

## Properties: Qualities, Powers, or Both?

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### ABSTRACT

Powers are popularly assumed to be distinct from, and dependent upon, inert qualities, mainly because it is believed that qualities have their nature independently of other properties while powers have their nature in virtue of a relation to distinct manifestation property. George Molnar and Alexander Bird, on the other hand, characterize powers as intrinsic and relational. The difficulties of reconciling the characteristics of being intrinsic and at the same time essentially related are illustrated in this paper and it is argued that the reasons for thinking of powers as essentially relational are based on misguided epistemological consideration. Finally, I present a way of thinking of fundamental properties as primitive natures that we can only understand in virtue of what they do but which we should not think of as being ontologically constituted by these doings. According to this view, properties are both qualities and powers.

### 1. Introduction

The question whether natural properties are qualities or powers, or even both qualities and powers – indeed, whether some properties might be qualities while others are powers – is one of four great issues in the metaphysics of properties (Armstrong 2005). It has received a lot of interest lately, for instance by John Heil (2003), George Molnar (2003), Jonathan Lowe (2006), Alexander Bird (2007a), C. B. Martin (2008), Jonathan Jacobs (2011), and Stephen Mumford and Rani Anjum (2011). This interest, I believe, reflects a growing dissatisfaction with the *categorical view* of properties, which has for some time been the default view of properties, the “one in which many of us were brought up” (Armstrong 2005, 312). According to the categorical view, the nature of reality is grounded – on the most fundamental level – in causally inert and self-contained qualities (Black 2000), while powers are, at best, second-order properties that supervene on regularities in the pattern of fundamental qualities.

The contrasting view is *dispositional essentialism*, the view that there are fundamental properties that endow their bearers with particular powers. However, dispositional essentialists disagree about the best way to characterize such fundamental powers and it is this disagreement I am concerned with in this paper. The disagreement, roughly, is between what I call *pure* and *mixed* conceptions of powers. Purists think of powers and qualities as mutually exclusive types of properties – as tradition dictates – but deny that powers must be grounded in such

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qualities. According to the purist, the nature of powers is exhausted by their ‘dispositional essence’, something they construe as a relationship to a ‘manifestation’, which is basically whatever it is that the power is able to bring about. Qualities, on the other hand, are construed as properties lacking a relation to any such manifestation. Consequently, powers are ‘pure’ by only having a dispositional essence while qualities are ‘pure’ by completely lacking a dispositional essence (Ellis and Lierse 1994; Molnar 2003, ch. 3; Bird 2007a, ch. 5). Purism divides again into *dualism* and *monism*. Dualists accept the existence of pure qualities alongside pure powers on the fundamental level (Ellis and Lierse 1994; Molnar 2003, ch. 10), while monists hold that all fundamental properties are pure powers (Bird 2007b).

According to the mixed view, on the other hand, the notion of fundamental properties whose nature is exhausted by a relationship to a manifestation makes no sense individually, and likewise the notion of properties that have no particular bearing on the behaviour of the property bearer. Instead objects must at any given time be in a determinate qualitative state independently of any manifestation they might bring about, and still it must be that same qualitative state that determines whatever manifestations they actually bring about. On this view, there really are no pure qualities and/or pure powers; properties either are both qualities and powers, or neither (Martin 1997; Mumford 1998, vi; Heil 2003, 111; Jacobs 2011). The difference between ‘both’ or ‘neither’ is negligible. If the qualitative and dispositional are not contraries, then a property that is both qualitative and dispositional is neither a pure quality nor a pure power, but something in the neighbourhood of both.

According to the mixed view, the qualitative/dispositional distinction is merely a conceptual distinction that does not reflect a deeper ontological distinction between two types of property, nor different aspects of one and the same property. They are different ways of considering “the selfsame property”:

If  $P$  is an intrinsic property of a concrete object,  $P$  is simultaneously dispositional and qualitative;  $P$ 's dispositionality and quality are not aspects or properties of  $P$ ;  $P$ 's dispositionality,  $P_d$ , is  $P$ 's quality,  $P_q$ . (Heil 2003, 112)

The problem is that proponents of the mixed view acknowledge that we understand properties as dispositional or qualitative in ways that aren't obviously compatible and still maintain that these ways of understanding are complementary rather than contrary ways. The argument for the identity, in the face of the apparent incompatibility, is that properties (like the image of the duck/rabbit) cannot be fully understood merely in terms of either the dispositional (duck) or the qualitative (rabbit) but only in terms of both (duck/rabbit) (Martin 2008, 68).

The mixed view has affinities with the idea of complementarity in physics concerning the wave-particle duality. The notion of wave and particle (disposition

and quality), respectively, are mutually incompatible and yet complementary descriptions of one and the same phenomenon. Despite their apparent incompatibility we must accept that they describe the self-same entity because each way is inadequate on its own and yet indispensable for a complete account of reality. It is due to the incompatibility of the way we conceptually distinguish between the dispositional and qualitative that Martin talks about their identity in reality as ‘surprising’ (Ib., 67) and why the only way to express the identity of the dispositional and qualitative (a view Martin calls the ‘Limit View’) is to demonstrate that they cannot be completely abstracted from each other:

The only way to express this Limit View of real properties that does not amount to treating real properties as compounds of purely qualitative and purely dispositional properties is to show how the attempt to abstract these as distinct elements is unrealizable in reality and only approachable as *limits* for different ways of being of the *same* unitary property such that they may be necessarily or contingently covariant (Ib., 63).

However, if the dispositional/qualitative duality (as opposed to the wave/particle duality) is a mere conceptual duality, there is hope for finding a way to resolve the incommensurability.

I think the distinction between pure qualities and pure powers stems from a number of misguided epistemological considerations that have been muddying the waters. In this paper I will attempt to clarify what these considerations are, why they imply a distinction between the qualitative and dispositional, and why they are misguided. This will, I hope, facilitate the reception of a mixed conception of fundamental properties. A first step is to say something more about the notion of a pure quality in order to be better able to appreciate why it is believed to be contrary to the notion of power.

## 2. *Pure qualities*

It is surprisingly difficult to give an informative and coherent characterization of the notion of pure quality, beyond that of being causally inert and self-contained. A survey of the literature reveals an array of conflicting statements. They are often described as observable (Goodman 1954, 40), and yet their nature is just as often described as essentially unknowable (Lewis 2007; Sparber 2009, 141–142). Some say we need pure qualities to make sense of powers (Ellis and Lierse 1994; Armstrong 1997; Ellis 2010) or at least mixed qualities (Martin 1997; Heil 2003, ch. 10). Others claim we can only make sense of qualities in negative terms, notably in contrast to powers; as properties that do not have a dispositional essence (Armstrong 2005; Bird 2007a, section 4.1).

