

LIMITATIONS OF POWER

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1 Introduction

An ontology of *powers*—essentially dispositional natural properties—has recently become popular, and consequently philosophers have sought to apply this ontology to a number of problems and areas outside fundamental metaphysics, such as those concerning causation, intentionality, and free will. In this paper I warn against over-extending the case for a powers ontology: the powers ontology cannot answer typical questions outside fundamental metaphysics. I suggest that proposals that attempt to do this suffer from a conflation of ‘power’ and ‘disposition’ or from an abuse of metaphor.

2 A taxonomy of properties

In order to see clearly in such debates we need to be very precise regarding what it is that we are talking about. Two key terms here are ‘disposition’ and ‘power’. Sometimes, these terms are used interchangeably. But that is at best a potentially very misleading way of talking; very often it betrays a confusion which leads to the impression that the metaphysical insights to be gained from the debates just referred to are greater than they really are.¹ In this section I introduce the key concepts. In addition to making clear the difference between ‘disposition’ and ‘power’, I also distinguish between ‘fundamental’ and ‘non-fundamental’ metaphysics. Discussion over the merits of a powers ontology belongs to fundamental metaphysics, whereas dispositional accounts of such-and-such typically belong to non-fundamental metaphysics. We see that the two sets of philosophical questions are orthogonal.

Sparse and abundant properties First, we need to bear in mind Lewis’s distinction between *abundant* and *sparse* properties. The general idea of an abundant property recognizes that we can use the term ‘property’ in a loose sense, for example in talking of the property of being grue. But we can also use the term ‘property’ in a narrower sense, and deny that being grue is a real property; it isn’t a property that we would appeal to in a scientific explanation. Lewis (1986) rightly thinks that we should make an *ontological* distinction between properties in the loose sense,

¹Almost everyone agrees that there are dispositions; for example, it seems trivially true that fragility is a disposition. But it is highly contentious that there are any powers as intended by the metaphysics of powers. So our concepts ‘disposition’ and ‘power’ ought not be treated as being the same.

which he calls *abundant* properties, and in the narrow sense, which he calls *sparse* properties. Lewis takes abundant properties to be sets of (actual and possible) objects; property is any such set, and consequently every self-consistent predicate determines an abundant property. My preference is to think of abundant properties to be intensional abstract objects; something similar to the senses of predicates. Sparse properties correlate with some subset of the predicates that will be found in a complete, correct scientific description of the world. Lewis needs sparse properties, which we may think of as the *natural* properties, for certain important philosophical tasks, and recognizes that the ontology of universals, in particular as promoted by David Armstrong (1978), can do this work. On this view sparse and abundant properties are very different categories of things: sparse properties are universals and abundant properties are something else, such as sets (Lewis) or intensions (my view). So if we use 'property' to include both, then 'property' is a pseudo-category, being a hybrid of two different categories. The sparse properties, universals, are a basic ontological component; their existence does important explanatory work, whereas abundant properties are not basic or explanatory in this way.

Regarding sparse properties, Lewis focuses on the fundamental natural properties. However, it is far from obvious that the existence of universals should be limited to these. I will take it that it is *prima facie* plausible that corresponding to properties such as being radioactive or being a vertebrate there are universals. So we should distinguish between fundamental sparse (natural) properties and the non-fundamental sparse (natural) properties

Dispositions Now let us turn to dispositions. We shall start with *predicates*. Dispositional predicates may be *covert*, such as the familiar 'fragile' and 'soluble' as well as other terms ending in '-ile', '-able', and so forth. Or they may be *overt*, such as 'disposed to burn when ignited', and other phrases of the form, 'disposed to M when S' (the latter we shall symbolize by: $D_{S,M}$). Dispositional predicates are widely held to have some close relationship to subjunctive/counterfactual conditionals, although it is a matter of some dispute what this relationship in fact is (we'll discuss some of those problems in Section 7). Now let us turn to entities: dispositions are the entities corresponding to these predicates—fragility, solubility, the disposition to burn when ignited. Understood in this way, dispositions are typically abundant properties. If we talk of the properties of potability, being mobile, being disposed to intoxicate when inhaled, then the properties are not ones that we can be confident will be components of a completed science. That said, we can also use dispositional expressions to refer to sparse properties. The expression '(sparse) property of being disposed to exert a force of $e q_1 q_2 / r^2$ on an object with charge q_2 ' refers (in my opinion) to the sparse property of possessing charge q_1 . So the term 'disposition' may be thought to be cross-categorical in the same way as the term 'property'.

Powers Powers are properties with a certain kind of essence—an essence that can be characterised in dispositional terms. Because *power* is a theoretical concept and not the name of an independently identified set of properties, I have elsewhere used an intentionally technical term *potency* to designate this kind of property. It is in the nature (essence) of a potency/power P that there is a specific dispositional charac-

ter, $D_{S,M}$ such that, necessarily, for any particular, x , that possesses P , $D_{S,M}x$ holds. Powers are intended to be sparse properties. Those who hold that there are powers regard them as metaphysically basic and not dependent or supervenient on any other kind of entity. Powers contrast with **categorical** properties. The latter I take to be sparse properties that do not have any essential properties beyond self-identity (and, maybe, their degree of polyadicity).

Metaphysicians debate whether fundamental sparse properties are all powers or are all categorical properties or are some of each. Note that 'categorical' is very often used in contrast to 'dispositional'; for example, a philosopher might say 'triangularity is a categorical property'. This is not to use 'categorical property' with the sense used in the preceding paragraph, for one might make this claim about triangularity without being committed to holding that the property is a sparse property. Rather it is being claimed that the intension of 'triangular' does not have the dispositional features possessed (for example) by 'fragile' and other dispositional predicates. In the literature this difference has manifested itself as a debate about the different (analytic) relations the predicates concerned may have to subjunctive conditionals (Mellor 1974; Prior 1982). It may be useful therefore to distinguish between 'categorical sparse properties' (those sparse properties lacking dispositional essences) and 'categorical abundant properties' (those abundant properties whose intensions lack a dispositional implication, and so any appropriate relation to a subjunctive conditional).

