

The ungrounded argument is unfounded: a response to Mumford

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Abstract Arguing against the claim that every dispositional property is grounded in some property other than itself, Stephen Mumford presents what he calls the ‘Ungrounded Argument’. If successful, the Ungrounded Argument would represent a major victory for anti-Humean metaphysics over its Humean rivals, as it would allow for the existence of primitive modality. Unfortunately, Humeans need not yet be worried, as the Ungrounded Argument is itself lacking in grounding. I indicate where Mumford’s argument falls down, claiming that even the dispositions of the simplest particles can have categorical bases.

Keywords Dispositions · Powers · Property · Categorical · Humean supervenience · Reduction · Subatomic particle

1 Introduction

Responding to the thesis of ‘global groundedness’ for dispositions (the claim that every dispositional property is grounded in some property other than itself), Stephen Mumford argues for the possibility of ungrounded dispositions on the basis of what he dubs the ‘Ungrounded Argument’ (hereafter UA).¹ If successful, UA would represent a major victory for anti-Humean metaphysics over its Humean rivals, as it would require that our world contains ungrounded or ‘primitive’ modal features.²

¹ Mumford (2006).

² I follow Mumford in using ‘Humean’ to pick out those contemporary authors who subscribe to Humean Supervenience (the doctrine that there is nothing more to the universe than arrangements of local qualities on which all else supervenes) and the like.

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Unfortunately, though I share Mumford's anti-Humean sentiment and agree that dispositions can exist without grounds, I argue that UA is incapable of achieving this conclusion. The problem concerns the ways which Mumford believes dispositions would have to be grounded, combined with an overstatement of the claims of current physics. Once corrected, the Humean has no problem rejecting UA's conclusion that there exist some ungrounded dispositions.

The order of presentation will be as follows: Section 2 recreates Mumford's Ungrounded Argument, along with the key notions used in its development. In Sects. 3 and 4 I respond to UA, arguing that UA either involves an equivocation or begs the question against Humeanism, and that even simple subatomic particles can have categorical properties which serve as the grounds of dispositions. In Sect. 5 I go one step further, arguing that even simple subatomic particles must have categorical properties. If successful, this will provide adequate argumentation for Humeans to respond to UA.

2 Mumford's ungrounded argument

The purportedly ungrounded dispositions to which Mumford directs us are the dispositions of the most basic subatomic particles. It is here that his argument begins, with the claim that:

[1] There are subatomic particles that are simple.

Mumford openly admits that [1] is contingent and contentious, but stresses that it is nevertheless acceptable and plausible. It is a theoretical claim of physics, and is accepted by a number of theoreticians.³ Despite the support for [1], it is worthy of note that the success of UA requires that the subatomic particles instanced in [1] not be just any subatomic particles. Moreover, they cannot be some subatomic particles discovered in the far off future, because UA makes explicit claims about the properties had by these subatomic particles (see premise [3] below). In other words, [1] is not the claim that the universe has at its base some smallest particles, but the more contentious conjunction that the universe has at its base some smallest particles, *and we have located them*. If we had not located (at least some of) them, then Mumford could make no substantive claims about their properties. I suggest that this requirement makes [1] less plausible than it initially appears: there are many of us who believe the universe has at its base some smallest particles, but it is a much smaller subset who agrees we have actually found them.⁴

The next step in Mumford's argument is a clarification of what it means to be 'simple', and is a statement he takes to be an analytic, necessary truth:

³ Mumford directs the reader to [Molnar \(1999\)](#), where Molnar likewise claims that there are simple subatomic particles, but they are far from being alone. That said, I doubt we would have to look very far to find someone (in the know) who disagrees.

⁴ If it turns out that there are much smaller particles than those we presently take to be the smallest, UA could still be exonerated if the properties of each were relevantly similar. To this extent we can interpret Mumford as offering an argument to the effect that: *if* there are subatomic particles that are simple, *and* they are similar in the relevant ways to the subatomic particles of which we are presently aware (which at least plausibly are the simples), *then* there are ungrounded dispositions. Mumford fails to appreciate the importance of the second conjunct of the antecedent.

[2] That which is simple has no lower-level components or properties.