I have come to the conclusion that the best explanation to this chaos is that there really is no single notion of pure quality belonging to some particular ontology of

properties ‘in which many of us were brought up’. Something resembling the notion of pure quality is a part and parcel of many mutually exclusive ontological views, such as Humeanism, naïve realism, phenomenological realism, scientific realism, and indeed dispositional essentialism. However, lurking in the presuppositional depth-structure of most ontologies, I think we can find what could be described as a proto-idea of what it is to be a fundamental property and which can explain the popularity of the purist distinction between qualities and powers. It is because this proto-idea is easily reconciled with most notions of ‘quality’ but not as easily to that of pure power, i.e. a property constituted by a relation to a manifestation.

This proto-idea can best be described by appeal to a cluster of very general characteristics popularly used to describe fundamental properties (seldom all at once), notably as being *simple*, *first-order*, *independent*, *intrinsic*, *monadic*, *objective*, *actual* or *occurrent*, and *determinate*. Something resembling this characterization of fundamental properties is found in many and mutually incompatible ontologies. It is so conceptually compelling that even dispositional essentialists like Molnar believe that pure powers, if fundamental, must be just as simple, first-order, independent, intrinsic, monadic, objective, actual/occurrent, and determinate as pure qualities have ever been thought to be (Molnar 2003, section 2.4). What there is a disagreement about is whether fundamental properties of this kind can be powers. Let us consider these characteristics a little more closely, because many of them are interrelated and cannot easily be understood independently of each other (which makes it difficult to accept one and deny the others).

*Simple* – Fundamental properties must be simple, because if a property is a combination of properties it is dependent on those other properties and hence not fundamental.

*First-order* – Simple fundamental properties must be first-order (they must be properties of a particular rather than properties of a property) because if they were a property of a property they would be dependent on other properties and hence not fundamental.

*Independent* – Simple, first-order, fundamental properties must be ontologically independent, by which I mean that they can be instantiated independently of the instantiation of other property instances. If they could not be instantiated independently of other property instances, they would be dependent on other properties and hence not fundamental.

*Intrinsic* – Fundamental properties that are simple, first-order, and independent, will also be intrinsic to their bearers; they will be instantiated in an object independently of anything external. The intrinsic character of fundamental properties is a direct consequence of being simple, first-order and independent.

*Monadic* – Fundamental properties that are simple, first-order, independent, and intrinsic, must be monadic or non-relational, that is, they can be instantiated in ‘one place only’. To say that they are monadic is arguably just a different way to express the idea that instances of fundamental properties are independent of other property instances and hence can obtain in their absence. Please note that although monadic properties are independent of relations this does not prevent them from *grounding* relations. Two unrelated objects that just happen to have the same property, *F*, also stand in a relation of *F*-resemblance. Indeed, the very notion of a fundamental property is arguably the notion of a property that can ground relations and higher-order complex properties, without being itself a relation or higher-order complex property.

*Objective* – If fundamental properties are ontologically independent of other things then their nature and existence must also be independent of what we happen to believe about them; they are *objective*.

*Actual/Occurrent* – If an object is the bearer of a fundamental property then there are no two ways about it, it *actually* has it right then and there, which is arguably the same as saying that it has it *occurently*.

*Determinate* – Things have at any given time (actually/occurently) a fully *determinate* nature. A red object is never indeterminately red, but surely always has a surface colour with a determinate hue, lightness and chroma. The belief that nature is determinate in this sense is known as the *principle of ontological determinacy*, and is widely taken for granted in metaphysics and natural science, explicitly or implicitly. (Andrew Newman 1992: ch. 4.2).<sup>1</sup>

For the sake of simplicity, I will use the term BASIC as shorthand for properties of this kind, i.e. that are simple, first-order, independent, intrinsic, monadic, objective, actual/occurrent, and determinate. Remember that the point here is not to establish that BASIC is a true characterization of fundamental properties. The point is to illustrate how this proto-idea has led philosophers to believe that powers cannot be fundamental properties in their own right, i.e. BASIC.

We are now, I think, in a position to appreciate better the different problems facing a pure vs. mixed conception of powers. The purist wants to portray powers as BASIC properties whose nature is exhausted by their dispositional essences. This is problematic because BASIC properties are supposedly independent of other property instances, while dispositional essences supposedly are nothing but a relation to a manifestation property. The purist appears to be describing powers

<sup>1</sup> Newman discusses the principle at length, arguing it to be a basic assumption in physics. He refers to a discussion by Peter Geach (1979, 52) who again refers to J.M.E. McTaggart who thought it was so important for our view of reality that he called it the ‘Total Ultimate Presupposition’.

as both dependent and independent of their manifestation properties. In section 4 I discuss how Molnar (2003, ch. 3) and Bird (2007a) attempt to resolve this problem.

The proponents of the mixed view face a different challenge, since they deny that the nature of powers is exhausted by a dispositional essence. They think that all fundamental properties are powers but also that a world in which all fundamental properties are ‘nothing but a relation’ in the purist sense, implies the absurd conception of a reality in which everything dissolves into relations between relations between relations etcetera *ad infinitum* (Martin 1997). The problem for the mixed view is instead that of producing an account of a property, or a way of being, that plays a distinct causal role without thereby being *constituted* by a relation to a manifestation. This is no easy task, mainly because the very idea of a causal role has traditionally been associated with the idea of a relation to an outcome, and because the lack of a relation to an outcome has been associated to the idea of a property that lacks a dispositional essence. Indeed, this is why BASIC properties appear to embody self-contained and causally inert qualities. But, as I will argue in the next section, the notion of pure quality is not equivalent to that of BASIC property.

### 3. *Fundamental properties: Genus vs. differentia*

Let me now untangle the notion of a BASIC property from that of a quality or power, respectively. Being BASIC is shorthand for a cluster of perfectly *general* characteristics for a *class* of properties. They are features shared by all fundamental properties, and therefore say nothing about the particular nature – the unique essence – of any particular property that make it different from any other property within the class: they define the genus but not the species. Fundamental properties must therefore have some further characteristic, the *differentia*, in virtue of which they are distinct from other fundamental properties. It is this further nature about which philosophers disagree. Categoricalists think that fundamental properties must be differentiated by some basic and unique ‘quality’ while dispositional essentialists think that this further nature is, or at least also can be, ‘dispositional’. Proponents of the pure vs. mixed view then disagree whether this basic and unique dispositional nature is constituted by a relation to a manifestation.

It should be clear now that even though the proponents of the pure and mixed view face different problems they still have a common goal, notably that of making sense of the idea that powers can be BASIC. One may wonder why this is so important. Couldn’t dispositional essentialists just argue that at the most basic level there just are relations? I detect a resistance to taking that approach, at least among those involved in this debate, and that resistance is surely grounded in the

familiar idea that the nature of reality must ultimately be grounded in entities that just have a nature in themselves, not in virtue of anything else. For anything at all to have a nature there must be entities whose nature is ungrounded but whose nature can ground the nature of other things; arguably that is what it is to be fundamental. Now, it is possible to reject this premise, arguing instead that there is no fundamental level and that everything is just a matter of relations, but this is not the place to discuss the merits or deficits of such a theory (for an interesting discussion, see Schaffer 2003).

