingent identity of the dispositional and categorical suggests that powers are not reducible to merely categorical properties, but rather to categorical properties *plus* causal laws.<sup>40</sup>

---

<sup>40</sup> This tension is also mirrored in his account of truthmakers for counterfactual statements entailed by dispositional ascriptions, as noted in section two. Armstrong declares that the truthmaker is a categorical property of the disposed object:

“What Armstrong has to do therefore is to make plausible the idea that categorical properties by themselves will provide adequate truthmakers for the counterfactuals associated with dispositions, capacities and, more generally, with all active and passive powers.” (Armstrong, Martin and Place 1996:41)

While elsewhere he includes laws of nature as part of the truthmaker:

“Armstrong accepts the need for truthmakers for true attributions of unmanifested dispositions. But he suggests that non-dispositional properties of the disposed thing plus ‘strong’ laws of nature linking these non-dispositional properties may be sufficient truthmakers.” (Armstrong, Martin and Place 1996:91-92)

With different laws, the vase could have possessed the same categorical properties, yet not been fragile. As such, the vase and its categorical properties are not a complete truthmaker for the counterfactual statement “if this vase had been struck it would have shattered”. For Armstrong

Armstrong willing concedes the importance of laws in his reductionist account of dispositions:

“It is obvious that this treatment of dispositions places great weight on the notion of a law of nature.” (Armstrong, Martin and Place 1996:41)

Armstrong dissolves this apparent incompatibility in these two accounts of dispositions by arguing that laws of nature are not casual factors and so are not part of dispositional ascriptions (or truthmaker for statements entailed by dispositional ascription). According to Armstrong, the microstructure of a fragile vase is a causal factor in bringing about its manifestation and is part of the truthmaker of a dispositional ascription. However, he claims laws of nature are not causal factors. Laws of nature do not bring about the manifestation of a disposition. Rather, entities act in accordance with laws of nature:

“There is no call for non-categorical properties. Notice that the laws are not causal factors. The causal factors, real and feigned, bring about the manifestation *in accordance with* the relevant laws, and not with the addition of the laws.” (Armstrong, Martin and Place 1996:41)

To better understand why laws of nature are not casual factors I turn to a debate between Ellis and Bird. Ellis attempts to distinguish between categoricism and the pure powers view of properties on the grounds that categoricism properties are intrinsically passive entities (that are pushed and pulled around by laws of nature external to the properties), while properties as pure powers are essentially active (Ellis 2002:139-144). On Ellis’ account of categoricism laws are causal factors. Bird rejects Ellis’ account of passive categoricism properties pushed around by laws:

“But the picture is highly misleading. Strictly, the metaphysics of laws does not tell us that the laws push and pull things around. The only pushing and pulling is done by one object on another, in virtue of the forces between them. To be sure, the forces exist in virtue of the laws, but that doesn’t make it legitimate to talk of the laws doing any pushing or pulling. Imagine some object attached to a spring. We may explain its

---

there appear to be two different truthmakers for counterfactual statements entailed by dispositional ascriptions.

motion by the force exerted by the spring, a force governed by Hooke's law. But that doesn't make Hooke's law exert a force — it is only the spring that exerts a force. 'Pushing', 'pulling', 'exerting a force' are all causal notions. But on no metaphysics of laws do laws cause anything, although they may govern what causes what. No doubt, such talk is intended metaphorically and so not to have its usual causal implications. But those implications nonetheless make the metaphor a misleading one." (Bird 2007:129)

Bird shows why Ellis is wrong to characterize categorical properties as passive and laws as causal factors pushing things around. In so doing, Bird's account of the role of laws fleshes out Armstrong's claim that objects act in accordance with laws of nature rather than being caused to act by laws. The spring causes the object to act the way it does, not Hooke's law. Hooke's law does not exert any force on the object and does not cause it to act.

On the basis of the claim that laws of nature are not casual factors, Armstrong dissolves the apparent tension of having two different accounts of dispositions and avoids admitting non-categorical entities such as laws to his account of dispositions. Armstrong's argument here rests upon the claim that only causal factors are part of the dispositional ascription (or truthmakers for counterfactual statements entailed by dispositional ascriptions).

### **Categorical properties are also dispositional.**

Franklin (1986), Heil (2003) and Martin (Armstrong, Martin and Place 1996:73) challenge Armstrong's claim that all properties are purely categorical. They argue that supposedly purely categorical properties are also dispositional.

Franklin asks us to consider Democritus' attempt to reduce all properties to the shape (a categorical property) and movement of atoms. In particular, Democritus explains the hardness (a dispositional property) of solids in terms of the hooked shape (a categorical property) of the atoms of solids. These hooked atoms stick to one another and thereby make an object solid. However, Franklin notes that the

hardness of a solid depends not only on the hooked shape of its atoms but also on their rigidity (a dispositional property):

“In order to make the solid hard, however, the atoms must not only be hooked, but must retain their hooked shape when they come into contact with other atoms.” (Franklin 1986:62)

To retain their hooked shape these atoms must also be rigid. However, rigidity — the property of preserving shape when acted upon in certain ways — is a dispositional property. Franklin’s argument shows that shape, a paradigm categorical property, involves a dispositional property. Franklin draws the conclusion that dispositions cannot be eliminated from our ontology.

Heil uses a different example to make the same point as Franklin (Heil 2003:93). Heil argues that a ball rolls or could roll in virtue of its spherical shape, but only if it is also rigid. The ball’s disposition to roll cannot be reduced to a purely categorical property of shape, but must also include the dispositional property of rigidity. Just as the categorical property of shape is insufficient for hardness, so too the ball’s shape is insufficient for the ball to possess the power to roll.

Martin finds it so evident that structural properties, used by Armstrong as examples of purely categorical properties, are also dispositional, that he does not bother to argue the point:

“Place and Armstrong have emphasized *structural* properties in their discussion of dispositional properties. Martin thinks the emphasis is misguided, not only because what is structural is *evidently* intrinsically dispositional *itself*, but, more importantly, because the issue can be more cleanly discussed in terms of *non-structural* properties.” (Armstrong, Martin and Place 1996:73)

Armstrong accepts Martin’s claim that, structural properties, such as shape, involve dispositionality:

“In talking about the categorical properties that dispose a thing to act in a certain manner if and when certain initiating causes are present, influenced no doubt by a desire to tie the discussion to paradigm cases

such as brittleness, both Place and Armstrong speak of ‘structures’. But structures such as bondings, the sort of structures that are relevant to dispositions such as brittleness, are, as Martin says, ‘evidently intrinsically dispositional’ themselves. Bonding, in particular, is a sort of negative disposition, involving resistance to parting.” (Armstrong, Martin and Place 1996:90)

Armstrong preserves his categorical account of properties in the face of these counterexamples by following Martin’s suggestion and restricting his ontology to the fundamental particles, that are pointlike and lacking in structure:

“Armstrong therefore sees the force in Martin’s suggestion that it is best to work with such cases as hypothetical non-structural properties of (hypothetical) genuinely elementary particles.” (Armstrong, Martin and Place 1996:90)

Armstrong asks that a grain of salt be used when talking about categorical structures underlying ordinary everyday dispositions of macroscopic objects, as he finds such examples useful to give concreteness to the discussion of dispositions.

How successful is this move by Armstrong? It was argued that structural properties such as shape also involve dispositionality and are not purely categorical. In response, Armstrong makes an ontological retreat to the realm of fundamental properties, which are point like and lacking in structure. The counterexamples and criticisms presented by Franklin and Heil have no purchase in this realm of structureless entities and so give us no reason to think that fundamental properties are dispositional.

### **No epistemic access to causally inert properties**

Categoricalism has also been criticized on epistemic grounds. It is claimed that if properties are categorical, then we cannot have any knowledge of them. One argument contends that categorical properties are causally inert and so are undetectable and unknowable. A second argument rests upon the identity conditions for categorical properties. It reasons that if categorical properties are

quiddities, then their identity is independent of any of the features in virtue of which we are capable of detecting and knowing them. I show both arguments fail to establish the truth of their conclusion. The first argument rests upon a misunderstanding of categorical properties. The second begs the question.

A number of philosophers have questioned how we could have epistemic access to purely categorical properties on the ground that they are causally inert properties. For example, Heil voices these concerns when he notes that:

“An advocate of the view that properties are powers can reasonably challenge an opponent [that is, a proponent of categoricism] to produce an example of a purely qualitative property. If such a property is detectable, then it would not seem to be purely qualitative after all. If it is not detectable, it will be tricky to recruit it as an example.” (Heil 2003:87)

This epistemic criticism assumes that categorical properties are acasual. However, this assumption relies on Ellis’ misleading metaphor of categorical properties as passive, inert entities. As noted above, Bird shows why this metaphor is wrong. He argued that categorical properties are not inert, passive entities pushed and pulled around by laws of nature. Rather, properties act in accordance with laws of nature. If this is correct, then categorical properties are not inert, passive entities and so need not be undetectable and unknowable. Furthermore, once this misleading metaphor is dispelled, there is also no reason to think that detectability entails a property is not purely categorical. Detectability is accounted for in terms of purely categorical properties acting in accordance with laws of nature. The significant point here is that powers, and so detectability, are accounted for without admitting any non-categorical entities. This argument that categorical properties are unknowable is unsound. It rests on the false premise that categorical properties are acasual.

I now turn to the second epistemic argument against the existence of categorical properties. In chapter 4.2 I discussed Bird’s contention that categorical properties are quiddities. It follows, argues Bird, that the transworld identity of properties as quiddities is independent of any of the features in virtue of which we are capable

of detecting them. As such, Bird reasons, we cannot detect or know any categorical properties. Bird counters that we do have knowledge of properties, and so categoricism must be false. This leads Bird to conclude that we should reject categoricism's account of properties and powers in favour of dispositional essentialism.

I showed that Lewis, a proponent of categoricism and properties as quiddities, rejects Bird's conclusion by rejecting his premise that we do have knowledge of properties. He argues for "Ramseyan humility", an epistemic humility about properties (Lewis 2009). In advocating epistemic humility, Lewis argues that we can know that a certain property role is occupied, but denies that we can know what property or power it is that occupies that role.

As I argued in chapter 2.2, for dispositional essentialism, a property just is its causal property role. As such, for dispositional essentialism, to know that a certain property role is occupied is to know what property or power occupies that role. The point I stressed in chapter 2.2 was that Bird and Lewis are in agreement in so far as we can know that a certain property role is occupied. They disagree about whether the nature and identity of a property is exhausted by the causal property role it occupies. As such, the disagreement is not epistemic, as Bird claims. Rather the dispute is metaphysical. I concluded that Bird's supposedly epistemic argument against categoricism turns out to be a metaphysical disagreement about the nature of properties. The disagreement is about whether or not the nature of a property is exhausted by the causal role it plays. Bird's epistemic argument against categoricism only gains traction by assuming dispositional essentialism, by assuming that there is no more to a property than its causal role. As such, Bird's epistemic argument cannot be used as an argument against categoricism without facing the charge of begging the question. Bird's epistemic argument fails to give us any reason to reject categoricist accounts of properties.

## **Conclusion**



Armstrong's categoricalist account of properties and powers manages to fend off the three objections ranged against it here in section 4.3.3. Categoricalism is not inconsistent or obviously false. However, as argued in section two, Armstrong has failed to provide any reason to accept his claim that all properties are categorical and that dispositions are reducible to and identical to categorical properties. His argument for categoricalism was shown to be unsound. Two premises — the claim that dispositional ascriptions entail counterfactual statements and that dispositions are intentional — were both shown to be false. Both premises rest upon the false claim that dispositions entail and are analysable in terms of counterfactuals. The problem is that counterfactual conditions merely provide a defeasible, rough-and-ready way to pick out dispositions. Armstrong has confused and conflated a means by which we pick the reference for dispositional terms for the meaning of those terms and made unwarranted ontological conclusion about the nature of dispositions and dispositional ascriptions.

## **Chapter 4.4 — Dispositions are not extrinsic properties**

**Introduction** — Arguments that dispositions are extrinsic properties of their bearers are invalid or unsound and so fail to establish the truth of their conclusions.