Non-fundamental sparse properties I said that in my view we should hold that there are both fundamental and non-fundamental sparse properties; the non-fundamental sparse properties will be the properties we find in explanations outside fundamental physics. Are such properties powers or categorical properties? This is a question that has been little addressed in the literature. But I think it is clear at the very least that some non-fundamental sparse properties are neither powers nor categorical properties. Take the property of being a methane molecule. This is a plausible natural, sparse property. On the one hand it is not a power. Although possessing that property may involve its bearers in having certain dispositions (e.g. to burn), those dispositions are not the essence of being a methane molecule. That essence concerns what the molecule is made of, not what the molecule will do. On the other hand, the property does have an essence (it is certainly a necessary, and plausibly essential consequence of being a methane molecule that the molecule has a part that is a carbon atom) it cannot be a categorical (sparse) property. In the sense of 'categorical property' used here, whereby categorical properties do not have interesting essences of any kind (they are quidditistic), then a property with an essence that concerns constitution is not a categorical property.

So some non-fundamental properties are neither powers nor categorical properties. Are any of them, then, categorical properties? Or are any powers? Matters are most unclear. Consider the possibility that all the fundamental properties are categorical. Would properties compounded of these be categorical too? Not necessarily for the nature (identity, essence) of a non-fundamental property might con-

cern its relationship to the fundamental properties.² It would thus have a non-trivial essence and so be non-categorical. A possible counter-view is that there could be emergent properties and laws: such properties could be categorical and being are not essentially linked to the underlying categorical properties.

How about non-fundamental powers? I think that the matter is most unclear. One might think, as in the preceding paragraph, that the essence of a property compounded of powers may concern its relation to those parts it is composed of. So it might be that such a property might confer a dispositional character (even necessarily) but that would not be its essence; the constitution or construction of the non-fundamental property would be what is essential to it. And likewise the emergentist reply might provide some ground for thinking that there could be non-fundamental properties whose essences are dispositional. That in fact might be a plausible view (see Bird 2008 for an argument in this direction).

The important thing to note is that there has been very little investigation of these questions in the literature. As we see below, the best arguments for an ontology of powers concern the existence of fundamental powers, so those arguments leave us in the dark as regards the question of non-fundamental powers. So to establish, given the existence of fundamental powers, that there are also non-fundamental powers would require an understanding of the relationship between fundamental and non-fundamental sparse properties. How is it that non-fundamental sparse properties exist at all? Are they complex universals compounded of basic universals? And if so how are they compounded? What kind of essence does a property have that is compounded of other properties? And if not compounded, are they emergent? How does that emergence occur? And how do we show that the emergent non-fundamental properties are powers? If one wishes to say, for example, that human beings have powers, then one must address these questions. But to date there has been little attempt so to do.

3 Distinguishing powers from dispositions

That there is a difference between dispositions and powers is clear and, I shall argue, crucial if we are to avoid certain confusions. Not every disposition is a power. It is fairly uncontroversial that there are dispositions: things are fragile, soluble, and so forth, and so by the characterisation of dispositions as abundant properties, there are abundant properties that are these dispositions. On the other hand, powers being theoretical entities, it is disputable whether there are any powers. Perhaps we do not need any entities with dispositional essences among the metaphysically basic entities of the world. David Armstrong (1997, 2011) for one denies that we do. According to Armstrong, universals do not have dispositional essences. Rather their natures are *categorical*, which I take to mean that they have no natures/essences beyond the trivial, such as self-identity.

Armstrong's denial that universals are ever powers is not a denial that universals can ever be characterised dispositionally. Typically they can be. For example, there

²This argument may depend on mereological essentialism, and this could be rejected. See Hawley (2010) and Hawley and Bird (2011) for discussions of complex universals.

may be a law that things that are P, when they are S, will also be M. In which case we can characterise F dispositionally: things that are P are disposed to be M when S. But this is *not* to say that P is a power. For Armstrong holds that the laws of nature are contingent. There are other worlds in which this law fails to hold. In some such worlds it will be false that things that are F are disposed to be M when S. Hence while it may be a contingent truth about our world that objects that are P have this disposition, this is not a necessary truth about the universal F, and so *a fortiorifortiori* P's essence cannot be characterised by this disposition. This point is important. The debate over the existence of powers is not a debate over the existence of dispositions. Armstrong rejects powers but accepts that there are dispositions. Note also that his point does not depend on his view of laws in particular: anyone who believes in universals and holds laws to be contingent, can hold that there are universals which can be given a *contingent* dispositional characterisation.

In the following I shall argue that it is important to keep in mind the distinction between powers and dispositions. Powers and dispositions contribute to different, independent projects in metaphysics. Consequently, the success of a dispositional account of some phenomenon provides no evidence that an ontology of powers is correct. For non-powers theorists such as Armstrong or Humeans such as Lewis can equally make use of dispositions. Conversely, adherence to the powers ontology gives one no special reason to think that dispositional accounts are likely to be appropriate in a wide range of areas in metaphysics and elsewhere in philosophy. Nor, I argue, are powers likely to be helpful in answering questions beyond a limited area of metaphysics. To suggest that they can is to confuse powers and dispositions.