Clearly, it is the perceived need for a fundamental level of ungrounded entities that explains the widespread scepticism towards the suggestion that all fundamental properties are pure powers. A monism of that kind is thought to invite the image of an infinite series of properties that have no nature on their own except for a connection to something else that is equally lacking in any independent nature. This difficulty is now popularly known as the *Regress of Pure Powers* and has been advanced in different forms by a cadre of philosophers (for discussions, see Bird 2007b; Engelhard 2010; Ingthorsson, forthcoming). I will not discuss that problem here but instead focus on purist and mixed attempts to argue that powers do bestow on their bearers a nature that is in some sense independent of the manifestation property and that, therefore, some form of dispositional monism is viable.

At the heart of most ontologies is the highly abstract proto-idea of a fundamental property (BASIC), which is widely perceived to exclude the notion of properties whose nature is exhausted by a relation to a manifestation. In the next section I will consider in more detail how Bird and Molnar attempt to argue that, on the contrary, fundamental properties can be both BASIC and relations to manifestations.

#### 4. *Pure powers: BASIC and relational?*

It should be noted at the outset that neither Bird nor Molnar make explicit use of the detailed characterization that I have called BASIC, although Molnar comes very close to doing so (2003, section 2.4). However, they both think powers can be fundamental and ontologically independent of their manifestation, which is close enough, for the purposes of this paper, to present them as trying to construe pure powers as BASIC while still being relations to a manifestation. The difficulty of reconciling the independence of powers with their relational nature comes out very clearly in Molnar's discussion. He states the independence of powers like this:

[the] occurrence of the manifestation of a power depends on the existence of the power, but not vice versa. Powers can exist in the absence or in the presence of their manifestations and so are ontologically independent of the occurrence of the manifestations. (Ib., 82)

At the same time Molnar admits that the claim that powers are independent is a “fertile source of philosophical puzzlement” (Ib., 57). The puzzle is how powers can be BASIC and still essentially acquire their nature in virtue of a relation to what Molnar interchangeably calls the ‘objects of powers’ or the ‘manifestations of powers’:

If powers can exist when they are not being manifested, and powers are properties that owe their identity to their manifestation, then, it would seem, they are properties whose very nature depends on something that may not exist. This is a peculiar feature for properties to have. INDEPENDENCE is in need of elucidation. (Ib., 82–83)

The problem of independence is that if powers are BASIC, they cannot depend on the existence of the manifestation, but if they are nothing but a relation to the manifestation they surely do depend on the manifestation. So, they appear both dependent and independent of the manifestation, which is puzzling. The following passage by Bird gives rise to the same kind of puzzle:

Dispositional essences are relational – the essence of a property is a relation to other properties [. . .] all there is to (the identity of) any property is a matter of its second-order relations to other properties [. . .] the second-order relation in question is the relation that holds, in virtue of a property’s essence, between that property and its manifestation property – which we will call the *manifestation relation*. (Bird 2007b)

Bird claims that the essence of a disposition *is* a relation, notably the manifestation relation, and yet this relation is a *second*-order relation that holds in virtue of the essence. What, I ask, is the first-order essence that obtains independently of the relation and in virtue of which the second-order relation holds, *if* at the same time that very essence is nothing but the very second-order relation in question? It would seem that the object has a first-order essence in virtue of a second-order relation, a relation that in its turn holds in virtue of the first-order essence, and yet the first-order essence holds independently of the relation. This is an equation I find difficult to solve. Bird seems torn between endowing his powers with a truly BASIC nature and characterizing that nature as nothing but a relation.

Molnar and Bird proceed, in two different ways, to resolve the puzzle invited by the ontologically independent and yet relational nature of powers. Molnar, inspired by U.T. Place (1996), suggests that the relational nature of powers, their ‘directedness’, could be cashed out as a physical analogue to the intentionality of mental states, which supposedly do not require that the objects towards which they are directed actually exist. That would give the property a BASIC and yet non-relational directedness towards something that does not exist. However, this brings another difficult problem into focus. These manifestation properties must in some



sense be real, so what is the ontological status of these non-existing objects toward which powers can be directed? As Bird (2007a, 114ff) observes, Molnar appears to be committed to an ontology of Meinongian objects, which is why he rejects physical intentionality.

I too am sceptical of physical intentionality, just as I am sceptical of the idea that mental intentionality is a relation to something that does not exist. I find it more plausible to think that we are intentionally directed to the *idea* of Harry Potter when we think of him, rather than to some real but non-existent Harry Potter. Surely Harry Potter is nothing but an idea that exist in our minds, towards which we can turn our attention, just as we assume that our minds contain memories towards which we can direct our attention.

The ontological status of intentional objects is a contentious matter that cannot be settled here. I merely present reasons for being sceptical to the idea that powers have a BASIC nature that is constituted by a relation to non-existent objects. For Molnar's idea to work one has to accept that there are real objects that lack existence, and one has to accept that there are fundamental properties whose only nature is their directedness to those real but non-existent objects. For those, like me, who are not keen to accept such entities and still think there are BASIC powers, other solutions have to be sought. The mixed solution is the one I favour (see section 8).

Bird's preferred solution is to invoke the reality of *possibilia* that can exist even if they are not instantiated in time and space. This assumes a distinction between what it is to exist and what it is to obtain, as opposed to Molnar's distinction between real but non-existent objects. A power, according to Bird, can be a BASIC property of an object, independently of whether their manifestations actually obtain, by virtue of a relation to the necessarily existing possibility of the obtaining of the manifestation property. However, even if manifestations are construed in this way as existent *abstracta* then the nature of a power is constituted by a relation to a distinct entity, the manifestation. It is not clear to me that such a property really can be conceived of as BASIC, because it is clearly relational and dependent, and hence grounded in something more fundamental: abstracta. An appeal to abstracta does not conclusively resolve the original worry of how an essentially relational property could exist independently of the existence of the relatum to which it is essentially related. Bird's solution is to say that the ontological independence of a power only requires that the 'obtaining' of the power is independent of the 'obtaining' of the manifestation property, which is not to say that the power exists independently of the existence of the manifestation. One could argue that Bird's solution requires a weaker sense of ontological independence than many of us would be comfortable with.

Having the distinction between existing and obtaining in mind, I worry that Bird's position really isn't all that different from either Molnar's or Meinong's

position. To be sure, Bird claims that his possibilia exist (even when they do not ‘obtain’) while Molnar’s ‘objects of powers’ and Meinongian objects do not exist although they are real. However, when we consider what the alleged existence of Bird’s possibilia consists in, the difference seems not too great. The term ‘Meinongian objects’ refers to that broad category of objects in Meinong’s ontology that do not have being, and which are distinct from objects that have being mainly by not being conditioned by temporality (for the details see Marek 2009, 4.3.2). The sense in which Meinongian objects are necessary but non-existent beings is then very close to the sense in which Bird’s possibilia necessarily exist but do not necessarily ‘obtain’, because by ‘non-existent’ Meinong really means ‘does not obtain at any place or time’. In any case, the objects postulated by Bird, Molnar and Meinong to resolve the puzzle under consideration, can all be understood as *abstracta*. They just disagree about the existential status of such abstracta, or at least on what to call that ontological status.