### **4.4.1 The intrinsic extrinsic distinction**

- Two definitions of intrinsic: independence, duplicate
- Problems with the with intrinsic extrinsic distinction

### **4.4.2 Smith’s argument that dispositions are relational and extrinsic properties of their bearers**

- Prior’s response — the complete dispositional predicate defeats Smith
- Choi’s distinction between being fragile and being disposed to be fragile undercuts Prior
- Independence of a disposition and its manifestation shows Smith is wrong to claim dispositions are extrinsic

### **4.4.3 McKitrick’s arguments that dispositions are extrinsic properties of their bearers**

- McKitrick’s key-and-lock argument for extrinsic properties
- McKitrick’s argument that weight is extrinsic
  - Argument fails as McKitrick uses a non-rigid designator to define “weight”
  - Bird’s reply that rest mass is “doing the work” and it is intrinsic

### **4.4.4 Molnar on Boyle’s key-and-lock argument for relational, extrinsic properties**

- Boyle’s key-and-lock argument for relational, extrinsic powers.
- Molnar uses Leibniz’ criticism of occasionalism to show extrinsic dispositional powers are founded on intrinsic properties
- A better argument that extrinsic properties are founded upon and reducible to the intrinsic properties of their bearers

- Conflating a disposition and its manifestation underpins Boyle's argument for relational, extrinsic properties

**Conclusion** — Arguments that dispositions are relational, extrinsic properties of their bearers mistake the manner in which we identify, pick out and talk about dispositions for the nature of dispositions. These arguments conflate the manifestation of a disposition (which may be extrinsic) with the disposition itself and so make unwarranted ontological claims that dispositions are extrinsic. They also fail to distinguish between rigid and non-rigid ways of designating dispositions. Just because we can use an extrinsic property term to designate a disposition it does not follow that dispositions are themselves extrinsic.

## **Introduction**

This chapter examines arguments that dispositions and powers are extrinsic properties of their bearers. Molnar holds that:<sup>41</sup>

“Powers are intuited as intrinsic by common sense, and the intuition is reinforced by the use of certain concepts, and the existence of certain practices, in science.” (Molnar 2003:102)

However, a number of philosophers argue that powers are extrinsic and relational properties of their bearers. I examine arguments by A.D. Smith (1977), Jennifer McKittrick (2003) and Robert Boyle (1666) that powers and dispositions are extrinsic properties of their bearers.

I make three claims. One, I conclude that arguments for extrinsic powers are either invalid or unsound and therefore fail to give any reason to accept that powers are extrinsic. Two, I show that even if dispositions are extrinsic properties, they are nonetheless founded upon and reducible to intrinsic properties of their bearers. Three, I note that these arguments mistake the manner in which we identify, pick out and talk about dispositions for the nature of dispositions. They confuse the manifestation of a disposition (which may be extrinsic) with the disposition itself. They also fail to distinguish between rigid and non-rigid ways of designating dispositions. We can use extrinsic property terms to designate and refer to a disposition, but it does not follow that dispositions are themselves extrinsic.

### **4.4.1 The intrinsic extrinsic distinction**

Before examining arguments for extrinsic dispositional properties, I will say a few words about the intrinsic/extrinsic distinction.

#### **Two definitions of intrinsic**

Paradigms of intrinsic properties are shape, mass and internal structure. Whereas paradigms of extrinsic properties are weight and spatial relations; such as being

---

<sup>41</sup> Other philosophers that view dispositions as intuitively intrinsic are Lewis (1997:148), Mellor (1974:158) and Mackie (1973:ch4).

five miles from Gundagai. There are at least two definitions of intrinsicity in philosophical debate:

- a. Duplicates — F is an intrinsic property of *a* iff there is no exact duplicate of *a* that is not F. (Langton and Lewis 1998)
- b. Independence — F is an intrinsic property of *a* iff *a*'s having F is independent of the existence or non-existence of any *b* that is distinct from *a*. (Molnar 2003)

The intrinsic/extrinsic distinction is also often used to mark a distinction between relational and non-relational properties.<sup>42</sup>

- c. Non-relationality — F is an intrinsic property of *a* iff F is a non-relational property of *a*. (Smith 1977)

### **Problems with the with intrinsic/extrinsic distinction**

Lewis notes that definitions of intrinsicity form “a tight little family of interdefinables” (Lewis 1999:112). In one case, intrinsicity is defined in terms of being a duplicate, which in turn is defined in terms of intrinsicity. In the other case, intrinsicity is defined in terms of independence, which in turn is defined in terms of intrinsicity.

Perhaps interdefinable terms need not be a problem. For example, we may define necessity in terms of possibility and possibility in terms of necessity. In any case, Lewis and Langton (1998) claim that the problem of interdefinables can be overcome. I will not pursue the matter, but instead turn to a more serious problem that confronts both the duplicate and independence criteria for intrinsicity.

---

<sup>42</sup> The terms “relational” and “intrinsic” are neither equivalent nor coextensive. A property may be both relational and intrinsic. Weatherston (2006) provides an example. Having longer legs than arms is an intrinsic property, yet it also involves a certain relation. Perhaps one could argue that the longer than relation supervenes on, or is some way reducible to, the intrinsic properties of its relata, and so may be intrinsic. However, there are convincing reasons for thinking foundationalism about relational properties is wrong. For example, Molnar (2003:51-54) shows that spatio-temporal relations are not reducible to their relata:

“If relations between objects and space-time can change without the real intrinsic properties of either undergoing any change, then spatio-temporal relations appear to lack foundation in their relata.” (Molnar 2003:53)

Shape, often cited as a paradigmatic example of an intrinsic property, fails to satisfy either the independence or duplicate criteria for an intrinsic property. Ellis (2001:27) points out that the shape of a stretched rubber band depends in part upon the external, outside forces doing the stretching. As such, shape is not an intrinsic property, on either the independence or duplicate criteria. A duplicate of the rubber band need not be stretched, and so will have a different shape. Hence shape is not an intrinsic property on the duplicate definition. The shape of the rubber band is dependent, at least in part, on outside, external forces and so the rubber band's shape is not independent of the existence or non-existence of any *b* distinct from the rubber band. Shape is not an intrinsic property on the independence definition. What does this show? I think this suggests that neither criterion is necessary for a property to be intrinsic. At best these definitions provide sufficient conditions for a property being intrinsic. But that is not enough for an adequate definition, which requires an equivalence relation between the *definiendum* and the *definiens*.

Such problems have lead Brian Weatherson (2006) to suggest there may be no fact of the matter which distinction the words “intrinsic” and “extrinsic” latch onto. While Humberstone (1996) suggests that the intrinsic/extrinsic distinction is at best confused and perhaps worthless. Faced with these problem, philosophers have been prone to give up on pinning down a notion of intrinsicity and declare that, despite these shortcoming, we nonetheless have enough or a working definition to get on with things.

I share these misgivings. However, my primary concern in this chapter is to show that arguments for extrinsic dispositional properties are either invalid or unsound (and so fail to establish the truth of their conclusion). For the sake of argument, I accept the intrinsic/extrinsinc distinction has substance, and show that nonetheless, arguments advanced for the existence of extrinsic dispositional propeties fail.

#### **4.4.2 Smith's argument that dispositions are relational and extrinsic properties of their bearers**

I now turn arguments claiming that dispositions are extrinsic properties of their bearers. In this section, I show that A.D. Smith (1977) wrongly conflates the manifestation and manifestation conditions of a disposition (which may be extrinsic) for the dispositions itself when he argues that dispositions are relational and extrinsic properties of their bearers.

Smith's argument employs an example of a woodblock that gains a disposition — fragility — by changing its location:<sup>43</sup>

“A sturdy wooden block is taken on a space flight to Neptune. The inner constitution of the block does not change at all, but when the astronauts who are flying the spacecraft arrive on Neptune and one of them inadvertently knocks the block to the ground it shatters.” (Smith 1977:142)

Not only has the woodblock gained a disposition on its travels to Neptune, it has done so without any change in its inner constitution or intrinsic properties:

“It will make sense to say that an object has changed its nature even though the intrinsic constitution of the object has changed in no way whatever.” (Smith 1977:445)

Smith intention here is to explicitly reject Armstrong's (1968, 1973) claims that any dispositional change must be in the intrinsic properties of the object:

“What our example shows is that Armstrong goes too far in insisting that the change in question must concern the intrinsic nature of the object in question.”(Smith 1977 142)

Having ruled out that the change in disposition is a result of a change in the intrinsic properties of the object, Smith proposes that we look to the environment:

“In our example the change consists in the translation of our block of wood from the earth's environment to one which causes the wood to

---

<sup>43</sup> Smith notes that it does not necessarily follow that the woodblock is fragile. It is possible an evil demon zaps the woodblock on Neptune with, say, a destructo-ray as it is falling, causing it to shatter. But he supposes that it is fragile. That is, Smith's example is meant to show that it is possible that the same woodblock may be fragile on Neptune and yet not-fragile on Earth.

behave surprisingly differently from the way it behaves on earth.” (Smith 1977:142)

Change of environment here leads to change of disposition. This makes the environment part of the dispositional ascription, part of what it is to possess a disposition:

“The first point to make is that all dispositional predication takes place against a presupposed environmental background.” (Smith 1977:443)

Elsewhere, he reiterates this point:

“That to ascribe a disposition to an object is, firstly, implicitly to locate an object in a general type of environment.” (Smith 1977:443)

Smith is not arguing that a disposition is wholly determined by the environment and extrinsic properties. Rather, the environment is merely part of what it is for an object to possess a particular disposition:

“It (Smith’s view) refuses to restrict this ‘basis’ to the internal constitution of the object which possesses the disposition.” (Smith 1977:445)

Instead, it includes both the internal constitution of the object and its environment:

“Since both the internal constitution of an object and the environment of that object are relevant to the behaviour of that object, so that both of these factors must be taken into account when using the concept of a ‘basis’ for dispositions, and since, also, to assert that an object possesses a disposition is explicitly to say something about that object.” (Smith 1977:443)

Smith’s claim that the dispositional basis is relational (and includes external, environmental factors) commits Smith to the existence of extrinsic dispositions, on both the duplicate and independence criteria of extrinsic. According to the duplicate criterion:

F is an extrinsic property of *a* if and only if there is an exact duplicate of *a* that is not F.



The woodblock on Neptune possesses the property of being fragile. However, a duplicate of the woodblock on Earth does not possess the property of being fragile. Hence, being fragile is an extrinsic property of the woodblock.

According to the independence criterion:

F is an extrinsic property of *a* if and only if *a*'s having F is dependent on the existence or non-existence of some *b* that is distinct from *a*.

The woodblock on Earth lacks the property of being fragile, yet the woodblock on Neptune possesses the property of being fragile. We have a case of the same woodblock possessing different properties — being fragile and being not-fragile — in different environments. This shows that the property of being fragile is dependent on some *b* that is distinct from the woodblock. Hence, being fragile is an extrinsic property of the woodblock according to the independence criterion of intrinsicity.<sup>44</sup>

### **Prior's response — the complete dispositional predicate defeats Smith**

Prior uses her notion of the incomplete dispositional predicates to defend Armstrong's claim that the dispositional basis must be one or more of the non-relational properties of the disposed object (Prior 1985:54-58). She argues, contrary to Smith, that the woodblock is fragile wherever it is located and so does not gain a disposition on its journey to Neptune. If Prior is correct, then Smith is wrong to conclude that the dispositional basis is relational and extrinsic. I conclude that Prior is not correct. In the next section, I argue that Prior's claim that the woodblock is fragile wherever it is located is undercut by a distinction Sungho Choi (2008) draws between possessing a disposition and being disposed to possess a disposition.

---

<sup>44</sup> These extrinsic properties are real properties for Smith. They are not what P.T. Geach (1969) calls merely Cambridge properties, involved in merely Cambridge changes. Following Kim (1974), I use the example of Socrates' death and Xanthippe becoming a widow. For Geach, Socrates' death is a real change in Socrates. Whereas, Xanthippe's becoming a widow is not a real change in Xanthippe. It is only a change in which predicates she satisfies. Being transported to Neptune brought about a change in the woodblock, a real change. It has, according to Smith, gained a disposition and with it a different way of acting and behaving — it shattered when struck on Neptune. It seems clear that Smith regards the change undergone by the woodblock to not be merely changes in its Cambridge properties or the predicates it satisfies.