What it means to be ‘lower-level’ is understood in two distinct but related ways. The first is in terms of smaller entities that would form substantial constituents of the simple particles. According to this first sense, for a subatomic particle to be simple is for it to have no component parts “which are spatially distinct and possible particulars in their own right.”⁵ These subatomic particles need not be absolute simples in the mereological sense (that is, they might well have such *abstract* parts as a top and bottom half, or a left and right side), but there cannot be any identifiable entities that make up the simple. Simplicity in this sense can be contrasted with the complexity of something like a water molecule: a water molecule is not simple because it has parts (2 hydrogen atoms and one oxygen atom) none of which is individually identical with the water molecule itself, and all of which can be isolated from the others.⁶

This is an important step in UA, as it blocks a standard Humean manoeuvre. In many instances, when faced with a dispositional property, the Humean will aim to avoid robust commitment to the dispositional property by explaining its potential behaviour in terms of the interactions (or potential interactions) of constituent entities. For instance, the solubility of table salt in water is explained in terms of the electrostatic attraction between the sodium and chlorine atoms of the salt, which is overridden by the greater charges of the oxygen and hydrogen atoms when the salt is placed in the water.⁷ The dispositional property of the salt is thereby explained by—or for those who prefer, reduced to—features of the constituent entities.⁸ As the subatomic particles UA considers are simple, there are no such constituent entities for the Humean to lean on.

The second sense of ‘lower-level’ concerns a relationship between levels of properties, which Mumford understands in terms of supervenience. For a property to be simple in this sense of ‘lower-level’ is for it to lack any property on which it supervenes.⁹ Understood in this way, if mental properties supervene on physical properties of the brain (as has been the claim of many a philosopher of mind), then mental properties cannot be simple. Mumford notes that in certain examples, like that of the salt’s solubility, the reduction derived from the having of constituent entities runs via the *properties* of the sodium and chloride, and so is itself just another supervenience case. That may be so, but to allow for possible cases that do not work this way, Mumford

⁵ Mumford (2006, p. 474).

⁶ This isolation need only be in principle. We can perfectly well separate oxygen atoms from the hydrogen atoms, but when we get to smaller entities it is not required that we actually be capable of isolating the constituent in question.

⁷ The example of table salt (an ionic compound) is employed within this section for illustrative purposes alone. It is much easier to gain a sense of how dispositionality might be explained via constituent entities by looking at something larger; the thought is that if the subatomic particles were to have lower-level components, then the dispositions of the subatomic particles could be explained in a manner similar to that of the salt’s solubility.

⁸ It might be argued that electrostatic attraction is itself a disposition. This may well be right, but for present purposes my interest is in the treatment of dispositions in terms of properties (dispositional or otherwise) of the constituent entities. We shall deal with the dispositional/categorical case in due course.

⁹ Nothing hangs on Mumford’s interpretation of supervenience (he opts for the largely uncontroversial Davidsonian definition (1970)), so I will avoid all analysis of the notion.

suggests we maintain the distinction between lower-level qua constituent entity and lower-level qua subvenient property.¹⁰

UA's third premise concerns the properties had by the subatomic particles instanced in [1]. It is claimed, on the basis of current science (physics in particular), that:

[3] The properties of subatomic particles are (all) dispositional.

Mumford cites as evidence for [3] standard reference works in physics that define such terms as 'charge', 'mass', and 'spin' in ways that can only be interpreted as dispositional. For instance, 'charge' is defined as "a property of some elementary particles that gives rise to an interaction between them," where it is clear that the inclusion of *gives rise to* warrants treating charge as a dispositional property. As these definitions come from scientists with no interest in the present debate, they make for a strong case. Mumford even goes so far as to explain why we should think of these properties as dispositional, quoting from C.B. Martin that elementary particles cannot at any stage be manifesting all they are then capable of—they cannot be, as Martin likes to say, "in pure act"—and hence their properties must be dispositional.¹¹

The fourth premise concerns the way in which dispositions have grounds, if and when they do.

[4] The grounds of a dispositional property can be found only among the lower-level components or properties of that of which it is a property.

For the purposes of defending [4], Mumford understands grounding as requiring that the grounding property be a property *other* than the grounded property. In other words, if there are 'self-grounded' properties (and they are *only* self-grounded), these will not constitute a counterexample to [4], nor are they a refutation of UA's conclusion.