Please note again that it is not my intention to settle anything in this matter. I just want to explain why one might want to construe powers in a different way, by clarifying the problem of thinking of BASIC properties as essentially relational. I think there is a way to explain how powers can be BASIC without grounding them in a timeless structure of abstract entities.

To my mind, then, much would be gained if it were possible to construe powers as properties whose nature enable them to play a causal role without thereby being a relation to a particular outcome. In light of the fact that although BASIC properties don’t depend on relations they can still ground relations, it shouldn’t be too difficult to construe powers as properties that can ground causal relations while not themselves being relations. This is what I believe Martin, Heil and Jacobs are trying to do. Martin very explicitly states that powers are not relations (2008, 12), and has criticized all attempts to characterize them conditionally, i.e. in terms of the manifestations they are popularly depicted as being directed towards (see in particular Martin 1994). Heil takes a similar point of view when he argues that the practice of characterizing dispositions in terms of manifestations “does not oblige us to regard dispositions as relations” (2003, 82). He continues:

To regard dispositions as relations between the disposition itself (or some property grounding the disposition) and its actual or possible manifestations is to confuse a feature of our way of characterising dispositions – conditionally by reference to their possible manifestations – for the dispositions themselves. (Ib., 83)

I take the point to be that manifestations should not be taken to be *constitutive* of the nature of a power, in any ontologically significant sense, but instead as mere epistemic devices to characterize or conceptualize powers. Manifestations are always consequences of the exertion of a power, not something that grounds the nature and reality of powers in an ontological sense. I take it that the

unifying thesis of mixed accounts is that powers are not relations, and that the idea that they are relations stem from misguided epistemological concerns.

It is no secret that empiricist epistemology is to be found among the concerns that Martin and Heil think are muddying the waters. I agree to that, but I believe that empiricist epistemology and its success in philosophy, builds on something that does not often receive much attention in philosophy, and yet is at the heart of many philosophical disputes. It is the fact that when thinkers have matured to the level that they are able to start serious philosophical reflection they already have a pre-theoretical or intuitive notion of the nature of reality, which is derived from the character of the world as it appears in sensory perception. In perception there are qualities, and, as Molnar observes, we cannot really avoid accepting them as real entities in their own right:

We accept the existence of qualities because acceptance is *forced upon us* in experience. One needs but to recall the immediacy, the urgency, and above all, the *intrusiveness* of what is qualitative in perception and sensation to see that there is nothing ‘theoretical’ about the qualities disclosed in experience. (Molnar 2003, 178)

Molnar is not admitting here that we are right in accepting the existence of pure qualities, only that we do accept them as part of our pre-theoretical world-view. He goes on to point out that it is not easy to reconcile this pre-theoretical view with our best scientific theories about what the world is like.

Now, quarrel as we may about whether phenomenal qualities tell us about the world or not, then it can hardly be disputed that in the end perception is our interface with reality (we may disagree whether it is the only one), and so inevitably the degree to which our philosophical views about reality make sense of our perception of the world, or vice versa, is going to be a serious influence. In the next few sections I will offer some further reflections on how the way we perceive the world influences our way of thinking of the world, and how the dynamics between the two bears on the dispute at hand.

### 5. *Properties and perception*

Qualities and powers have been considered to be contraries for other reasons than those I present above. Indeed, these other ways might be more familiar, even though it may come as a surprise to the reader that they have anything to do with perception. Let me explain.

A popular way to draw the distinction between qualities and powers is to argue that ascriptions of powers, but not of qualities, entail certain kinds of counterfactual conditionals (Carnap 1936–1937; Goodman 1954; Mumford 1998; Choi 2008). Hugh Mellor (1974) has disputed this, arguing that ascriptions of qualities also entail the same kind of conditionals. However, even though it is admitted that

qualities also entail conditionals then our understanding of the quality in question seems to be independent of our understanding of any such entailment, while our understanding of a power appears to be more closely related to our understanding of the entailment. For instance, we seem able to understand what it is to be a triangle without understanding that if we were to measure its angle sum the result would be  $180^\circ$ . We could even recognize a triangle without ever explicitly thinking that if we were to count its corners the result would be three.

On the other hand, we cannot understand what it is to be fragile without understanding that a fragile object would break if struck smartly (or something equivalent). The conditional appears to provide the defining features of the power – they tell us what the power *is* – while for qualities the conditional only provides a consequence implied by the defining features that we already are acquainted with. This implies that we somehow understand powers only through the conditionals – or rather through the behaviour of the objects in the various circumstances noted in the conditionals – but that we have some other independent means to understand qualities. Note now, that the *only* qualities we can pretend to understand in this independent way are the ones we can perceive. It is only those features of reality of which we have what Locke called *Sensible Ideas* (Locke 1964, k. II, ch. I), such as colours, smells, shapes, etc., that we can understand independently of any conditional that might be given. None of the properties discovered and described by science, but which we have no corresponding perception of, can be understood independently of conditionals of some sort.

Now, it is true that in perception we are aware of numerous qualities whose nature appear to be ‘wholly present’ in every perceiving act. Indeed, for these qualities there is no way to grasp them *except* through a perceiving act. It is impossible to explain to anyone what it is for an object to be Burgundy; each person must experience that for him/herself. However, for any example given of a quality whose nature we grasp independently of any conditional the question arises of what it is exactly that we thus grasp immediately in perception; do we grasp the objective character of the natural properties themselves, or do we only grasp the nature of the phenomenal qualities that represent natural properties in perception without necessarily resembling them?

The idea that in perception we grasp the nature of some natural properties independently of our understanding of any conditionals, presupposes that phenomenal qualities reveal the characteristics of the natural properties they represent. That is, it presupposes some form of naïve realism, the view that, in the veridical cases, we are directly acquainted with the objects themselves and their occurrent nature, without mediation of any qualities of experience, sometimes called *qualia*. This view is sometimes called the *revelation thesis* (Johnston 1992) or the *transparency thesis* (Campbell 1993), and is often supported by an appeal to what is widely acknowledged to be a salient feature of perception, notably that in

experience we *appear* to be directly aware of the things themselves. Frank Jackson calls this feature the *diaphonousness* of experience (2005), and Gendler and Hawthorne call it *perceptual directness* (2006, 2–3).

Now, many philosophers not only agree that experience *appears* to be direct in this sense, but are also tempted to agree that it really is direct (Byrne and Tye 2006). But, it is controversial whether the fact that experience appears to be direct itself supports that it really is direct (Nida-Rümelin 2007), and it is controversial whether the view of the world as obtained through perception is compatible with the scientific view of the world (for a defence of this view, see Byrne and Hilbert 2003). This isn't the time to settle anything regarding the directness of perception, so I will simply admit that my reasoning below depends on the rejection of naïve realism, but here I believe I am in agreement with most dispositional essentialists.

