Can bare dispositions explain categorical regularities?*

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Abstract

One of the traditional desiderata for a metaphysical theory of laws of nature is that it be able to explain natural regularities. Some philosophers have postulated governing laws to fill this explanatory role. Recently, however, many have attempted to explain natural regularities without appealing to governing laws. Suppose that some fundamental properties are bare dispositions. In virtue of their dispositional nature, these properties must be (or are likely to be) distributed in regular patterns. Thus it would appear that an ontology including bare dispositions can dispense with governing laws of nature. I believe that there is a problem with this line of reasoning. In this essay, I'll argue that governing laws are indispensable for the explanation of a special sort of natural regularity: those holding among categorical properties (or, as I'll call them, categorical regularities). This has the potential to be a serious objection to the denial of governing laws, since there may be good reasons to believe that observed regularities are categorical regularities.

1 Introduction

To begin, I'll define the relevant theories of laws of nature. A *Humean base* includes no synthetic necessary connections of any kind. *Humeanism* holds that there is a Humean base and either (a) that laws that reduce to or supervene on regularities (as Lewis (1973, 1994), Loewer (1996), Earman and Roberts (2005a,b), Beebee (2000), and Schaffer (2008) argue) or (b) that there are no laws at all (as van Fraassen (1989) argues). Thus Humeanism

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accepts a recombination principle according to which any distribution of natural properties is possible.

One way to reject Humeanism is to accept the following thesis:

Governing Laws: There are some governing laws, where governing laws are states of affairs distinct from natural regularities that necessitate (or probabilify) natural regularities.

Note that I use 'states of affairs' very loosely; we might even substitute 'features of the world' in its place. One way to accept Governing Laws is to provide an analysis of the relevant states of affairs. The most well-known analysis of Governing Laws, due to Armstrong (1983), Dretske (1977), and Tooley (1977, 1987), treats laws as relations among universals. Alternatively, one could follow Carroll (1994) and Maudlin (2007) in treating the laws as unanalyzable primitives.

If one likes neither Humeanism nor Governing Laws, one can reject both. That is, one can accept the following thesis while denying the Humean base:

Descriptive Laws: There are no governing laws; if there are any laws at all, they reduce to or supervene on other features of the world (such as facts about natural regularities or bare dispositions).

Let *Descriptive Non-Humeanism* be the denial of both Humeanism and Governing Laws. The most common way to accept this position (with respect to the metaphysics of laws) is to postulate necessary relations between natural properties by building the necessary relations into the fundamental properties themselves, as recommended by Shoemaker (1980) and defended recently by (Ellis 2001), (Mumford 2004), and (Bird 2007).[1] This approach does not invoke governing laws; it merely holds that some fundamental properties are bare dispositions. Thus we have three mutually exclusive and jointly exhaustive theories: Humeanism, Governing Laws, and Descriptive Non-Humeanism.

I'll now have to say how bare dispositions fit within this framework. I'll use the following definition to distinguish dispositional from categorical properties at the fundamental level (D, C, and M are taken to be distinct sparse properties):

Disposition: D is a *dispositional property* if and only if there exist a manifestation M and conditions C such that $\Box(\forall x)[Dx \rightarrow (Cx \; \Box\!\!\rightarrow Mx)]$.[2]

[1] Ellis's and Bird's version is often called *dispositional essentialism*.

[2] The formula at the end is read as 'necessarily, for all x, if x has D then x would attain

There are two ways for a property to satisfy Disposition. First, a property can satisfy the right-hand side of the biconditional in virtue of its own intrinsic nature—that is, in a basic and irreducible way. Call such a property a *bare disposition*, and the view that there are bare dispositions *Bare Dispositionalism*. Second, a property can satisfy the right-hand side of the biconditional in virtue of features of the world extrinsic to it. Let a *categorical property* be a property that does not satisfy D in virtue of its own intrinsic nature.[3] Then a categorical property Q could satisfy D in virtue of a necessary governing law that relates Q to M and C in the relevant manner.

Of course, my distinction between dispositional and categorical properties is very controversial.[4] Disposition is a restricted version (since it applies only to sparse properties) of the entailment principle according to which dispositions do, whereas categorical properties do not, entail subjunctive conditionals of the form specified by the principle. However, there are two good reasons to think that we may simply ignore this controversy. First, Bird (2007, 3.3) argues that much of the debate is irrelevant when we restrict the analysis to fundamental dispositions. Specifically, he suggests that finks, antidotes, and other traditional counterexamples to conditional analyses of dispositions simply do not arise when the analysis is restricted to properties at the fundamental level. It is the fundamental level that concerns us here, for our interest is in whether theoretically-postulated sparse bare dispositions can play a certain explanatory role. Second, my argument attempts to identify a structural problem with the way in which Descriptive Non-Humeanism employs bare dispositions. This problem cannot be avoided by changing the analysis of dispositions in any of the familiar ways. Thus, those who prefer a different analysis of dispositions are invited to think of their preferred analysis for the remainder of this paper; my arguments will proceed unaffected. (To be clear, I am supposing

M if it were in conditions C'. My statement of this principle is a slight adaptation from the definition of *Entailment* found in (Choi and Fara 2012). Mumford (1998), Ellis (2001), and Bird (2007) are recent proponents of Descriptive Non-Humeanism who have endorsed something like the entailment principle for distinguishing dispositions from categorical properties.