Prior sees an ambiguity in ordinary language dispositional concepts that arises because the dispositional predicate is incomplete (Prior 1985:5). She uses solubility an example to make her point:

“Consider the question ‘Is nail-polish soluble?’ How are we to answer this question? Certainly nail-polish will not dissolve in water of temperature 20C, and under pressure of 1 atmosphere (these are ordinary room-type conditions). However nail-polish will dissolve in acetone (the basic ingredient of nail-polish remover) at 20C and 1atm.” (Prior 1985:6)

Prior further notes that virtually any solid object will go into solution under some set of conditions:

“There is no solid of which I can think for which I cannot also think of a solvent which will dissolve that solid at standard room temperature.... [F]or a given solid and a given solvent that solid will dissolve in that solvent if we just make the temperature and pressure high enough.” (Prior 1985:6)

The same point can be made of fragility. Is a steel beam fragile? Well that depends. A steel beam at room temperature will not shatter when struck with moderate force. However, a steel beam at room temperature will shatter when struck with massive force. Also, a steel beam cooled to absolute zero will shatter when struck with moderate force.

According to Prior, the source of this ambiguity lies in the incompleteness of the dispositional predicate. The statement “*a* is *F*”, where *is F* is a dispositional predicate, appears to be a one-place predicate. However, this is misleading, dispositional predicates have at least two-places. Choi (2008) characterises Prior’s account of incomplete dispositional predicates as involving hidden argument places. This different perspective, or at least different terminology, sheds light on Prior’s position. Choi notes that the relational expression “...is taller than...” has two argument places. It requires completion by two terms to form a complete proposition and take a truth value:

“In view of this, we can say that Prior’s thesis that ‘fragile’ is an incomplete predicate boils down to the claim that, though ‘fragile’

appears to have one argument place, in fact it has more than one.” (Choi 2008:158)

In order to complete the dispositional predicate we need to fill in the background conditions (and perhaps the initiating cause of its manifestation).<sup>45</sup> According to Prior:

“If we follow this intuition then we will say salt is water-soluble at STP, phosphorus is not water-soluble at STP, but phosphorus is water-soluble at high temperatures and pressure.” (Prior 1985:7)

The dispositional predicate *is F* is incomplete and as a result the statement “*a is F*” lacks a truth value. However, the dispositional predicate *is F under conditions M and initiating cause N* is complete and hence the statement “*a is F under conditions N and initiating cause M*” possess a truth value.

Prior applies her analysis of the dispositional predicate to Smith’s claim that the woodblock is fragile. She takes the incomplete dispositional predicate “is fragile” and completes it:

“Using dispositional predicates as incomplete predicates I would give the following account of Smith’s case. The block of wood is non-fragile (under conditions CE – Earth-type conditions), and fragile (under conditions CN – Neptune-like conditions). The block of wood possesses the disposition of fragility (under conditions CN), wherever it is located.” (Prior 1985:46)

Instead of the incomplete predicate “is fragile”, we now have the (more) complete predicate “is fragile (under conditions Cn)”.

With this move Prior undercuts Smith’s claim that the woodblock gained a disposition on its trip to Neptune, and with it his claim that dispositions are relational and extrinsic properties of their bearers. According to Prior’s complete dispositional predicate, the woodblock is fragile (under conditions Cn) wherever it is located. The woodblock is fragile (under conditions Cn) when located on

---

<sup>45</sup> Prior notes that an unspecified initiating causes may also render a dispositional predicate incomplete:

“Let us now focus our attention on the initiating cause. Suppose that we have a piece of steel and that the ordinary standing conditions obtain – temperature of 20C etc. This piece of steel will not shatter if struck with a blow of medium force. However, it will shatter if struck with a blow of immense force.” (Prior 1985:7)

Earth. And the woodblock is fragile (under conditions Cn) when located on Neptune. Hence, according to Prior's analysis of the dispositional predicate, the woodblock does not gain (or lose) a disposition on the trip to Neptune. Smith's argument that dispositional properties are relational and extrinsic properties of their bearers rests upon his claim that the woodblock gained a disposition. Prior's complete dispositional predicate shows Smith has no reason to claim that dispositional properties are relational and extrinsic properties of their bearers.

### **Choi's distinction between being fragile and being disposed to be fragile undercuts Prior's argument**

Choi draws a distinction between possessing a disposition and being disposed to possess a disposition. I use his distinction to argue Prior is mistaken when she claims, contrary to Smith, that the woodblock does not gain a disposition on its trip to Neptune.

Choi describes a steel beam. It is not actually fragile, but would be fragile if cooled down to an extremely low temperature (Choi 2008:160). The steel beam has what Choi terms a "compound" disposition to be fragile, but this is not the same as actually being fragile:

"It is to be realized that an object that is actually not fragile may have the compound disposition to be fragile if placed under the condition of low enough temperatures, and vice versa. Then it follows that the compound disposition in question must be distinguished from fragility." (Choi 2008:160)

Choi seems right to draw this distinction. We do not call a steel beam fragile, even though there are circumstances under which it would shatter.

Prior's argument against Smith rests upon her claim that the woodblock did not gain a disposition on the trip to Neptune. But Choi's distinction suggests otherwise. According to Choi's distinction, the woodblock on Earth has a compound disposition to be fragile but is not actually fragile. Whereas the woodblock on Neptune is actually fragile. Contrary to Prior's claims, the woodblock does gain a disposition when it journeys from Earth to Neptune. With

this, Prior's argument against Smith collapses. Prior has shown no reason to reject Smith's premise that the woodblock gains a disposition.

In the next section I give an argument that shows why Smith is wrong to claim dispositions are extrinsic properties of their bearers. Before turning to that, I want to say a few words about how Prior's understanding of dispositions is influenced by a faulty semantics of dispositions in the form of the counterfactual analysis of dispositions. On the counterfactual analysis:

$x$  is fragile if and only if  $x$  were dropped then  $x$  would shatter.

On the counterfactual analysis anything that would shatter upon being struck or dropped (under some condition) is fragile. This presents a problem. As Prior noted, virtually any solid object will shatter under some set of conditions.

Virtually every solid object is therefore rendered fragile on the counterfactual analysis of dispositions. The problem is that we do not ascribe fragility to virtually every solid object. Vases and glass are considered fragile, but not steel beams and concrete blocks. Prior describes the problem as such:

“Dispositional predicates are useful because they divide the world into those items which possess a particular disposition  $D$  and those items that do not. Dispositional predicates would lose this utility if our criterion for ascribing disposition  $D$  to an item were simply that this item would manifest that disposition under *some* set of circumstances.” (Prior 1985:6)

Prior and Choi respond to this problem in two different ways. Prior's response is to treat the dispositional predicate as incomplete. The complete dispositional predicate leaves us with fragility under conditions  $N$ , fragility under conditions  $M$ , and so on. While virtually any object will break under some conditions, not every object will break under conditions  $M$ . This shows that the completed dispositional predicate is able to divide up the world into those items which possess a particular disposition  $D$  (under circumstances  $M$ ) and those items that do not. The utility of dispositional predicates is saved.

Choi responds by distinguishing between being fragile and being disposed to be fragile. The distinction between being fragile and being disposed to be fragile

allows for the existence of objects that would shatter upon being struck (such as steel beams), but are nonetheless not fragile (they only possess a compound disposition to be fragile). In making this distinction, Choi saves the utility of dispositional predicates. His distinction shows dispositional predicates are able to divide up the world into those items which possess a particular disposition D and those items that do not. All items may well shatter under some conditions, but, because of the distinction, the dispositional predicate *is fragile* does not apply to all objects.

However, Choi's distinction between being fragile and being disposed to be fragile undermines the counterfactual analysis. On Choi's distinction, there are objects that satisfy the counterfactual definition of fragility — they would shatter if struck — but are nonetheless not fragile.<sup>46</sup> (I have argued in chapter two that the counterfactual analysis is wrong.) So I think Choi is right to distinguish between possessing a disposition and being disposed to possess a disposition. He is right to say that just because something would break upon being struck it does not follow that it is fragile.

### **Independence of a disposition and its manifestation shows Smith is wrong to claim dispositions are extrinsic**

Despite the shortcomings of Prior's argument, there is still good reason to hold that Smith fails to establish the truth of his premise that the woodblock gains a disposition on its journey to Neptune and his conclusion that dispositions are extrinsic properties of their bearers. I argue that Smith, in locating the dispositional basis in the relational properties of an object, confuses and conflates a disposition with its manifestation. The manifestation and the manifestation conditions of a disposition may well be extrinsic, but that gives us no reason to hold that the disposition (or its causal basis) is extrinsic. This is because a disposition and its manifestation are ontologically distinct.

---

<sup>46</sup> Choi (2003, 2005a, 2005b, 2008b, 2009, 2011) devotes much energy to defending the counterfactual analysis of dispositions. However, he does not explicitly note or address this incompatibility between the counterfactual analysis and his distinction between possessing a disposition and being disposed to possess a disposition.

Smith claims the woodblock loses a disposition (sturdiness) and gains a disposition (fragility) on its journey to Neptune without any change in its “inner constitution”. According to Smith, the woodblock is not fragile on Earth, yet is fragile on Neptune. Perhaps Smith is correct, but his example alone fails to demonstrate this. All his inter-planet example shows is the woodblock has gained the conditions to manifest the disposition of fragility and so shatter on its journey to Neptune. Given the ontological independence of a disposition and its manifestation (as argued for in chapter 4.3), this is not sufficient to show that the woodblock gained a disposition. Smith has conflated the disposition — fragility — with its manifestation — shattering. He has conflated conditions  $C_n$  (Neptune-like conditions), required for the woodblock to shatter, with the actual property of being fragile.

Smith anticipates the denial of his claim that the woodblock gained a disposition on its journey to Neptune. He thinks that in denying the woodblock gains a disposition:

“We are implying that the concept of an object’s nature is in a sense deeper than the notions of disposition or power...” (Smith 1977:455)

Smith mischaracterises the implications here because he misunderstands the nature of a disposition. The issue is not whether or not the concept of an object’s nature is deeper than its dispositions or powers, rather the issue is that the concept of a disposition or power is deeper than its manifestation. Smith is unable to see this as he confuses and conflates the manifestation for the disposition. He confuses and conflates the manner in which we identify and pick out fragile — by reference to their breaking and shattering — with fragility itself.

Why would Smith, or anyone else, confuse and conflate a disposition with its manifestation? Mumford contends that empiricist, verificationist and anti-realist assumptions that refuse to separate evidence from ontology are at fault (Mumford 1998:ch3). Verificationist principles entail that a disposition just is its observable events, namely its manifestation. Armstrong describes this mistaken conflation as a propensity to:

“...project into the disposed things a ghostly image of the manifestation of the disposition, even when it is not manifested.” (Armstrong, Martin, Place 1996:93)

In chapter three one I introduced Kripke’s distinction between fixing the reference of a term and giving its meaning. Kripke warns us to:

“Bear in mind the contrast between the *a priori* but perhaps contingent properties carried by a term, given by the way its reference was fixed, and the analytic (and hence necessary) properties a term may carry, given by its meaning... the way the reference of a term is fixed should not be regarded as a synonym for the term.” (Kripke 1980:135)

Smith’s argument for relational, extrinsic dispositions fails to take note of this distinction. Smith confuses and conflates how we identify and fix the reference of a disposition with the disposition itself. As noted, independence shows that a disposition is ontologically distinct from its manifestation. We may well use the manifestation of a disposition to identify a disposition, but it is not what the disposition is. Moreover, “fragility” does not mean “shattering”. “Shattering” is not a synonym for “fragility”. Smith mistakenly equates the outward, contingent signs of a disposition, namely its manifestation, or manifestation conditions with the disposition itself when he argues that dispositions are relational and extrinsic properties of their bearers.

#### **4.4.3. McKitrick’s arguments that dispositions are extrinsic properties of their bearers**

I now turn to two further arguments for extrinsic dispositions, given by Jennifer McKitrick (McKitrick 2003). These arguments confuse the manner in which we fix the reference of a dispositional term with its meaning and fail to attend to the difference between rigid and non-designators. Once these confusions are pointed out, it becomes clear that both arguments fail to establish that dispositions are extrinsic properties of their bearers.



