PUZZLING POWERS: THE PROBLEM OF FIT

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Abstract – *The conjunction of three plausible theses about the nature of causal powers—that they are intrinsic, that their effects are produced mutually, and that the manifestations they are for are essential to them—leads to a problem concerning the ability of causal powers to work together to produce manifestations. I call this problem the problem of fit. Fortunately for proponents of a power-based metaphysic, the problem of fit is not insurmountable. Fit can be engineered if powers are properties whose natures are determined holistically. However, this power holism does not come without a cost, as a power-based metaphysic must be supplemented by a certain amount of additional machinery in order to avoid the problem.*

1. INTRODUCTION

There is a growing interest in powers (or dispositions as they are often called), and a growing number of realist theories of powers appearing in the philosophical literature. What such theories have in common is a treatment of the metaphysical aspects of causation in terms of an ontology of irreducibly causal properties—properties whose causal nature is their (primary) essence. Ontologies that admit irreducible causal powers are to be contrasted with ontologies that take all properties to be inherently non-causal, properties whose causal capacities come after the fact through the addition of some independent causal-cum-modal feature, such as a law of nature.

My concern here is with a problem that arises for those ontologies that countenance irreducible causal powers.[1] The problem I consider is one that concerns the way those powers work together to produce their manifestations. Powers must (typically) act in conjunction with one another to produce manifestations; a requirement of their working together is that they have the appropriate 'fit' for one another. If the salt is to manifest its solubility in the water, the water must likewise manifest its power to have the salt go into solution; there is no space for disagreement. However, as powers are intrinsic, and the manifestations they are capable of producing are set and incapable of change, their managing to line up is a matter of great mystery. Somehow the powers must be engineered such that they have the appropriate fit for one another. I call this the problem of fit.

As far as I can tell, the problem of fit arises for any powers-based metaphysic that includes realist but non-reduced powers, and endorses the following three theses: (i) powers are intrinsic properties, (ii) the set of manifestations a power is for is essential to it, and (iii) manifestations are produced reciprocally through mutual interaction. In presenting the problem I am not

[1] I shall not be concerned with distinguishing between views that take all properties to be powers and those that take some or most properties to be powers, as long as there is no introduction of some other causal-cum-modal feature that would duplicate or replace the work of the powers.

targeting any power-based metaphysic in particular. The three theses that give rise to the problem appear to a greater or lesser extent within most accounts in which powers play the primary causal role, but the problem is avoided where the three theses in question are not all part of the account.

Additionally, despite this looking like an attack on powers, it is not my intention to argue that a powers-based metaphysic is undesirable or untenable, or even that one of the three theses needs dropping. In fact, my conclusion is not intended to cast a negative light on power-based metaphysics at all. The problem I consider is not a problem without a solution; it is simply not a solution that resides where one would expect. It is not the case that an inconsistency can be derived from the conjunction of the three theses, but their combination raises an unpleasant difficulty. Each of the three theses is such that it is independently plausible, and the fact that they jointly give rise to a problem need not undermine that initial plausibility. All things considered, an ontology of causal powers is generally better off with these three theses than without them; dare I say, I am mildly skeptical about viability of any powers-based metaphysic that does not endorse all three of the theses.

The solution, I suggest, must come from *beyond* this characterization of the powers, through further specification of their nature and as part of the fuller metaphysic in which the powers are situated. No serious metaphysic stops at the postulation of certain ontological features alone. An account must given of how these features operate, how these features explain what it is they are employed to explain, and even what might explain their being as they are. It is within this wider account that I suggest we look for solutions to the problem of fit. To that end, I shall argue that powers are best thought of holistically, such that their individual natures are collectively determined.

The order of presentation is as follows: I begin with a brief presentation of the three theses (§2). Though each of the three theses could easily be the topic of its own paper, limited space precludes a full defense of each. This is followed by a discussion of the problem of fit (§3). Having presented the problem, I return to a discussion of the three theses in order to show that the best response to the problem is not to be found by abandoning one or all of the three theses, and that a view is better off with them than without (§4). Once I have argued that the problem of fit is not to be solved by rejecting one of the three theses, I propose a potential solution to the problem, which I call 'power holism' (§5). Finally, following the presentation of power holism, I consider a number of suggestions as to what kind of larger metaphysic would permit this power holism (§6).

2. THREE THESES ABOUT POWERS

The problem of fit arises from the conjunction of three plausible theses about the nature of powers. The theses are: the Intrinsicality Thesis, the Essentialist Thesis, and the Reciprocity Thesis. I shall present each in turn.

2.1 **Intrinsicality Thesis**: Powers are intrinsic properties

The first thesis is that powers are intrinsic properties. According to it, the instantiation of a power by a given object depends on that object alone, and not

what properties may or may not be instantiated by any other contingent objects.[2] This means that an object's instantiating a power property is independent of: what other objects happen to be present in the world, the locations of other objects and the object in question, whether or not a power is ever manifested, and perhaps most important to the discussion at hand, what powers happen to be instantiated by other contingent objects (should there be any). An object will have numerous powers, most of which will never be manifested due to contingent facts about the locations and distribution of other powers, but this lack of manifestation has no bearing on what powers an object has. This is what it is for powers to be intrinsic.

2.2 Essentialist Thesis: The set of manifestations a power is capable of producing is essential to it

The second thesis concerns the identity of powers. According to it, the identity of a power is given by the set of manifestations it is for—this is its essence.[3]

We commonly think of a power as the ability of an object to bring about some *specific* manifestation when met with the appropriate stimulus—the sort of thing that roughly corresponds to a subjunctive conditional—but this is only half the story.[4] The other half of the story is the power property that underlies this ability, that property in virtue of which the associated subjunctive conditionals are true. These are really just the same thing viewed from two different perspectives. The former perspective focuses on the effects of the power, and individuates powers according to a single manifestation type. The latter perspective sees powers in terms of the underlying property that supports the powers in the first sense, and is individuated according to the range of potential manifestations it supports.[5] What we have is a hub-and-spoke model, where the power property is the hub, and the spokes are the many different types of manifestations the hub is capable of bringing about for each different type of stimulus.[6]

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[2] It is a matter of much debate how best to define 'intrinsic', and it might well be the case that no entirely satisfying definition is to be found, but that is a discussion best had elsewhere. For present purposes I opt for the definition found in Lewis and Langton (1998), that for a property to be intrinsic is roughly for its instantiation to be independent of both loneliness and accompaniment, but nothing I claim hangs on this definition in particular.