[3]This definition may be problematic, because failing to satisfy D in virtue of intrinsic nature may be necessary but insufficient for being a categorical property. However, the arguments of this paper are consistent with all of the standard definitions of categorical properties, so I'll ignore this issue here.

[4]Much of the debate is focuses on Mellor's (1974) objection to the above distinction. (Prior 1985) and (Mumford 1998) treat this and other objections thoroughly. (Bird 2005, 2.2) provides a nice summary of recent debates concerning the closely related conditional analysis of dispositions.

that we are able to maintain a genuine distinction between categorical and dispositional properties.)

It should be obvious that Bare Dispositionalism is inconsistent with Humeanism, so for the rest of this paper I'll ignore the latter theory.[5] But what is Bare Dispositionalism's relation to Descriptive Non-Humeanism and Governing Laws? It is consistent with both accounts. Some ways of endorsing Governing Laws involve the acceptance of bare dispositions. For example, one could treat omnipotence as a bare disposition and laws of nature as an omnipotent being's preferences that the natural world be uniform. The state of affairs consisting of the preferences of the omnipotent being is distinct from regularities and necessitates regularities; thus, it is a governing law. On the other hand, it seems that the acceptance of Bare Dispositionalism offers the only promising way to explain regularities without accepting Governing Laws. Some sort of modality seems to be required in order to explain regularities, but how would a theory incorporate that modality without employing bare dispositions? Positing modal connections between properties must be done in something like the manner of Disposition in order to avoid positing governing laws (more on this later). Positing modal connections between individuals—that is, between tokens rather than types—will not explain regularities. Positing bare subjunctive facts is so closely related to positing bare dispositions—if it is not the same thing—that objections to the latter can, insofar as we are concerned, be mirrored for the former.[6] In any case, most philosophers who accept Descriptive Non-Humeanism accept bare dispositionalism (notably, Ellis (2001), Bird (2007), and Mumford (2004, 2005)). For these reasons,

[5]Bare dispositionalism would be consistent with Humeanism if we did not stipulate that D, C, and M are distinct sparse natural properties. But in that case, the sense in which bare dispositions are "bare" wouldn't be interesting—the modal connection involved in Humean dispositions would be fully reducible—and they would lose their explanatory power over natural regularities. See (Foster 1982-1983), (Fales 1990, Chapter 4), and (Bird 2007, 86–90) for arguments for the explanatory weakness of Humeanism.

[6]See (Lange 2009) for an account of laws in terms of bare subjunctives. Classifying this type of theory into my framework is somewhat tricky. I'm inclined to think that if the subjunctives are used for the purposes of property individuation (e.g., "such and such objects are of the same kind because the same subjunctives are true of them") then it counts as a version of Descriptive Non-Humeanism and will be subject to the arguments of this essay. On the other hand, if we have an independent means of individuating properties—say, one that gets us categorial properties—and we think that bare subjunctives are necessarily true of these independently individuated properties, then this theory would be classified as a version of Governing Laws. In this case, it bears obvious similarities to the version of Governing Laws endorsed by Carroll (1994) and Maudlin (2007). See (Hildebrand Forthcoming) for a criticism of the explanatory power of that view.

I'll assume that the success of Descriptive Non-Humeanism depends on the success of Descriptive Laws + Bare Dispositionalism.

We must now consider the nature of natural regularities. What are they? Very roughly (we won't require a precise definition here), natural regularities are the features of the world that allow us to systematize the world using general principles. Obviously, standard universal generalizations such as that all Fs are Gs or that all Fs are Gs under conditions C describe regularities (assuming that the properties involved are natural properties, or at least that they possess an appropriate degree of naturalness). Similarly, any axiom in a Ramsey/Lewis best systems analysis describes a regularity. While a more precise definition would be nice, that isn't required for our purposes; whatever the precising definition is, it needs to countenance the regularities just mentioned as regularities. Thus, I'll simply assume that some regularities are described by universal generalizations of the form *all Fs are Gs under conditions C*. This assumption simplifies the arguments that follow, though it is not strictly required.[7]

Furthermore, I'll operate under the assumption that some natural regularities are *categorical regularities*, or regularities among categorical properties only. Consider a regularity of the form all Q are M in C. This regularity is categorical if and only if Q, M, and C are categorical properties. This assumption is very controversial, of course, but I believe that it is best defended in a separate paper. Why not defend it here? The primary reason is that my defense of this assumption relies on a set of epistemological assumptions not required for the arguments of this paper, and thus the two arguments are quite independent of one another.[8] That said, it is worth noting that the assumption is accepted by most philosophers in both the Humean and Governing Laws traditions. Further, some prominent Descriptive Non-Humeans accept categorical properties. Brian Ellis (2001) and (2009, especially Chapter 5) is a notable example, but I do not know whether he believes that there are regularities among categorical properties.

