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Powerful Substances Because of Powerless Powers

ABSTRACT: *I argue that the debate between proponents of substance causation and proponents of causation by powers, as to whether substances or their powers are causes, hinges on whether or not powers (as properties) are self-exemplifying or non-self-exemplifying properties. Substance causation is committed to powers being non-self-exemplifying properties while causation by powers is committed to powers being self-exemplifying properties. I then argue that powers are non-self-exemplifying properties, in support of substance causation.*

KEYWORDS: substance causation, causation by powers, properties, causation, exemplification

Proponents of substance causation argue that substances are causes because substances are the bearers of causal powers and substances cause by exercising such powers. Proponents of causation by powers, however, argue that the powers of substances, strictly speaking, are causes because powers are what do the causal work. Substances, on the other hand, are merely derivative causes, insofar as they are the bearers of powers. In this article, I argue that the debate between substance causation and causation by powers as to whether substances or their powers are causes hinges on whether powers—as properties—are self-exemplifying or non-self-exemplifying properties. The argument for substance causation assumes that powers are non-self-exemplifying properties. The argument for causation by powers, on the other hand, assumes that powers are self-exemplifying properties that themselves have the character they confer on their bearers. I focus primarily on Ann Whittle's recent defense of substance causation and Andrei Buckareff's defense of causation by powers. There are many accounts of substance causation and causation by powers defended against other views of causation, such as causation by events or facts as well as regularity and counterfactual accounts. However, Whittle has gone to the greatest lengths in defending substance causation against causation by powers while Buckareff has gone to similar lengths defending causation by powers against substance causation.

I begin by characterizing substance causation. I then present the main argument for substance causation under consideration in this article, which has most recently been defended by Whittle. I then lay out Buckareff's critique of Whittle's argument and his defense of causation by powers. I next argue that the debate between substance causation and causation by powers hinges on whether powers are self-exemplifying or non-self-exemplifying properties, with those who defend substance causation committed to powers being non-self-exemplifying properties

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and those who defend causation by powers committed to powers being self-exemplifying properties. I conclude by offering some reasons for why powers are non-self-exemplifying properties, in support of substance causation.

1. Characterizing Substance Causation

As I ultimately defend substance causation in this article, it is important first to characterize briefly substances and how causation by substances will be understood. Substances are individual things or objects. Such individuals have properties and can persist through changes in those properties (see, for instance, Swinburne 1997; Lowe 2008; and Whittle 2016). While having properties, substances are not themselves properties of other individuals. Additionally, substances are the entities upon which properties ultimately depend. Properties—on the substance metaphysic assumed in this article—need bearers, whether the properties are tropes or instances of universals. Among the properties possessed by substances are causal powers, such as an electron's power to repel negatively charged particles, an object with mass's power to attract gravitationally other massive objects, H_2O's power to break the bonds of polarized molecules such as sodium chloride, a stove's power to heat a pot, and so on. As I show below in section 3, this assumption is also shared by most proponents of the causation by powers view.

There are three features common to most versions of substance causation theory that, as we shall see, are relevant to my main argument. First, substance causation is the exercise of a substance's agency. That is, a substance's causing some effect just is the substance *acting* in some manner. For example, a bomb's exploding is the bomb's causing the bridge to collapse (see, for instance, Anscombe 1993; Swinburne 1997; and Lowe 2008). As E. J. Lowe states it, 'Causing is acting and it is substances that act' (2008: 164). Lowe's claim has impressive historical precedence. According to Leibniz, 'the efficient [that is, productive] cause is the active cause' (1966: 472) or 'cause through action' (1923: VI.ii.490) and 'everything that acts is an individual substance' (1969: 502). According to Aquinas, 'actions belong to supposits'—that is, substances (1981: 2a2ae. Q.58, Art 2).

Second, the exercise of a substance's agency consists in the exercise of at least some of its causal powers (Lowe 2008: 154). Given that a substance's causal agency is the exercise of its powers, a substance can only produce an effect if it has the power to produce that effect. For example, a particle can only repel another particle if the first particle has a repulsive power, such as a power grounded in or identical with its charge.

Third, in the account of substance causation under consideration, I assume that the causal powers of a substance are properties of the substance. Hence, at least a subset of a substance's properties—its powers—are a crucial part of the explanation for some given effect. Yet while the properties of a substance are a part of the explanation for effects caused by substances, that does not entail that the properties—rather than the substance—cause the effect. Instead, the substances cause their effects *in virtue of* their powers. A particle's repulsive power does not repel like-charged particles. Instead, the particle repels like-charged particles in virtue its repulsive power.

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(I remain neutral in debates among realists about dispositional properties as to whether (i) there are two kinds of irreducible, fundamental properties: categorical or qualitative properties and dispositional properties or (ii) identity theories of dispositional properties that hold that properties are powerful qualities, in which one and the same property is both categorical and dispositional. For a helpful overview, see the introduction in Marmodoro 2010.)