4 Distinguishing fundamental from non-fundamental metaphysics

Projects in metaphysics may be (roughly) divided between those in *fundamental* metaphysics and those in *non-fundamental* metaphysics. In fundamental metaphysics we aim to say what the fundamental entities of the world are, how they relate, and how they account for the most basic and general features of the world (such as the existence of facts or the fundamental laws of nature). Fundamental metaphysics aims to describe the basic structure of the world on which all else supervenes, and so aims primarily to capture the fundamental level of existence. Non-fundamental metaphysics by contrast is concerned with question that relate to other ontological levels, most particularly that of middle-sized dry goods. The 'analysis of causation' and the 'analysis of dispositions' are examples of projects in non-fundamental metaphysics. When we ask for an analysis of 'A caused B', we are typically asking for informative necessary equivalents for sentences such as 'Susie's throwing the stone caused the breaking of the window'. Sometimes the project *may* be one of 'analysis' in the old fashioned sense, of finding *a priori* reductive synonyms or truth-conditions, but it need not be. But not all non-fundamental metaphysics need be regarded as seeking the analyses of concepts. For example, Timothy Williamson (1995) rejects the analysis of concepts but regards his epistemol-

ogy as relating to the metaphysics of mind. Epistemic states are not fundamental entities (which is consistent with their being irreducible); the relevant metaphysics is non-fundamental metaphysics. Likewise debates surrounding free-will are non-fundamental. (I will use ‘analyze’ for a more general task of uncovering informative (and necessary) relations between one state of affairs and another.)

Arguments surrounding powers belong to fundamental metaphysics. Whereas when we find that dispositional accounts of certain concepts are attractive, (e.g. dispositional accounts of causation, rule-following, etc.) we are engaged in non-fundamental metaphysics. And while certain projects in fundamental metaphysics and in non-fundamental metaphysics might overlap, in general they do not impinge upon one another. To illustrate the different kinds of issue involved in discussing powers and dispositions, I shall first present a key issue in deciding whether an ontology of powers is correct. I shall then mention a debate concerning the appropriateness of a dispositional analysis. We shall see that the matters up for debate are entirely different.

An example of fundamental metaphysics If fundamental universals are not powers, what else might they be? One possibility, favoured by Lewis (see Black 2000) and by Armstrong (1997), is that they are *quidditistic* properties. The difference is this. While the powers theorist thinks that the nature and identity of a universal is given by its essential dispositional character, the quidditist thinks that universals have no such character essentially; rather the identity of fundamental universals is primitive. So the former thinks that universal A in world w_1 is identical with universal B in world w_2 because A and B have the same dispositional character in the two worlds, whereas the latter thinks that this identity is a brute fact. Consequently, while the powers theorist thinks that this limits the behaviour of universals in other possible worlds, the quidditist sees no such restriction. This has been seen as a problem for the quidditist, since it implies that the following is possible. The total nomic role in the actual world of A is R_A and of B is R_B . In some other possible worlds these roles might be fully swapped, so that A fills the role R_B and B fills the role R_A . Everything about the universals is exactly swapped. But this other world would still be a distinct world because of the primitive identity of the universals. This seems objectionable enough, but further worries are raised about knowledge of properties and our ability to refer to them. In the opposite direction, the quidditist will point out that the dispositional character that the powers theorist says fixes the identity of universals is itself a relationship to further universals (the stimulus and manifestation universals). If these universals are also powers, then their identities will be fixed by their dispositional characters, which will in turn depend on further universals. So it looks as if the identity of one universal depends on the identity of other universals which in turn depends on the identities of yet further universals, and so forth. Either this must come to an end—i.e. with universals whose identities are not fixed by their dispositional character (e.g. quidditistic properties). Or we will find that the chain of dependencies will return to include universals already mentioned, in which case the chain is circular. Or the chain of dependencies is infinite. The second and third options seem unpalatable (especially the third, which implies infinitely many fundamental properties). So it

looks as if not all universals can be powers (see Swinburne 1980; Blackburn 1990; Armstrong 1997). Arguably the (monistic) powers theorist can accept circularity, so long as the structure of circularity has enough asymmetry to fix the identities of its components (Bird 2007b). But the point I am currently interested in is not the correctness of these views but rather the nature of the debates involved. They turn on issues of the modal character of universals: what they could be like (or not) in other possible worlds or on the grounding of the identity of universals. These are questions in fundamental metaphysics that are quite unlike the questions we find in non-fundamental metaphysics and its applications.

An example of non-fundamental metaphysics One prominent example of the latter concerns the analysis of rule-following. What makes it that S was following rule A as opposed to rule B, when all S's actual actions are ones mandated both by rule A and by rule B (the actions mandated by the rules do differ, but only for cases that S has not yet encountered)? One possible answer is that S might be disposed to follow rule A but not disposed to follow rule B. As a consequence, S would behave in the A-rule way and not in the B-rule way in some hypothetical circumstance where the rules would differ in what they demand. As is well known, Kripke (1982) raises objections to this view. He points out that it is possible to follow a rule but make a mistake and fail to do as mandated by that rule. But if the subject acted so as to make the mistake, then the subject was so disposed. So it is not the case that the subject was disposed to follow the rule. Martin and Heil (1998) respond that Kripke is assuming the simple conditional analysis of dispositions, which says that dispositional ascriptions are exactly equivalent to corresponding subjunctive (or counterfactual) conditionals. But that analysis is known to be false, thanks to finks, masks, antidotes, and the like (see Section 7). So Kripke's objection fails. This is not the end of the story, but the moral of telling it is clear. This debate does not concern fundamental properties. It does not concern the modal character or identities of a whole category of ontologically fundamental entities. It does not therefore involve speculation concerning the nature of other possible worlds in any general way. Rather the canvas is much more restricted, to consideration of the states of persons (following a rule, being disposed thus-and-so), and in so doing we do not need to consider what fundamental properties are like.

Consequently, one's view of the fundamental metaphysical question: 'are fundamental universals powers or quidditistic properties?' is orthogonal to one's view of the non-fundamental question: 'is to follow a rule to be disposed in a certain way?' One might be a powers theorist and believe that fundamental universals have an essentially dispositional character, but one would not be thereby given any reason to think that rule-following is dispositional. Nor is the reverse true. One might agree that to follow a rule is to be disposed a certain way. But one might think also that the fundamental universals, if they have a dispositional character, have that character only contingently.