To sum up, the two views under consideration here are Governing

[7] If, like Cartwright (1983), one doubts whether there are any regularities described by straightforward universal generalizations, one can move to more subtle descriptions of the regularities. An anonymous referee helpfully noted that this may be an advantageous feature of Descriptive Non-Humeanism. It can countenance laws having subtle forms by building exceptions to regularities into the dispositions themselves.

[8] Teaser: The argument is a close relative of Hume's argument for the unobservability of causal relations. One can generalize Hume's argument to argue that all synthetic modality is unobservable, and therefore that bare dispositions are unobservable properties. From this it follows that observable regularities are categorical regularities.

Laws and Descriptive Non-Humeanism. In the next section I explain how Descriptive Non-Humeanism explains natural regularities and show why the success of this explanation is thought to obviate the need for governing laws. However, in Sections 3 and 4 I argue that Descriptive Non-Humeanism's explanation of regularities cannot be extended to those of the categorical variety. In Section 5 I consider some attempts to repair Descriptive Non-Humeanism. Finally, I conclude by identifying an important asymmetry in the way that Descriptive Non-Humeanism and Governing Laws posit necessary connections; in virtue of this asymmetry, Governing Laws is not susceptible to the same types of arguments that plague Descriptive Non-Humeanism. Thus the focus of this paper is not Bare Dispositionalism itself, but whether Bare Dispositionalism obviates the need for governing laws of nature. The upshot is that insofar as we have good reasons to accept categorical regularities, we also have good reasons to prefer Governing Laws to Descriptive Non-Humeanism.

2 Descriptive Non-Humeanism's explanation of regularities

I'll now explain how Descriptive Non-Humeanism employs bare dispositions to explain natural regularities. Consider some arbitrary property D that satisfies Disposition. Disposition entails that any object that possesses D under conditions C attains M. This gives us the regularity that all D are M in C. That's all there is to it! This is a very simple and, on the surface, plausible way to account for natural regularities. (Those interested in a more careful derivation of regularities from dispositions should consult (Bird 2007, 41–48).)

This explanation appears to make governing laws dispensable. The state of affairs consisting of a particular's possession of D is literally a part of the regularity that all D are M in C. According to Bird (2007, 47), such generalizations are indicative of relations between universals—for example, in this case there is a relation between D and M and C—but these relations are not *sui generis*, not atomic, and not themselves universals. Hence the laws aren't distinct from the regularities; *all* of the properties in question are parts of the regularities, so the laws are not governing. To quote Bird, on this view "the laws spring from within the properties themselves" (2007, 2). Thus there is no need to postulate a governing law to account for the necessary connection between D, M, and C.

3 The explanatory weakness of Descriptive Non-Humeanism

Unfortunately, Descriptive Non-Humeanism is unable to extend its explanation to cover categorical regularities. The explanation of regularities just provided explains regularities of the following form: all D are M in C. This is a perfectly acceptable explanation of the regularity in question, but, relative to the present goal, it suffers from a serious shortcoming. The regularity that all D are M in C is not a regularity among categorical properties only. D, being a bare disposition, is not categorical. One of the properties involved in the regularities capable of being explained by Descriptive Non-Humeanism must be a bare disposition. What we want is an explanation of categorical regularities, but that sort of explanation has not been provided by this account. It must be extended to cover such cases.

I'll now consider a few ways in which Descriptive Non-Humeanism might be extended to explain categorical regularities. These options may not exhaust the possibilities, but they are the best options I can think of. Suppose that the Descriptive Non-Humean makes the following move: we can explain categorical regularities by postulating that there is a categorical property Q that is always co-instantiated by D. (To help keep variables straight, the reader can associate Q with *Qualitative* properties, since qualitative properties are often thought to be categorical.) This is the natural move to make. We have to get the relevant categorical properties into the picture somehow! Then the regularity that all Q are M in C will coincide with the regularity that all D are M in C. The former is a regularity among categorical properties, and it is explained in virtue of the latter regularity. However, there is a problem with this proposal. It gives rise to two options, neither of which is satisfactory: either it is contingent that all Q are D—that is, contingent in the sense that there is no necessary connection binding Q to D—or it is necessary.