2. The Argument for Substance Causation

The argument for substance causation that I defend starts with the premise that substances are what possess causal powers (a premise that is also endorsed by many proponents of causation by powers). It is substances that are magnetic, corrosive, attractive, repulsive, soluble, and fragile (Lowe 2008: 136–37). Substances—as the bearers of causal powers—are then the best candidates for causes. Whittle has recently defended a rigorous version of this argument (2016: 3, interpolations and emphasis original):

1. Some actual substances possess causal powers. [POWER]
2. If a substance possesses a causal power, then it is efficacious. [EFFICACY]
3. If a substance is efficacious, then it can be a cause. [CAUSE]
4. Some actual substances' causal powers are manifested. [MANIFEST]
5. Therefore, some actual substances are causes. [SC]

As I show below, the controversy between those who defend substance causation and those who defend causation by powers lies with premises 2 and 3. Crucial to the argument for substance causation is the connection between the possession of a causal power with efficacy (premise 2, efficacy) and efficacy with being a cause (premise 3, cause). These premises could be another way of construing two features of substance causation addressed earlier, in which (i) substance causation consists in the exercise of its powers and (ii) that powers are part of the explanation of the effects of substance causation. Substances are efficacious and therefore causes *because* they possess powers. However, Whittle recognizes that the term *efficacious* can mean one of two things (2016: 5–6):

> Efficacy$_1$: An entity is efficacious$_1$ if and only if it can be a cause.
> Efficacy$_2$: An entity is efficacious$_2$ if and only if it can noncausally contribute to causation.

The argument only succeeds if the possession of a power makes a substance efficacious$_1$ rather than merely efficacious$_2$. This leads right into the main point of disagreement between those who defend substance causation and those who defend causation by powers: if powers are properties, then a critic would argue that it is the properties, rather than their substances, that are efficacious$_1$. Whittle denies this inference, responding:

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> The function of properties is not to stand in causal relations, but rather to 'enable' their bearers to be causes. They are what make substances powerful, but it is the substance that does the causing. Properties, by contrast, are causally relevant by being those entities in virtue of which substances have the powers they do. (Whittle 2016: 13)

So according to Whittle, substances are efficacious$_1$ while their properties are efficacious$_2$. That is, substances are causes while their properties noncausally contribute to causation. Properties play a noncausal role in causation. Whittle defends the thesis that substances—rather than their properties—are efficacious$_1$ via an analogy:

> By analogy, a drink is tasty in virtue of its ingredients: its gin, tonic, lemon, and ice. There is no reason to think that any of these ingredients are tasty independently of the drink. The drink's tastiness noncausally depends on its ingredients. Similarly, substances are powerful entities that enter into causal relations. They exert powers in virtue of their properties. Their properties are what make substances powerful, causally efficacious entities that cause things. But properties are not themselves powerful entities that cause things. Properties are the kingmakers, substance is king. (Whittle 2016: 13)

So just as the ingredients of a drink explain why the drink is tasty, even though that does not entail that the ingredients themselves are tasty, properties explain why substances are powerful even though that does not entail that properties themselves are powerful. The latter point is the main point of contention between those who defend substance causation and those who defend causation by powers.

3. The Argument for Causation by Powers

Buckareff has recently challenged the argument for substance causation, arguing instead that powers are efficacious$_1$ while their substances are merely efficacious$_2$. His argument consists of two moves, the first of which is most pertinent to my argument. First, Buckareff argues that substances are active only to the extent that their powers are active, in which case substances are efficacious$_1$ only if powers are efficacious$_1$. Second, he argues that if powers are efficacious$_1$, then via a causal exclusion argument, substances are not efficacious$_1$. Instead, substances are merely efficacious$_2$, as the bearers of powers. While there are challenges to causal exclusion arguments (Pernu 2013), I do not challenge Buckareff's second move. For the sake of argument, I grant that *if* powers are efficacious$_1$, substances would be merely efficacious$_2$. Instead, it is the first move—that substances are active only to the extent that their powers are active—that I challenge.

Before turning to his argument, it is important to note that Buckareff's position is representative of many proponents of what I call the causation by powers view. For example, Stephen Mumford and Rani Lill Anjum state that while objects such as apples can be said to move scales, it is 'only because they had a property that was

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capable of moving the scales' (2011: 1). Ultimately, 'it will always be the property doing the causing' (2011: 2). Anjan Chakravartty also has stated that it is causal properties that are 'ultimately responsible for causal phenomena' (2010: 107). Anna Marmodoro has also recently endorsed this view, claiming that 'at the most fundamental level, it is powers that are causally activated, derivatively, at the macro-level, we can say that substances, constituted by the powers, are the agents of causal action' (2017: 58). While these other proponents of causation by powers have explicitly stated that powers—rather than their substances—are efficacious$_1$, Buckareff has gone to the greatest lengths in defense of this thesis. (It is worth noting that most proponents of causation by powers have offered compelling defenses of the view that powers—rather than events or facts—are causes.)

Buckareff lays out three assumptions behind his argument. First, powers are identical with the dispositional properties of substances (2017: 1022). Buckareff ultimately argues that at least a subset of the properties of substances—their dispositional properties—are efficacious$_1$. Second, powers are pleiotropic—they are directed at different manifestations with different partners, where such partners are themselves powers (2017: 1022). A substance causal theorist, as far as I can tell, would agree with this assumption, or at the very least have no reason to disagree. Third, an effect is the 'polygenic outcome of the combined manifestations of the interacting causal powers' (2017: 1022). It is this last assumption that I challenge. While many effects are the polygenic outcome of the combined *manifestations* of causal powers, I argue that those powers do not *interact*. Rather, the substances interact in virtue of their powers.