If naïve realism is rejected, then the distinction between properties we grasp independently of conditionals and properties we only grasp in terms of conditionals, only distinguishes between properties of which we have vs. lack sensible ideas. However, very plausibly, this distinction has nothing in particular to do with a categorical difference between natural properties but everything to do with perceptual contingencies. For instance, due to the makeup of our perceptual apparatus we only perceive light from a particular segment of the full spectrum of electromagnetic radiation, a segment that we consequently call 'visible' light. The 'visibility' or 'invisibility' of light clearly does not reflect a natural boundary or difference between two types of light but only the limitation of our sensitivity to light.

There are organisms that are sensitive to a broader spectrum of light, and therefore have sensible ideas of colours that we have no sensible ideas of, e.g. ultra-violet. We lack such ideas merely because of a limitation in our sensory apparatus. A minority of humans cannot make a distinction between certain frequencies of light within that band typically called 'visible' light. They lack the sensory impressions necessary to form certain types of sensible ideas, because they lack the necessary receptors for that particular frequency of light; a condition we call colour-blindness.

Similarly, we can smell sulphur and so have a sensible idea about sulphur-smell, but cannot smell carbon monoxide hence we are oblivious to the presence of carbon monoxide. This difference is surely not due to the inability of carbon monoxide to influence us causally – it is lethal in very small doses – but rather to our lack of olfactory receptors that could react with carbon monoxide to produce the appropriate smell-impression necessary to produce a sensible idea of carbon monoxide smell.

The idea that sensible ideas do not represent things as they really are and consequently that there is a distinction between appearance and reality, can be

based on fairly simple observations about certain discrepancies in our perception of things. For instance, that Socrates finds the same wine to be sweet when he is in good health, but sour when he is ill. Or, that objects can change from yellow to green merely by a change in lighting. It is also supported by the observation that perception appears to give no information at all about the objective nature of the property in question. Seeing that an object is red tells us, at best, that it is somehow different from a green object, but it gives us not the slightest clue of the micro-structure of the molecules of the surface that, as science tells us, is responsible for the difference in the ability of the object to reflect some frequencies of light and absorb others. The scientific explanation of surface properties is taken to inform us how superficial the phenomenal representation really is.

If phenomenal qualities merely represent natural properties but do not resemble them, then perception informs us, at best, only *that* things have certain properties but not *what* those properties are like; perception may thus inform us that properties are identical with themselves and distinct from others, but it does not inform us of *what* makes them so. Even Humeans, who are the most devout followers of categoricism, accept this point. This is reflected in their acceptance of *humility*, the thesis that the objective nature of fundamental properties is in principle unknowable (Lewis 2007; Sparber 2009, 141–142). The basis of Humean humility is the idea that since fundamental properties do not have dispositional essences, then they do not necessarily cause our senses to produce a particular phenomenal representation of them, wherefore the relationship between their objective nature and any conception we might have of them is contingent. Clearly they reject naïve realism. However, they still assume that fundamental properties must have some determinate nature, it is just admitted that we might not be able to know exactly what that nature is.

If Humeans can grant that qualities must have some determinate nature, despite our inability to perfectly grasp what they are, then I see no reason why dispositional essentialists (or anyone else that accepts humility) should insist that powers must be accounted for in terms of some determinate observable or measurable manifestation whose objective nature – no less than that of pure powers – is admitted to be beyond human cognition. We must be equally entitled to assume that fundamental powers still must have some determinate nature although we may not know or be able to imagine exactly what that nature is.

However, there is an interesting twist to the discrepancy between perceptual and scientific knowledge of properties, notably that *spatial properties seem to be an exception*. Perception depicts a ball as being spherical, and although a scientist would probably remind us that visual appearance always has something to do with surface reflectance then she will agree that the ball appears to be spherical basically because it *is* spherical. The apparent sphericity in perception is assumed to resemble the real life sphericity it represents. It is the filling in of colour, smells,

sounds, etc., that we believe to be subjective, and we believe that the absence in perception of so many of the things science has discovered is really out there reveals how superficial and limited perception is as a source of knowledge.

To my mind, the agreement between perception and science over spatial properties shows that it is no coincidence that spatial/geometrical properties is the only kind of property that is consistently offered as a concrete example of pure qualities in objective reality. It is because it is recognized that of all the qualities with which we are familiar in perception, only spatial/geometrical properties have a chance to be received as objective properties. This in turn is supposed to substantiate the claim that there is a class of properties that we grasp independently of conditionals.

For me the interesting question is whether the fact that we understand shapes independently of any conditional they might entail, implies that shapes are causally inert? I think not. In fact I think shape is the best case there is for the identity of qualities and powers. We can understand from our grasp of shapes, a priori of testing any particular shape, that a key fits in the appropriate lock in a way that no key with a different shape will do; we understand that a leaden ball dropped onto a pillow will make a hollow corresponding to whatever shape the ball happens to have. Indeed, Ingvar Johansson argues that we can “intuit [. . .] a kinematics of mechanisms in the same way as we can intuit some truths in Euclidean geometry” (1997, 411). His point, I take it, is that Archimedes didn’t have to build an Archimedean screw to know it would work. He could see that it had to work merely on the basis of the visual representation of the geometry of the mechanism.

Counterexamples have been given to show that shapes do not have a causal role, but to my mind they are inconclusive, at least for those who accept a mixed view and thus reject the idea that causal roles must be cashed out in terms of a necessary connection to some particular determinate manifestation. For instance, Lowe has suggested in conversation that a spherical soap bubble does not thereby have the power to roll on an inclined plane, which it should if its sphericity bestowed on it a distinctive causal role. Also, that regions of empty space have a shape but do not thereby influence anything in any distinctive ways.

The soap bubble does provide trouble for the purist who thinks of powers as a necessary connection to a particular manifestation property, such as rolling down an incline if you are spherical, but not to those that adopt a mixed view and only insist that a spherical soap bubble will interact decisively different with its surroundings than a square soap bubble, without requiring that ‘sphericity’ must manifest itself in one and only one way regardless of circumstances or other properties of the property bearer. A proponent of the mixed view will think of the causal role of shapes in the following way. Take a standard ball from a pinball machine and submit it to a range of experimental conditions, say, testing it on a range of different automated pinball machines with a range of surfaces, including

magnetic and sticky toffee surfaces. The idea is that this ball, in virtue of its shape, will behave in various ways in the different conditions, but consistently it will behave the same in each one of those conditions. Furthermore, it will behave differently in each of these conditions compared to another ball with a different shape (all other properties being equal); the difference will be down to the difference in shape. Replace the pinballs with soap bubbles with different shapes and the soap bubbles will behave very different from the pinballs, mostly for reasons nothing to do with their shapes, but the difference between the behaviour of spherical and non-spherical soap bubbles will be down to shape if that was the only difference in properties there were.