[3] The manifestations here are best thought of as a manifestation-types, as certain powers can be manifested more than once (for example, elasticity).

[4] This is not to suggest that powers are analysable in terms of subjunctive conditionals, just that there is some connection between them, and we tend to pick them out in that way. See Martin (1994) and Bird (1998) for more on the failure of the conditional analysis of powers.

[5] From here onwards I will use the term 'power' to refer to power properties, and 'ability' to refer to manifestation-specific ways powers can be exercised. A number of the authors quoted in this paper use 'disposition' where I would use 'power' or 'ability'; unless the use is ambiguous, I have left the quotations as they appear.

[6] To be clear, when I say that the power 'supports' many abilities, I do not mean to suggest that the two are distinct or that the supporting property is not powerful. A power is capable of bringing about numerous manifestations—it is by focusing on a single manifestation type within that set that we get the single manifestation conception (an ability). Hence, for a power property that is capable of producing (amongst other things) shatterings, we might speak of the fragility that the power supports, but this is really just to consider one aspect of the power.

The set of spokes supported by the hub gives the essence of the power. This means that in any world we find a power of type *P* (type may be a matter of identity or exact similarity depending on whether the properties are tropes or universals) it will provide its possessor with the same set of abilities; the power is *for* precisely that set of potential manifestations.[7] As the identity of the property is determined according to the abilities it supports, it follows from the essentialist thesis that the manifestations of a power will be necessary. If they were contingent, then the set of manifestations a power is capable of producing would vary from world to world—which is incompatible with the essentialist thesis. This means that *anywhere* we find a power property of the type *P*, it has the abilities supported by *P*, even if *P* supports abilities that will not be manifested due to the lack of appropriate stimuli.

2.3 Reciprocity Thesis: Manifestations are often the mutual product of powers in distinct objects or parts of objects working together[8]

The third thesis describes what it takes for a power to be exercised. As we have noted, specific abilities are often thought of roughly in terms of subjunctive conditionals, such that to have this or that ability is to be such as to produce manifestation M when met with stimulus S. Though frequently overlooked, for the great majority of cases we are interested in, the stimulus S that is required for M is the presence and absence of other powers.[9]

Alexander Bird (2007: 21-24) seems to have the opposite intuition. He claims that we have no need for complex powers where conjunctions of simpler powers could do the same job. If he is right, hubs typically have only one spoke. However, I suspect that Bird is clinging too closely to a treatment of powers in terms of subjunctive conditionals. Although he played an important part in showing the failure of the conditional analysis of powers (Bird 1998), he seems to be suffering from a conditional analysis hangover, and is thinking of powers less as naturally occurring properties (hubs) and more as conveniently packaged and neatly individuated law-like subjunctive conditionals (spokes). Despite our differing intuitions, reducing the number of spokes per hub does not avoid the problem of fit, so we can ignore it for now. However, it will make a slight difference to the solution (as we shall see in §5) giving us two slightly different forms of power holism.

[7] Defining essentialism this way—in terms of the identity of the power in possible worlds—is far from ideal. On at least one view of properties (see §6.3), a difference in what properties are instantiated at a world means that all properties in that world will differ. It follows on such a view that no property of type *P* exists in more than one world.

[8] The terminology here, that of 'reciprocity' and 'mutuality' as applied to the causal action of powers, is due to C.B. Martin—I follow him in my understanding and application of these concepts. He writes that reciprocity holds "between properties of different things or parts of things for the manifestation that is their common product – for example, the soluble salt and solvent water for the solution of the salt in the water," and later that the "important point remains that the manifestation of a given dispositional state will require the cooperation of some other dispositional states amongst its reciprocating partners" (1993: 82). Following Martin's lead, Heil says of a salt crystal's manifesting its power to dissolve in water that "this manifestation is a manifestation of both the salt crystal's disposition to dissolve in water and the water's complementary disposition to dissolve salt" (2003: 198).

[9] Many instances where powers produce manifestations are reciprocal, but a small set are not. This difference corresponds to the difference between *transeunt causation*—causation *between* objects, and *immanent causation*—causation *within* objects (Lotze 1884, Johnson 1924, Zimmerman 1997). Putative cases of immanent causation include such occurrences as

> "I have been talking as if a disposition exists unmanifested until a set of background conditions is met, resulting in manifestation. This picture is misleading, however, because so-called background conditions are every bit as operative as the identified dispositional entity. A more accurate view is one of a huge group of disposition entities or properties which, when they come together, *mutually manifest* the property in question; talk of background conditions ceases." (Martin 2008: 50)

The basic idea behind the reciprocity thesis is that manifestations are a mutual affair. Producing manifestations requires the *co-operation* of two or more powers, where these powers complement one another. Consider the smashing of a martini glass by a rock. It takes more than just a rock—you need a martini glass too. This is not just to say that the breaking of the glass is a manifestation that requires both objects to be present (though that should not be ignored), both objects must have the appropriate powers. If the two objects are not appropriately powered, or lack the powers for that kind of manifestation, then some other manifestation would occur.

It perhaps goes without saying that if either the rock or the glass has different powers, then a different manifestation will result. But this is no threat to reciprocity, it merely recognizes that objects can vary in the mutual manifestations they are capable of producing. Whatever manifestation the rock and glass give rise to is a product of the powers of the rock *and* the glass, powers that work together to produce what they do—it is not simply up to one object or the other. This is the case if their mutual manifestation is the shattering of the glass, the rock's bouncing off, or even the shattering of the rock.

Let us be clear exactly what is being claimed here. I am *not* saying that the manifestation two (or more) objects produce cannot be surprising or unexpected: that is simply an epistemic matter and easily explained. What I am saying is that when manifestations are produced that involve two or more objects, the powers of the objects involved must cohere. Each must manifest powers that are for an identical manifestation. Consider what the alternative would mean: the glass manifests its power to shatter, and the rock manifests, what, some power for which the manifestation is *not* the glass's shattering? No sense can be made of this. The only power the rock can manifest is that which matches that of the glass. This is not a matter of you turning left and me right, this is *me* turning *both* left *and* right simultaneously. It cannot be permitted—powers will always be reciprocally matched.