### **McKitrick's key-and-lock argument for extrinsic dispositional properties**

McKitrick (2003:159) uses an example from Shoemaker to argue for the existence of extrinsic dispositional properties:

“A particular key on my key chain has the power of opening locks of a certain design. It also has the power of opening my front door. It could lose the former power only by undergoing what we would regard as a real change, for example, a change in its shape. But it could lose the latter without undergoing such a change; it could do so in virtue of the lock on my door being replaced by one of a different design. Let us say that the former is an intrinsic change and the latter is a mere-Cambridge power.”  
(Shoemaker 1984:221)

McKitrick uses this example to conclude that “Shoemaker’s mere-Cambridge power is an extrinsic disposition” on the basis that “perfect duplicates [that is, the one and same key in this case] do not necessarily share the disposition to open door *x*.” (McKitrick 2003:159).

In drawing this conclusion, McKitrick contends that the key possesses two different powers: one intrinsic — the power of opening locks of a certain design, and the other extrinsic — the power of opening Shoemaker’s front door. However, there is nothing in Shoemaker’s example that forces us to accept McKitrick’s conclusion. “The power of opening my front door” non-rigidly designates the same power that is rigidly designated by “the power of opening locks of a certain design”. There are not two powers at play here, just two different terms designating the one and the same property of the key. The supposed extrinsic dispositional power of the key and the intrinsic dispositional power of the key are just the one and same power differently described. Once we attend to the distinction between rigid and non-rigid designators and note how they function, it becomes clear that Shoemaker’s example does not force us to accept McKitrick’s conclusion that dispositions are extrinsic properties of their bearers.

There is nothing wrong with using a non-rigid designator to pick out the reference of a term. We can use the non-rigid designator “the worlds fastest shearer” and the rigid designator “Jackie Howe” to pick out and designate Jackie Howe. So too we can use the non-rigid designator “the power of opening my front door” to pick out and designate the same property that is rigidly designated by “the power of opening locks of a certain design”. But it is wrong to think, as McKitrick does, that just because there are two different designators there are two different properties. McKitrick fails to establish that the key has two different powers, one intrinsic and one extrinsic. Rather, she has merely shown that the one and the same property can be referred to in two differently ways, one rigidly and one non-rigidly.

### **McKitrick’s argument that weight is an extrinsic property**

McKitrick pursues a second argument for extrinsic dispositions. She argues that weight is an extrinsic dispositional property (McKitrick 2003:159-60). She asks us to assume the following definition of weight:

“ $x$  has weight  $n$  iff  $x$  has a disposition to depress a properly constructed scale so as to elicit a reading of  $n$  pounds in a gravitational field of strength  $f$ .” (McKitrick 2003:160)

Using the duplicate criterion for extrinsicity, McKitrick then argues that weight is extrinsic on the grounds that the same person (that is, an exact duplicate) would have different weights in different gravitational fields:

“A person’s weight on earth is different than her weight on the moon. Moving from the earth to the moon, she can remain intrinsically the same; however a different gravitational field becomes local, and so her weight changes. Alternatively, if one person were on earth and her perfect duplicate were on the moon, they would have different weights.” (McKitrick 2003:160)

Modern physics uses the “gravitational” definition to define weight as the product of mass and gravitational acceleration. On this definition, McKitrick conflates a manifestation of weight — namely, depressing a scale — with weight itself. The gravitational definition gives us no reason to accept that weight is an

extrinsic property of its bearer. However, an older “operational” definition from Newtonian physics defines weight as the force measured in weighing an object. This is the force an object exerts on its support. On the operational definition, weight looks to be an extrinsic property of its bearers.

It appears that the question as to whether we should accept McKitrick’s claim that weight is an extrinsic dispositional property is a question about the correct definition of weight. It appears to be question as to whether the gravitational or operational definition of weight is correct. However, this is not how McKitrick sees the matter. According to her, the adequacy of her definition of weight is “not the issue”. Instead, she claims that:

“The property referred to by the overtly dispositional locution on the right of the biconditional can be called weight... for short, even if these overtly dispositional locutions fail to capture what we, or physicists, ordinarily mean by ‘weight’....” (McKitrick 2003:160)

McKitrick’s point here is not that calling something “weight” makes it weight. She is not making the clearly false claim that calling a hawk “a handsaw” makes it so. Rather, her point is that whatever it is that her definition of “weight” refers to, whatever it is that is picked out by her use of “weight”, be it weight or otherwise, it is nonetheless an extrinsic dispositional property. She is claiming that there is some property, a property that she calls “weight”, and whatever this property happens to be it is an extrinsic dispositional property.

In making such a statement, McKitrick is making a claim about predicates and properties. She assumes that when a predicate applies to an object it does so in virtue of the object’s properties. She argues:

“If a predicate ‘is P’ is unambiguous, and applies to an object in one environment but does not apply to a perfect duplicate of that object in another environment, then those objects differ with respect to some extrinsic property P.” (McKitrick 2003:167)

In this case, it is thought, we can move from the application of her predicate “is weight” to the existence of some extrinsic property, even it is not actually weight.

However, there is good reason to believe this is not the case. As argued in chapter three, predicates and properties are not isomorphic. We cannot simply move from the fact that we truly apply a predicate to an object to the existence of a corresponding property. Satisfaction of a predicate is not sufficient for the existence of any corresponding property.

The problem for McKittrick is that the application or non-application of a predicate to an object does not in and of itself entail anything about what properties that object does or does not possess. She requires a further argument, an argument that her predicate “is weight” corresponds to a property, be it weight or otherwise. Without this her argument is merely about predicates, not properties, and she has only shown that the predicate “is weight” is an extrinsic predicate. She has said nothing about the nature of properties, be they extrinsic or otherwise.

Regardless of the adequacy of McKittrick’s definition of weight, an argument for the extrinsicity of weight can be simply stated. Two duplicate objects — one on Earth, the other on the Moon — will possess different weights. Hence, weight is an extrinsic property.

Alexander Bird counters such an argument by giving a reductionist account of weight:

“But in this case it is clear that the property that is doing the work is the mass of the objects and that is identical for both.”<sup>47</sup> (Bird 2007:125)

Bird claims that weight, an apparently extrinsic property, is reducible to rest mass, which is constant across changes in gravitation and so is an intrinsic property.

---

<sup>47</sup> Specifically, it is rest mass that is doing the work and it is intrinsic. As Bird notes, in special relativity, mass is extrinsic — the mass of an object increases with its velocity relative to an observer (Bird 2007:125).

Prior, in defending her account of location of the dispositional basis, counters Ernst Mach’s argument that inertial mass is extrinsic (Prior 1985:53-54). Prior shows that either inertial mass is an intrinsic categorical property or the distinction between a disposition and its manifestation undercuts Mach’s argument.

Bird generalizes this reductionist account. He argues that all extrinsic dispositions are reducible to intrinsic dispositions and “fundamental potencies” (Bird 2007:125). For Bird, the fundamental properties of physics (such as the charge, mass and spin of an electron) are dispositional essences or pure powers. These are intrinsic properties. All other powers and dispositions are extrinsic but reducible to these fundamental intrinsic properties.<sup>48</sup> That is, all dispositions and powers are intrinsic properties or reducible to intrinsic properties. Bird’s argument for intrinsic powers is limited in its application, as it rests upon his dispositional essentialist account of powers and with it the notion that dispositions are pure powers.

#### **4.4.4 Molnar on Boyle’s key-and-lock argument for relational, extrinsic properties**

Instead of pursuing Bird’s argument, I turn to a more general argument that is not dependent upon the pure powers view of properties. Molnar, in taking issue with Robert Boyle’s contention that dispositions (and indeed all properties) are relational and extrinsic, adapts Leibniz’s criticism of occasionalism to argue that supposedly extrinsic dispositional properties are reducible to the intrinsic properties of their bearers. I show that Molnar fails to provide adequate reason to accept his claim that the openability of a lock is founded on the non-relational, intrinsic properties of the lock and key.

#### **Boyle’s key-and-lock argument for relational, extrinsic properties**

Boyle contends that for an object to possess a property it must stand in an actual relation to another body or perceiver.<sup>49</sup> Boyle uses the example of a lock and a key to illustrate his relational account of properties:

---

<sup>48</sup> Bird also appears to be committed to an eliminativist view of extrinsic dispositions, not merely a reductionist one. Bird follows Lewis and Langton (1998) in maintaining that duplicates should share natural properties, but need not share all non-natural properties (Bird 2007:11). If duplicates fail to share the same weight, as they do, then it follows that weight is not a real, natural property. The only real, natural properties for Bird are the intrinsic dispositional essences of the fundamental properties of physics.

<sup>49</sup> Boyle’s argument is motivated by his rejection of the Scholastic notion of “*qualitates reales*”, according to which for every quality we attribute to a body, there is some distinct entity in that body. On the Scholastic view, if a body gains a quality, then something intrinsic to the body must be added. Boyle employs the key and lock as a counterexample. The lock gains the quality of

“We may consider, then, that...whoever invented locks and keys...had made his first lock...that was only a piece of iron contrived into such a shape; and when afterwards when he made a key to that lock, that also in itself was nothing but a piece of iron of such a determinate figure. But in regard to these two pieces of iron might now be applied to none another after a certain manner, and that there was a certain congruity betwixt the wards of the lock and those of the key, the lock and the key did each of them obtain a new capacity; and it became a main part of the notion of a lock that it was capable of being made to lock or unlock by that other piece of iron we call a key, and it was looked upon as a peculiar faculty and power in the key that it was fitted to open and shut the lock: and yet by these new attributes there was not added any real or physical entity either to the lock or to the key, each of them remaining indeed nothing but the same piece of iron, just so shaped as it was before.” (Boyle 1666:23)

The example is supposed to show that the lock and key can acquire and lose properties and powers without any change in the lock (or key) itself. The central claim here is that “the lock and the key did each of them obtain a new capacity” without the addition of “any real or physical entity either to the lock or to the key”. The lock gains the power to open when it stands in a certain relation to the key. This power-bestowing relation between the lock and the key can change without any change to the non-relational properties of the lock or key itself. Boyle concludes that this “new capacity” of the lock to open is, like all properties, relational.

Boyle’s relational dispositional properties are also extrinsic properties of their bearers, on both the duplicate and independence criteria. A duplicate of an openable lock could fail to stand in the right power-bestowing relation to the relevant key, or the relevant key may not even exist. As such, the lock’s power to open is not shared by duplicates and so openability is an extrinsic property of the lock for Boyle, on this criterion. The lock’s power to open is also extrinsic for

---

being openable when the key comes into being with no addition or change to the intrinsic properties of the lock.

Boyle on the independence criterion. Boyle's account of dispositions is overtly and explicitly relational. An object only possesses a power if it stands in some relation to another body. It follows that the lock's openability is not independent of the existence or non-existence of any *b* that is distinct from the lock. The power to open is not independent of the existence of the key that is distinct from the lock. Quite clearly, on the independence criteria, the power to open is an extrinsic property of the lock. We can generalize this point. For Boyle, all properties and qualities are relational and so extrinsic.<sup>50</sup>

### **Molnar adapts Leibniz's criticism of occasionalism**

Molnar adapts Leibniz's criticism of occasionalism to argue that Boyle's supposedly extrinsic dispositions are reducible to intrinsic properties of their bearers.<sup>51</sup> Occasionalism denies that things possess causal efficacy. It denies that bodies causally interact on other bodies or minds. Rather, God is the only cause. For example, during a game of billiards, I strike my cue ball with the cue tip and the ball moves. According to the occasionalist, my will did not move my arm, my arm moving did not move the billiard cue, and the billiard cue striking the ball did not cause the ball to move. Rather, God caused my arm to move, the billiard cue to move, and the ball to move.<sup>52</sup> My will, my arm moving and the billiard cue striking the ball are merely occasions for God's intervention.

Leibniz charges that occasionalism renders all events miraculous in that their occurrence is independent of the "nature" of the things involved (and instead dependent upon divine acts). To avoid the charge of relying on miracles, how things behave must relate to the nature of those things (Leibniz 1988:205).

Leibniz is right to note that if the way something acts is unrelated to and

---

<sup>50</sup> The "mechanical affections" of size, shape, motion or rest and texture are exceptions, for Boyle. These mechanical affections are the only wholly intrinsic and non-relational properties of any composite bodies.