As for the empty sub-regions of space, then I am prone to think that they simply are not distinct objects that bear property-instances of any kind *independently* of the rest of space, and so should not be expected to have any distinct causal powers of their own. Any sub-region of space will be distinguished from the rest of space only by fiat, and will not act on other objects in any independent manner.

Turning now to consider the other way we acquire knowledge of properties, notably through science. The end product of scientific inquiry is theoretic knowledge, as opposed to intuitive familiarity in experience. It is imagined that theoretical knowledge is rather more reliable and objective than the knowledge we acquire via unaided perception. Science surely began as an attempt to explain the world as we perceive it, but the lesson was soon learnt that in order to explain the world as we perceive it, it was necessary to postulate the existence of more properties than those we immediately perceive, like gravity and flammability. Subsequently, science had to postulate even more fine-grained properties to explain the properties that were postulated in the first instance, e.g. how the structure of atoms and the properties of their parts explain flammability in terms of the ability of materials for rapid oxidation. I won't guess at the number of orders in which experience is now removed from our best theories of the most fundamental properties we pretend to know. And yet, the function of these theories is still to explain the world as we perceive it.

It is old news that the properties science postulates to explain the world as we perceive it, but of which we have no perceptions, tend to be labelled dispositions/powers, while properties we perceive tend to be labelled qualities. This is only natural. If the properties that our senses cannot detect only reveal themselves as changes in properties we can detect, then naturally we make sense of imperceptible properties in terms of properties with the power to change properties we can detect. However, it is one thing to accept that the qualities of experience do not completely resemble the properties they represent, but another thing to accept that they do not capture anything at all about them. Surely, the qualities in nature must in some sense resemble the qualities of experience, if not in any other way then surely in terms of what is common to them all, notably that they are simple,



first-order, independent, monadic, actual/occurrent, and determinate. Objectivity is then really the distinguishing feature between phenomenal and natural qualities, considered on the level of types, and then of course that particular unique 'quality' of each phenomenal and natural quality, respectively.

I believe it is for this reason that there is still a strong tendency to think that the powers science discovers must be grounded in properties similar to those represented in perception, but which we happen not to perceive. Thus, imperceptible qualities whose nature we cannot in principle know are postulated to ground the powers whose nature we seem only able to understand in terms of changes in qualities, instead of just postulating powers.

But no sense-making human activity has ever imposed an objective essence onto a mind-independent entity, so why should we assume that objective entities adjust to our capacity to make sense of them? That our senses are only made to detect some properties and not others is not a reason to postulate a difference between the properties, or to insist the properties that we cannot perceive have no BASIC nature or are for their nature dependent upon the properties we do perceive. I think it is the tendency to account for the nature of powers in terms of properties we observe that is the basis of the idea that powers must be relational. Flaws in this reasoning are the subject of the next section.

#### 6. *Must powers be relational?*

Traditionally, powers have been supposed to be relational because we understand them in terms of what they are able to do, and this ability is represented in terms of a necessary connection, or rather a dependency relation, to the *result* of their doings: the manifestation, preferably a perceivable manifestation. BASIC properties in their turn are not supposed to stand in any dependency relation to any manifestation, they are mere ways an object happens to be. But do we really have good reasons to suppose that powers are not ways an object happens to be that at the same time constitutes an ability to do, instead of being a mere relation to the result of doings, those results somehow being more suitable representatives of how something just happens to be? I believe the source to this idea is not really the impossibility of thinking of properties as abilities and qualities at the same time, but the idea that they must be separate entities because we can think of what an object is like and what it can do independently of each other.

The idea that qualities are distinct from abilities, derive from Hume's analysis of the idea of a necessary connection (*Treatise*, bk I, part. III, sect. XIV). The analysis has had an influence even on philosophers that reject Hume's scepticism, and even those who accept humility. The idea Hume planted is that nothing can be inferred *with necessity* from our perception of the qualitative make-up of an

object or event – of the way the object or event *is* – about the qualitative make-up of any succeeding object or event. This has been taken to show that it is possible to separate in the mind the qualitative make-up of an object or event (what it *is*) from its causal role (what it can *do*).

Hume didn't invent what might be called the 'test of separability', the idea that what can be separated in thought is also separated in reality. Hume's contribution was simply to point out that the qualitative make up of a thing, as we perceive it, can be separated in thought from what it can do, which is a reasoning that, as per usual, invites the thought of an ontological distinction.

But, one has to be careful. Hume didn't really say that we could separate the property itself from its causal role, he only said that the *idea* of a property could be thus separated from the *idea* of any causal role; a causal role being equivalent to a necessary connection between the idea of a property had by an object and an idea about a distinct property which was assumed to be a result of anything the object did. Indeed, Hume explicitly argued that the mind cannot form an idea of any thing separate from a perception or idea, and so cannot really distinguish between perception of *x*, and *x* itself:

Now since nothing is ever present to the mind but perceptions, and since all ideas are deriv'd from something antecedently present to the mind; it follows, that 'tis impossible for us so much as to conceive or form an idea of any thing specifically different from ideas and impressions. (Ib., bk. I, part II, sect. VI)

This conclusion follows from the initial premise that the content of our minds reduces without residue to two kinds of perceptions: impressions and ideas, of which all ideas are less lively copies of impressions. However, one can accept the force of the observation that the conception of properties can be separated in thought from the conception of causal roles – at least when those causal roles are supposed to be conceived in terms of an 'outcome', i.e. in terms of the properties of some distinct entity – without accepting Hume's doctrine that the concept of a reality separate from perception is unintelligible.

To argue that the perception/conception of properties can be separated in thought from the causal roles of the property, does not establish that what a thing can do is in reality distinct from what it is like. It only establishes that the perception/conception of the property can be separated from the causal role. But, then again, it is only the perception/conception of the causal role, as opposed to the causal role itself, which is separated in thought from the perception/conception of the property. And, the perception/conception of a causal role is reduced to a necessary connection between two distinct perceptions/conceptions. The contingent relationship believed to hold between a property and its causal role – as established by Hume's argument – thus only reflects the contingent relationship between (i) our conceptions of reality and what that reality is like in itself, and (ii)

between distinct conceptions, e.g., between the conception of how a thing is occurrently in a situation, *M*, and the conception of how it, or something else, is in a future situation, *N*. In other words, the only thing Hume establishes is that there is no conceptually necessary link to be found between distinct impressions or the ideas that impressions give rise to. The further conclusion that therefore there is no natural connection between what a thing is like and what it can do depends on further assumptions, notably either that impressions and corresponding ideas represent things as they actually are (naïve realism), or that our thinking simply is confined to the phenomenal representation of reality and that we are therefore unable to intelligibly make sense of the distinction between appearance and reality.