With these three assumptions, how does Buckareff argue that powers, rather than substances, are efficacious$_1$? Take an effect E, such as a scale's pointer pointing to the 150 g mark when a pear is weighed. What is the efficacious$_1$ cause of E? According to Buckareff, it was not the pear, a substance. However, it is also not simply the pear's weight. Instead, the cause is

> the constellation of mutually manifesting causal powers of the pear and the scale that is causally efficacious$_1$. To say that the pear's weight or even that the pear caused the scale's pointer to move is useful shorthand for something much more complicated. (Buckareff 2017: 1023)

Here Buckareff is right to point out that an effect such as E is dependent on various causal powers, such as the pear's weight, the earth's gravity, forces in the scale's springs, and so on. So, according to Buckareff, the pear is not efficacious$_1$. The pear's weight is also not efficacious$_1$. Instead, the constellation of mutually manifesting interacting causal powers is efficacious$_1$.

Importantly, what is efficacious$_1$ with respect to E (and many other outcomes) is the *total* cause, according to Buckareff. Buckareff is again correct that neither the pear alone nor its weight alone is the total cause of the outcome. For that matter, most effects in nature do not have solely one substance or one power as their total cause. However, one might object to Buckareff's claim here, and argue that all is required for something to be efficacious$_1$ is that it be *a* cause, rather than the *total*

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cause. For example, while the pear or the pear's weight is not the total cause of the pointer's position on a scale, it is surely a cause, and therefore efficacious$_1$.

Yet, even supposing that Buckareff is right that only the total cause is efficacious$_1$, the substance causal theorist could further object that Buckareff has inferred more than is licensed to be inferred. While the substance causal theorist could grant that it is neither the pear alone nor its weight alone that is efficacious$_1$ with respect to the outcome, that does not entail that it is the constellation of mutually manifesting *interacting* causal powers that is efficacious$_1$. The key word here is *interacting*. The substance causal theorist instead could argue that it is the constellation of mutually *interacting* substances, in virtue of their manifesting powers, that is the total cause of the scale's pointer pointing to the 150 g mark. My argument does not hinge on whether what is efficacious$_1$ is the total cause or if a partial cause (for example, oxygen as a cause of fire) can be efficacious$_1$. The main point of tension, I submit, between those who defend substance causation and those who defend causation by powers is instead whether it is the substances or the powers that are, strictly speaking, interacting.

Buckareff challenges this objection, arguing, 'The causal powers have a sort of priority in causation that suggests that they are efficacious$_1$ and the substances are merely efficacious$_2$ in the production of the outcome' (2017: 1024). What sort of priority do causal powers enjoy over substances in causation? According to Buckareff, 'Any account of the substances being the cause of the pointer's movement involves the substances depending upon the activity of their causal powers' (2017: 1024). Key here is that according to Buckareff (in agreement with other proponents of causation by powers), powers are active. Because this is the thesis I challenge it is important to see what, if any, reasons Buckareff gives in support of that claim. As far as I can tell, Buckareff gives three reasons.

First, I take Buckareff to argue that it is the power that is active from the thesis that powers are directed toward their manifestations (see, for instance, Heil 2003; Martin and Pfeifer 1986; Place 1996; Molnar 2003). Buckareff writes:

> Consider just some of the objects and their causal powers involved in causing the scale pointer to move. We have the pear's mass, the Earth's acceleration of gravity, and the restoring force of the spring in the weight, among other things. For simplicity's sake, I will just stick to these three factors. The causal powers represented here are each directed at specific manifestations with each other. (2017: 1023)

So Buckareff can be taken to argue that since the powers are what is directed to specific manifestations, the powers are active.

Second, Buckareff holds that a power's being manifested is identical with its being active or at the very least, a power's being manifested entails its being active. He writes,

> [w]hat matters, for my purposes, is that it is the causal powers that are present in the location in question that are causally active, manifesting in response to each other's presence. (2017: 1023)

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> But the causal efficacy of the substances is only owing to the work of certain of their causal powers that are manifested in the causal process, not all of them. (2017: 1023)
>
> But the substances cannot be efficacious$_1$ in the production of the outcome apart from the activity of the relevant causal powers possessed that are manifested at the time the outcome is generated. (2017: 1024)

Buckareff is not the only proponent of causation by powers to connect a power's manifesting with its being active. Neil Williams has also written that '[w]hen these [powers] constellations arise, the powers that constitute them jointly act to bring about their manifestations' (2014: 360). Similarly, Mumford and Anjum have written, '[p]owers, we maintain, are productive of their manifestations, and production is clearly itself a causal notion' (Mumford and Anjum 2011: 8).