The mutuality of causal action—whether it results from powers or not—is not an unfamiliar notion. Recall Mill's lesson that when looking at causation we need to consider the total cause (Mill 1967: Bk 3 ch. 5).[10] When considering causation we tend to focus on a single salient feature of the cause, treating it as *the* cause, thereby downgrading the importance of the other factors involved.[11] And

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object persistence, locomotion, and particle decay. For the purposes of the present discussion, keep in mind that the reciprocity thesis is intended for cases when objects interact causally with other objects.

[10] The lesson is repeated by Mackie (1965).

[11] For instance, Lewis states that "we allow a cause to be only one indispensable part, not the whole, of the total situation that is followed by the effect in accordance with a law" (1973: 159).

yet without those other factors 'the' cause could not have produced the effect. We say that it is the rock that broke the glass. The rock is the *subject*, it is the one we are interested in; the glass is merely the object of the rock's action. But when powers are the source of causal action, the rock does not act *upon* the glass, the two act *together*. It follows that it was a mistake to single out a single feature and treat it as *the* cause in the first place. All aspects of the cause are involved. This is the essence of mutuality.

Perhaps the worst offenders of singling out causes are those who speak in terms of 'active' and 'passive' powers, where the 'active' powers are the causal 'doers', and the 'passive' powers idly acquiesce. Similar connotations follow from distinctions like 'agent' versus 'patient', and 'triggering conditions' versus 'standing conditions'. In as much as these distinctions are intended to be epistemic, they are reasonably innocuous. It is as metaphysical distinctions they become dangerous. They suggest that some feature of the cause has causal dominance over the other. This bias is most obvious in the case of agent/patient; it conjures up images of human agents acting freely as prime movers and forcing the surrounding world to comply. But this implication of causal inequality cannot be permitted. The water contributes as much to the salt's going into solution as the salt—there is no sense in which any power involved is any less than any other.

What if the so-called 'patient' is categorical—would this not require that the 'agent' power alone is the lone causal actor? Contrary to what is suggested, because the purportedly passive categorical property contributes to the manifestation, it cannot be categorical after all. In order to influence the 'agent', it too must be powerful—there is no halfway house for powers. If they contribute nothing, then they cease to be causally relevant and fall out of the equation. A property either contributes causally, which means that the property has the power for whatever manifestation is produced, or it plays no causal role whatsoever.[12] Perhaps the only good that comes from thinking of powers as active and passive is that it recognizes the need for powers on the part of all objects involved. We might think of this as an implicit endorsement of the claim that all parties involved have reciprocal powers. This is the only sense in which the active/passive distinction is even close to getting it right; it otherwise skews the picture of the causally egalitarian powers.

Nor can it be the case that one or the other object has no relevant powers at all. If the glass has no powers at all (*vis a vis* the incoming rock), the result is not a passive smashing or a passive rebounding, it is an impossibility. If causal effects are just the manifestations of powers, then how can powerless glasses participate in manifestations? We need powers all around; reciprocity abounds.

3. THE PROBLEM OF FIT

Having described the three theses that set up the problem of fit, I turn now to the problem itself. Stated briefly, the problem is that powers have to work together when they produce manifestations (reciprocity), but as they are not relations (intrinsicality), and they cannot change with the circumstances (essentialism), the fact that they are causally harmonious is without explanation. Powers 'fit' together

[12] I am uncertain that this second disjunct offers a live possibility. If a property neither produces nor prevents a manifestation, then its promoting that manifestation might still be a causal contribution, even if its doing so is counterfactually irrelevant.

for the production of mutual manifestations. To fail to have the correct fit is to describe an impossible situation: the operations of the powers cannot permit anything less than perfect congruence. But the fact that powers have the appropriate fit for one another is not something that is yet accounted for. The very possibility of reciprocal power based causation demands nothing short of perfect harmony on the part of the interacting powers, but their intrinsicality and necessity are insufficient for the manufacture of that harmony. That is the problem of fit.

Let us consider the problem more closely. Central to the intrinsicality thesis is a kind of independence. As per our working definition of 'intrinsic', for a property to be intrinsic is for its instantiation to be independent of the presence or absence of other objects. This sets up part of the problem, as it makes clear that the having of powers—as intrinsic properties—in no way depends on any other contingent objects. The having of powers is also independent of whether or not those powers should happen to be manifested. Each power is the locus of many potential manifestations, but its instantiation in no way depends on those manifestations ever being realized.

However, though the having of some specific power is independent of its being manifested, it is nevertheless individuated in terms of the set of potential manifestation types it supports. Fragility is the ability to shatter, flammability the ability to combust, elasticity the ability to stretch without damage. And this connection between the power and what manifestations it is for is necessary. This is the essentialist thesis. Its importance in developing our problem is that what the intrinsic powers are *for* (that is, the manifestations they are capable of producing) is some specific set of determinate manifestations. Their potential effects are written into them; it is their nature to produce certain prescribed manifestations (when met with the appropriate circumstances).

This would not be problematic were it not the case that powers produce manifestations (when they do) in causal partnerships. The final feature of the problem then comes from the reciprocal nature of power-based causation. In all instances of transeunt causation, causation is a matter of the power properties of distinct objects working together to create manifestations: it is a mutual affair. And even when not interacting, powers must line up with one another in order that transeunt causation be possible at all. They must be built for mutual and harmonious interaction, even if interaction should never occur.

Powers are intrinsic properties, and what they are for is necessary and determined, but the production of manifestations is co-operative. This is where the problem arises. If causation was always non-interactive—or conversely if powers were relational or indeterminate, there would be no problem of fit. It is precisely because the having of the properties and what they are 'for' is independent of their causal interactions that the question of fit arises. The problem is explaining the fit. A proper fit is the only option, yet nothing about the intrinsicality or necessity of the powers prepares the properties to fit together.