The micro-reductive aspect of [4] is largely uncontroversial. The most outspoken proponents of ungrounded dispositions have all offered reductive theses that treat dispositions either in terms of (structural) constituent entities or in terms of subvenient properties.¹² For those rare theorists who oppose micro-reduction in all its forms, [4] will be found unacceptable, but as these theorists are unlikely to oppose Mumford's conclusion, we can ignore them. Slightly more controversial—though still largely uncontroversial—is the claim that any reducing property must itself be a property of the object with the disposition. Those who endorse extrinsic dispositions may want to take issue with [4], but again, they will most certainly be in the minority.¹³

The fifth premise follows from the conjunction of premises [1–4], and the conclusion directly from the fifth:

[5] The dispositional properties of subatomic particles have no ground.

¹⁰ It is with this second sense I shall take issue, arguing that understanding 'lower-level' in this way either means that there is an equivocation between 'simple' as it appears in premise [1] and 'simple' as it appears in premise [2], or that [1] is implausible or begs the question against the Humean.

¹¹ Mumford (2006, p. 476). The quote from Martin is found at Martin (1993, p. 184).

¹² See Jackson (1998), Lewis (1997), Armstrong (1997), Prior (1985), and Jackson et al. (1982).

¹³ McKittrick (2003) forms a large part of the pro-extrinsic disposition minority, though depending on how [4] is interpreted, even she might not object.

∴[6] There exist some ungrounded dispositions.¹⁴

The upshot of UA is the falsity of what Mumford calls ‘global groundedness’, the thesis that every dispositional property has some other property as its ground, or what previous authors have referred to as a ‘base’.¹⁵ Hence Mumford’s claim is that there are (or more correctly, there is reasonable evidence to believe that there are) ungrounded dispositions. This applies to grounding properties of any sort, dispositional or categorical—though it is the latter that will be of greatest concern to Humeans, as no Humean could sensibly tolerate a cascade of dispositions, however large, unless it ended at some point in a categorical property. Therefore, if we are to defend the Humean, it will not be enough to show that the dispositions Mumford considers have grounds, but rather that they have categorical grounds (though the former would nevertheless refute Mumford’s argument).

Mumford presents his argument as an instance of *modus ponens*: [1–4], therefore [5 and 6]. Mumford then states that for any Humean, whose natural impulse would understandably be to reject [6], UA must be read as an instance of *modus tollens*: not [5 and 6], therefore not [1–4]. However, Mumford insists that because we are in a strong position to endorse [1–4], the Humean impulse is to be rejected. Mumford rounds out his paper with some general and mildly persuasive reasons why one might want to give up on those Humean impulses, and what the dispositional alternative entails. We need not concern ourselves with these latter details; what matters for us is whether the premises of UA adequately support its conclusion. This matter, I stress, is not at all insignificant. What hangs in the balance is at the core of the Humean/anti-Humean debate. As Mumford states, UA is an argument that “might be one of the most important in contemporary metaphysics.”¹⁶

3 A ‘simple’ equivocation

I happen to agree with the conclusion of UA, and endorse it whole heartedly, but nevertheless I think that UA is to be rejected. It is not, unfortunately, an argument that we are compelled to read as an instance of *modus ponens*, and cannot, therefore, be declared as even a minor victory in the debate against the Humeans.

Before turning to the more serious worry, it is worth noting that a good deal of UA is highly speculative, and deeply reliant on the present status of microphysics. Mumford acknowledges that [1] is contingent, but seems to think that science is on his side. For the time being, that happens to be the case: we have not found any particles smaller than the subatomic particles instanced in [1]. But to lean too heavily on that fact is to commit a fallacious appeal to ignorance. In response, how convinced should we be that we have arrived at the simples? If current physics is any indication, then we should hardly be convinced at all: millions of dollars are spent each year looking

¹⁴ Mumford presents UA in two different forms: a short one to demonstrate its validity, and a longer one that illustrates the important issues. As the validity of UA is not in question, I consider only the longer form, which is presented here.

¹⁵ See especially Prior (1985).

¹⁶ Mumford (2006, p. 471).

for smaller particles. These are not the actions of rational people who believe that we have already found the simples.