Third, I take Buckareff to argue that powers—rather than their substances—are active because of the counterfactual dependency of effects on powers. A scale's pointer would not point at the 150 g mark if the pear being weighed did not possess the determinate weight it possessed. Therefore, the pears weight, strictly speaking, is what acts on the scale. Buckareff writes:

> The outcome seems no less causally dependent upon the presence of the substance's various causal powers. To take the case of the pear, the pointer moving to the 150 g mark causally depends upon the weight of the pear. We would have a different outcome if the weight of the pear were different. So it seems the weight would be a cause because anything the pear allegedly causes is dependent upon the pear having some weight. This is so because, if it had no weight, then it would have no mass. If it has no mass, then it would not be a pear, but something very different (e.g., a gauge boson like a photon or a gluon). (Buckareff 2017: 1022)

Mumford and Anjum have similarly argued that '[t]he apples indeed moved the scales, but only because they had a property that was capable of moving the scales' (2011: 1). Specifically, 'it was the weight or mass that was the causally active property, not the colour of the apples, nor their shape' (Mumford and Anjum 2011: 1). The argument then is that given that a precise outcome (such as the scale's pointer moving to the 150 g mark) is dependent on some of a substance's powers, those powers, strictly speaking, are active rather than their bearer. As I argue, however, while all three reasons are consistent with powers—such as a pear's weight—being active, they do not entail it. If Buckareff and other proponents of causation by powers are to establish that powers are active, they need an additional reason, to which I now turn.

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4. Powers Are Active Only If Powers Are Self-Exemplifying Properties

I argue that Buckareff's argument that powers are efficacious$_1$ because powers are active relies on a further assumption in need of defense. Specifically, I argue that powers—as properties—are active only if powers are self-exemplifying properties. Suppose, for the sake of simplification, a world consisting of only two negatively charged particles P_1 and P_2, where P_1 repels P_2. P_1's charge—a property—explains or grounds P_1's character as a negatively charged particle, which in turn explains why P_1 repelled P_2: P_1 repelled P_2 because P_1 is negatively charged. So powers—as properties—explain or ground the character and behavior of their bearers. So far, proponents both of substance causation and causation by powers would agree. Yet where the proponents of substance causation and the proponents of causation by powers disagree is whether (i) P_1's property of being negatively charged repels P_2 or (ii) P_1 itself repels P_2. If P_1 itself repels P_2, then P_1 is efficacious$_1$. If P_1's negative charge repels P_2, then P_1's negative charge—a property—is efficacious$_1$. Granting Buckareff's causal exclusion argument, P_1 is then merely efficacious$_2$.

This points to two different ways that powers—as properties—explain and ground he character and behavior of their substances: Either (i) the powers themselves have the character they ground in or confer on their bearers or (ii) powers themselves do not have the character they ground in or confer on their bearers. That is, either powers are self-exemplifying properties or powers are non-self-exemplifying properties. If powers are self-exemplifying properties, then powers themselves are powerful. If powers are non-self-exemplifying properties, then powers are not themselves powerful, but rather make their bearers powerful. If powers are to be efficacious$_1$, they need to be self-exemplifying properties. That is, powers themselves need to be powerful. An electron's negative charge needs to be itself negatively charged if its charge is to repel like-charged particles. This applies whether powers—as properties—are tropes or property instances of universals.

(My discussion of the characterization of self-exemplifying versus non-self-exemplifying properties is largely indebted to Robert Garcia's work on properties and character grounding. While Garcia focuses exclusively on tropes, I extend this to other candidates for properties as well, such as the property instances of universals. See Garcia 2015; 2016.)

To clarify further, take a spherical object O. O is spherical in virtue of a spherical property S (either a property instance or trope). If S is a non-self-exemplifying property, then O is spherical because of S but S itself is not spherical (Garcia 2015: 637). In this case, S confers a character on O but S does not confer its own character on O. That is, while S confers a character on O that is somehow grounded in S, S does not itself have the character it grounds in O (Garcia 2016: 500). On the other hand, if S is a self-exemplifying property, then O is spherical because of S, which itself is spherical. In this case, S confers its own character on O. That is, S has the character it grounds in O.

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What's key here is the difference between how non-self-exemplifying versus self-exemplifying properties confer character on their bearers. Non-self-exemplifying properties, while having formal and functional character (for example, being a property, being self-identical, being a sphere-maker), are not themselves charactered by the character they confer on their bearers (Garcia 2016: 501). So a non-self-exemplifying property of sphericity is not itself spherical shaped. Instead, its bearer is spherical shaped because of its property of sphericity. A self-exemplifying property of sphericity, on the other hand, is itself spherically shaped.

There is a similarity, as Garcia has noted in his extensive work on this topic between character grounding by non-self-exemplifying properties and truth making (2016: 501). Truth making is irreflexive. A truth-maker is not itself true but makes something else—a truth bearer—true. Similarly, non-self-exemplifying properties are irreflexive character grounders. That is, such properties do not have the character they confer on their bearers.

On the assumption that powers are properties, powers confer a character on their bearers. Specifically, powers confer on their bearers the power to act in some manner. A negatively charged particle confers on its bearer—the particle—the character of having a disposition or power to repel like-charged particles. As powers are properties, they either self-exemplify or do not self-exemplify the character they confer on their bearers. This applies to both active powers and other dispositional properties. A negatively charged particle's repulsive power is itself repulsive to like-charged particles or it is not. A vase's fragility is either itself fragile or it is not.