An analogy might prove useful. Consider a jigsaw puzzle. The primary task when working on a jigsaw puzzle is to position the pieces so that they form a united whole—typically some image or other. The matter of jigsaw puzzle completion is literally one of fit. The pieces need to be fitted together. Except for a few anomalous jigsaw puzzles, each piece can only be fitted into the puzzle in one way. The completed puzzle is the perfect example of fit—the image of the completed puzzle only emerges if the pieces admit of what we might call a 'harmony of shape', and that is exploited in their being joined. The harmony that jigsaw puzzle pieces enjoy mirrors that of the reciprocal powers. Like the puzzle

pieces, they too must admit of the appropriate fit for one another in order to produce manifestations. They must stand in the right kind of relation to one another—that of being *for* the same manifestation.

Now, let us recall how it is that jigsaw puzzles are made (that is 'made' in the sense of created by toy companies, not put together). That is to say let us reflect on what allows for, or even provides for, this fit in the case of jigsaw puzzle pieces. That is simple enough: they are created by cutting up some picture. You start with a complete and whole image which is then cut into pieces, and it is no surprise that the pieces consequently admit of the right kind of fit for one another. But imagine what would happen if jigsaw puzzles were not made that way. Imagine, for instance, what would happen if jigsaw puzzle manufacturers divided the task of creating jigsaw puzzles amongst a variety of different laborers, without providing each with any indication of what the final image was to be, and without allowing for any collaboration. What are the odds that such a jigsaw puzzle could ever be put together? I have seen some mighty hard jigsaw puzzles in my day, but this one takes the cake! Even if a puzzle was as simple as those intended for the youngest of children, consisting of only four or five large pieces, the odds that our puzzle makers could get their pieces to coincide are astronomically low. You simply cannot build a jigsaw puzzle that way. And yet that is exactly the case with our powers: they are intrinsic, so do not enjoy the ease of collaborating that relations might afford, they have their effects necessarily, so what they are 'for' cannot vary or be assigned on the occasion of interaction, and yet the theory has it that they must come together harmoniously for the production of mutual manifestations. That any manifestation should occur is like the completion of a most improbable jigsaw puzzle—but anything less than completion is unthinkable. Worse yet, any world where the puzzle does not come together is an impossible world.

It is in this last regard that the analogy between fit for puzzles and fit for powers breaks down. In the case of puzzles one can imagine getting lucky and having the pieces fit, but any world without the fit for powers is an impossible world, and it cannot be luck that divides the possible from the impossible. Might it be the case that fit is a local phenomenon, such that despite a lack of total fit, on those occasions that token powers line up a manifestation results? (By analogy, the puzzle cannot be completed, but this and that piece fit together.) The short answer is that a lack of fit for powers is impossible in the token case, so local fit fares no better. Imagine a heavy rock with the power to smash a particular martini glass. The powers of the rock (r) are such that when it contacts the martini glass (m) with a certain high velocity (v)—it will result in a state of affairs that is or includes m's being smashed. However, m's powers are such that if struck by r at v, m emits a loud 'ping'—but does not break. Now imagine that we strike m with r at v. What happens? Does m shatter—as was r's power, does m remain intact, and emit a loud ping sound—as was m's power, or does nothing occur, because the two powers do not fit? The answer: none of the above.

The suspicion that a lack of fit could simply mean no manifestation is produced comes from the mistaken thought that when things do not change there is no causation involved. One point of defending a metaphysic of irreducible powers is to have the *powers* serve as the causal basis. As almost all token events are causally connected to some other event(s) that precede and follow them, the need for fit is paramount. There are many scenarios (most even) that produce rather boring 'static' manifestations that do little more than maintain the status quo, but even then it is still the case that all the concrete particulars involved have powers

with the right fit for one another.[13] Nor does the unnoticed work of the powers end with the static abilities. Martin notes that powers are often hard at work producing manifestations that are nothing more than the prevention of other manifestations by other powers.[14] This is not to mention that the frequency of 'successful' manifestations is far too common to be a purely random occurrence. Causation is ubiquitous; holding out for luck in any shape or form simply will not do. We cannot have a world in which such a lack of fit occurs. The need for fit cannot be marginalized.

That is the problem of fit. As I have claimed, the problem demands some sort of explanation on the part of the theory. Unlike many problems raised in the philosophical literature, I do not pose this problem as if it is incapable of solution. I think it can be solved, and will consider a number of proposals below. The point to keep in mind, however, is not whether or not the problem can be solved, but how elegant the solution happens to be. If you can only solve a problem by taking on board some highly dubious claims or mechanisms, then the overall attractiveness of an ontology of causal powers suffers. And when it comes to systematic metaphysics, the attractiveness of the theory counts for a lot. Ontological proposals are typically judged according to a kind of cost/benefit analysis that weighs their problem solving ability and intuitiveness against their theoretical simplicity and economy (of ontological categories). The greater the number of implausible claims an ontology requires, the weaker the theory becomes (all else being equal). However, before turning to solutions, we must first examine why the problem of fit cannot simply be avoided by dropping one or all of the theses that give rise to it.

4. REJECT ONE OF THE THREE THESES?

Met with a problem that arises from the conjunction of three theses, a natural first response is to question the theses themselves. That is what I shall do next. However, I hope to show that we should look elsewhere for a solution, as an account of irreducible causal powers is better off with the three theses than without.

4.1 Deny Intrinsicality?

The intrinsicality thesis is endorsed by virtually every proponent of a powers-based metaphysic. In fact, it is all but universally agreed that the right account or analysis of 'power' and its synonyms (whether ultimately realist or reductive) must treat them as intrinsic.[15] That makes rejecting the intrinsicality thesis a pragmatic

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[13] For more on the notion of 'static' powers see Williams (2005). Though many static manifestations will arise without reciprocal partners, just as many will not.

[14] "The life of most honest dispositional states is spent mostly in the presence of other dispositional states whose manifestation is the prevention of those former states from having *their* manifestation. Any particular set of manifestation conditions for a kind of manifestation must exclude other sets of manifestation conditions and so prevent the dispositional state from manifesting manifestations suited to the excluded conditions. It is a busy world" Martin (1993: 181).