<sup>51</sup> My interest here is not historical. I am not attempting to elucidate Leibniz's criticism of occasionalism. Rather, my interest is with Molnar's argument.

<sup>52</sup> I have presented act occasionalism, as promoted by Nicolas Malebranche. Leibniz's criticism equally applies to the rule occasionalism of Antoine Arnauld and Pierre Bayle. The existence of a God-given general law is not sufficient to free occasionalism from miracles. It still needs to explain events in terms of the nature of things.

independent of how that thing is, then such acts are unexplicable and miraculous. With this Leibniz makes a stinging criticism of occasionalism.

Having established that a thing's behaviour must relate to its nature, we next need to ask: what is the nature of a thing? According to Molnar, the properties that constitute a thing's identity are its nature:

“As Locke argues, the essence, or nature, of a thing is what we are defining when we give the real definition of a thing. A real definition expresses the sum of the properties that constitute the identity of the thing defined.” (Molnar 2003:38)

Leibniz's claim that how things behave must relate to the nature of those things now becomes the claim that how things behaves must relate to the properties that constitute the thing's identity.

The next step in Molnar's argument is to claim that a thing's nature is intrinsic:

“But the properties that are part of the nature of a thing are intrinsic to that thing.” (Molnar 2003:104)

Molnar does not consider the possibility that these properties are extrinsic. It is easy to see why: both the independence and duplicate criteria define extrinsic properties as those properties that a thing can lose while still retaining its identity and nature.<sup>53</sup> Extrinsic properties cannot be part of the nature of a thing. An entity can lose extrinsic properties, but cannot lose its nature, and still remain the same thing. This leaves Molnar to conclude:

“Therefore any non-miraculous explanation of what happens to things must relate the happenings to the intrinsic properties of the things.” (Molnar 2003:104)

Let us summarise Molnar's adaptation of Leibniz's argument against occasionalism:

---

<sup>53</sup> On the duplicate criterion, a duplicate of *a* can have the same nature as *a*, while losing all its extrinsic properties. Hence, extrinsic properties are not part of the nature of a thing. On the independence criterion, *a* can retain its identity and nature independently of the existence of anything other than *a*. If extrinsic properties are relational, as Boyle claims, then the extrinsic properties of *a* cannot exist independently of the existence of anything other than *a*.



- (P1) What happens should be explicable in terms of the (God-given) nature of things (assumption)
- (P2) The nature of a thing is given by the properties that constitute the thing's identity (assumption)
- (P3) What happens should be explicable in terms of the properties that constitute a thing's identity (P1, P2)
- (P4) The extrinsic properties of a thing do not constitute a thing's identity, as they can be lost without changing a thing's identity
- (P5) The properties that constitute the identity of a thing are intrinsic properties of their bearers (P3, P4)

Therefore:

- (C) "Any (non-miraculous) explanation of what happens to things must relate the happenings to the intrinsic properties of the things." [P3, P5]

Molnar contends that if (C) is true, then dispositional properties are founded upon and reducible to the intrinsic properties of their bearers (Molnar 2003:105). In particular, if (C1) is true, then the lock's openability is founded upon and reducible to intrinsic properties:

- "If the lock's openability is an extrinsic property, it is founded on intrinsic properties." (Molnar 2003:105)

Molnar is correct. If C1 is true, then the lock's openability is founded upon and reducible to intrinsic properties. The conclusion C1 makes the general claim that what happens to things must relate the happenings to the intrinsic properties of the things. Molnar's conclusion — that dispositional behaviour must relate the happenings to the intrinsic properties of its bearer — is just a specific form of this general claim.

However, Molnar is not right and C1 is not true. Leibniz's argument, as presented by Molnar, is valid. It is not possible to hold P1 and P2 and yet deny P3. And it is not possible to hold P3 and P5 and deny C1. That is, the truth of the premises forces the truth of the conclusion. However, the argument is not sound. Premise P3 is false (and with it P1 is also false).

I now show why these premises are false. A famous problem with Leibniz's metaphysics, first identified by Antoine Arnauld, is that his account of substances makes certain properties essential that are not essential (Leibniz 1962:vII,30). According to Leibniz, each individual substance has a concept so complete that it contains all predicates true of it past, present, and future (or from which all its predicates are deducible). This wrongly makes every property of an individual substance essential to it.

A similar problem arises in the argument above, but for different reasons. The argument makes certain properties of a thing necessary that are not necessary. Molnar holds that only the non-accidental intrinsic properties of a thing are part of its nature (Molnar 2003:104). The accidental intrinsic properties of a thing are not part of its nature. He also holds that "necessary" and "non-accidental" are equivalent terms (while "essential" and "non-accidental" are not equivalent terms). It follows that the properties that constitute the nature and identity of a thing are also necessary properties of that thing. That is, the properties that constitute the nature and identity of a thing are the properties it would possess in all possible worlds. This is a reasonable and relatively uncontroversial claim. For example, the number three is a prime in all possible worlds. Hence being a prime is a necessary property of three and part of its nature and identity. Whereas the property of being written in red pen on the cover of my maths book is a property possessed by three in this world, but not in all worlds. As such, this property does not constitute the nature and identity of three.

While it may be reasonable to claim that the identity of a thing is given by the properties it would possess in all possible worlds, it is not so reasonable and uncontroversial to make the further claim, as premise P3 does, that what happens to a thing should be explicable in terms of the properties that constitute a thing's identity (that is, in terms of its necessary properties). The problem is that premise P3 renders all causally efficacious properties of a thing as part of a thing's nature and constituting its identity, and so necessary. However, this is wrong — not all causally efficacious properties of a thing are necessary.

Consider a cricket ball. It is, among other things, spherical, hard and red. *Being red* is a causally efficacious property of the cricket ball. A new and firmly struck cricket ball can leave a red mark (a “cherry”) on a cricket bat. A cricket ball will also make a red mark on a bowler’s pants from polishing the ball. The ball also causes a red sensation in viewers observing it. The point here is that at least some of the ball’s behavior is determined, in part, by its redness. However, *being red* is not a necessary property of the cricket ball (and hence not part of its nature or identity, on Molnar’s account). To see this, imagine a possible world in which the ball is painted blue or rolls through a grass fire and is singed black. It is still the same ball: it does not lose its identity or nature and become another, different cricket ball. It just changes colour. The ball’s redness is causally efficacious and so related to how a thing behaves (namely appearing red, leaving a cherry etc.), and yet *being red* is not a necessary property of the cricket ball.

As this example demonstrates, the problem facing P3 is that the way things behave may be related to properties that do not constitute the identity of those things, and so are not necessary. Another way to state the problem is that there are causally efficacious properties that do not constitute the identity of the thing and that are not part of the nature of a thing. I argued that being red was just such a causally efficacious, but not necessary, property of a cricket ball. The property of being red does not constitute part of the cricket ball’s identity, as defined by Molnar. Yet being red determines in part the behaviour of the cricket ball. This shows that P3 is false.<sup>54</sup>

It is false that what happens should be explicable in terms of the properties that constitute a thing’s identity, where these properties are necessary. Leibniz’s argument as presented by Molnar, is unsound. It gives us no reason to accept the conclusion C1 that “any (non-miraculous) explanation of what happens to things must relate the happenings to the intrinsic properties of the things”. In turn, the argument gives us no reason to accept Molnar’s conclusion that all dispositional properties are founded upon and reducible to the non-relational, intrinsic

---

<sup>54</sup> P1 and P2 entail P3. That is, the argument from P1 and P2 to the conclusion P3 is valid. However, the conclusion P3 is false, so we know the argument is not sound. P1 is also false.

properties of their bearers. Molnar has failed to give us reason to accept that the openness of Boyle's lock is founded on the non-relational, intrinsic properties of the lock and key.

### **A better argument for intrinsic dispositional properties**

This does not mean that we should reject Molnar's claim that all dispositional properties are founded on the non-relational, intrinsic properties of their bearers. Rather, we should just reject this particular argument for that claim. There is another possible argument that Molnar can make for the intrinsicity of dispositional properties.

Molnar argues that Boyle's disposition-bestowing relation is congruity, and that it is a founded relation and so reducible to the non-relational and intrinsic properties of its relata. That is, Molnar argues that Boyle's supposedly extrinsic relational properties are reducible to the intrinsic, non-relational properties of their relata.

Molnar draws our attention to the distinction between founded and unfounded relations. Some relational properties are founded upon, and so reducible to, the non-relational properties of their relata. That is, in some cases:

$$(\exists x)(\exists y)R(x,y) \text{ is reducible to } (\exists x)(\exists y)(Fx \wedge Gy).$$

Comparative relations, such as *being taller than* and *resembling*, are examples of founded relational properties that are reducible to the non-relational properties of their relata. Molnar uses the metaphor of divine creation and the example of Mount Everest being taller than K2 to make his point:

“After creating Mount Everest and K2, complete with all their intrinsic properties, God did not have to create as an additional item, the relation between their heights.” (Molnar 2003:51)

Founded, reducible relations such as this are an ontological bonus in that the relational property of *being taller than* is not an addition to the ontological inventory over and above the non-relational properties of the heights of Mount Everest and K2. Once you have  $(\exists x)(\exists y)(Fx \wedge Gy)$ , where F and G are non-relational properties, you also have the relation  $(\exists x)(\exists y)R(x,y)$ . The only way for

Mount Everest to alter its relational property of being taller than K2 is for Mount Everest and/or K2 to change their heights, which are non-relational properties. This shows the relational property of being taller than is founded upon and reducible to the non-relational properties of its relata.

There are also relational properties that are unfounded and so not reducible to the non-relational properties of their relata. For example, spatio-temporal relations are unfounded.<sup>55</sup> Consider the dog on the tucker box. It famously has the spatial relational property of being five miles from Gundagai (Yorke 1857). However, the dog's location is contingent. We could move the dog on the tucker box three miles further down the road, and do so without altering the non-relational properties of either the dog on the tucker box or Gundagai. If the dog on the tucker box can change its distance from Gundagai, that is, change its spatial properties, without any change in the non-relational properties of the dog on the tucker box or Gundagai, then it follows that spatial relations are not reducible to the non-relational properties of the dog on the tucker box or Gundagai. We may generalize this point to claim the spatial properties of objects are unfounded and not reducible to the non-relational properties of their relata.

We are left to ask what type of relational property is Boyle's disposition-bestowing relation? Is it founded upon and reducible to the non-relational properties of its relata? Or is it like spatial relations, unfounded and not reducible to the non-relational properties of its relata? In exploring the nature of the disposition-bestowing relation, Molnar asks us to consider two locks *L1* and *L2*:

“Let us say that at *t* a key, *K*, is made. Let *L1* be a representative member of the class of locks that at *t* become openable when they were not openable prior to *t*. Let *L2* be a member of the class of locks that were not openable prior to *t* and that do not become openable at *t*. (Molnar 2003:104-105)

Why does the making of the key *K* bestow the disposition of being openable on some locks, namely (*L1*), but not on others, namely (*L2*)? Molnar asks how Boyle

---

<sup>55</sup> For a defence of founded spatio-temporal relations see Campbell (1990).

accounts for this selective empowering. What is the disposition-bestowing relation that accounts for this selective empowering?

According to Molnar, Boyle's disposition-bestowing relation is "congruence" (Molnar 2003:105).<sup>56</sup> Molnar's claim finds support in the following passage from Boyle:

"But in regard to these two pieces of iron might now be applied to one another after a certain manner, and that there was a certain congruity betwixt the wards of the lock and those of the key, the lock and the key did each of them obtain a new capacity..." (Boyle 1666:23)

On this account, the selective empowering in Molnar's example is explained in terms of congruence. *K* stand in the disposition-bestowing relation to *L1* and not to *L2* because *K* is congruent with *L1* and not congruent with *L2*.

The congruity relation is a comparative property, like *being taller than*, and so is reducible to and founded upon the non-relational properties of its relata. As congruity is the disposition-bestowing relation, it follows that dispositional properties are founded relations and so reducible to the non-relational properties of their relata. This means Boyle's supposedly relational dispositional properties are reducible to non-relational properties. In particular, *L1*'s relational power to open is a congruent relation and so reducible to, and founded upon, the non-relational properties of the relata — *L1* and *K*. The property of being openable is reducible to, and nothing over and above, the non-relational properties of the lock and key.