I argue then that Buckareff's argument, and in many ways the debate between the proponents of substance causation and the proponents of causation by powers, hinges on whether or not powers are self-exemplifying properties. This can be further substantiated by specific claims that Whittle, Buckareff, and others make regarding the relations between powers and substances. I start with Whittle's defense of substance causation as several claims in her article support my contention that the debate between those who defend substance causation and those who defend causation by powers hinges on whether or not powers are self-exemplifying properties, with those who defend substance causation being committed to powers being non-self-exemplifying.

First, take Whittle's analogy between the powers of a substance on the one hand and the tastiness of a drink is one such example. A drink is tasty in virtue of its ingredients but that does not entail that its ingredients are themselves tasty. Second, Whittle argues that while substances are powerful entities, 'properties are not themselves powerful entities' (2016: 13), supporting my contention that those who defend substance causation are committed to powers being non-self-exemplifying properties (assuming that powers are properties). Instead, '[t]heir properties are what make substances powerful, causally efficacious entities that cause things' (2016: 13). Third, Whittle approvingly quotes Jonathan Bennett, who noted that 'in our world the pushing and shoving and forcing are done by things—elementary particles and aggregates of them' (2016: 14, quoting Bennett 1988: 22). A particle pushes and shoves and forces because of its powers, but its doing so—according to Whittle—does not entail that the particle's powers

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themselves do the pushing and shoving and forcing. Finally, when discussing Alexander Bird's dispositional essentialism, Whittle explicitly argues that if 'properties are powers and substances are the bearers of properties, dispositional essentialism ascribes powers to substances, not to properties' (2016: 4). If I understand Whittle correctly, I take her to be arguing that powers are not themselves powerful but rather make their bearers powerful. In other words, powers are non-self-exemplifying properties.

Evidence that Buckareff holds powers to be self-exemplifying properties is found in numerous places where he argues that causal powers are active. For example, Buckareff claims that '[w]hat matters, for my purposes, is that it is the causal powers that are present in the location in question that are causally active' (2017: 1023). Furthermore, 'any account of the substance's being the cause of the pointer's movement [when being weighed on a scale] involves the substances depending upon the activity of their causal powers' (2017: 1024). Hence, Buckareff argues that it is powers that, strictly speaking, do the causal work. Buckareff writes, '[b]ut the causal efficacy of the substances is only owing to the work of certain of their causal powers' and 'all the work of causal production is attributable to the causal powers of substances' (2017: 1021). As causal powers do the work, 'if we are looking for where any causal oomph or efficacy$_1$ is located we should look to the causal powers, not the substances' (Buckareff 2017: 1025). So powers, not substances, strictly speaking act. It is the powers of particles that attract or repel, while their particles only attract or repel derivatively. Therefore, Buckareff is committed to powers being self-exemplifying properties.

I note that Buckareff is not alone, as a proponent of causation by powers, in characterizing powers in a way that is best explained by such powers as being self-exemplifying properties. For example, Mumford and Anjum argue that 'it is properties that do the causal work, and they do so because they are powerful' (2011: 1). Marmodoro similarly argues that 'powers are powerful because they bring about qualitative change in other powers' (2017: 70).

As I discuss above in section 3, I find in Buckareff's article three reasons why he holds that powers are active. First, powers are active, rather than their substances, because powers are what is directed toward their manifestation, rather than their substances. Second, he either identifies the manifestation of a power with its being active or else holds that the manifestation of a power entails that it is active. Third, causal powers are active—rather than their substances—because of the counterfactual dependency of effects on powers. A scale's pointer would not point at the 150 g mark if the pear being weighed did not possess the determinate weight it possessed.

However, these three reasons hinge on powers being self-exemplifying properties. If a power is a non-self-exemplifying property, then while a power—rather than its bearer—is what is directed toward a manifestation, the bearer is what acts when the power is manifested. The proponent of causation by powers would need to argue further that a power is a self-exemplifying property. Perhaps the proponent of causation by powers might argue that the burden is on the proponent of substance causation to deny that powers are self-exemplifying properties. After all, powers—rather than their bearers—are what is directed to their manifestations.

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In response, I argue that the directedness of a power does not alone entail that it is self-exemplifying. This is evident in the case of dispositions such as a vase's fragility. While fragility is not an active power, fragility nonetheless has a directedness toward a manifestation. The vase's fragility is directed toward shattering. Yet when the fragility is manifested, the vase—rather than the fragility—shatters, in which case the fragility is a non-self-exemplifying property. It is worth noting that in an extended discussion of directedness, Marmodoro—a proponent of causation by powers—claims that a vase's fragility is directed to its manifestation of breaking and yet the vase—not its fragility—breaks when the fragility is manifested. She writes, 'Fragility is a power of an object to break. That is, fragility is directed toward the breaking of the object' (2010: 31). So a property can have a directedness toward a manifestation and yet not be a self-exemplifying property. Therefore, the directedness of a power alone does not entail that the power is a self-exemplifying property, in which case the directedness of the power does not entail that the power—rather than its bearer—is active.