If it is contingent that all Q are D then we have just pushed the regularity in need of explanation up one level. The regularity that all Q are D is just as much in need of explanation as the regularity that all Q are M in C. Here, the regularity that all Q are D is doing the crucial work—without that regularity, the original regularity that all Q are M in C goes unexplained—but the regularity that all Q are D has not been explained. Accepting that all Q are D is contingent—the result of chance, as opposed to the result of some necessary connection between Q and D—is just as damning as accepting that all Q are M in C is contingent. To put the problem another way, the probability that all instances of Q are instances of D appears to be just as low as the probability that all instances of Q are instances of M in

C. Thus the former regularity does not offer a satisfying explanation of the latter. In general, we cannot offer a satisfying explanation of one regularity by postulating another.

On the other hand, if it is necessary that all Q are D then one must give an account of the necessity. I'll consider four options in this section, but none of them are satisfactory. Accordingly, one way for the Descriptive Non-Humean to respond to my arguments would be to propose a fifth.

First, one can treat this necessity as primitive. That won't work, because the holding of a necessary relation between Q and D constitutes a state of affairs distinct from the regularity that all Q are D; unlike the state of affairs consisting of a particular's possession of Q and D, the state of affairs consisting of an unanalyzable necessary relation between Q and D isn't part of the regularity that all instances of Q are instances of D. Accepting such a relation is equivalent to accepting a governing law relating Q and D, and is thus inconsistent with Descriptive Non-Humeanism.

Second, one can attempt to analyze the necessary truth that all Q are D by postulating a further bare disposition D^*. One option would be to say that all Q have D^*, and it is in virtue of possessing D^* that all Q have D. This just pushes the regularity in need of explanation back one level; now we need an explanation of the regularity that all Q have D^*. Another option would be to relate Q to D in the following way: necessarily, anything with D^* has both Q and D. However, we need to explain the regularity that all Q are D^*—it's not enough to show that all D^* are Q—so the same problem arises, leading to a vicious explanatory regress. This proposal gets things backwards. Though it explains the regularity that all D^* are D and Q, it does not explain the required regularity—namely, that all Q are D. Put formally, the problem is simply that '$\forall x(D^*x \rightarrow (Qx \& Dx))$' does not entail '$\forall x(Qx \rightarrow Dx)$'.

Third, one can attempt to analyze the necessary truth that all Q are D by claiming that the necessary connection between the two is analytic, or acceptable according to the preferred definition of Humeanism, whatever that turns out to be. For example, one could claim that D is part of the very concept of Q or that it is true by definition that all Q are D. (For example: 'salt' just means 'water-soluble substance with certain observable qualities'.) Though this account succeeds in explaining the regularity that all Q are D, it succeeds only by making Q a bare disposition. On this proposal, Q satisfies Disposition in virtue of its intrinsic nature—to make it true *by definition* that Q satisfies Disposition, Q must be a bare disposition—and is therefore not a categorical property. Here I assume a substantive reading of 'definition'. Clearly, we can't offer an explanation of regularities by

choosing to use words in a certain way. If one simply insists on using a term to refer only to objects that are both Q and D, but also denies any substantive relation between the two, one is simply treating the connection between Q and D as contingent. We've already seen the problems for that approach. Thus we need a more substantive reading of 'definition', but on such a reading the regularity that all Q are M in C is not in fact a regularity among categorical properties.

Fourth, one could try to explain the necessary connection between Q and D in terms of natural kinds.[9] This appears to be a natural suggestion, given that many proponents of Descriptive Non-Humeanism endorse natural kind essentialism (Ellis (2001) is a noteworthy example). But careful! Simply admitting natural kinds (or natural kind essences) into our ontology won't help. We must go beyond the common suggestion that bare dispositions are natural kinds in order to get the right connection between Q and D. We need a *conjunctive* kind K such that membership in K guarantees the possession of both Q and D. Furthermore, as in the second strategy, this account requires the additional fact that *all Q are K* in order to explain why all Q are D. It's not enough just to accept that there is such a kind, because '$\forall x(Kx \rightarrow (Qx\&Dx))$' does not entail '$\forall x(Qx \rightarrow Kx)$'. Thus we have a new regularity in need of explanation, and we encounter the same problems in trying to explain this regularity as we did in trying to explain the regularity that all Q are D in the first place.

The regularity that all Q are K cannot be contingent, for it would stand in just as much need of explanation as the regularity that all Q are D. There are various options for making it necessary. If the connection is primitive, we might as well simply posit a governing law; the point of appealing to bare dispositions to do the work of laws was to avoid positing a new type of natural necessity.[10] If the connection holds in virtue of some other disposition or natural kind then we enter a regress. So perhaps the necessary connection is reducible? In this case it could be analytic, or, as I suspect some proponents of natural kinds would argue, it could be an a posteriori identity such that K is a natural kind *because* Q and D are the very same

[9] I thank an anonymous referee from *Philosophical Studies* for suggesting that I consider this option carefully.