[15] For instance, Lewis—who defends a functional account of dispositions—says straightforwardly that "dispositions are an intrinsic matter" (1997: 138). And Armstrong, who identifies dispositions with certain categorical properties plus the laws of nature, says that "a disposition entails the presence (or absence) of non-relational properties of the object" (1973: 12). Representative of the realist side we find Molnar claiming that

non-starter. The only (public) dissenter of the intrinsicness thesis is Jennifer McKitrick, but even she admits that many powers will be intrinsic, she merely rejects the claim that they are all that way (McKitrick 2003).[16] Though I am largely unmoved by her arguments (McKitrick has a very catholic approach to properties that makes room for properties that others—myself included—see no need for), very little is lost should it turn out that some powers are extrinsic. At worst, should it turn out that only *some* powers are intrinsic, the problem of fit would still make for a considerable problem. Hence, if we are to avoid the problem of fit, nothing short of wholesale dismissal of intrinsicness will suffice, and that is not something the proponent of powers is willing to endorse.[17]

4.2 Deny Essentialism?

With little chance of the intrinsicality thesis being rejected, what ground might be gained by rejecting the essentialist thesis? For starters, nothing can be gained by *only* denying that the set of manifestations a power is for are essential to it. All one would get is a treatment of powers according to which the same power was for different sets of manifestations in different worlds, but within each world it would still be for a specific set of manifestations, and so the problem of fit would remain.[18] What must be added is that even within a world powers are not directed at some *specific* set of manifestations, but instead embody a kind of 'raw' and directionless causal center—with its various abilities still *to be determined*. Call these contingently specified powers 'TBD powers'. Only if powers are TBD powers could they avoid worries about fit, as fit would, presumably, arise at times of manifestation, determined somehow in accordance with the other partnering powers. However, despite initial appearances, we cannot usefully think of the power properties as being TBD powers while holding the rest of the power metaphysic constant.

The problem with the idea of a TBD power is the question of what eventually determines what the power is for. It cannot be the case that the manifestation is determined in conjunction with the various power partners, as there would still have to be something in the powers that determines their joint nature. What could that be if not something in the property already? In other words, if the manifestation is determined in conjunction with the various partners, we still have to postulate an intrinsic structure within the powers that makes them such that they create said manifestation with said partners. In order that the TBD

"[p]owers are intrinsic properties of their bearers. This is one of the prima facie basic features of powers that have to be saved by any analysis" (2003: 129).

[16] McKitrick endorses an 'abundant' theory of properties, according to which any class of things, however gerrymandered, miscellaneous, and superfluous, is a property. She allows that many (perhaps all) of the non-intrinsic powers she defends may supervene on intrinsic powers.

[17] Despite being hugely unpopular, if powers were relations, they would still be intrinsic to the collections of reciprocally partnered objects. And since there is nothing stopping those objects from interacting with other such collections (for manifestations that result from mutual production, prevention or permittance), we soon find that the only powers are powers of the entire world. Again, not an entirely untenable thesis, but a far cry from the picture of powers most defenders envision, and not something many are likely to jump at. On the other hand, though it is hard to know just what to make of Karl Popper's account of 'propensities', inasmuch as they resemble powers, they come awfully close to being powers of a whole system, and not of the particulars that make it up (1990).

[18] Not to mention that this would require a very different account of how powers are individuated; for the sake of argument I shall assume this can be achieved, though I cannot claim to know what it would be.

powers result in determinate manifestations, there must be some causal *mechanism* by which the TBD powers go from to-be-determined to determined—this is itself a power.[19] If this is just the process of some other (perhaps more basic) power operating within the power, then we have the same problem all over again and we are back to square one. On the other hand, if this role is played by anything but a power, then some other causal-cum-modal feature is doing the work, and despite appearing to be a power-based metaphysic, we have some other sort of metaphysic in place. And that is the real problem here: the contingency we gain by rejecting the essentialist thesis does not remove the need to determine what the power is for, it just moves it elsewhere. And there is nowhere it can be moved that can help us with the problem of fit.

4.3 Deny Reciprocity?

Central to the problem of fit is the reciprocal nature of the manifestations. At first blush it seems that if we remove this feature—or at least amend it somewhat—we can avoid the problem. However, this proposal fares no better than the previous two.

We have already seen that any non-egalitarian system of powers quickly breaks down into an egalitarian one, so we cannot hope to escape reciprocity by claiming that only one of the interacting objects carries the power, such that it *imposes* the manifestation of that power on the other objects involved. Regardless of what we might think about the 'passenger' objects, if they play any role in the production of the manifestation in question, they must have the power to do so. That leaves us with just one option: the denial of interactive (transeunt) causation.

The rejection of *interactive* causation would not mean the end of causation altogether, as we could still have immanent causation, but it would mean that none of the standard examples of causation (rocks shattering martini glasses; billiard balls colliding; wrenches turning nuts) would be causal *in the way we took them to be*. What we would end up with is a power-based version of Leibniz's metaphysic—the apparent causal interactions being nothing more than an intricate series of changes and shifts in position carried out in accordance with each individual object's internal plan. And that is where the biggest problem with this solution comes in: rejecting interactive causation avoids the problem of fit, but introduces in its place a parallel problem regarding the harmonious states of the non-interacting objects. This is a kind of internally-driven harmony, but is no less problematic than the original problem. Where the problem of fit asks how it is that the intrinsic powers line up in the right way so as to produce mutual manifestations, its non-interactive counterpart problem asks how it is that the powers of the objects that direct their individual paths can be such as to line up in the right way so as to *appear* to produce mutual manifestations; we are no better off.

As it happens, I think rejecting interactive causation is a solution worse than the problem: it defies common sense and undermines the very phenomena it was developed to explain. But even for those who do not agree, that the problem of fit resurfaces in another form is reason enough to look elsewhere.

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[19] Might the TBD power be determined entirely randomly? Perhaps, but this would be a far cry from what we find in the world. Most often, similar objects have similar powers, and similar sets of powers go together.