(I note that I am not here claiming that a vase's fragility is a power. Rather, fragility—like a power—has a directedness toward a manifestation and yet fragility is not a self-exemplifying property, as the vase—not the fragility—breaks when the fragility is manifested. Therefore, the burden is on the defender of causation by powers to argue that powers are self-exemplifying properties. In section 5, below, I address the issue of exemplification and liabilities or passive powers such as fragility in greater depth. I argue that if liabilities or passive powers, such as fragility are non-self-exemplifying, it is more plausible that active powers are also non-self-exemplifying rather than self-exemplifying.)

With respect to the other two reasons, if a power is non-self-exemplifying property, then when the power is manifested, the power's substance is active. Even if an effect is counterfactually dependent on a substance's property, the substance—rather than the property—could be the cause if the power confers a character—specifically the character to act in a certain way—onto the substance that the power itself is not characterized by.

5. Why Powers Are Non-Self-Exemplifying Properties

Having argued that Buckareff's argument relies on a further premise—that powers are self-exemplifying properties—I offer some reasons to believe that that premise is false, in which case powers are non-self-exemplifying properties and therefore not efficacious$_1$. I note that I do not argue that all properties are self-exemplifying properties. Taking a stand on that issue goes far beyond the scope of this article. I also do not take a stance on whether all properties are powers or if instead there are also properties that are not powers. Instead, I offer two reasons to hold that if powers are properties, powers are non-self-exemplifying properties.

I note that this argument is independent of the argument that proponents of causation by powers are committed to powers' being self-exemplifying properties (and accounts of substance causation that hold that powers are properties are committed to powers being non-self-exemplifying properties).

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The first reason stems from liabilities and passive powers (I use the terms interchangeably). Until now, I have mainly considered active powers, such as an electron's repulsive power. However, a number of philosophers (both presently and historically) who have posited causal powers have also posited passive powers and liabilities. (For representative historical figures, see Aristotle 1984: 1045b 27–1046a 35; Aquinas 1981: 1.25.1c and 1.78.3c; Locke [1690] 1975: 2.21.2 and 2.21.73. For a contemporary figures, see Harré 1970; Lowe 2013: 159–60.) I start with liabilities whose manifestation results in the destruction of their bearer (in contrast to liabilities such as malleability that do not result in the destruction of their bearer). Examples of such liabilities include a vase's fragility and sodium chloride's water-solubility. I use the specific examples of fragility and solubility in part because they are some of the most common examples, and they are frequently used by theorists of causal powers to advance important aspects of their theory. For example, Mumford and Anjum recognize that fragility is the paradigm example of disposition (2011: 4). Furthermore, they use the example of fragility to argue for the possibility of dispositions that may never be manifested, a key component of not only their theory but of any realist theory of powers (2011: 5). Similarly, in the introduction to *The Metaphysics of Powers*, Marmodoro likewise claims that '[p]owers are properties like fragility and electric charge, whose possession dispose their bearers in a certain way' (2010: 1).

So take a vase's fragility, which is its disposition to break when struck. If the vase's fragility—a dispositional property—is a self-exemplifying property, then the vase's fragility is fragile. In that case, when the vase's fragility is manifested, it is the fragility itself that breaks. But that is absurd. When a vase's fragility is manifested, the vase breaks, as I argue above. Take as well sodium chloride's dispositional property of being water-soluble. If its disposition is self-exemplifying, then when that disposition is manifested, it is the solubility itself that dissolves in water. Again, that is clearly false. When sodium chloride's dispositional property of solubility is manifested, the sodium chloride is what dissolves.

There are also passive powers or liabilities whose manifestation does not result in a destruction of their bearer. Take an electron in a grounded state that has the passive power to absorb energy when hit by a photon and move to an excited state. It is not the electron's power to absorb energy that absorbs the energy when the electron moves to an excited state. Instead, the electron absorbs energy when it moves to an excited state. At a more macroscopic level, a sponge's power to absorb water (a power that marbles lack) does not absorb water. The sponge absorbs water.

A similar reason stems from properties that ground an entity's ability both to act on and be acted upon by other entities. (According to at least one proponent of the causation by powers view, Marmodoro [2017: 74], all powers fulfill both active and passive causal roles.) Consider again an electron's negative charge, which grounds both its power to repel other electrons and like-charged particles (an active power) and its disposition to be repelled by such particles (a passive power). When an electron e_1 repels a distinct electron e_2, e_1 is also repelled by e_2. Furthermore, e_1 is repelled by e_2 because of e_1's negative charge. However, it is not the negative charge that is repelled. The whole electron is repelled, including its mass and spin. Or take the example of gravitational attraction between two distinct bodies b_1 and

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b_2. When b_1 attracts b_2, b_1 is also simultaneously attracted by b_2. Both b_1's attracting b_2 and b_1's being attracted by b_2 are because of b_1's mass. Yet in the case of b_1's being attracted by b_2, it is not b_1's mass that is attracted. All of b_1 is being attracted by b_2. While this applies in cases where relative positions are not changed (for example, a book lying on a desk), it is even more salient in cases of moving bodies. When an asteroid moving through space changes its trajectory because of the gravitational influence of a nearby star, it is not merely its mass that changes trajectory. Instead, the whole asteroid changes trajectory in virtue of its mass.