I have argued that debates over the correctness of a fundamental ontology of powers belong to fundamental metaphysics and are independent of the correctness of a dispositional account of, for example, rule-following, which belongs to non-

fundamental metaphysics. I shall further illustrate the difference between such areas of debate in the following sections. We should expect them to be independent for the following reason. Consider some fundamental natural property P. The powers theorist says the for some dispositional character, $D_{S,M}$, P has this character essentially. The opponent, a quidditist, denies this. As we saw, Armstrong can say that instead there is a contingent law that things that are P, when they are S, will also be M; P itself is not a power, it is a quidditistic (or categorical) property. Both parties agree that things that are P have the disposition $D_{S,M}$, but they disagree over whether this relationship between P and $D_{S,M}$ is necessary or contingent. So both parties will agree on the distribution of dispositions in the actual world. In fact they also agree on the distribution of dispositions in nearby possible worlds, since these have the same laws as the actual world. They will only start to differ when we attempt to go more remotely. Armstrong would say that there are some (fairly remote) possible worlds where somethings are P but are not also $D_{S,M}$; the powers theorist denies that there are any such worlds. So the difference between the views will show up when we consider putative worlds with different laws—such as in the debate over quidditism. However, debates concerning the correctness of dispositional accounts (e.g. of rule-following, causation, etc.) do not need to consider such putative worlds. When asking whether someone who follows a rule is disposed in a certain way we do not need to consider the kind of putative world (one with different laws) relevant to the debate over powers. Consequently, we should not expect the debate between the powers theorist and her opponent to have any ramifications for dispositional account of rule-following, causation, and the like.

5 Laws of nature

One advantage claimed for powers by their supporters is that they provide us with an account of the laws of nature. Consider a power, P, whose essence is the dispositional character, $D_{S,M}$. Thus any object that is P and which receives stimulus S will yield manifestation M, and so the following is true: $\forall x(Px \wedge Sx \rightarrow Mx)$. Hence the existence of powers generates a universal generalization characteristic of the laws of nature. In this example we assumed that the dispositional predication, $D_{S,M}x$, is equivalent to a subjunctive conditional, $Sx \square \rightarrow Mx$. This need not always be the case—the cases where it fails are cases where we have *ceteris paribus* laws.

A benefit of this approach to the laws of nature is the fact that it identifies the necessity we attach to the laws of nature—it is metaphysical necessity. Contrast this with Armstrong's (1983) account. There necessity comes from a second order relation N that holds between first order universals, so that if $N(E,G)$ then $\forall x(Fx \rightarrow Gx)$. But as Lewis complains, Armstrong does not articulate where this necessity comes from. Worse, on pain on explanatory emptiness or infinite regress, Armstrong must admit that it is a metaphysical necessity that N has this property. In which case N cannot be a universal with a categorical essence, contradicting a central commitment of Armstrong's metaphysics. Once that commitment is relaxed, objections to powers seem unwarranted. At the same time, powers avoid certain kinds of sceptical worry that threaten properties with categorical essences.

The preceding two paragraphs are a merest sketch, but they do provide some indication of the kind of argument that may be adduced in favour of powers. Note certain important features of the discussion: it is abstract and takes place at a basic metaphysical level. The account of laws of nature is not a commitment to explain, directly, every law of nature in the manner outlined above. It is sufficient that the fundamental laws of nature be explained in this way, and the other, non-fundamental laws of nature will supervene upon these. I do not think, for example, that Avogadro's law or Dalton's law of partial pressures can be explained directly as consequences of powers that appear in chemistry. While all powers are sparse properties (and so universals), the powers theorist need not argue that all sparse properties are powers. For not all sparse properties need be fundamental universals: the characterisation of sparse properties allowed that properties figuring in true, non-fundamental science (e.g. chemistry) might be sparse universals. And it would require further argument to show that these properties are powers; indeed *prima facie* it seems that they are not: the property of containing a carboxylic acid group (–COOH) might well be a sparse property, but does not look at all like a power. But that need not trouble the powers theorist so long as all the fundamental properties are powers.

A consequence, I suggest, of the nature of these arguments for powers, is that the arena for discussing the advantages (and disadvantages) of an ontology of powers is fairly limited. The consequences of that ontology will show up at the fundamental levels of existence but not at higher levels. Thus considerations gleaned from basic physics may be relevant to the assessment of the powers ontology. That is because the fundamental properties appearing in the fundamental laws of physics must have a dispositional character if the powers view is to be correct. But what we know from chemistry will not be relevant, because chemistry does not discuss fundamental properties. It may be true that the facts of chemistry supervene on the facts of physics, but the precise nature of that supervenience is epistemically opaque. So anything we know about chemistry is going to be irrelevant to the debate about powers. *A fortiori* what we know from the world of middle-sized dry goods (Susie throwing a stone and breaking a window, Susie following a rule) will also be irrelevant to such debates. As a result, while I believe that the powers/potencies approach is of crucial significance for 'fundamental ontology' I see no reason for expecting it to have repercussions beyond that limited if important sub-field within metaphysics.

According to the forgoing discussion, the powers ontology can explain why there are laws, but does not explain directly any of the particular laws, excepting possibly the fundamental laws of physics. That explanation entails that the laws of nature are necessary. As mentioned, this might be thought to be an advantage, since there is an intuitive sense in which laws carry some kind of necessity with them, which distinguishes them, for example, from mere regularities. On the other hand many philosophers hold that the laws of nature are contingent, since we can imagine that they might have been otherwise. Note that this disagreement is a disagreement about modal facts, characteristic of debates in fundamental metaphysics.