5. POWER HOLISM

With the problem of fit before us, I shall now consider one way that the problem might be resolved. I do not suggest that this is the only solution—or even that it is the best—but it is one that I think a number of proponents of a powers-based metaphysic will find reasonably attractive, and is worthy of exploration.[20] The solution comes in two parts: the first part concerns the nature of powers, offering one way they could be that would provide for fit; the second part is somewhat more speculative, and considers three ways the world could be that would allow for the powers to be the way the first part of the solution suggests. The core of the first part is that powers are properties whose natures are determined *holistically*—powers are structured in terms of each other. The second part considers ways in which this holism can arise. Let us start with the first part.

As per the working definition for intrinsicality, a property is intrinsic just in case its being *instantiated* is a matter of the way that object is itself, independent of the presence or absence of any other wholly contingent object. Intrinsicality concerns the *having* of the property, not what the property itself is like. Hence, the intrinsicality thesis contributes to the problem of fit by placing one sort of restriction on the powers (concerning their instantiation), but does not otherwise limit us in terms of the nature of powers. Including the other theses we know that powers must work with one another, and that their causal profile is essential to them. What all three leave ample room for is an account of how the powers are engineered.

In order to provide the fit of powers, we must set up the powers so that they always match. How can this be done? One way is to cram all the information about every other property into the power, thereby 'building' powers according to a plan—a plan that includes what kind of manifestation would result from each and every possible set of reciprocal partners. In keeping with our jigsaw analogy, this is nothing more than having our individual laborers building their particular puzzle piece from a blueprint. With a blueprint to work from, it is hardly surprising that the puzzle pieces should fit together, even if they are constructed separately. If each laborer knows the shape of the other puzzle pieces and the shape her own puzzle piece is to have, then getting them to line up afterwards presents no difficulty at all.

Returning to the power properties, the result of packing in all this information is that each property contains within it a blueprint for the entire universe. Fit, then, is to be explained by the internal blueprint each carries. Each power property is intrinsic, but contains within it organized plans for every possible circumstance in which it might find itself. These plans constitute instructions for what manifestation (if any) is to be produced in each circumstance. However, in order to generate the 'blueprint' that the power follows, it would have to be the case that the other powers on the blueprint were *already* set, but as their nature must be determined in the same fashion, we face the same problem again—we have nowhere to start (and a vicious regress looms large). We can avoid this problem if the determination of powers is not engineered piecemeal, and instead they are all set up *at once*. What we need is power holism.

In order to get clear what I mean by 'power holism', we will first need to get clear about what 'holism' means. As the term has seen a great many

[20] In conceding that this is not the only solution I do not mean to suggest that I am aware of others that I am failing to mention, I merely suspect that other solutions may be possible.

philosophical applications (perhaps far too many), I will start by stating what I do *not* mean by 'holism'. 'Holism' is often understood in terms of the somewhat clumsy and trivial aphorism that the whole is more than the sum of its parts. This can be refined in any number of ways, but in each we find the familiar thought that either features of the whole are emergent, do not reduce to, or cannot be explained by, features of the constituent parts, or instead that features (or even the existence of) the parts would not obtain in the absence of the other parts that make up the whole. For instance, in the philosophy of physics, 'holism' is sometimes taken to be the thesis that the properties of position or spin can only (properly) be attributed to a system and not to those particles that make it up (Healey 1991); and in moral theory 'holism' can mean the anti-particularist claim that reasons are altered by their context (Dancy 2000). What these interpretations have in common—and therefore what makes them of no use in the present case—is that they concern the sort of features that can be instantiated by the individuals that make up a system or whole. But our interest is in the nature of certain properties themselves, not the individuals that have them. Similarly useless are versions of holism that understand it as an explanatory or purely epistemic notion; what we require is an ontological conception, but not one that takes the existence of constituents to depend on that of others, or where the holism results in relational properties (because powers are intrinsic). What we need is a notion of holism according to which constituents of the whole determine their natures collaboratively, through a sort of collective engineering.

Of the range of extant holisms, what is sometimes called 'semantic holism' comes closest to the meaning that I have in mind. Here is one version of semantic holism: "the specific, determinate meaning of each belief depends on the specific, determinate meaning of all other beliefs with which it is arranged in a system of beliefs: if the meaning of one constituent of a system of belief changes, the meaning of all the other constituents changes as well" (Esfeld 1998: 374). This has all the features I want to replicate: first, there is no suggestion that this or that belief depends for its existence on any of the other beliefs in the system; second, the determinate meaning of a belief depends on *all* other beliefs in the system; third, changes to any belief result in changes to all beliefs, and fourth, there is no suggestion that beliefs are relational in virtue of gaining their determinate meanings this way. Mutatis mutandis, this is the model of holism to be applied to the powers in power holism. No power depends for its existence on any other power, and powers are not relations, but all powers within a system contribute to the nature of all other powers, such that each is set up for the appropriate fit with one another. Powers are capable of fit for one another because they are determined collectively.

Power Holism: The specific, determinate nature of each power (that is, the set of manifestations a power is for and the precise partners required for those manifestations) depends on the specific, determinate nature of other powers with which it is arranged in a system of powers

Given the way I have constructed the problem of fit, it makes sense that the powers that make up a system of powers—and therefore that collectively determine each other's natures—are the powers that combine to produce manifestations (if or when they do). That is how I envision power holism, and as

far as resolving the problem of fit is concerned, this is enough. Nonetheless, depending on how one thinks of manifestations, we might have additional lines of determination within a system of powers. It is an open question what ontological category manifestations belong to; as the (potential or actual) effects of reciprocal powers there is some reason to think of manifestations as events, and though I am prone to treat them as states of affairs, a common suggestion is that manifestations are properties, and that these properties are powers.[21] If one adopts this last suggestion, there is no need to amend the thesis of power holism, but one finds additional connections between the powers. A power's nature would then be determined via connections to its power partners *as well as* to the powers that are its potential manifestations.

A system of powers is a set of powers such that every power in the set has at least one other power as a reciprocal partner. On one model of powers, *every* power has *every other* power as a reciprocal partner.[22] In that case, there is no power that falls outside the system, and the system is highly inter-related. But we could also have a model of powers that is far less inter-related. For instance, Alexander Bird prefers a picture of powers according to which each power has just one ability associated with it (think one spoke for every hub), and many powers are not connected with each other in any way at all. Is this conception of powers a threat to power holism?