So I argue that liabilities, passive powers, and the passive aspects of powers are non-self-exemplifying. If liabilities, passive powers, or the passive aspects of powers are non-self-exemplifying, then it is plausible to hold that active powers are non-self-exemplifying properties as well. While one can consistently hold that passive powers are non-self-exemplifying while active powers are self-exemplifying, a theory that holds that both kinds are non-self-exemplifying has the merit of being simpler and more unified than one which holds that the former are non-self-exemplifying while the latter are self-exemplifying. Of course, not all powers causal theorists countenance passive powers (see, for instance, Heil 2012; Ingthorsson 2002), so my argument is a conditional argument: If there are passive powers (or passive aspects of powers), then such powers are non-self-exemplifying properties.

The second reason to hold that powers are non-self-exemplifying properties stems from higher-level powers grounded in lower-level properties. Take a ball's power to roll down an inclined plane (Lowe 2010: 19; Garcia 2015: 639–40). The ball's power to roll—a dispositional property—is grounded in other properties: the ball's sphericity, mass, and rigidness. The sphericity, rigidness, nor mass alone have the power to roll. For example, if the object were cubical shaped, while it would perhaps have the power required for translational motion and therefore be able to slide, it would not have the power for the additional rotational component needed for rolling. Without mass, the ball would not be gravitationally attracted to the bottom of the plane. Nor would there be a center of mass to serve as the axis for the rotational component of a ball's motion when rolling. Furthermore, rigidity is required. Stars, for example, are spherical and very massive, but they would not roll as they are not rigid, but gaseous.

So the sphericity, mass, and rigidness do not have the power to roll. Instead, they dispose something else—a distinct bearer—to have that power (Garcia 2015: 639–40). With respect to the power to roll, they are non-self-disposing properties. As they are non-self-disposing with regard to having the power to roll, they do not have that specific character which they confer on their bearer. So with respect to the power to roll, the sphericity, rigidity, and mass are non-self-exemplifying. Simply put, it is not the sphericity, rigidness, or mass that rolls. It is the ball that rolls because of its sphericity, rigidness, and mass.

However, Mumford and Anjum have challenged the argument that the power to roll down an inclined is a higher-level power. Instead, they argue that all spherical objects have the power to roll down an inclined plane (2011: 3). In response, I first note that their argument is intended to argue for the thesis that sphericity is

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a dispositional rather than categorical property. Addressing those who argue that some properties are nondispositional or categorical, Mumford and Anjum argue:

> A pandispositionalist [such as Mumford and Anjum] has to defend the view, therefore, that even a property such as sphericity is in reality a cluster of causal powers. This is not easy because the property term does not wear its powers on its sleeve. But even this, the pandispositionalist says, is covertly dispositional. Something that is spherical is disposed to roll in a straight line down an inclined plane. Something that is cubical, in contrast, is not. (2011: 3)

In response, one can consistently hold that sphericity is a dispositional property while denying that sphericity is the same thing as the power to roll down an inclined plane. In fact, all three properties that I argued are required for the power to roll down an inclined plane can be understood as dispositional properties. An object's mass, for example, is defined as both the quantity of its matter as well as the amount of energy it would take to move the object. The latter is a disposition. Rigidity as well is a dispositional property. A rigid object such as a bowling ball will not change shape when moving along a wooden surface, unlike a beanbag. Sphericity can also be understood dispositionally. For example, spherical objects are disposed to cause creatures with sight to see something spherical rather than cubical. However, even if sphericity, mass, and rigidity are dispositional properties, their being so does not entail that one of them is identical with the power to roll. It also does not entail that the power to roll is not a higher-level power grounded in the lower-level powers. Instead, pandispositionalism is consistent with the thesis that the power to roll is a higher-level power, for it could be the case that the higher-level power is grounded by lower-level powers or dispositions.

Furthermore, I argue that the power to roll *is* a higher-level power. For in addition to a spherical (or perhaps cylindrical) shape, mass is also necessary for any rolling motion, as I argued earlier. Take the rotational component of a rolling motion. Rotation occurs in extended bodies whose mass is distributed over a nonzero volume. While the sphericity provides the shape of the extension, something needs to be extended— the mass. Additionally, as mentioned above, when a sphere rolls, its center of mass is its axis of rotation. While the center of mass of a body (including spherical bodies) is a mathematical idealization, the mass is not. If there is no mass, there can be no mathematically idealized center of mass. Mass is also required for the frictional forces which are a component of rolling, specifically where the rolling object is in contact with the surface the object is rolling on. However, if there were no mass, there would be no frictional forces. In this case, the object would perhaps slide along the surface (and thus have translational motion) but it would not rotate.

Perhaps, however, a mid-sized spherical object could roll due to a very complicated array of various electromagnetic forces instead of gravitational forces, much in the way that particles move through accelerators (albeit, such a setup would be far more complicated than are current particle accelerators, as it would need to produce both translational and rotational motion, whereas current

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particle accelerators only produce translational motion). In this case, while the objects could have mass (and would once it starts rolling due to its having kinetic energy from the acceleration involved in rolling), their mass would not be required for the rolling. Yet in this scenario, a different property—charge or polarity—would be required, in addition to the shape. But if charge or polarity is required in addition to the shape, the power to roll would still be a higher-level power.