[10] Drewery (2005, 385–386) suggests that positing kind essences is equivalent to positing governing laws. (I'll have more to say about this later.) Also, the proposal under consideration is closely related to Tooley's (1987, 123–129) suggestion that we reduce the necessity involved in governing laws in terms of conjunctive universals. Sider (1992) and Hildebrand (2012) have argued that Tooley's proposal fails in its attempt to reduce the necessity, with the result that this proposal introduces a new modal primitive.

property. However, in this case Q cannot be a categorical property; it satisfies Disposition in virtue of its intrinsic nature.[11] In sum, the appeal to natural kinds simply inherits the difficulties of the above three suggestions, depending on how it is interpreted.[12]

To recap, for the account to explain the regularity that all Q are M in C we require the extra step that all Q are D. The Descriptive Non-Humean cannot treat the connection between Q and D as contingent, because the regularity that all Q are D is just as much in need of explanation as the regularity it is supposed to explain. The Descriptive Non-Humean cannot treat the connection between Q and D as a primitive necessary connection; that would be to endorse Governing Laws. The Descriptive Non-Humean cannot postulate additional bare dispositions to explain the necessary connection between Q and D; that would lead to a vicious explanatory regress, since at each higher level there is a further regularity in need of explanation. The Descriptive Non-Humean cannot bind Q and D together by definition; that makes Q a bare disposition (that is, a non-categorical property), and so precludes the explanation of any categorical regularity. Finally, the Descriptive Non-Humean cannot bind Q and D together by appealing to natural kinds, since, depending on how we interpret that suggestion, the appeal to natural kinds inherits the problems of the above accounts. In sum, although Descriptive Non-Humeanism provides a perfectly good explanation of certain natural regularities, it cannot provide an explanation of categorical regularities.

4 An example

Before consider additional strategies, it may be helpful to consider an example. I find the example most intuitive when it is stated in terms of observable rather than categorical properties, but this does not have any deep philosophical importance. It is intended merely as a heuristic aid.

Suppose that *water-solubility* is a bare disposition such that, necessarily, anything with it would dissolve if placed in water. (Of course no one thinks that water-solubility is really a *bare* disposition, but this won't matter for our purposes.) This explains the regularity that everything water-

[11] If this sounds counterintuitive, that may be because the strategy considered here is closely connected to C.B. Martin's proposal (see his contributions to (Armstrong et al. 1996)) that all properties have both dispositional and categorical "aspects," and thus that there are no categorical properties as I have defined them. This is simply to deny the guiding assumption of this essay, so I will not further explore this option here.

[12] See Beebee (2011, 518–526) for further epistemological difficulties with this proposal.

soluble dissolves when placed in water. The problem is that this regularity is unobservable (and not categorical). There is nothing that it is like to see water-solubility, taste water-solubility, touch water-solubility, and so on. Water-solubility is not observable, so neither is the regularity that everything water-soluble dissolves when placed in water. What we want is an observable regularity: for example, that all salt dissolves when placed in water. *Saltiness*, *dissolving*, and *being placed in water* are observable. (It is like something to observe them.) Can we explain this regularity?

One way to do so is to stipulate that all salt is water-soluble. In conjunction with the explanation of the unobserved regularity that everything water-soluble dissolves when placed in water, we now have an explanation of the observed regularity that all salt dissolves when placed in water. Unfortunately, we now have a new regularity: that all salt is water-soluble. How do we account for that regularity?

We cannot say that the regularity that all salt is water-soluble is a contingent regularity, for then it would stand in just as much need of explanation as the regularity that all salt dissolves when placed in water.

We cannot explain the regularity by positing a primitive necessary connection between saltiness and water-solubility, because that would be to endorse a governing law and thereby deny Descriptive Non-Humeanism.

We cannot explain the regularity by postulating a new dispositional property D^* that all salt has in virtue of which all salt has water-solubility, since then we would need to explain the regularity that all salt has D^*, and so on ad infinitum. And of course it won't do to say that there is a property, D^*, such that everything with it must be both salt and water-soluble, since, once again, that won't explain the regularity that all salt has water-solubility.

We cannot explain the regularity by stipulating that the concept of saltiness includes the concept of water-solubility—that is, by binding the two together by definition such that nothing that fails to possess water-solubility is salt. This strategy fails to account for the nature of our observable experiences; it entails that salt is unobservable. To see this, let us introduce a new concept: *schmaltiness* is a property that is observationally equivalent to saltiness but lacks the definitional connection to water-solubility. With this concept on the table, it is easy to see that we cannot actually observe that a given substance is salt; to do that, we would need to observe that a given substance is both schmalty and water-soluble. But we cannot observe water-solubility. Thus, the observed quality of a given salty substance is merely schmaltiness. Thus, on this proposal, the regularity that all *salt* dissolves in water is unobservable. The regularity we observe is

merely that all *schmalt* dissolves in water. Thus we cannot explain the regularities we observe by binding unobservable properties (water-solubility) to observable properties (schmaltiness); that makes the relevant properties (saltiness) undetectable by the senses. Thus, though the explanation in question explains the *unobserved* regularity that all *salt* dissolves in water, it does not explain the *observed* regularity that all *schmalt* dissolves in water.