In a similar vein, how much confidence should we put in the claim that the properties of these purportedly simple subatomic particles are in fact dispositional? Admittedly, their characterisation is dispositional, and they are defined in such a way as to look dispositional, but that need not make them dispositional. It is perhaps closer to the truth to say that the definitions for ‘charge’ and ‘mass’ and ‘spin’ are not so much dispositional as *operational*, and intricately tied up with the means by which they are tested and located. How else could the properties of unobservable micro entities be defined but in terms of the kinds of actions we find them capable of exhibiting? We correctly recognise that behind those actions lie capacities, but how can we say with any kind of confidence that behind those capacities there are no other properties, properties that are non-dispositional? Science is here limited by its methods, and lacks the kind of access needed to serve as serious evidence for metaphysical claims.

But enough of this mild scepticism about what present science can tell us about metaphysics; there is a problem with UA much deeper than this. The problem concerns the property cum supervenience reading of ‘lower-level’ in [2], and forces us into a destructive dilemma. Once we take seriously the supervenience interpretation, we are either forced to read ‘simple’ as it appears in [1] differently than when it appears in [2], or [1] begs the question against Humeanism. Let us consider the first horn of the dilemma: the alleged equivocation.

Recall that the two interpretations of ‘lower-level’ at play in [2]. The first, call it the ‘*substantive*’ reading, states that something is simple just in case it is lacking in component entities that could be particulars in their own right. On the second interpretation of ‘lower-level’, call it the ‘*supervenience*’ reading, a property is simple if and only if it fails to supervene on some other property. As was discussed, a property might fail to be simple on either interpretation, because it could be instantiated by a non-simple object, and had in virtue of the object’s constituents, or because it supervened on the properties of those same constituent entities. An object, however, could only be simple in the *substantive* sense; it is sheer nonsense to speak of an object supervening on some property or properties.

Now consider the use of ‘simple’ in premises [1] and [2]. When it appears in [2], it is given to both interpretations. But [1] concerns the simplicity of certain subatomic particles, so is not open to the *supervenience* interpretation. The simplicity considered in [1] is the simplicity of microscopic objects, so the only reading of ‘simple’ that can apply is the *substantive* reading. For the time being, this might seem alright—after all, [2] is supposed to be an analytic truth about simplicity, and [1] might just be a specific instance of the more general understanding of ‘simple’. But consider what happens as the argument progresses.

Premise [3] comes with independent evidence, so is unaffected. Likewise, premise [4] looks like a reasonable statement of the thinking behind micro-reduction. But keeping in mind that [1] can only be given the *substantive* reading, [1–4] no longer provide support for [5]. Premise [5], itself a subconclusion of [1–4], concerns the dispositional properties of the simple subatomic particles, not the subatomic particles themselves. So the simplicity at issue is *supervenient*, not *substantive*. Working backwards, the intended reasoning is that dispositional properties of the subatomic particles have no

ground [5], because the properties of the subatomic particles are all dispositional [3], and the only permissible grounds must be found among the lower-level components or properties of the subatomic particles [4]. But as the subatomic particles are simple [1], they have no lower-level components or properties [2], so there can be no grounds. However, because the simplicity in [1] is *substantive*, it provides insufficient support for [5].

Under the *substantive* reading, the simplicity of the subatomic particles in [1] undermines one type of reduction of the dispositional properties. This is the reduction of the sort discussed in the salt/solubility example above. The subatomic particles have no constituent entities that can be used to reduce their dispositional properties. Nor is it the case that the dispositional properties of the subatomic particles can supervene on the properties of the constituent entities, because there are no constituent entities. But there is another way in which the dispositional properties might be reduced. That is if they supervene on the properties of the subatomic particle itself. The properties that might form the subvenient base do not need to be properties of the constituent entities, they can be properties of the entity itself. This is what we might call a ‘pure’ supervenience, in contrast with the substantive/supervenient case when there are constituent entities present.

Are there such cases? Mumford himself admits the possibility. Though Mumford is careful to point out that there can be cases of reduced dispositions wherein the ‘lower-level’ is *both* a matter of there being constituent entities at work *and* the properties of those constituent entities serving as the subvenient base, he reiterates that the *substantive* and *supervenient* are two distinct ways in which the dispositions might be grounded. In fact, the case is much more common than it seems. For instance, Armstrong takes dispositional properties to be nothing over and above categorical properties in the presence of certain laws of nature. Though sometimes he invokes a reduction in terms of the properties of the constituent entities, this is not always the case, nor need it be. This kind of reduction makes use of ‘lower-level’ on a purely *supervenient* reading (the dispositional property supervenes on the subvenient categorical property, given the correct environment), but no constituent entities are invoked. We can have subvenient categorical properties that are properties of the subatomic particles.