The short answer is no—but it does give rise to two slightly different forms of power holism. On the first conception of powers, every power is connected to every other; by analogy we might think of all the powers in that large system as forming a ring.[23] Call this 'strong' power holism. On the second conception of powers, groups of powers have natures that are inter-related, but we have multiple systems, and no system shares any power with any other system. We have multiple rings, rather like the Olympic rings (only no ring contacts any other). Call this 'weak' power holism. As ought to be clear, weak power holism is as much a form of holism as strong power holism, only the latter is more inclusive. Within each of the smaller rings of weak power holism we still find a series of powers that has its nature determined by its power partners, only the rings of one color have no contact or connection with the rings of any other color.[24] This makes for a strange view of reality, as the different color rings would be like ghosts to one another—causal systems that pass through each other without any possible contact or awareness—but strange is not impossible. And just as with the strong version, the weak version provides a response to the problem of fit. Of course, if weak power holism is the response, then what needed to fit was not every power with every

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[21] Regarding the nature of manifestations, Molnar (2003) speaks of them as events; Williams and Borghini (2008) treat them as states of affairs, Mumford (2004) and Bird (2007) opt for powers, and Handfield (2008) speaks of process types.

[22] Most of the potential manifestations of such partnerings would be rather dull manifestations. Our tendency is to focus only on exciting manifestations, but though many are for such exciting things as change, other less exciting ones include prevention of other manifestations or having things remain as they are—but these are as genuine as any other. See Williams (2005).

[23] This is not to suggest that a ring has anything like the appropriate architecture to map this type of holism; its application here is just for contrast with weak holism.

[24] A related discussion can be found in Bostock (2003), though he rejects the possibility I consider.

other, but smaller sets of powers, but the difference is only one of degree.[25] Regardless of the number of systems involved, the problem of fit arises, and a version of power holism comes to the rescue.

As a final word on power holism, the suggestion of holism for powers is not entirely new to the literature. In addition to the occasional vague murmurings in the direction of holism made by other authors, Stephen Mumford has an account of powers that is explicitly holistic, and, if I am interpreting him correctly, it bears most of the features of power holism as I have described it.[26] Mumford proposes that we understand properties as "clusters" of abilities that both exhaust the nature of properties and "fix the identity of the property;" consequently "a property's causal roles are necessary to it" (Mumford 2004: 171).[27] And though these properties are intrinsic, he claims that "[t]he world is a single whole, composed of properties whose essence and identity are determined by their place in that whole" (Mumford 2004: 184). He even adds that a "world comes with a whole, connected system of properties," where the identity of each property "is fixed by relations to other properties," such that "change one property and we change all the properties" (Mumford 2004: 182, 171, 215n.3). This looks like power holism to me.

6. BEYOND POWER HOLISM

As I noted above, power holism is only half the response to the problem of fit. The other half involves the greater metaphysic in which the holism is situated. Power holism gives powers the right sort of fit for one another, but it does nothing to help explain how this holism is afforded. We now need to ask what kind of world *allows for* the fit that power holism bestows?

Let me start by noting that there is a sense—a very natural sense—in which power holism is an 'after-the-fact' metaphysic. What I mean is that in order to have a system of powers that can determine the natures of the individual powers, you first need to have the powers 'available'. There needs to be, metaphorically speaking, opportunity for the powers to 'communicate' with one another in order to sort them out. Recall the near impossible task of manufacturing jigsaw puzzles by constructing the pieces in isolation. That task becomes quite easy if we permit collaboration between the individual piece-makers. There are plenty of ways of doing this—you could put them together in a room, or draw up plans for the completed puzzle and pass them around—but whatever the strategy it will require the right sort of temporal or spatial proximity. They cannot collaborate if every piece-maker cannot communicate (directly or indirectly) with the makers of the

[25] Weak power realism also faces a second problem of fit, as each potential manifestation must be such that it does not coincide with, rule out, or come into contact or conflict in any way with the potential manifestations of any other system of powers. This may be a reason to prefer thinking of powers as forming a comprehensive system.

[26] The vague murmurings include Martin's inclination to speak of the range of powers and how they interact with partners as forming "lines" or "nets" (1993), which he says form "holistic nets" (2008: 46), and Heil's suggestion that the world be viewed "as a network of power" (2003: 97). Unfortunately, neither sees fit to elaborate on these remarks.

[27] So as not to misrepresent Mumford's position, note that Mumford's preferred terminology is to speak of properties as clusters of 'powers', by which he intends what I mean by 'abilities'. To avoid confusion I have switched his terminology to keep it in line with what I have been using.

adjacent pieces. But what counts as collaboration when it comes to powers; how do *they* convene? I will consider three answers that might be given, all which relate to the sort of world we might have that could contain holistic powers.

6.1 Brute Force

For some, taking the investigation any further is to go well beyond what we need or properly understand. Looking beyond power holism is undoubtedly to engage in big-picture, and highly speculative, metaphysics. Why not just recognize that there are necessary relations that hold between powers that determine their natures, and be done with it? That is, why not just accept power holism as a brute metaphysical fact?

As with much metaphysical reasoning, the suggestion of bruteness is always at hand and ever ready to step in as a would-be solution to prevent further investigation. There is nothing wrong—in the sense of inconsistency or error—about invoking a 'those are just the facts' answer as to how power holism might arise. Nor does it fail to be a genuine option in the present scenario. But as with all claims of bruteness, it fails to provide the philosophical quiet which drives so much of our investigation. If we were satisfied by bruteness, scientists would be largely unemployable and we would have long since abandoned our metaphysical quests.

That is not to deny that bruteness can—and must—be present in any substantial metaphysic. There must be an end point to all investigation; whatever entities reside at the fundamental level are incapable of full explication, as this would require another level, more basic than that it explains. Nonetheless, it is one thing to recognize the place of bruteness, and yet another to concede that the entities, features or facts at hand constitute the end point. Bruteness has its place, but it would be a mistake to decide that we have reached the end until we have seen the alternatives. With that in mind, I suggest we continue the search, and only resort to bruteness if the alternatives are unsavory. Even then it will be unable to provide the security and warmth we are after, but it will have to do.