Finally, we cannot say that all schmalt is salt—and therefore that all schmalt is water-soluble—because *saltiness* is the conjunctive natural kind such that its members are both schmalty and water-soluble. This requires an account of the regularity that all schmalt is salt. That regularity cannot be contingent, for then it would stand in need of explanation. It cannot be necessary, because all options on offer—treating the necessity as primitive, positing a new disposition and/or new natural kind, treating the connection as analytic or as an a posteriori identity—lead to the very same problems specified for the three options above.

In this example, I did not assume that saltiness, dissolving, and being placed in water were categorical properties. This assumption is not required for the argument, so one might wonder whether the argument above can be extended to show that Descriptive Non-Humeanism cannot explain *observed* regularities regardless of whether bare dispositions are observable or not.[13] Unfortunately, the above example *does* rely on the following assumption: that water-solubility is unobservable. Accordingly, an argument that Descriptive Non-Humeanism cannot explain observed regularities regardless of the nature of observable properties would require the following assumption or something similar: a bare disposition is observable only insofar as its manifestation is an observable property. With that assumption, one can show that the nature of observable properties is irrelevant to the explanatory power of Descriptive Non-Humeanism. Unfortunately, though I find this assumption plausible, it is very similar to the assumption that observable properties are categorical properties—too similar, I think, to be of use here. In other words, I think that the way to defend this assumption just is to argue that observable properties are categorical properties. As I mentioned at the end of Section 1, this project is best pursued elsewhere.

[13] I am indebted to an anonymous referee from *The Philosophical Quarterly* for suggesting this strategy.

5 Additional strategies

As we've seen, the regularities explained by Descriptive Non-Humeanism always involve a disposition as part of the regularity. The fundamental challenge is to get categorical properties into the picture in the right way. There are two general strategies that the Descriptive Non-Humean might consider at this point. The first engages the fundamental challenge directly, and attempts to provide a new explanation of categorical regularities in terms of dispositions. The second posits an alternative method of explaining categorical regularities that does not rely on dispositions at all.

5.1 Categorical properties are not fundamental

The first general strategy can be introduced as follows:

> We can grant that the above arguments work when applied to properties at the macroscopic level. But no one is postulating macroscopic bare dispositions! When we move to the micro level—where the operative thesis is that all *fundamental* properties (perhaps those essential to our best physical theories) are bare dispositions—the above arguments simply aren't relevant. Since everything at the macro level depends on things at the micro level, we can explain macro level categorical regularities by appealing to micro level regularities among bare dispositions.

This sounds reasonable, but the nature of the dependence relation between levels needs to be specified more carefully. I'll sketch two developments of this relation and argue that they cannot help the Descriptive Non-Humean to explain categorical regularities.

First, suppose one endorses a supervenience thesis to connect categorical properties to bare dispositions.

Supervenience: There is a dispositional structure—a set of relations among dispositional properties and their instantiations—at the microphysical level. Because all properties in that structure are bare dispositions, the structure exhibits regularities. Categorical properties *supervene* on parts of that structure. Since the structure is regular, the categorical properties that supervene on the structure are distributed regularly.

There are a few ways to explain the problem with Supervenience, but I'll restrict myself to one that mirrors my arguments above.[14] The question we must ask is this: what is the nature of the supervenience relation? My response will be familiar at this point.

Obviously, it cannot be an accidental, contingent relation. There cannot be a merely accidental connection between the bare dispositions and the categorical properties, otherwise the regularities among categorical properties would be unexplained. (Furthermore, it would be strange to classify a contingent relation as a supervenience relation.)

The supervenience relation cannot constitute a brute necessary connection between the dispositional base and the categorical properties supervening on that base. If it did, the relation's holding between the base and the categorical properties would constitute a governing law. (Or, if there were some way of making it so that it didn't—for example, by fiat—it would introduce a new type of necessity into the account, in which case there would be no motivation for accepting this new necessity over the necessity required for governing laws.)

The supervenience relation cannot be explained by positing further bare dispositions or conjunctive natural kinds, for exactly the same reasons that one cannot postulate a new type of bare disposition or natural kind to explain a categorical regularity. That would lead to an explanatory regress of the sort explained in sections above.