(If the object had zero rest mass, it would move at light speed. As the object moves at light speed, several more issues arise that go beyond the scope of this article. For example, the top of a rolling object moves at two times the speed of the axis of rotation. If the axis of rotation is moving at light speed, which it would presumably due given that the object has zero rest mass, the top of the rolling object would be moving at two times light speed, which is physically impossible.)

Finally, in defense of my thesis that the power to roll is a higher-level power, I must address one last argument of Mumford and Anjum's. They argue that spherical objects that do not in fact roll are objects that have the disposition to roll but whose disposition exists unmanifested, perhaps due to a countervailing power or else because the object lost the power to roll due to a loss of shape (for example, when squished):

> The soap bubble is indeed disposed to roll in a straight line in virtue of being spherical and the reason it doesn't is because it has a countervailing power of stickiness that is stronger than its rolling power. Similarly, the crooked weight of the bowls ball countervails its power to roll in a straight line, and the non-rigid sphere has the power to roll as long as it is spherical, though, of course, as soon as it loses its shape, it ceases to have that power. (2011: 3–4)

I argue that all three examples are consistent with the power to roll being a higher-level power. First, with respect to the bubble, the bubble's stickiness blocking the power to roll is consistent with the power to roll's being grounded in the rolling object's shape, mass, and some very minute degree of rigidity. Second, with respect to the crooked weight, I note that the specific power in question is the power not just to roll but to roll in a straight line. However, if the crooked weight countervails that power, its doing so does not entail that that power is identical with the shape alone of the rolling object. Once again, it is also consistent with the power's being grounded in two or more lower-level powers. As I argue above, the power to roll requires at least two lower-level powers or dispositional properties: the right sort of shape and mass. Furthermore, rather than hold that the crooked weight countervails the ball's power to roll in a straight line, it is plausible that the power to roll in a straight line is grounded in part not just by mass but mass distributed in the right way.

Third, with respect to the nonrigid sphere losing its shape, the fact that a nonrigid sphere loses the power to roll when it loses it shape also does not entail that the shape is identical with its power to roll. Instead, it is also consistent with the power to roll being a higher-level power in part grounded in its shape (in addition to its mass and rigidity, as I have argued), which the object loses when it loses its shape. When the

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object loses its shape, it loses one of the required lower-level properties, and hence loses the power. In this case, rigidity is also required because rolling consists of different points of the object rolling contacting different points of the surface rolled on at different points in time. That, however, requires a persistence of the right sort of shape. A nonrigid object's shape will not persist when moving along a rigid surface, in which case I argue that a nonrigid object does not have the power to roll. In general, the shape is not enough for the power to roll. Additional properties, such as mass and rigidity, are also needed, in which case the power to roll is a higher-level power.

None of the examples given by Mumford and Anjum entail that the power to roll is not a higher-level power. Furthermore, the power to roll requires at least the right sort of shape, mass, and rigidity. Therefore, the power to roll is a higher-level power, one whose lower-level powers do not exemplify the specific character they confer on their bearer of having the power to roll. In general, the lower-level powers that ground a higher-level power do not self-exemplify the character of the higher-level power conferred on their bearer. If the individual lower-level powers did self-exemplify the character of the higher-level power conferred on their bearer, they would not be lower-level powers.

This leads to two important and related issues. First, if there are higher-level powers (which I have just presented evidence for), are such powers self-exemplifying or non-self-exemplifying? The power to roll, as I have already argued, is at least one higher-level power that is non-self-exemplifying. It is not the power to roll that rolls. Instead, the ball rolls. Of course, one can consistently hold that some higher-level powers are non-self-exemplifying and others are self-exemplifying. However, in the interests of a unified theory of powers, if some higher-level powers (such as the power to roll) are non-self-exemplifying, then it is plausible to hold that all higher-level powers are non-self-exemplifying. As I similarly argued earlier with regards to passive and active powers, a theory holding that all higher-level powers are non-self-exemplifying has the merit of being more simple and unified than one in which some higher-level powers are self-exemplifying and some are not. Second, if higher-level powers are non-self-exemplifying, then, again, it is plausible to hold that all powers are non-self-exemplifying. Once more, a theory that posits all powers as non-self-exemplifying (both higher- and lower-level powers) also has the merit of being more unified than does one that posits higher-level powers as non-self-exemplifying and lower-level powers as self-exemplifying.

6. Conclusion

To summarize: The debate between proponents of substance causation and proponents of causation by powers hinges on whether or not powers—as properties—are self-exemplifying or non-self-exemplifying properties. Those who defend substance causation are committed to powers' being non-self-exemplifying properties, evident from the premise that substances are the bearers of powers, a view most recently defended by Whittle. Those who defend causation by powers, on the other hand, are committed to powers' being self-exemplifying properties, as

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described in Buckareff's argument for causation by powers rather than substance causation, which he makes from premises found in many accounts of causation by powers. However, there are two reasons to hold that powers are non-self-exemplifying properties: the first reason stemming from passive powers and the second from higher-level powers.

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