Molnar's aim is to show that Boyle's supposedly extrinsic dispositional properties are intrinsic, not merely non-relational. So the question becomes, are all non-relational properties also intrinsic properties of their nearers? Molnar thinks we

---

<sup>56</sup> Dan Kaufman (2006:175) contends that Boyle never gives an explicit account of the ontological status of disposition-bestowing relations. Kaufman notes that manifestation is not required for the existence of a quality or power. Boyle distinguishes between a quality and its manifestation. Spatial proximity is also not required for the relevant property-bestowing relation to obtain. Lock and key need not be in the same room or even on the same island. Intention is also not required — an "accidental" key may bestow power. However, the relata need to be contemporaries. A body has a quality at *t* only if all of the relata required for the quality exist at *t*.

can find a predicate that is a counterexample, one that is both extrinsic and non-relational:

“...‘[I]s such that the Duke of Wellington is mortal’ is an extrinsic-and-non-relational predicate when applied to anyone but the Old Duke.”

(Molnar 2003:43)

However, he denies that there are any properties that are non-relational and extrinsic:

“I think that all the extrinsic properties of an object are relational. The only putative counter-examples that come to mind are of the sort that Sydney Shoemaker has called ‘mere Cambridge properties’, that is, not properties at all.” (Molnar 2003:43)

Molnar does not explicitly state his argument for this position. However, Molnar holds a version of the independence criterion of intrinsicity. The non-relational properties of an object do not depend upon what other objects exist and so are intrinsic. For example, *K* and *LI*'s non-relational properties do not depend upon what other objects exist and so are intrinsic. Molnar has shown that the property of being openable is founded upon and reducible to the non-relational, intrinsic properties of *K* and *LI*. With this argument, Molnar shows that being openable, like all dispositional properties, is reducible to the intrinsic properties of its bearers. We must conclude that Boyle is wrong to claim that the dispositional properties of objects are extrinsic properties of their bearers.

### **What underpins and motivates Boyle's argument for relational, extrinsic properties?**

Boyle claims that dispositional properties are relational, and so extrinsic. The locks power to open involves a relational between the lock and an appropriate key. Boyle's relational account ties the disposition to the conditions required for its manifestation. Boyle makes the conditions required for the manifestation part of the dispositional ascription. The lock possesses the property of being openable because it stands in the right relation to the key required for the lock to manifest its dispositions and open.

However, as was noted above, the independence of a disposition and its manifestation show that dispositions are not relational properties. Similarly, the independence of a disposition and its manifestation undercuts Boyle's claim that dispositional ascriptions are relational. If an object can possess a dispositional property independently of its manifestation, so too it can possess that disposition independently of the conditions required for that manifestation. Just as the independence of a disposition and its manifestation suggests that a sugar cube is soluble even when not dissolving, so too independence shows that a sugar cube is soluble even in the absence of the water required for it to dissolve.

Independence suggests that Boyle is wrong to claim that dispositions are relational and therefore extrinsic properties. To claim otherwise is to take a verificationist, anti-realist view of dispositions and powers. It is to suggest that the truth value of dispositional ascriptions does not transcend our evidence for such truths. That confuses and conflates the disposition with the conditions required for its manifestation. As Heil notes:

“Conditionals provide a defeasible, rough-and-ready way to pick out dispositions, not a reductive analysis.” (Heil 2003:195-96)

Boyle confuses a “rough-and-ready” way of picking out dispositional properties, a way of fixing the reference the dispositional terms, with the dispositional property itself when he claims that dispositional properties are relational.

### **Conclusion**

I have shown that arguments by A.D. Smith (1977), Jennifer McKittrick (2003) and Robert Boyle (1666) that dispositions are extrinsic properties of their bearers are either invalid or unsound and therefore fail to give any reason to accept that powers are not intrinsic. I have also shown that an argument can be constructed from Molnar (2003) demonstrating that even if dispositions are extrinsic properties, they are nonetheless founded upon and reducible to intrinsic properties of their bearers.

Arguments that dispositions are relational, extrinsic properties of their bearers mistake the manner in which we identify, pick out and talk about dispositions for



the nature of dispositions. These arguments conflate the manifestation of a disposition (which may be extrinsic) with the disposition itself and so make unwarranted ontological claims that dispositions are extrinsic. They also fail to distinguish between rigid and non-rigid ways of designating dispositions. Just because we can use an extrinsic property term to designate a disposition it does not follow that dispositions are themselves extrinsic. As a result, these arguments fail to give us any reason to hold that dispositions are extrinsic properties of their bearers.

## **Dispositions — conclusion**

The central claim of this thesis is that a number of key, competing theories of dispositions mistake and conflate how we fix the reference of dispositional terms for the nature of dispositions and the meaning of dispositional terms when they argue that:

- i) Dispositions are extrinsic properties of their bearers (Boyle 1666)
- j) Properties are purely dispositional (Bird 2007)
- k) Properties are purely categorical (there are no dispositional properties) (Armstrong in AMP 1996)
- l) Dispositional and categorical properties are separate and distinct properties (Prior, Pargetter and Jackson 1982)

This central claim rests upon a distinction between word making and world making — a distinction between how we talk about the world and designate objects and how the world is. Objects, like properties, can be picked out in a diverse range of ways. As Kripke argues, the very same object can be picked out with a rigid designator — a name — or non-rigidly, using descriptions. But these are just ways of designating and picking out entities. Neither way is metaphysically nor semantically revelatory (see chapter three). They do not tell us about the nature of dispositions and properties, nor do they disclose the meaning of dispositional and property terms.

The lesson I draw from this is the main conclusion of my thesis — that debates about the nature of properties can often turn out to be debates about the usefulness and informativeness of different ways of picking out and designating a property. However, this has little to do with the metaphysics of properties. Different ways of picking out a property are just that — different ways of picking out a property. They are not ways of distilling the meaning of dispositional and categorical terms nor are do they reveal the nature of dispositions and properties.

I show that theories that make substantial ontological claims about the nature of dispositions and properties mistake how we identify, designate and talk about

dispositions and properties for the nature of dispositions and properties. For example, we saw in chapter 4.2 how Bird mistakes the manner we characterise and pick out the reference of properties using dispositional terms for the nature of these properties themselves. Bird uses the fact that physicists:

(a) employ only dispositional terms, such as “spin” and “charge”, to characterize the fundamental physical particles

and

(b) employ only dispositional methods to explore the nature of fundamental particles

to argue that properties are purely dispositional. The problem is that scientific methodology has only one mode of characterising and exploring the properties of fundamental entities: the dispositional. Particle physics probes subatomic particles by bombarding them with other particles and observing how they act and interact. So the fact that science tells us that the fundamental particles are dispositional is not a reflection on the nature of the world. Rather it is a reflection on the methodology of science. Even if the fundamental entities are categorical, particle physics would still characterise them using dispositional terms.

Armstrong’s argument that all properties are purely categorical (chapter 4.3) and Prior, Pargetter and Jackson’s argument that there are separate and distinct dispositional and categorical properties (chapter 4.1) both rest upon a false counterfactual semantics of dispositions. The dispositional ascription:

“*x* is fragile”

is thought to entail and be analysable in terms of the conditional statement:

“If *x* were dropped, then *x* would break”

or the counterfactual:

“if *x* had been dropped, then *x* would have broken”.

However, as Lewis notes, a simple conditional analysis of dispositions is “simple indeed — but false” (Lewis 1997a:143). Finks, mimics, masks and antidotes show that a true counterfactual is neither necessary nor sufficient for the possession of a disposition. In particular, C.B. Martin’s (1994) electro-fink and reverse electro-fink examples illustrate that a true conditional is neither necessary nor sufficient for a true dispositional ascription.

Attempts to save the counterfactual analysis by adjusting and strengthening the counterfactual fail (see chapter 2). We are led to conclude along with Heil that:

“Conditionals provide a defeasible, rough-and-ready way to pick out dispositions, not a reductive analysis.” (Heil 2003:195-96)

The predicate “soluble” and the counterfactual “If  $x$  were placed in water, then  $x$  would dissolve” are merely two ways of picking out and designating the same property. Neither way of designating, be it a rigid or non-rigid, is revelatory of the nature of properties.

There is no reason to follow Armstrong and hold there are no dispositions, nor any reason to follow Prior, Pargetter and Jackson and hold there are separate and distinct dispositional and categorical properties. To think otherwise is to take one way of designating properties as revealing the nature of those properties. Their arguments rest upon a false semantics of dispositions and so are unsound.

The counterfactual analysis also causes more trouble for accounts of dispositions and properties. The counterfactual analysis includes mention of a disposition’s manifestation (say the breaking of a fragile object) and so makes it tempting to see the manifestation of the disposition as part of the disposition. However, powers and dispositions are ontologically independent of their manifestation. A tennis ball is elastic even when not bouncing. The Ming vase on level two of the Morven Brown building is fragile right now, even when it is not shattering. Indeed, the vase need never shatter, yet it may still remain fragile.

Mumford contends that empiricist, verificationist and anti-realist assumptions that refuse to separate evidence from ontology are also at fault here (Mumford 1998:ch3). Verificationist principles entail that a disposition just is its observable events, namely its manifestation. We readily observe a tennis ball bouncing when dropped. This makes it tempting to take the manifestation (the bouncing) for the disposition itself (elasticity) as it is the most obvious and observable sign of the disposition. But this is, once again, to mistake how we identify and designate

dispositions for the disposition itself. Armstrong describes this mistaken conflation as a propensity to:

“...project into the disposed things a ghostly image of the manifestation of the disposition, even when it is not manifested.” (Armstrong, Martin, Place 1996:93)

There is a long history, dating back to at least Boyle in the seventeenth century, claiming that powers are relational and extrinsic properties of their bearers. As noted in chapter 4.4, Boyle claims that a key’s power to open a lock is a relational and extrinsic property of the key. Boyle (1666), Smith (1977), Prior (1985) and McKittrick (2003a) confuse and conflate the manifestation of a disposition with the disposition itself when they argue that dispositions are relational and extrinsic properties. They argue that the manifestation of a power is relational and extrinsic and so conclude that the power itself is relational and extrinsic.

However, this is to mistake the manifestation, a readily observable and useful way of picking out a disposition, for the disposition itself. The manifestation may well be relational and extrinsic, but the manifestation is not the disposition, and so it does not follow that the disposition is relational and extrinsic. Arguments that dispositions and powers are extrinsic properties of their bearers are unsound and give us no reason to accept their conclusion.

Once we are sensitive to:

(a) the distinction between how we talk about the world and how the world is

and

(b) are aware that the manner in which we identify, discover and designate powers and properties does not reveal the nature of those properties or the meaning of dispositional and property terms,

then it becomes apparent that arguments making substantive claims about the nature of dispositions and properties are either invalid or unsound. It becomes apparent that these theories provide no grounds to accept their ontological claims about the nature of dispositions and powers. This is a skeptical conclusion. Our

language provides us with ways to identifying and picking out dispositions and properties, but it does not tell us about the nature of these entities. In pursuing metaphysics, we must be wary of this distinction between how we talk about and identify entities and the nature of these entities.

Where to from here? I think the next step in our attempts to understand the nature of dispositions and their role in causation, laws and modality is to develop a semantics of dispositions that avoids the pitfalls of the counterfactual analysis. To this end, John Maier (2015) argues that dispositional predicates are generally derived from ergative verbs, while Michael Fara (2005) sets out to analyse dispositions in terms of habituals.