The separation in thought between a property and its causal role looks so much neater if one denies, as Hume did, that it makes sense to distinguish between the perception/conception of a property and the property itself, and likewise between the perception/conception of the causal role and the causal role itself. But it is a basic assumption in the debate now under consideration, that it makes sense to distinguish between appearance and reality; humility is a manifestation of that.

In fact, if we do assume that the relationship between a property and the phenomenal quality that represents it, is as contingent as the relationship between a property and its causal role, we have no reason to insist that powers but not qualities must be understood in terms of a relation to a manifestation. If we can only make sense of natural qualities in terms of the phenomenal qualities that represent them, then the essence of natural qualities should be represented as a relation to the phenomenal quality. However, such an absurd conclusion could only follow if we assume that the characteristics of mind-dependent perception are *constitutive* of the nature of mind-independent properties. I for one will not suggest any such thing, and I doubt anyone involved in this debate is likely to do so either. On the contrary, I will suppose that the property represented by the phenomenal quality has a determinate nature independently of the character of the phenomenal quality (independently of our minds), and I suggest that we can calmly assume that a property that gives rise to a manifold of 'outcomes' can nevertheless have a determinate nature independently of the character of those 'outcomes' because the property is not identical to these outcomes.

The idea, then, that properties that determine what a thing can do must be relational is a consequence of the urge to characterize everything in terms of something that somehow turns up in perception, even when it is admitted that the manner in which any property turns up in perception is only contingently related to what that property is really like. Powers are believed to be essentially related to a manifestation because manifestations, as opposed to powers, have been thought to belong to the domain of the perceptible, the perceptible having been considered by Hume to be the only thing that is conceptually intelligible at all. If instead, (i)

it is denied that the distinction between perceptible and unperceptible (observable vs. unobservable) reflects anything more than the distinction between properties that our senses happen to be sensitive to and properties they happen not to be perceptible to, (ii) it is accepted that the character of the phenomenal qualities that represent the perceptible qualities is only contingently related to the objective characteristics of the properties they represent, and (iii) that properties still must have a determinate nature independently of whether and how we perceive them, then there is no longer a good objection to the suggestion that there are properties that determine both what something is *and* what that something can do.

### 7. *The determinate nature of unmanifesting powers*

A related obstacle to the identification of the dispositional and qualitative is the problem of how to think of unmanifesting powers as determinate property instances; as tropes or modes. The source to this difficulty, again, is the conviction that the power is nothing more than a relation to a manifestation and therefore is only as determinate as the particular manifestation it is related to. The problem is that any unmanifesting power, prior to its triggering by a stimuli, can be tied to a range of possible outcomes, each representing determinately different manners of being. The conclusion is supposed to be that a power that is not being exerted exists in some kind of indeterminate limbo waiting for a stimulus to trigger its exertion at which point its determinate nature is realized by the coming into existence of some determinate manifestation.

The argument is a case of epistemology being allowed to override ontology, comparable to the idea that until a property is measured it has no definitive value. Surely an object can be in a particular occurrent state whether or not humans have a hard time conceiving exactly what that way is. Being objectively speaking in a certain state, *F*, involves being *F* independently of our attempts to conceive or measure it.

If objects are allowed to have determinate properties independently of the way we conceive of these properties, then I do not see any obstacles in thinking of unmanifesting powers as fully occurrent and determinate properties, or ways of being, independently of any manifestation we would like to conceptually tie it to. We may have some difficulty in conceiving of those ways of being, but this is just the same difficulty as that of conceiving of any property as that property is in itself.

The problem of thinking of powers as occurrent and fully determinate modes of being is yet another symptom of the assumption that for anything to be considered determinately real we must be able to attach to it a determinate description, a description that would eliminate all the mystery of powers and make them look like determinate states of something we could recognize, preferably in perception.

To perceive a property or state of a thing, seems to take away (or never even introduce) any mystery of the character of the property or state. In perception a property appears to be revealed to us in all its determinateness (as a phenomenal quality), but we should have learnt by now that this is merely a psychological illusion.

If what I have argued above is on the right track, then the trouble of attaching a true conception/description of a power to the power itself also applies to qualities; either that, or it applies to nothing at all. I lean towards the conclusion that we have no reason to regard the perceived manifestation of a power as being constitutive of its nature, any more than we have a reason to regard phenomenal qualities of experience to be constitutive of the nature of the physical qualities they represent.

I would like to make it clear at this point that I do not think that perception completely distorts what things are really like. It represents objects, truly, I think, as having certain determinate and BASIC properties. It is the further claim I dispute, that perception accurately captures the determinate and unique essence of each property as that essence is in itself, as opposed to merely represent them as being unique or different from each other. Even though perception as a matter of fact distorts most properties then I don't think this is a necessary characteristic of perception. I think we have fairly good reasons to think that we perceive shapes as they really are in reality, and at the same time we perceive the causal contribution of shapes to what their bearers can do.

#### *8. How to think of mixed properties*

How should we think of properties, if not in terms of first-order pure qualities that ground second-order pure powers, or in terms of first-order powers whose only nature is a second-order relation to other powers? I suggest that we should think of them as BASIC ways of being, whose unique essence (their individuating nature) is difficult to grasp, but that whatever that nature is, it is occurrently determinate and it makes a decisive difference to how the object behaves in interactions with other objects. The key is not to think of the decisive manner in which a fundamental property determines behaviour in terms of a relation to a manifestation.

In a little more detail, our understanding of the nature of basic properties should be modelled in terms of theoretical entities postulated to explain behaviour, but without supposing that their nature reduces to that behaviour. Behaviour is here understood as the manner in which an object reveals itself in perception and/or measurements. Whether we like it or not, perception is our interface with reality. We may imagine science to be a different interface, but perception is still our interface with science. The limitations and peculiarities of this interface have gradually been dawning on us since the beginning of reflective thought. We can

compensate for these limitations, e.g., by triangulation of what different senses tell us, and through abstract and mathematical representation of reality. Arguably, we often can compensate to a degree that the discrepancy appears to be negligible between the intellectual representation of something and what that something is really like.

One important difficulty involved in the conceptualization of theoretical entities postulated to explain behaviour, is the sheer heterogeneity of behaviour associated with each particular object even in the absence of any apparent difference in the object. How do we characterize the nature of a simple property by appeal to a range of heterogeneous behaviour that the property can give rise to in a particular? It really is not too complicated. Once you stop thinking of the nature of the property in terms of the behaviour, and instead think of it as a property that can give rise to behaviour, then you can blame the heterogeneity of behaviour on the heterogeneity of interactions that a particular may be involved in. That is, we should *not* expect an object to always behave in one and only one way with respect to a particular power, whatever the circumstances, but instead expect it to always behave a certain way in the same circumstances and differently than objects with other properties would behave in those very circumstances; again without thinking of that behaviour in those circumstance to be constitutive of the nature of the object but as a consequence of how its nature contributes to that particular circumstance.