There is an obvious problem with this response: how can there be categorical properties on which the dispositions supervene if [3] is true? First of all, it should be noted that the subvenient properties do not have to be categorical. That is how Armstrong would ground the dispositions, but the dispositional properties of the subatomic particles could just as well supervene (in the non-constituent entity way) on other, different dispositional properties of the subatomic particles. And that would be enough to block the path to the conclusion of UA. But that is the easy way out, and not nearly good enough for the Humean, who needs contingent properties as the subvenient base. So we need to provide, on behalf of the Humean, some categorical properties of the subatomic particles that can serve as the subvenient bases.

My response will come in two forms, each taking a different approach. The first casts doubt on [3], the second I will save for Sect. 5, where I argue that the subatomic particles *must* have some categorical properties.

At this point only [3] is standing in the way of the equivocation horn of the dilemma. The Humean needs some categorical properties on which the dispositional properties of the subatomic particles might supervene, but the claim of [3] is that all the properties of the subatomic particles are dispositional. Let us reconsider [3].

As we have seen, the standard properties ascribed to subatomic particles all have a distinctly dispositional flavour. ‘Charge’, ‘mass’, ‘spin’ and the like all look like dispositional terms, used to pick out dispositional properties. But do they? They certainly point to dispositions of the subatomic particles, and they correctly ascribe to those subatomic particles abilities that they are not presently exercising, so we can be sure that the subatomic particles do have dispositions—but how can we be sure that these dispositions are not grounded in categorical properties? What makes it the case that when a physicist says a particle has spin, the disposition in question can have no categorical base? Certainly not because the physicist fails to provide a name for such a property, and certainly not because the best name that could be provided would have to be something like ‘whatever categorical property supports spin’.

Subatomic particles have dispositions. This is beyond doubt—but whether they have categorical properties as well is not something to which the physicist can respond. Granted, physicists tend not to speak of categorical properties in these cases. But, as was suggested above, that is because they have no choice in the matter. When your only means of investigating and tracking subatomic particles is via certain experimental responses, the only properties you can possibly ascribe to them are dispositional. But this says nothing about what properties are genuinely at work. That physicists fail to speak of, name, or instance in their theories, categorical properties is of no relevance to the question of whether or not those subatomic particles have categorical properties. That the physicists fail to instance them cannot so much as give us a preference one way or the other.

We should regard [3] with the deepest suspicion. What makes [3] sound plausible is its similarity to a weaker claim [3*], but [3*] is not strong enough to support the move to [5].

[3*] At least some of the properties of subatomic particles are dispositional.

We have every reason to think that [3*] is true. When Martin claims that no subatomic particle is ever ‘in pure act’, he is surely right. Even subatomic particles are capable of more than they ever manifest at any given time, so the need for dispositions is clear. But the truth of [3*] is a far cry from the truth of [3]. [3*], unlike [3], allows for the possibility of categorical properties. And with enough doubt cast on [3], there is no reason why subatomic particles could not have categorical properties, in which case we have potential grounds for dispositional properties strong enough to satisfy even the Humeans.¹⁷ Hence, on the equivocation horn of the dilemma, UA’s conclusion can be avoided.

¹⁷ I argue in Sect. 5 for the stronger claim that subatomic particles must have categorical properties. And though no one can give any robust account of their natures, that is no argument against their existence.

4 ‘Simple’ begging the question?

So what of the other horn of the dilemma—does it fare any better? The first horn arises from interpreting ‘simple’ as it appears in [1] differently than when it appears in [2]. The second horn starts with the obvious fix to this problem: insist that ‘simple’ be used the same way in each. There are two ways that this can be done: one has us make ‘simple’ in [1] conform to the use in [2], the other is the reverse. Neither produces a desirable result.

The typical reading of [1] understands ‘simple’ in terms of constituent entities. [1] might well be paraphrased as:

[1*] There are subatomic particles that are not composed of constituent entities.