6.2 Platonism

With the right picture of properties one can provide opportunity for collaboration. The Platonist has such a picture. According to the Platonist, all properties are necessary existents that enjoy a supernatural permanence outside of whatever instantiations may or may not obtain. Unlike their Aristotelian counterparts, they are not tied to the spatiotemporal realm, and do not stand or fall according to their place in it. Regardless of how the details of Platonism get fleshed out, all powers are always available to collaborate in such a way as to holistically determine the nature of each. It may be an open question whether the best metaphor in this case is that of all the powers being together in the same room (platonic heaven?), or that of a platonic blueprint each power follows when instantiated, but either neatly affords the holism we are after. Hence there is one potential way to lay the foundation for power holism: be a Platonist about properties.[28]

6.3 Naturalism and Monism

What if Platonism is not to your liking, and brute facts leave a nasty taste in your mouth? One account of properties (and existence generally) goes by the name

[28] The general version of Platonism I describe would *allow for* power holism, but would not (without further details) *provide for* power holism. I leave it as an exercise to the reader to decide how those further details might be filled in.

'naturalism'. According to this view, all things that exist do so within space and time; there are no 'supernatural' entities that exist outside the spatiotemporal realm.[29] Nothing about this picture demands that properties are not collaborative, but under naturalism there is a tendency to think of properties as existing when and where they do, freely popping into existence and out of existence as a matter of mere happenstance, (somewhat) randomly distributed about the universe. Can naturalism permit the collaboration that power holism requires?

Though the initial response looks like it ought to be 'no' (there can be no supernatural blueprint, and the apparent contingency of instantiation does not look amenable to a convention), naturalism is not without its means. First of all, one could simply append a brute fact power holism to one's naturalism. That would do the job. But even without the brute response, there is another way. All one needs is to have the powers arranged in the right way, and this can be achieved if one adopts a (substantial) form of *monism*.

Just like 'holism', 'monism' has a range of meanings, but all point in roughly the same direction: singularity. Jonathan Schaffer has identified two historically central versions of monism—existence monism and priority monism—and either serves our purposes (Schaffer forthcoming). According to existence monism, the universe has exactly one (enormous) object in it: the one whole. It has no (proper) parts; all properties are properties of the one object, the 'blobject'.[30] Existence monism is monism of the sort frequently attributed to Spinoza and Hegel.[31] According to priority monism, exactly one object is ultimately prior: it has discernible parts (and those parts have properties), but they are all dependent on the whole which is their foundation. The world is not a collection of discrete particulars from which we can derive the 'whole world', the world is the primary particular, and we get the common particulars derivatively. On both views it is purportedly the case that monism is compatible with our perceptual experience, commonsense belief, and our best science.[32] For present purposes, we have no need to assess whether that claim is true—my only interest is in positing a potential way a naturalist might find room for power holism.

So what can monism do for holism? The thought that all of existence is one big object, or that the whole that is everything is prior to any parts it might have, appears to provide a sufficient framework from which power holism could arise—even if naturalism is true. The properties had by the 'one' are all instantiated within the spatiotemporal realm, so naturalism is satisfied, but it also seems that the stage is set for the collaboration of the powers in virtue of their all being properties of the same particular. There is no need for a supernatural blueprint, if, so to speak, monism allows us to get all the properties in the same room.

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[29] Armstrong (1997) endorses this form of naturalism.

[30] 'Blobject' is Horgan and Potrc's (2008) name for the one object of existence monism. They contend that 'blobjectivism' (the thesis that only the blobject exists) is compatible with the (indirect) truth of all our standard claims about the world and its inhabitants.

[31] Schaffer (forthcoming) argues that this attribution is mistaken; he argues they are better interpreted as priority monists.

[32] The compatibility requires certain revisions: under monism the claims of commonsense perception and science would not be strictly speaking true, but either some appropriate paraphrase would be (Hawthorne and Cortens 1995), or they would have an 'indirect correspondence' with the world (Horgan and Potrc 2000 and 2008). How easily the revisions can be made will have a significant impact on the 'cost' of adopting monism.

As long as we can account for the apparent variety, nothing about monism is that odd or unusual. It just means that as a matter of fact everything is part of the same large concrete particular. Spinoza was happy enough with this picture of the world, and excepting the special place of mind, Descartes was too. I cannot see what has changed in the last three hundred and some years to make us think that we know anything better about the nature of reality at such an abstract level that would have us contradict them, so why not follow their lead? I think once one gets past the initial sense of implausibility regarding monism, it looks to have as much in its favor as any pluralistic alternative.

Nonetheless, some might find the thought of monism less attractive than the brute or Platonic alternatives. To them I offer a highly speculative suggestion. If we can make sense of something like existence monism *at a specific time*, nothing seems to rule out that universe later being pluralistic, if the parts of the one were to later become objects in their own right (priority monism already affords this in a derivative way; this would be non-derivative). This is a form of pluralism that grows out of monism. Imagine a great pane of glass as representing our monistic starting point. Now that great pane is shattered, and our single entity is divided into thousands of entities—some of which are similar to one another, but many of which are unique. Following the shattering, what were powers had by *parts* of the pane (for interaction with other parts of the pane) are now intrinsic powers of the many distinct shards. And the fit they have for one another is explained by the holism afforded by their common ancestry. This 'ancestral' monism boasts the additional plausibility of echoing the jigsaw puzzle example of above. Real jigsaw puzzles—the ones that are manufactured and admit of perfect fit—are cut from a single picture. The many pieces are the pluralistic ancestors of a single object, and they owe their perfect fit to their common starting place: they fit together because they were once *one*. Perhaps the universe is like this too.

7. CONCLUSION

I have proposed that one way to deal with the problem of fit is to have the nature of powers determined collectively. Whether this power holism comes about as a brute fact of nature, or relies on Platonism or monism, we have a picture of the world that is very close-knit. This result stands at the opposite pole to the loose and particularist picture of reality as given in Humean supervenience, and depending on one's account of properties, the unity inherent in a power-based metaphysic might extend to the oneness of the world.[33] The task now is to determine how costly this unity proves to be, if it is in fact costly at all.

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[33] According to the doctrine of Humean Supervenience "all there is to the world is a vast mosaic of local matters of particular fact" on which all else supervenes (Lewis 1986: *ix*).

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