The suggestion that we blame the heterogeneity of behaviour on the heterogeneity of interactions rather than on an indeterminacy of the power or on a multitude of powers, is based on the conviction that no power is singularly capable of anything at all; that every so-called manifestation is brought about mutually by *reciprocal disposition partners* (Martin 1997; Heil 2003, 83; Mumford and Anjum 2011). I don't intend to add anything here to what has already been argued in favour of the reciprocity of powers in the literature, except to point out that the reciprocity of interactions is a basic principle of modern theories of action in dynamical systems (Bunge 1959, 170–171; Ingthorsson 2002; 2007). This is an extremely strong argument in favour of reciprocity, and of the conclusion that manifestations are never the product of a singular power but always of a nexus of powers that mutually manifest something.<sup>2</sup>

<sup>2</sup> There are phenomena that have been suggested to be examples of the production of a manifestation by a single power. These include spontaneous decay, say, of a muon into a gluon and neutrino, respectively, and the generation of a field by elementary particles. However, as to whether these phenomena really involve the spontaneous production of a manifestation by a single power, is a matter of controversy, and arguably depends on the theory you choose to describe the phenomena. For instance, the decay of a muon can only be treated as spontaneous in so far as the muon is treated as a simple particle without any internal structure up until it decays. If, on the other hand, it is treated as an unstable compound, then the decay can be interpreted as the outcome of an interaction between its parts (Bunge 1959, 163; Ingthorsson

An interesting epistemological consequence of the suggestion that manifestations are always the result of reciprocal interactions between objects with powers, is that we never observe the particular manifestation of any particular power whatsoever, but only manifestations that are mutually produced by two or more powers. If this is right, then no conditional ever suggested as a specification of what a power can do has really specified what any particular power can do; they have only stated the outcome of various combinations of powers.

Let me illustrate my suggestion on a more concrete level with the help of an example involving a basic property of a basic entity, i.e. a simple property of a part that has no further parts: the negative charge of an electron. For the sake of simplicity I stick to the classical model of particle physics, since the main purpose here is to illustrate an idea and not to prove how things really are. Charge comes in multiples of smallest units (it is quantized), and the electron carries exactly one such unit,  $e$ . Now, is charge a quality or power? It is clear that physics describes the nature of charge only in terms of what its bearer can do, and we have no perceptions of this nature; phenomenal qualities cannot guide our understanding. We can think of two billiard balls repelling each other, which is a sensible idea, and scale it down in our imagination to fit interactions between electrons. But that would not be a sensible idea of charge, only of the consequence of an interaction between charged particles. We also perceive the forces exerted on us by other objects and can imagine these forces as acting on electrons, but this would again only be, at best, a conception of the effect of the exertion of forces but not of the charge that makes the exertion of forces possible. Consequently, we cannot conceive in such terms what it would be to be negatively charged, independently of how the bearer of such a property would behave.

Charge is understood as a property that makes the bearer experience either an attractive or repulsive force in the vicinity of other bearers of either negative or positive charge. So, the behaviour in virtue of which we understand it is in a sense heterogeneous. Still, charge is clearly described as a BASIC property of its bearer even at times when the bearer is not exerting it. It is indeed a relativistic invariant. And, which is more interesting, it is not intrinsically a *vector* quantity; it is not intrinsically directed towards a particular outcome, which would be expected if it were a power in the way Molnar and Bird depict them. Charge only acquires a direction towards attraction or repulsion in an interaction with a second charge,

2002). In the case of fields, the question is whether to treat charge as a simple property of an electron (classical model), or as a power of a particle that spontaneously generates a field (a mix of classical and quantum models), or to treat the particle as an excitation in a field (quantum field theory). In the latter case, the field is not generated by a power, it is the bearer of the power to attract or repel. So, the question of whether there are particular powers that spontaneously manifest something on their own and not mutually with other powers, have to do with questions that have to be settled within physics. Fortunately, nothing important in this paper hinges on this controversy.

and then the direction depends on whether the second charge is negative or positive. This is why Coulomb's law, which describes electric charge, has a scalar and a vector form; the scalar form giving only the magnitude of the charge individually, while the vector form gives both the magnitude and the direction depending on the charge of the second particle (Griffiths 1998, 59).

Is it then a quality or a power? Charge is understood only in terms of its power-bestowing features, and still it is characterized as an intrinsic *and* non-directed property until it encounters a second particle, i.e. until it mutually partners a particular outcome. Charge fits the formal characteristics associated with BASIC properties, even though its unique essence – that which distinguishes it from other intrinsic properties – is clearly specified in terms of what the bearer can do. Indeed, the heterogeneity of what the bearer can do is clearly down to the heterogeneity of interactions that it can partake in, not to the heterogeneity of its intrinsic nature. My suggestion is that we treat charge as a way of being that we cannot *fully* conceive of as it is in itself, but allow that we can come close to such an understanding by charting what difference it can make to have such a property, and then we denote that way of being with a sign with a symbolic function: *e*. The most important thing to consider is that the specifications of what the bearer of charge can do (attract vs. repel), are not constitutive of the unique essence of that property but are instead specifications of what we know about the consequences of interactions between charged particles. These specifications have an epistemological import only.

There are in fact a great number of properties that clearly are wholly characterized or picked out in terms of what they do and yet are considered to be determinate properties that characterize the object as it is in itself. Indeed, for the type of theoretical entities discussed above, this is the rule rather than the exception (Thompson 1988). A particle can be described as having a determinate rest mass that remains invariant between frames of reference in relativistic physics. You cannot get much closer to describing something as it is in itself at a given time. And yet, there is no understanding of what mass is, of its essence, except in terms of what an object with mass can do. But the point is that the consequences of the exertion of the power must not be made equivalent to the unique essence of that power, any more than we should make the nature of an effect constitutive of the nature of the cause.

Martin and Heil admit that we might need to understand a power in terms of the particular manifestations it is an accomplice to produce – they call them 'typifying manifestations' – but they warn us against identifying the power with them or take them to be constitutive of the BASIC nature of the power. In the end we must consider every manifestation as an indirect indication of the presence of a property whose nature we must try to grasp by abstraction from its various manifestations.



## 9. Conclusion

In sum, I think the very idea of powers being directed is nothing but a reflection of our difficulty of conceiving of properties except in terms of their effects on our conceptual apparatus. Some properties are represented in perception and we imagine that we thus know in such terms what an object is like. However, this perception provides no information as to what that object can do, simply because perception really does not inform us what the object is actually like. I suggest that philosophy should do what natural scientists have found it natural to do. Let us denote properties with a symbol and assume that this symbol denotes a BASIC way of being inhering in a particular, and let us denote the determinate state occurrently realised by the particular as a quantity. For example, when we say that something is 78.3 kg then this means that this something has a determinate amount of mass. We have really no perfect idea of what exactly mass is, but a pretty good idea of what an object with mass could do, and we can come very near an estimate of the determinate mass of any object at a given time. But this requires distinguishing between properties on the basis of their causal roles, which in turn indicates that properties are causally relevant in distinctive ways.\*

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