6 Causation

I have been pressing the thought that a debate may be central to a certain kind of fundamental metaphysics yet not have ramifications elsewhere in metaphysics, let alone beyond metaphysics. The debate between Aristotelian and Platonic conceptions of the forms is like this, as is the debate between nominalism and realism and likewise the more recent debate between trope and universal accounts of properties. These are questions of fundamental ontology. But their resolution need not impact on every part of metaphysics. For example, whether properties are tropes or universals is unlikely to have any influence on the debate as to whether causation can be analysed in terms of counterfactuals or not. Just the same is true for the ontology of powers. Although a debate about fundamental ontology, it is a debate whose ramifications for debates at higher levels in metaphysics are limited, including debates over the analysis of causation.

This last claim might seem odd. Above I explained the existence of the laws of nature in terms of powers. And the close relationship between laws and causation might suggest that powers can therefore explain causation. In any case, powers seem just the thing to explain causation: some event happened because something had a power to bring it about (and received the appropriate stimulus to that power); or, in Molnar's view, causation is the manifestation of reciprocal powers. (Molnar, 2003: 186–7, regards the ability of the powers ontology to be 'put to work' in explaining causation as part of the evidence for that ontology.)

The argument of the last paragraph is, however, misleading. Although I sketched how the powers ontology could explain the existence of the laws of nature, I also denied that the powers theorist could be expected to provide a programme of analysis that would explain each and every law in terms of powers. Many laws are higher level laws, and concern those sparse universals that are not powers (being a vertebrate, containing a carboxylic acid group). So no analysis of these laws in terms of powers may be expected. Likewise, when we ask for an analysis of causation we are asking for an analysis at this higher level, of causal relations between non-fundamental entities and their non-fundamental properties. On the other hand, if the fundamental laws can be explained directly in terms of powers, and these higher level laws supervene on the lower level laws, then powers do explain the existence of the higher level laws and higher level causation, but only in a general and indirect way. So the role that powers play in 'explaining' laws is not one from which we can expect a pay-off in terms of an improved analysis of causation.

Furthermore, although there may be a close relationship between laws and causation, the precise nature of that relationship is debatable, and knowledge of the nature of that relationship may do little towards providing an analysis of causation (i.e. an informative set of necessary and sufficient conditions). As an example of this consider Lewis's analysis of causation. Lewis analyses causation in terms of the ancestral of the relationship of counterfactual dependence. We may then ask for an analysis of counterfactuals, and Lewis provides this in terms of possible worlds and their closeness. Laws of nature play a significant role in determining the closeness of possible worlds. So causation does depend on laws in Lewis's scheme, but not in such a way that allows for an analysis of 'A causes B' in terms of any particular laws.

So on closer inspection it does not seem plausible that we should expect powers to help us with the analysis of causation. There is a question of fundamental metaphysics and ontology:

What features does the world possess that are responsible for the fact that there are causal relations?

which powers can help answer, albeit in a very limited way. Powers are the principal elements of the world that are responsible for the existence of laws of nature and causation. This question and answer must be distinguished from a different question and its answer:

Is there any true and informative substitute for Φ in 'necessarily, Φ if and only if A causes B'?

The latter is a project in non-fundamental metaphysics. It concerns not the fundamental level but a higher level of existence—causal relations are everyday, 'macro' phenomena. There may not even be causation at the most basic level in physics. So there is really no reason why anything that is relevant to answering the first question should impinge on our answer to the second. To return to the case of Lewis, we can pull apart his answer to the first, in terms of the existence of regularities in the Humean mosaic, from his answer to the second, in terms of counterfactuals. One can consistently accept his Humean fundamental ontology but reject his analysis of causation and likewise one can consistently accept his analysis of causation but reject his Humean ontology. Equally, one can accept a fundamental ontology of powers without that determining any particular analysis of causation.

This conflation between the two questions is made, for example, by Jon Jacobs. Jacobs (2007) proposes 'a powers theory of causation'. He defines 'power' as I have done above but then contrasts the powers theory with Lewis's counterfactual theory and argues that a powers theory handles pre-emption cases better than the counterfactual theory, because the powers theory makes causes sufficient for their effects not necessary. This is a confusion because what contrasts with a counterfactual theory is not a *powers* theory of causation but a *dispositional* theory of causation. The tell-tale sign of that is the fact that in contrasting the powers theory and the counterfactual theory Jacobs does not appeal to the fact that powers are essentially dispositional. Nor does he need to; a dispositional account without a commitment either way as regards powers delivers just the results Jacobs gives. Of course, the fact that powers have more than is required for a theory of causation does not strictly invalidate the theory. But for it to work we need to identify powers in the kind of pre-emption case discussed by Jacobs: Susie throws a stone which hits and breaks the bottle, but Bob throws also and his stone would have broken the bottle if Susie had not thrown. It might be correct to describe Susie at the moment of throwing as disposed to break the bottle if she throws (a *dispositional* theory should say something like this—Bird 2010). But does Susie have the *power* to break the bottle if she throws? That is not a question that gets an immediate *yes*, since 'power' here is a technical term: a natural property with a dispositional essence. And it is at best far from obvious that there is such a property. There is no fundamental natural property of that sort. Perhaps there is a non-fundamental natural property that has this

dispositional essence. How should we answer this question? It doesn't look as if any science is likely to employ a property of being able to break that bottle if one throws that stone, so it doesn't look like a natural property. Nor is it clear more generally that a natural property of a complex object has dispositional essence even if the natural properties of the object's proper parts all have dispositional essences. So I conclude that Jacobs has not offered us a powers theory of causation at all, only a dispositional theory.³ The same conflation, albeit less clearly, is made by Molnar (2003: 188f.), who holds that it is favour of a powers theory that it gives an account of causation. Mumford and Anjum (2011) take Molnar's cue and build an extensive theory of causation from a metaphysics of powers in their *Getting Causes from Powers*. But I do not see that the distinctive features of *powers* are significant in their story; indeed they are explicit in saying 'we are using the terms "power" and "disposition" as equivalent' (2011: 4). This conflation, as I have argued, is a source of confusion: they accept that fragility is a paradigm disposition, at the same time their view of powers is one that contrasts with Armstrong's view of properties; the identity of a power is fixed by its relations to other properties. But a remarked, while it is trivial that fragility is a disposition, it is far from trivial that fragility is a natural (sparse) property at all, let alone one whose identity is fixed by its relations to other such properties.