The supervenience relation cannot be explained away by defining categorical properties in such a way that they necessarily supervene on dispositional structures. As we saw above, the process of binding a bare disposition to a categorical property by definition does not establish a necessary connection between a *categorical* property and a bare disposition. Instead, it creates a new complex property that fails to be categorical. For these reasons, I believe that Supervenience leads to a dead end. Though, on the surface, it may appear to constitute a new explanation of regularities, it is nothing more than a slightly sophisticated version of the original strategy employed by the Descriptive Non-Humean. Being of the same kind, it is subject to the same problems.

The second and structurally different way to explain the dependence of categorical regularities at the macro level on non-categorical regularities at the micro level is to hold that categorical properties are manifestations of lower-level dispositions.[15]

[14]The same problem arises for dependence relations stronger than supervenience.

[15]I thank an anonymous referee from *Philosophical Studies* for suggesting this option.

Categorical Manifestation: There is a dispositional structure at some microphysical level L_D that consists of a set of relations among dispositions $D_1, \ldots, D_n$ and corresponding relations among their instantiations. All properties in that structure are bare dispositions, so it is reasonable to suppose that the structure exhibits regularities. Suppose further that there is a special class of dispositions at L_D whose manifestations are categorical properties at a higher macro level L_Q. Let D_i and D_j be dispositions with manifestations Q_i and Q_j, respectively, and suppose that D_i is the only disposition whose manifestation is Q_i. Finally, suppose that L_D includes the regularity that all D_i are D_j. (I omit conditions of manifestation for simplicity.) It follows that the categorical regularity that all Q_i are Q_j holds at L_Q. Thus we can explain categorical regularities by treating categorical properties as higher level manifestations of lower level dispositions occurring in a structure that exhibits regularities. For example, L_D could be the domain of fundamental microphysical objects, and L_Q could be the domain of our qualitative experiences. Thus D_i might be the disposition to cause a certain sort of phenomenal experience Q_i in a normal observer under normal conditions.

This story has (at least) two main requirements. First, for the dispositional regularity that all D_i are D_j to ground the categorical regularity that all Q_i are Q_j, Q_i and Q_j must be the manifestations of the dispositions D_i and D_j, respectively. Second, the regularity that all D_i are D_j must have an explanation. We don't want to explain one regularity by postulating another.

Suppose we take the first requirement for granted. That means that D_i is the disposition to give rise to Q_i under certain conditions of manifestation. Thus the only regularity in which D_i is guaranteed to participate in virtue of its own nature is a regularity of the following form: all D_i are Q_i (when under their conditions of manifestation). D_i is *not* thereby guaranteed to participate in any regularity at the level L_D, so it is not thereby guaranteed to participate in the regularity that all D_i are D_j. For obvious reasons, D_j cannot establish that regularity either. Thus there is a lacuna in the story above. The following claim is unsupported: "All properties in that structure are bare dispositions, so it is reasonable to suppose that the structure exhibits regularities." The general problem arises because dispositions are individuated by what they do. What D_i and D_j do is this: when under their conditions of manifestation, they give rise to certain categorical properties—namely, Q_i and Q_j. Thus, insofar as activity on level L_D is

concerned, our dispositions D_i and D_j don't contribute to any regularities; they behave exactly as they would if they were categorical properties. (It may help to imagine that we're looking at L_D through a microscope and simply ignoring the macroscopic world.) In the sections above, we saw that it is impossible to explain categorical regularities in terms of dispositions alone. Analogues of those arguments show that it is impossible to explain the regularity that all D_i are D_j—unless, of course, we postulate governing laws. The problem generalizes. Therefore, satisfying the first requirement precludes the Descriptive Non-Humean from satisfying the second.

Of course, we encounter the same problem if we start by taking the second requirement for granted. In that case we'll be forced to define all dispositions at L_D as having manifestations on L_D rather than L_Q. Thus satisfying the second requirement precludes the Descriptive Non-Humean from satisfying the first. (Having seen how the problem is generated by starting with the first requirement, filling in the details is trivial.)

The moral of the story: The Descriptive Non-Humean can explain regularities at level L_D; the Descriptive Non-Humean can explain regularities across levels; but the Descriptive Non-Humean cannot do both. Since both are required, the proposed solution fails.

5.2 An alternative explanation of categorical regularities

A referee has drawn my attention to a final option for Descriptive Non-Humeans. One might think that categorical regularities can be explained without appealing to either bare dispositions or governing laws. Instead, categorical regularities are explained directly by *natural kind essences*. This position might be inspired by such essentialists as Lowe (1989, 2006) and Oderberg (2007). In footnote 10 I suggested that such kind essences *constitute* governing laws and are thus inconsistent with Descriptive Non-Humeanism. Here I provide elaboration, focusing on some details of Lowe's account.