I suggest that it is the belief that [1*] is true, along with the belief that [1] and [1*] have the same meaning, that leads us to believe that [1] is true. Keeping the [1*] reading of ‘simple’ fixed, we must now restate [2] as:

[2*] That which is simple has no lower-level components.¹⁸

With the change from [2] to [2*], the argument for [5] breaks down, as [4] allows that dispositional properties might be grounded by lower-level properties, and nothing in [1*] or [2*] requires that the subatomic particles lack lower-level properties. Hence keeping ‘simple’ fixed based on the reading from [1] means that UA breaks down.

It is also worth noting that unlike [2], [2*] appears to be false. Because [2*] is a general claim about what it is for *anything* to be simple, it can apply to objects, properties, particles and so on. And though [2*] is a plausible claim about the simplicity of concrete particulars, for a property to be simple is not merely for it to lack constituent parts. What exactly it takes for a property to be simple I do not care to venture, but claiming that they would lack constituent entities is a category mistake. Moreover, nothing in [2*] rules out the possibility of a so-called ‘simple’ property supervening on some other property (clearly a necessary condition for a property’s being simple). It seems that reading ‘simple’ in [2] in accordance with our understanding of how it is used in [1] (as expressed in [1*]) is not a viable solution.

The alternative is to read ‘simple’ in [1] according to the definition given in [2], as Mumford had likely intended all along. Recall that ‘simple’ as per [2] has a two-part treatment, incorporating the *substantive* and *supervenient* senses of ‘lower-level’. I argued above that it was a mistake to apply the *supervenient* reading to subatomic particles. After all, they are concrete particulars, and not properties, and the only sense in which one concrete particular can be said to supervene on anything is a matter of its supervening on the constituent entities it has as component parts. In order to accommodate the complete reading of ‘simple’ at work in [2], we will have to permit mention of the *properties* had by the subatomic particles. Hence we can paraphrase [1] as:

¹⁸ Where ‘components’ is understood substantially in terms of constituent entities; under this interpretation properties are not constituents.

[1**] There are subatomic particles that:

- (i) are not composed of constituent entities, and
- (ii) have no properties that supervene on any other.

Because we now have explicit mention of properties, the reformulated UA can reach the subconclusion [5]. [1**], plus [2–4] give us [5], by *modus ponens*. However, [1**] is a premise that no-one should accept, Humean or otherwise.

First for the Humean: why should every Humean find [1**] unreasonable? The short answer is that [1**] begs the question against Humeanism. I have already argued that the most natural reason to believe [1] is because one believes [1*], in virtue of [1*] having to do with the lack of constituent entities. But [1**] makes an additional claim about the properties of subatomic particles—this already makes it less intuitive. Imagine now that a central platitude of your metaphysic is that all modal facts—and hence casual ones in particular—supervene on local matters of fact. And add to that the very reasonable belief that subatomic particles possess causal capacities. What you will tend to think is that these causal capacities *supervene* on various non-causal properties of the subatomic particles. In short, you would believe something inconsistent with [1**], and without independent evidence for [1**], would never concede to it.

Nor is there any independent evidence available. Empirical evidence from the physical sciences, however inconclusive, provides support for criterion (i) in [1**]. But it does nothing to help (ii), nor could it. (ii) is a metaphysical criterion, so no amount of empirical evidence could get us to believe it. Reasonable belief in (ii) comes from careful metaphysical thought and argumentation. Because of criterion (ii), to concede [1**] is to take on a robust metaphysical belief about the nature of the world. Moreover, because of criterion (ii), to concede [1**] is to take on a robust *anti-Humean* metaphysical belief about the nature of the world.

Humeans should not accept [1**], but nor should the rest of us either. Many properties we take objects to have are properties that supervene on other properties of that same object. There is no reason why the same should not apply to subatomic particles. Consider for instance the property of being crimson.¹⁹ In virtue of instantiating *crimsonness*, an object also instantiates the property of being red and that of being coloured, precisely because *redness* and *colouredness* supervene on *crimsonness*. There are many such examples. In the case of subatomic particles, if they instantiate a determinate mass property, then they will likewise instantiate a determinable mass property, such as ‘having mass’.

The second horn of the dilemma requires a uniform reading of ‘simple’. But in doing so we either end up making [2] come out false, or making [1] come out false and/or question begging against the Humean position UA seeks to undermine. In either case the argument fails, and Humeans can rest easy.