7 Dispositions

The general point I have made concerning the project of analysing 'A caused B' goes equally for 'x is disposed to manifest M in response to stimulus S'. In analysing statements with such forms we employ examples referring to familiar middle-sized dry goods: Susie and her stone and the window, the fragile glass, the soluble sugar cube. Why should our intuitions in such cases have a bearing on the correctness of theories concerning the essences of (fundamental) natural properties?

The recent history of the analysis of dispositional statements starts with the simple conditional analysis:

(CA) x is disposed to manifest M in response to stimulus S *iff* were x to receive stimulus S it would manifest M.

Charlie Martin (1994) pointed out the principal failing with this analysis. Dispositions can be gained or lost. An object might have a disposition $D_{S,M}$ at t and receive stimulus S at t . However, x loses the disposition $D_{S,M}$ so rapidly after t that the normal process of manifesting the disposition is halted and M does not occur. Hence at t the left hand side of (CA) is true and the right hand side is false. For example, a fragile glass might be caused to become very hot when struck so that the glass becomes soft and non-fragile. Such are cases of *finks*.

David Lewis (1997) sought to reform the conditional analysis in such a way as to avoid the problem of finks. He pointed out that the problem of finkish dispositions is that the causal basis for the disposition does not persist for long enough. So we need

³I should say that I use Jacobs's work as an example because it is so clear rather than because it is egregious; I admire much in his excellent thesis.

to recast the analysis in such a way that it requires that the causal basis persist for enough time for the manifestation to occur. Lewis's reformed conditional analysis runs thus:

(RCA) Something x is disposed at time t to give manifestation M to stimulus S iff, for some intrinsic property B that x has at t and for some time t' after t , if x were to undergo stimulus S at time t and retain property B until time t' , S and x 's having of B would jointly be an x -complete cause of x 's giving response M .

(An x -complete cause of y includes all the intrinsic properties of x which causally contribute to y 's occurrence. This stipulation is required to rule out certain other finkish counterexamples.)

I myself (Bird 1998) argued that Lewis's (RCA) fails to take account of interferers that do not remove the causal basis of the disposition but interrupt some other aspect of the causal process leading to manifestation, for example environmental conditions. I called these *antidotes*, having in mind the example of British anti-Lewisite, an antidote for arsenic poisoning which operates by preventing it from interacting with the body. Similar examples had been provided by Johnston (1992) and have been called *masks*. (RCA) suffers from a different kind of counterexample when we consider what happens when we substitute for B some feature that ought to disappear when the disposition manifests, such as the intact structure of the fragile glass. If the glass is struck and retains *that* property for long enough, then it does not break but may vibrate a little instead. So (RCA) says that the glass is both fragile and also has a disposition opposite to fragility. Sungho Choi (2008) thinks that there are other ways of retaining a version (CA).

I have just given a short run down of some of the moves made in the analysis of dispositions. Let us now step back and consider the lessons from that little piece of history, by considering the commitments of those involved. Lewis is well-known for his Humean commitments, in particular the Humean supervenience thesis: that all the intrinsic facts concerning the actual world supervene on the total pattern of the instantiation of natural properties at space-time points (the 'Humean mosaic'); those natural properties are quidditistic and (essentially) categorical; the laws of nature are regularities: they are the deductive consequences of the optimal axiomatic systematisation of the Humean mosaic. I am an anti-Humean and reject each of the Humean theses promoted by Lewis; in particular I am committed to the view that all fundamental natural properties are essentially dispositional (Bird 2007a). Charlie Martin's metaphysics promotes a two-sided view: all properties are both dispositional and qualitative in nature—I interpret this (though not with any confidence) as saying that natural properties are quidditistic, having primitive identity, but also have a dispositional essence.

Is there a connection between the positions taken by those mentioned in the debate concerning the correctness of (CA) and (RCA) and their views in fundamental metaphysics? I see none, in the sense that Martin's rejection of (CA) is not motivated by his two-sided metaphysics of properties; nor does the falsity of (CA) support that metaphysics. Likewise, Lewis's defence of (RCA) neither draws on his Humeanism nor does it provide support for Humeanism. My antidote counterexamples to (RCA)

do not depend on a theory of powers, nor do they provide evidence for such a theory. Just as in the case of the analysis of 'A caused B', the analysis of 'x is disposed to M when S' is debated independently of one's commitments regarding fundamental metaphysics. To reiterate a point made above, a tell-tale sign of this independence is that fact that in the discussion of the analysis of dispositions, questions concerning modality or essence do not arise. But the latter is the locus of disagreement among those who differ in their fundamental metaphysics.