The view under consideration may be described crudely as follows ("crudely" because a proper explanation of the characterization relation requires an explanation of Lowe's four category ontology, which I do not provide). Suppose that we have a natural kind that is *characterized* by properties. To borrow an example from Lowe (2006, 170), the kind *electron* is characterized by the properties *unit negative charge*, *rest mass m*, and *spin one half*. The kind is *not* the mere conjunction of these three properties. Rather, the kind is a substantial universal that *grounds* these properties; a particle's being an electron *explains* why the particle has the three proper-

ties in question.

How do governing laws enter into this picture? I believe that the characterization relation's holding between a natural kind and its associated properties constitutes a governing law. (Again, see (Drewery 2005).) The characterization relation's holding looks like a state of affairs (at least in a very loose sense of 'state of affairs' employed here); it is distinct from natural regularities; it necessitates regularities (or at least explains them in some weaker sense); hence it is a governing law. Indeed, I believe that Lowe (2006, Chapters 8–10) would agree with my assessment, at least in principle. My disclaimer has to do with the fact that it is slightly difficult to map Lowe's theory into the framework I employ here, in large part because I have used simplified definitions of competing theories of laws for ease of exposition. For instance, Lowe might be unhappy with my characterization of the Non-Humean connection involved in laws as a relation of 'necessitation' (see (Lowe 2006, 131, 162)). However, Lowe is clearly a Non-Humean, and the natural kinds we are considering do not constitute dispositions. In Lowe's system, the fundamental form of law statements—statements of natural necessity—are straightforward statements in which kinds are characterized by properties (Lowe 2006, 127). The crucial question is whether these Non-Humean connections are *distinct* from the regularities they support. I believe that they are. Natural kind essences are ontologically prior to the natural regularities they support. The result is that we have a theory that looks very much like a version of Governing Laws; at the very least, it looks more like that theory than either of its competitors.[16]

6 The asymmetry between Governing Laws and Descriptive Non-Humeanism

Some might worry that Governing Laws faces problems exactly analogous to those of Descriptive Non-Humeanism. After all, both theories postulate unobservable states to explain observable ones. However, there is an important difference between the two theories, in virtue of which Governing Laws is not susceptible to the difficulty that plagues Descriptive Non-Humeanism.

Governing laws are postulated to be unobservable relations that hold

[16]Disclaimer: Obviously, this discussion has been brief. It may be that natural kind essentialists can brand their theory in such a way that it does not satisfy Governing Laws. One option would be to identify a concept of the 'distinctness' of governing law and regularity according to which natural kind essences aren't distinct from the regularities that involve them. However, I know of no plausible candidates, so I won't pursue this matter here.

between tuples of properties, but nothing prevents these tuples from consisting of categorical properties only. According to Governing Laws, it is necessary (or probable) that, for any properties F and G, if a nomic relation holds between them then a corresponding regularity obtains between instances of F and G. However, unlike the postulate of bare dispositions, *all* of the relata of such nomic relations may be categorical or observable properties. (Of course, they don't have to be; for example, we could treat water-solubility as a bare disposition, and then use a governing law to explain the regularity that all salt is water-soluble.) Thus suitably postulated governing laws explain categorical regularities. It is impossible for Descriptive Non-Humeans to give this sort of explanation, since at least one of the relata in the regularities they are capable of explaining must be a bare disposition.

Relatedly, the theory of Governing Laws is not susceptible to the type of regress that besets Descriptive Non-Humeanism. One might worry that a regress ensues when considering the regularity that all governing laws are accompanied by regularities (see (van Fraassen 1989, Chapter 5), (Bird 2005), and (Handfield 2005) for relevant discussion). However, this is neither an observed regularity nor a categorical regularity; it is not a regularity among categorical properties only. Indeed, one way to accept Governing Laws is to employ bare dispositions to explain the necessary connection between law and regularity—that is, to explain the regularity that laws are always accompanied by regularities. This regularity is neither observed nor categorical, so there is no problem with postulating bare dispositions to explain it. This application of bare dispositions does not lead to a regress. For example, why must the physical world match up with an omnipotent being's preferences concerning the physical world? Because omnipotence is a bare disposition. End of story. The key point here is that Governing Laws must differ from Descriptive Non-Humeanism only with respect to the following question: how do we incorporate bare dispositions into our ontology? In this paper, I have argued that, insofar as we are interested in employing bare dispositions to explain categorical regularities, our answer to this question matters very much. Governing Laws can succeed where Descriptive Non-Humeanism fails. Thus those who wish to explain categorical regularities should prefer Governing Laws to Descriptive Non-Humeanism.

To conclude, I would like to emphasize that this project is not opposed to Bare Dispositionalism. As I have suggested, one way to make sense of Governing Laws is to explain the necessary connection between law and regularity by appealing to a special sort of bare disposition. That said,

I have argued that governing laws are indispensable for the explanation of categorical regularities. Accordingly, I think the answer to the original question, 'Can bare dispositions explain categorical regularities?', is this: only if there are governing laws.[17]

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