¹⁹ Colours are notoriously dubious examples of properties, especially on sparse views of properties, but what matters for this example are the proposed relations between the properties, not the specific properties themselves.

5 Occupying space

Defenders of UA, Mumford especially, are unlikely to let the Humean get off so easily. UA may fail in its rejection of global groundedness, but the truth or falsity of [6] is still up for grabs. Casting doubt on the truth of [3] makes room for categorical properties, but it does not produce them. Mumford might legitimately ask: “Just what are these putative categorical properties had by the subatomic particles?” The question becomes particularly pointed when we recall that the evidence for [3] is that the people who know the most about subatomic particles speak only in terms of dispositions. If the Humean is to argue that all dispositions have categorical grounds, the onus is on the Humean to produce some.

Given that physicists speak only in terms of dispositions, it follows that the Humean will not be able to *name* any categorical properties had by subatomic particles. But on the Humean’s behalf we can do the next best thing: we can insist that there must be some categorical properties at this most fundamental level. How so? By considering the denial of this claim, and demonstrating how unreasonable *that* claim is.

Let us assume that [3] is true, and so subatomic particles have no categorical properties. In what sense can we speak of these subatomic particles as having any *being*? What is it—at any given point in time—that accounts for their existence? Simon Blackburn has posed this question in terms of an object’s ability to occupy space, asking how we can think of objects as located in space if all their properties are directed towards potential future behaviours.²⁰ Martin puts the question in terms of what he calls ‘physical qualia’—demanding the need for existent objects to have qualities of some sort, in addition to their dispositions.²¹ Though Martin frequently stresses that subatomic particles are not in pure act, he does not claim that they are *not in act at all*. In order to exist, there must be some categorical way that a concrete particular is, and this applies at all times. It does not matter if most of what a subatomic particle is about concerns various potentialities and ways it might be in the future, it still must be some way or other at each moment it exists. And these non-dispositional ‘ways’ are nothing more than categorical properties.

Similar arguments have been raised against the possibility that all properties are (exclusively) dispositional, the view referred to in the literature as ‘pandispositionalism’. The argument Armstrong calls ‘Swinburne’s Regress’ is one such attack.²² The regress concerns the endless series of dispositions that could not be escaped without adding some categorical properties into the mix. If all properties are dispositional, then the manifestation of any disposition can itself be nothing more than another disposition, and so on and so on. ‘Change’ becomes the mere switching in and out of dispositions, but nothing changes in any substantive way. If any genuine change is to be effected, that is, if concrete particles are to manifest anything that is not merely another disposition, then categorical properties must be included, some way

²⁰ Blackburn (1990).

²¹ Martin, personal correspondence.

²² Armstrong (2002).

or other. Whether it is as the basis of existence, or in order that the manifestations of their dispositions have some content, subatomic particles must have some categorical properties.

Mumford is aware of the (putative) problem of being as it applies to properties, noting that most Humeans are suspicious of dispositional properties because dispositional properties seem to lack any being.²³ Dispositional properties are potentialities, but do not themselves have any way that they are other than this directedness toward future states. But this is not the problem I am raising. Whatever worries Humeans might harbour about the lack of being for dispositional properties is not the same problem as the lack of being for concrete particulars. Dispositions can be nothing more than pure potentiality, but concrete particulars cannot. There must be some actuality to a concrete particular, however limited. And that actuality gets cashed out in terms of categorical properties, and thereby provides the required ground for the dispositions.²⁴ Therefore, even though we are unable to name them, categorical properties are instantiated by subatomic particles, satisfying the onus on the Humean.

6 Conclusion

I happen to believe that there are ungrounded dispositions—but Mumford has not provided us with adequate reason to think so. Regardless of what reasons we might have for believing in ungrounded dispositions, UA does not force us to believe in them. From the Humean's perspective, a potentially damaging conclusion has been avoided—at least for the time being.

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²³ See Mumford (2006, p. 478).

²⁴ Could thin particulars be enough to satisfy the need for being? By definition, probably not. Nevertheless, even if the thin particulars were thick enough as to have being, this being would still be cashed out in terms of categorical properties. After all, if a property is not a feature or way that a concrete particular is (or could be), then what is it?

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