There are of course connections in another sense: if one thinks that fundamental natural properties are essentially dispositional in character, then the content of one's view depends in an important respect on what the analysis of dispositions yields. And the consequences of the combination, if true, may provide evidence for both together; if false they require the rejection of one component or another. This kind of connection is like the links in a chain, the strength of one link is independent of the strength of any other link, nonetheless they work together to do the work of the whole chain. When a chain fails, the failed link can be replaced by another, different link; a new chain may be made or the good links retained for whatever use one might put them to. Lewis's metaphysics might be seen in this light. (RCA) offers us an analysis of dispositional expressions by employing the notion of cause. 'Cause' is analysed by Lewis in terms of counterfactuals. Lewis also provides a possible-worlds semantics for counterfactuals. That semantics requires a notion of the closeness of possible worlds, an important determinant of which is the laws of nature true at a world. As mentioned, Lewis gives a regularity account of laws, where laws supervene on the Humean mosaic. So putting this all together, one might say that Lewis gives a Humean account of dispositions. But that may be misleading. Lewis presents a chain at one end of which is (RCA) at the other end of which is his Humeanism. One can break the chain between the two at many points—and many philosophers do. One could accept (RCA) but reject his counterfactual analysis of causation. Or accept the latter but reject the possible-worlds semantics for counterfactuals. Or accept that semantics but reject modal realism or reject the role given to laws in determining proximity of world. One might even accept the latter and reject the Humean, regularity account of laws. One could replace intermediate links without changing the rest of the chain—Lewis himself modified his counterfactual analysis of causation without that having any implications for the links either side—(RCA) and the possible-worlds semantics for counterfactuals. Since (RCA) and can stand at either end of a very long chain, it is misleading to think that there is any such thing as a 'Humean account of dispositions'. And the same goes for any other kind of fundamental metaphysics. There isn't an anti-Humean (powers) analysis of dispositions either. Of course, the powers theorist can tell a story analogous to Lewis's, providing a different chain linking the analysis of dispositions to fundamental ontology. Again the chain will be long, and the nature of the links at one end do not determine what links one has at the other. The powers theorist may adopt whole chunks of Lewis's chain without contradiction: for example, she might agree with (RCA) and the counterfactual analysis of causation but want to provide an alternative semantics for counterfactuals.

In conclusion, I note that it is tempting to think that there is a family of related concepts: disposition, cause, law, power, act, force, possibility, counterfactual etc.

such that none can be understood apart from at least some others in the family. If one adds a claim about fundamental metaphysics, for example, that powers are ontologically fundamental, it looks as if a satisfactory account of any of these will ultimately refer back to powers. I accept that these features of the world are indeed related. But the lesson of this section is that the relations in question are not so close or transparent that connecting one component of the family to one's fundamental metaphysics has immediate and obvious consequences for one's account of the other members of the family. All the links between the components are contested, and typically they are contested on grounds independent of the debates concerning the links between other components.

8 Intentionality, free agency, and the manifest image

We have discussed the analysis of everyday causal statements as one area where it has been supposed that the ontology of powers may be put to work in solving problems in philosophy outside of fundamental metaphysics. Intentionality is another such area. Numerous authors have noted that the nature of powers involves some kind of pointing to things outside of themselves and which may indeed never exist (their possible manifestations). This is very similar to the phenomenon of *intentionality*. So perhaps one of the ways in which the ontology of powers may prove its value is by giving an explanation of intentionality. This is a possibility raised by John Heil (2004: 442–3):

Molnar's ontology of powers is pregnant with possibilities barely touched on by the author. Suppose, for instance, you accept the idea that powers yield "physical intentionality." What of *mental* intentionality, the intentionality of thought? Molnar supposes that intentional states of mind typically owe their directedness to their being representational. Some mental states, Molnar thinks—pains, for instance—have directedness—pains are experienced as being at particular locations—but are not representational. Does this mean that the directedness of "representational" states of mind (beliefs, for instance) is different in kind from the directedness of powers? That would be hard to credit. Surely it would be worth extending the power model to representational states. Indeed, representation might be thought to stem from more fundamental dispositionalities present in intelligent creatures. This is a striking possibility, one easily overlooked in an era in which causal accounts of representation are widely taken for granted. In causal accounts, representations are connected to the world via incoming causal chains. In a dispositional model, the direction is reversed.

A related thought is expressed by Ellis (2002: 139–144), who draws on Sellars's idea of a tension between the manifest image and the scientific image. One locus of that difference is the debate on free-will, where the manifest image tell us that we are free agents able to choose our actions and the scientific image which tells us that we are made of particles who trajectories are determined by ineluctable laws.

Ellis supposes that this tension arises because this articulation of the scientific image is one imbued with Humeanism. If we reform the scientific image with a better fundamental metaphysics, a metaphysics of powers, then the tension disappears. For the Humean picture is one of merely passive objects with properties lacking any agency. On a fully Humean picture that is all there is. On Armstrong's semi-Humean picture we may be able to introduce laws to push and pull things around; but even then the things and their properties are passive. This contrasts with the agency we know we possess. How can objects have agency yet be composed of objects that lack agency, being subject to the pulls and pushes of universal laws? But if we replace the Humean picture by a metaphysics of powers this contrast disappears. For then agents are composed of objects whose properties are themselves active and so are active entities not passive ones. We are agents made up of components that themselves have agency.

A mystery arises in both cases because the possession by persons of intentionality/agency seems inconsistent with their being composed of parts that lack intentionality/agency. The mystery is solved by the metaphysics of powers, because then our parts do have intentionality/agency in virtue of the powers they possess.

Such solutions are confused and for the same reasons (Bird 2007a: 114–29). First, there is a composition problem. Even if our parts have intentionality and agency, how does that help explain how we as wholes have intentionality and agency? Neither intentionality and agency seem to compose in the right way. That is to say, it is not the case that the intentionality or agency of a whole is explained by the intentionality of its parts (just as the impressiveness of the Eiffel Tower is not explained by the impressiveness of its parts). *A fortiori* the intentionality of mental states is not to be explained by the physical intentionality (i.e. dispositionality) or agency of fundamental physical properties.

Secondly, dispositions just don't have the characteristics attributed to them (nor therefore do powers). Dispositions are not really like intentionality when one looks closely at the question (for example, properly understood, dispositions are not intentional whereas intentional states are). Similarly, dispositions do not confer agency. A loaded, primed gun is disposed to fire when the trigger is pulled. But that firing does not exhibit agency. The exact nature of agency is disputed, but no plausible view allows dispositions (or powers) to confer agency. On Davidson's view, S's ϕ -ing is an act of S's if ϕ -ing is intentional under some description. But most manifestations of dispositions are nothing like intentional under any description. On another account, S's ϕ -ing is an act of S's if ϕ -ing or not is under S's control: if S had the capacity not to ϕ . But a gun does not control its own firing; if it was disposed to fire when the trigger is pulled it did not have then the capacity not to fire.