## References

- Armstrong David M. (2005), 'Four Disputes About Properties', *Synthese* 144:1-12.
- Armstrong, D. M. (2001), 'Dispositions by Stephen Mumford', *Philosophy and Phenomenological Research* , 62:246-248.
- Armstrong, D. M., Martin, C. B. & Place, U. T. (1996), *Dispositions: A Debate*, London: Routledge.
- Armstrong, D. M. (1989a), *Universals: An Opinionated Introduction*, Boulder: Westview Press.
- Armstrong, D. M. (1989b), *A Combinatorial Theory of Possibility*, Cambridge: Cambridge University Press.
- Armstrong, D. (1978). *Universals and Scientific Realism, II: A Theory of Universals*. Cambridge: Cambridge University Press.
- Armstrong, David (1973), *Belief, Truth and Knowledge*, Cambridge: Cambridge University Press.
- Armstrong, David (1968), *A Materialist Theory of Mind*, London: Routledge.
- Armstrong, David (1969), 'Dispositions are Causes', *Analysis* 30.
- Ashwell, Lauren (2010). 'Superficial Dispositionalism'. *Australasian Journal of Philosophy* 88 (4):635-653.
- Averill, Edward (1982). *Essence and scientific discovery in Kripke and Putnam*. *Philosophy and Phenomenological Research* 43 (2):253-257.
- Barker Stephen & Smart Ben, (2012), 'The ultimate argument against dispositional monist accounts of laws', *Analysis* 72:714-722.
- Barnes, E. (2000), 'Ockham's Razor and the Anti-Superfluity Principle', *Erkenntnis*, 53, 353–74.
- Bauer William (2010), *The Ontology of Pure Dispositions*, Doctoral Thesis, University of Nebraska at Lincoln.
- Baxter, Donald L. M. (2001). 'Instantiation as partial identity'. *Australasian Journal of Philosophy* 79 (4):449 – 464.
- Beebe, H. (2005), 'Book Review: 'Powers: A Study in Metaphysics'. G. Molnar. S. Mumford (ed.). (Oxford, 2003)', *Philosophical Quarterly* 55, 674-677.
- Beebe, H. (2004), 'Book Review: 'Scientific Essentialism'. B. Ellis. (Cambridge,

2001)', *Mind* 113, 334-340.

Bird, A. (2012), 'Dispositional Expressions', in Gillian Russell and Delia Graff Fara (eds.), *Routledge Companion to the Philosophy of Language*. London: Routledge.

Bird, Alexander (2010). Causation and the manifestation of powers. In Anna Marmodoro (ed.), *The Metaphysics of Powers: Their Grounding and Their Manifestations*. Routledge.

Bird, Alexander (2008). Review of Stephen Mumford, David Armstrong. *Notre Dame Philosophical Reviews* 2008 (5).

Bird, A. (2007), *Nature's Metaphysics: Laws and Properties*. Oxford: Oxford University Press.

Bird, A. (2006), 'Potency and Modality', *Synthese*, 149, 491–508.

Bird, A. (2005), 'Laws and Essences', *Ratio*, 18, 437–461.

Bird, A. (2004), 'Antidotes All the Way Down?', *Theoria*, 19, 259–69.

Bird, A. (2003), 'Structural Properties', in H. Lillehammer & G. Rodriguez-Pereyra (eds.), *Real Metaphysics: Essays in Honour of D. H. Mellor*, London: Routledge.

Bird, Alexander (2001). David Armstrong, Charlie Martin, and Ullin place, edited by Tim Crane *dispositions: A debate*; Stephen Mumford *dispositions*. *British Journal for the Philosophy of Science* 52 (1):137-149.

Bird, A. (2000), 'Further Antidotes: A Response to Gundersen', *The Philosophical Quarterly*, 50, 229–233.

Bird, A. (1998), 'Dispositions and Antidotes', *The Philosophical Quarterly*, 48, 227–234.

Blackburn S. (1990), 'Filling in Space', *Analysis*, 50, 50-65.

Bonevac, D. ; Dever, J. & Sosa, D. (2012). 'The Counterexample Fallacy'. *Mind* 120 (480):1143-1158.

Boyle, R. (1666). *The Origin of Forms and Qualities According to Corpuscular Philosophy*, M.A. Stewart (ed.), *Selected Philosophical Papers of Robert Boyle*. Manchester: Manchester University Press, 1979, 1-96.

Bradley, M.C. (1979). 'Two Logical Connection Arguments and Some Principles about Causal Connection', *Erkenntnis*, 14:1-23.

Brenatano Franz (1924) *Psychologie vom empirischen Standpunkt*, Leipzig:



- Duncker & Humblot, 1874. (2nd, enl. ed. by Oskar Kraus, 1924, Leipzig: Meiner).
- Bunge, M. (1963), *The Myth of Simplicity: Problems in Scientific Philosophy*, Englewood Cliffs: Prentice Hall.
- Campbell, K. (1981). *Abstract Particulars*. Oxford:Blackwell.
- Carnap, R. (1936), 'Testability and Meaning (part 1)', *Philosophy of Science*, 3, 420-71.
- Carnap, R. (1937), 'Testability and Meaning (part 2)', *Philosophy of Science*, 4, 420-71.
- Carnap, R. (1932), 'Logical Foundations of the Unity of Science in Hanfling, O. (Ed.) (1981). *Essential readings in logical positivism*. Oxford: Blackwell, 112-129.
- Chalmers, Alan (2009), *The Scientist's Atom and the Philosopher's Stone*, Dordrecht: Springer.
- Choi, Sungho and Fara, Michael, 'Dispositions', *The Stanford Encyclopedia of Philosophy* (Spring 2014 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/spr2014/entries/dispositions/>.
- Choi, Sungho (2011), 'Finkish Dispositions and Contextualism', *The Monist*, 94, 103-120.
- Choi, Sungho (2009), 'The Conditional Analysis of Dispositions and the Intrinsic Dispositions Thesis', *Philosophy and Phenomenological Research*, 78, 568-590.
- Choi, Sungho (2008a), 'The Incompleteness of Dispositional Predicates', *Synthese* 163, 157-74.
- Choi S. (2008b) 'Dispositional Properties and Counterfactual Conditionals' *Mind*, 117, 795-841.
- Choi, Sungho (2007). 'Causation and Counterfactual Dependence'. *Erkenntnis* 67 (1):1-16.
- Choi, S. (2006,) 'The Simple vs. Reformed Conditional Analysis of Dispositions', *Synthese* 148. 369–379.
- Choi, S. (2005a), 'Do Categorical Ascriptions Entail Counterfactual Conditionals?', *The Philosophical Quarterly*, 55, 495–503.
- Choi, S. (2005b), 'Dispositions and Mimickers', *Philosophical Studies*, 122, 183–188.
- Choi, S. (2003), 'Improving Bird's Antidotes', *Australasian Journal of Philosophy*,

81, 573–580.

Clarke, Randolph. (2010), 'Opposing Powers', *Philosophical Studies*, 149, 153-160.

Clarke, Randolph. (2008), 'Intrinsic Finks', *The Philosophical Quarterly* 58, 512-518.

Collins, John David. & Hall, Edward J. & Paul, L. A. Ed (2004), *Causation and counterfactuals*, Cambridge: MIT Press.

Corry Richard. (2011), 'Can Dispositional Essences Ground the Laws of Nature', *Australasian Journal of Philosophy*, 89, 263-275.

Cross Troy (forthcoming), 'Goodbye, Humean Supervenience', *Oxford Studies in Metaphysics*,

Cross, Troy (2012). 'Recent Work on Dispositions'. *Analysis* 72 (1):115-124.

Cross Troy (2012), 'Review: The Metaphysics of Powers: Their Grounding and Their Manifestations', *Notre Dame Philosophical Reviews*.

Cross Troy (2005), 'What is a Disposition', *Synthese* 144, 321-41.

Derkse, W. (1992), *On Simplicity and Elegance*, Delft: Eburon.

Descartes R. (1954), *Principles of Philosophy*, extracts translated by Anscombe and Geach in *Descartes' Philosophical Writings*, Nelson.

Ellis, B. (2005a), 'Physical Realism', *Ratio*, 18, 371–384.

Ellis, B. (2005b), 'Universals, the Essential Problem and Categorical Properties', *Ratio*, 18: 462–472.

Ellis, Brian (2001), *Scientific Essentialism*, Cambridge: Cambridge University Press.

Ellis, Brian and Lierse, Caroline (1994), 'Dispositional Essentialism', *Australasian Journal of Philosophy*, 72, 27–45.

Englehard Kristina (2010), 'Categories and the Ontology of Powers' in Marmodoro, Anna (eds) (2010), *The Metaphysics of Powers*, New York: Routledge.

Everett, Anthony, (2009), 'Intrinsic Finks, Masks, and Mimics', *Erkenntnis*, 71, 191-203

Fara Michael (2005), 'Dispositions and Habituals', *Nous*, 39, 43-82.

Fine Kit (1994), 'Essence and Modality: The Second Philosophical Perspectives Lecture', *Philosophical Perspectives*, 8, 1-16.

Fodor, J. (1974), 'Special Sciences', *Synthese*, 28, 97-115.

Forster, M. & Sober, E. (1994), 'How to Tell when Simpler, More Unified, or Less Ad Hoc Theories will Provide More Accurate Predictions', *British Journal for the Philosophy of Science*, 45, 1-35.

Franklin, J. (1988), 'Are Dispositions Reducible to Categorical Properties?', *The Philosophical Quarterly*, 38, 62-64.

Frege, G. (1980). 'On Sense and Reference' in *Translations from the Philosophical Writings of Gottlob, P. Geach and M. Black* (eds. and trans.), Oxford: Blackwell.

Frisch, Mathias (2010). 'Causes, Counterfactuals, and Non-Locality'. *Australasian Journal of Philosophy* 88 (4):655-672.

Gauch, H. (2003), *Scientific Method in Practice*, Cambridge: Cambridge University Press.

Geach, P.T. (1969), *God and the Soul*, London: Routledge.

Goodman, N. (1954), *Fact, Fiction and Forecast*, Cambridge: Harvard University Press.

Hajek, Alan (forthcoming), 'Most Counterfactuals are False'.

Harre R., (1986), *Varieties of Realism: A Rationale for the Natural Sciences*. Oxford: Blackwell.

Harré, R and E. H. Madden. (1973). *Natural Powers and Powerful Natures*. *Philosophy* 48 (185): 209-230.

Haugeland, John (1982), 'Weak Supervenience', *American Philosophical Quarterly*, 19, pp.93-103.

Handfield, Toby (2010). *Dispositions, manifestations, and causal structure*. In Anna Marmodoro (ed.), *The Metaphysics of Powers: Their Grounding and Their Manifestations*. Routledge.

Handfield, Toby (ed.) (2009). *Dispositions and Causes*. Clarendon Press.

Handfield, Toby (2008), 'Unfinkable Dispositions', *Synthese*, 160, 297-308.

Handfield, Toby (2008). 'Humean dispositionalism'. *Australasian Journal of Philosophy* 86 (1):113-126.

Handfield, Toby & Bird, Alexander (2008). 'Dispositions, rules, and finks'.

- Philosophical Studies 140 (2):285 - 298.
- Heil, J. (2005), 'Kinds and Essences', *Ratio*, 18, 405–419.
- Heil, J. (2003), *From an Ontological Point of View*, Oxford: Clarendon.
- Hobbes, T. (1962), 'Body, Man and Citizen', in *Selections from Thomas Hobbes*, ed Peters, R. Collier
- Holsinger, K. (1981), 'Comment: the Blunting of Occam's Razor', *Canadian Journal of Zoology*, 59, 144–6.
- Holton, Richard (1999). Dispositions all the way round. *Analysis* 59 (1):9-14.
- Humberstone, I.L. (1996), 'Intrinsic/Extrinsic', *Synthese*, 108, 205-267.
- Jackson, Frank; Pargetter, Robert & Prior, E. W. (1982). Functionalism and type-type identity theories. *Philosophical Studies* 42 (September): 209-25.
- Johnston, Mark (1992), 'How to Speak of the Colors', *Philosophical Studies*, 68, 221–263.
- Johnston, Mark (1987), 'Is There a Problem About Persistence?', *Proceedings of the Aristotelian Society (Supp)*, 61, 107-35.
- Kane G.,(1995), *The Particle Garden: Our Universe as Understood by Particle Physics*. Bloomington: Addison Wesley.
- Kaufman, Dan (2006), 'Locks, Schlocks, and Poisoned Peas: Boyle on Actual and Dispositive Qualities', *Oxford Studies in Early Modern Philosophy*, 3, 153-198.
- Kelly, Alexander. (2009), 'Properties and Powers', PhD Thesis, University of Warwick.
- Kelly, K. (2004), 'Justification and Truth-Finding Efficiency: How Ockham's Razor Works', *Minds and Machines*, 14, 485–505.
- Kim, Jaegwon (1992), 'Multiple Realisation and the Metaphysics of Reduction', *Philosophy and Phenomenal Research*, 52, 1-26.
- Kim, Jaegwon (1974), 'Noncausal Connections', *Nous*, 8, 41-52.
- Kripke, S. (1988), 'Notes from Saul Kripke's Seminar on Secondary Qualities', *Phil 528*, Fall 1987, Princeton University, 13 January.
- Kripke, S. (1980), 'Naming and Necessity', Cambridge: Harvard University Press.
- Kripke, Saul A. (1971). Identity and necessity. In Milton K. Munitz (ed.), *Identity*

and Individuation. New York University Press. 135-164.

Lange, Marc (2010), 'Book Review: Alexander Bird, Nature's Metaphysics: Laws and Properties', *Philosophical Review*, 119, 97-99.

Langton, R. & Lewis, D. (1998), 'Defining 'Intrinsic'', *Philosophy and Phenomenological Research*, 58, 333–345.

Leibniz, G. W. (1988), *Philosophical Texts*, trans. And ed. R.S. Woolhouse and R. Francks, Oxford: Oxford University Press.

Levi, Isaac (2003), 'Dispositions and Conditionals' in *Real Metaphysics: Essays in Honour of D.H. Mellor*. Edited by Hallvard Lillehammer and Gonzalo Rodriguez-Pereyra, London: Routledge, 137-153.

Lewis David (2009) In Braddon-Mitchell, David & Nola, Robert (eds.). *Conceptual Analysis and Philosophical Naturalism*. Mit Press. 203-222.

Lewis, David. (1999), 'New Work for a Theory of Universals,' in *Papers in Metaphysics and Epistemology*. Cambridge: Cambridge University Press.

Lewis, David (1999), 'Extrinsic Properties' in *Papers in Metaphysics and Epistemology*, Cambridge: Cambridge University Press, 111-132.

Lewis, David (1997a), 'Finkish Dispositions', *The Philosophical Quarterly*, 47, 143–158.

Lewis, David (1997b), 'Naming the Colours', *Australasian Journal of Philosophy*, 75:3, 325-342.

Lewis, David (1988), 'Rearrangement of Particles: Reply to Lowe', *Analysis*, 48, 65-72.

Lewis, David (1986), *On the Plurality of Worlds*, Oxford: Blackwell.

Lewis, David (1983) 'New work for a theory of universals', *Australasian Journal of Philosophy*, 61:4, 343-77.

Lewis, David (1976), 'The Paradoxes of Time Travel', *American Philosophical Quarterly*, 13, 145-52.

Lewis, D. (1973), *Counterfactuals*, Oxford: Basil Blackwell.

Linsky B. (2011), 'Kripke on Proper Names and General Terms' in Berger, Alan (ed.). *Saul Kripke*. Cambridge University Press.

Locke, Dustin (2012). *Quidditism without quiddities*. *Philosophical Studies* 160 (3): 345-363.

- Lowe, E.J. (1988), 'The Problems of Intrinsic Change: Rejoinder to Lewis', *Analysis*, 48. 72-77.
- Lowe, E.J. (1987), 'Lewis on Perdurance versus Endurance', *Analysis*, 47, 152-154.
- McKittrick, J. (2005), 'Are Dispositions Causally Relevant', *Synthese*, 144. 357–371.
- McKittrick, J. (2003a), 'A Case for Extrinsic Dispositions', *Australasian Journal of Philosophy* 81. 155–174.
- McKittrick, Jennifer (2003b). 'The bare metaphysical possibility of bare dispositions'. *Philosophy and Phenomenological Research* 66 (2):349–369.
- Mackie J.L. (1980), *The Cement of the Universe*, Oxford: Oxford University Press.
- Maier, John (2015), 'Dispositions and Ergativity', *The Philosophical Quarterly* first published online March 8, 2015 doi:10.1093/pq/pqv013.
- Maier, John, 'A Dispositional Theory of Counterfactuals' Draft of 19 October 2011.
- Malzkorn, Wolfgang (2000). 'Realism, functionalism and the conditional analysis of dispositions'. *Philosophical Quarterly* 50 (201):452-469.
- Manley, D. & Wasserman, R. (2012). 'Dispositions, Conditionals, and Counterexamples'. *Mind* 120 (480):1191-1227.
- Manley, D. (2012). 'Dispositional Theory: Beyond The Biconditionals'. *Australasian Journal of Philosophy* 90 (2):321 - 334.
- Marmodoro, Anna (eds) (2010), *The Metaphysics of Powers*, New York: Routledge.
- Marmodoro, Anna (2009), 'Do powers need powers to make them powerful? From Pandispositionalism to Aristotle,' *History of Philosophy Quarterly*, 26,
- Martin, C. B. (1994), 'Dispositions and Conditionals', *The Philosophical Quarterly*, 44, 1–8.
- Mellor D. H. (2000), 'The Semantics and Ontology of Dispositions', *Mind* 109, 757–780.
- Mellor D. H. (1997), 'Properties and Predicates', in D.H. Mellor and Oliver A. (Ed.), *Properties*, Oxford: Oxford University Press.
- Mellor, D.H. and Oliver, A. (1997). Introduction, in D.H. Mellor and A. Oliver

- (ed.), *Properties*. Oxford:OUP.
- Mellor D. H. (1982), 'Counting Corners Correctly', *Analysis*, 42, 96–97.
- Mellor, D. H. (1977). Natural kinds. *British Journal for the Philosophy of Science* 28 (4):299-312.
- Mellor D. H. (1974), 'In Defense of Dispositions', *The Philosophical Review*, 83, 157–181.
- Menzies, P. (2009). 'Nature's Metaphysics Critical Notice'. *Analysis*, 69, 769-778.
- Mertz, Donald W. (1996). John Bacon, "Universals and Property Instances". *Modern Schoolman* 74 (1):55-62.
- Molnar, G. (2003), *Powers: A Study in Metaphysics*, Oxford: Oxford University Press.
- Molnar, G. (2000), 'Tuthmakers for Negative Truths', *Australasian Journal of Philosophy*, 78,72-86.
- Molnar, G. (1999), 'Are Dispositions Reducible?', *The Philosophical Quarterly*, 49, 1–17.
- Mumford, Stephen & Anjum, Rani Lill (2011). *Getting Causes From Powers*. Oxford: Oxford University Press.
- Mumford, Stephen (2007). *David Armstrong*. Routledge.
- Mumford, S. (2005), 'Kinds, Essences, Powers', *Ratio*, 18, 420–436.
- Mumford, Stephen (2001). Realism and the conditional analysis of dispositions: Reply to Malzkorn. *Philosophical Quarterly* 51 (204):375-378.
- Mumford, S. (1998), *Dispositions*, Oxford: Oxford University Press.
- Mumford, S. (1995) 'Ellis and Lierse on Dispositional Essentialism', *Australasian Journal of Philosophy*, 73, 606-12.
- Noonan, Harold W. (2010). Bird against the Humeans. *Ratio* 23 (1):73-86.
- Oddie, G. (1982). 'Armstrong on the Eleatic Principle and Abstract Entities'. *Philosophical Studies* 41:285–295.
- Oliver, A. (1996). 'The Metaphysics of Properties'. *Mind*, 105:1-80.
- Pasnau Robert (2011), *Metaphysical Themes 1274-1671*, Oxford: Oxford University Press.

- Popper, K. (1959), *The Logic of Scientific Discovery*, London: Hutchinson.
- Popper, K. (1949), 'A Note on Natural Laws and So-Called Contrary-To-Fact Conditionals', *Mind* 58.
- Prior, Elizabeth (1985), *Dispositions*, Aberdeen: Aberdeen University Press.
- Prior, Elizabeth (1982), 'The Dispositional/Categorical Distinction', *Analysis*, 42, 93-6.
- Prior E. Pargetter R. & Jackson F. (1982), 'Three Theses About Dispositions', *American Philosophical Quarterly*, 19, 251–257.
- Psillos Stathis (2006), 'What Do Powers Do When They Are Not Manifested?', *Philosophy and Phenomenological Research*, 72: 137-156
- Psillos, S. (2005), 'Scientific Realism and Metaphysics', *Ratio*, 18: 385–404.
- Putnam, H. (1975/1985) 'The meaning of meaning', in *Philosophical Papers*, Vol. 2: *Mind, Language and Reality*. Cambridge University Press.
- Quine, W. (1966), 'On Simple Theories of a Complex World', in *The Ways of Paradox*, New York: Random House.
- Quine, W.V.O. (1960). *Word and Object*. Cambridge, Mass:MIT Press.
- Rescher, N. (1998), *Complexity: a Philosophical Overview*, New Brunswick, NJ: Transaction.
- Rives, Bradley (2005), 'Why Dispositions Are (Still) Distinct from Their Bases and Causally Impotent', *American Philosophical Quarterly*, 42, 19-31.
- Ryle, G. (1949), *The Concept of Mind*, London: Hutchinson.
- Schrenk Markus (2010), 'Antidotes for Dispositional Essentialism' in Anna Marmodoro (ed.), *The Metaphysics of Powers: Their Grounding and Their Manifestations*. Routledge.
- Salmon, N. (1982), *Reference and Essence*. Oxford: Blackwell.
- Schroer, Robert (2013). 'Can a Single Property Be Both Dispositional and Categorical? The "Partial Consideration Strategy"', *Partially Considered*. *Metaphysica* 14 (1):63-77.
- Schroer, Robert (2012). 'Two challenges that categorical properties pose to physicalism'. *Ratio* 25 (2):195-206.



- Schroer Robert (2010), 'Is There More Than One Categorical Property?', *Philosophical Quarterly*, 60, 831-850.
- Seargent, David A. (1985). *Plurality and Continuity: An Essay in G.F. Stout's Theory of Universals*, Kluwer Academic Publishers.
- Shoemaker Sydney (1980), 'Causality and Properties', in Peter van Inwagen, ed., *Time and Cause: Essays Presented to Richard Taylor*, Dordrecht: Reidel, 109-136.
- Shope, R. K. (1978), 'The Conditional Fallacy in Contemporary Philosophy', *Journal of Philosophy*, 75, 397-413.
- Smart, J. (1984), 'Ockham's Razor', in Fetzer (eds), *Principles of Philosophical Reasoning*, 118-28.
- Smith, A.D. (1977), 'Dispositional Properties', *Mind*, 86, 439-445.
- Smith Michael and Stoljar Daniel (1998), 'Global Response Dependence and Noumenal Realism', *Monist*, 81, 85-111.
- Sober, E. (1981), 'The Principle of Parsimony', *British Journal for the Philosophy of Science*, 32, 145-56.
- Sober, E. (2006), 'Parsimony', in Sarkar, S. & Pfeifer, J. (eds), *The Philosophy of Science: An Encyclopedia*, London: Routledge, 531-538.
- Strawson Galen (2008), 'The Identity of the Categorical and the Dispositional', *Analysis* 68, 271-82.
- Strawson P.F. (1980), 'Reply to Evans', in van Strassen Z., (ed) *Philosophical Subjects*, Oxford:Claredon, 273-82.
- Swoyer, C. (1996), *Theories of Properties: From Plenitude to Paucity*, in *Philosophical Perspectives*, 10. Oxford: Blackwell, 243-263.
- Yablo, S. (1999), 'Intrinsicness', *Philosophical Topics* 26,590-627.
- Yates David (forthcoming), 'The Essence of Dispositional Essentialism', *Philosophy and Phenomenological Research*.
- Walsh, D. (1979), 'Occam's Razor: A Principle of Intellectual Elegance', *American Philosophical Quarterly*, 16, 241-4.
- Weatherson, Brian (2006). The asymmetric magnets problem. *Philosophical Perspectives* 20 (1):479-492.
- Williams, Neil. (2011), *Dispositions and the Argument from Science*, *Australasian Journal of Philosophy*, 89:1, 71-90.

Wittgenstein, L. (1961). *Tractatus Logico-Philosophicus*. Cornwall:Routledge.

Wittgenstein, L. (1988). *Philosophical Investigations*. Oxford:Basil Blackwell.

Yli-Vakkuri, Juhani (2010). 'Conditional and habitual analyses of disposition ascriptions'. *Philosophical Quarterly* 60 (240):624-630.