Finally, these cases are supposed to draw upon the nature of powers, and so provide that ontology with some confirmation. Powers are properties that are *essentially* dispositional. But these accounts do not seem to draw upon that crucial feature (*cf.* the criticism of Jacobs on causation above). It strikes me that Heil fails to make the distinction between powers and dispositions—note that he starts the quoted passage by talking about an ontology of powers but concludes it by talking of a dispositional model. A dispositional account of representation might be possible, in which the explanatory onus is placed upon macro-level dispositions possessed

by intelligent beings. But such an account would possess no revealing relationship to a fundamental ontology of powers. To suppose that it might is to suppose that the best explanation of macro-dispositions is the existence of micro- (i.e. fundamental) powers. But there is no reason to think that this is the case. For one thing, what is distinctive about powers is that their dispositional essences. Yet the *essentiality* of their dispositional nature would play no role in explaining the existence of certain macro-dispositions. Likewise, I am not sure how the essential dispositionality of fundamental properties makes them confer something that is agent-like. In general, how do the modal features of basic universals bear upon mysteries that concern macro-entities such as persons and their intentionality/agency?

Ellis might reply that we should see the second and third issues together. In the semi-Humean picture of Armstrong, entities do not possess properties that alone explain what they do. For what is also needed are the laws of nature. It is a combination of the laws and the properties of things that explain why those things do what they do. It is as if things are passive in themselves and the laws make things do what they do. On the powers view, however, laws are not needed to make things do what they do; their properties, being powers, suffice. And in that way things are active in themselves. This use of 'active' may be a helpful metaphor in articulating the powers view. But that heuristic work is not metaphysical work. More importantly, the 'agency' of powers bears no genuine identity with agency in humans for the reasons given. And in particular, the idea that powers are properties that have dispositional characters essentially does no work in resolving the tension with which we started. If I am troubled by the problem of free will I am troubled by the idea that the future locations of the physical components of my body are determined by the deterministic laws of nature governing the properties of those physical parts. Am I any the less troubled when I discover that the very same locations of my physical parts are determined by the essentially dispositional physical properties of those physical parts? After all, we have seen how powers generate the true universal generalizations that are (or stand in lieu of) the laws, and these generalizations will entail that one does Φ rather than Ψ . That one is made up of particles that possess powers does not somehow give people the capacity to falsify these generalizations.

9 Conclusion

Nineteenth century German philosophers such as Fichte, Hegel, and Schelling aimed to produce systems of philosophy, with works on ethics, metaphysics, epistemology, and political philosophy (etc.) that should demonstrate a unity of ideas across this philosophical spectrum. Satisfying though such an achievement might seem to be, in my view it is an illusion to think that it must be possible to produce a unified system of thought such that a correct view in say ethics should determine or be determined by the correct theory of knowledge (or both be determined by something else, such as metaphysics). The epistemology of philosophy is not like this. One's answer to one question might be perfectly consistent with both of diametrically opposed answers to a different question.

In this respect philosophy is not so very different from science. Consider the project of theoretical reduction in the philosophy of science: theories in non-fundamental physics, chemistry and other science should be deducible from the theories of fundamental physics plus certain identity claims linking the entities and properties of fundamental physics and those of the other sciences. This project is universally discredited. This means that adopting theory A in physics does not directly impinge on whether one should adopt theory B in chemistry. At the very least any connections are complex and non-trivial and depend on further discoveries in both physics and chemistry (not just in physics). Similarly in metaphysics (and other areas in philosophy), there are no simple connections between one's (rational) commitments in non-fundamental metaphysics and one's commitments in fundamental metaphysics (indeed in metaphysics, one of the reasons for this is the failure of reductionism in science).

As discussed, one can accept Lewis's counterfactual account of causation (a theory in non-fundamental metaphysics) yet reject his Humeanism (his fundamental metaphysics) (and vice-versa). While Lewis's metaphysics does have a certain unity, it is the unity of a chain: each link has to be forged and connected individually. This is not like the unity of arithmetic, where the theorems are all consequences of the same small set of axioms. And this is as we should expect things to be given the methods we employ. In contemporary philosophy (unlike say Descartes's philosophy) we do not aim to derive all of philosophy from a set of first principles. Rather we may adopt or reject a theory of causation principally on the basis of its being materially adequate: that is it conforms well (or not) to our intuitions about particular cases. A test of a theory of causation (in non-fundamental metaphysics) is that it must have the consequence that it is true that Susie's throwing the stone caused the breaking of the bottle in the pre-emption case. The specific reasoning processes of cognition in this case are unrelated to the reasoning processes involved in deciding whether a metaphysics of pure powers suffices to produce truthmakers for law statements or can avoid the problem of regress. Since the reasoning processes are unconnected, why should our answers to one question constrain our answers to the other question? It appears to me that failure to be precise about the use of terms such as 'power' and 'disposition' lures one into conflating two concepts (whatever terms one associates with them) that need to be kept apart. Similarly, failure to cash in the metaphors of 'directedness', 'agency', and 'activity' masks what is crucially different between fundamental powers and the properties of people. In both cases the resulting confluences allow one to move with apparent ease from commitments in fundamental metaphysics to projects far removed, such as certain topics in non-fundamental metaphysics. The point will generalise to a precept in the epistemology of philosophy: treat with causation any claim to find a moral for debates in epistemology, ethics, or social philosophy (and the like) from considerations in fundamental metaphysics, for the claim is likely to depend upon a conflation of concepts or an abuse of metaphor.⁴

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