

HAVE THE LAWS OF NATURE BEEN ELIMINATED?

TRAVIS DUMSDAY

Are there really such things as laws of nature? In everyday parlance, such a question is liable to seem absurd; after all, is not a belief in laws the very foundation of modern science? Yet, when one delves into the question more deeply, it comes to appear less absurd, for one of the major ongoing debates in contemporary philosophy of science has to do with the ontology of laws: Just what is it to be a law of nature? Depending on the answer one gives to this question, the idea that laws do not really exist may come to seem plausible. While such a position has had other defenders, notably Ronald Giere,¹ the most thoroughly developed and compelling case for it is to be found in Stephen Mumford's *Laws in Nature*.² There, he argues that laws of nature, properly understood as governing principles which explain regularities, do not exist. Despite a number of valiant attempts by metaphysicians to present a theory of laws that would explain what they are and how they exercise a causal force in the world, no convincing account has been forthcoming. What is more, a compelling alternative explanation for regularities has been set forth, namely that they result from the dispositions³ of objects. Whatever phenomena scientists employ laws to explain can instead be accounted for by reference to these, and consequently we have no reason to introduce law-talk into metaphysical discourse in the first place.

In what follows, I will begin by providing a summary of Mumford's case against laws. I will then briefly review Alexander Bird's reply to

¹ See Ronald Giere, *Science Without Laws* (Chicago: University of Chicago Press, 1999).

² See Stephen Mumford, *Laws in Nature* (New York: Routledge, 2004).

³ I will here take "disposition," "causal power," "potentiality," and "capacity," as synonyms. This accords with common usage in recent analytic metaphysics, although in earlier literature distinctions were sometimes made between them, with "disposition" being applied specifically to mental capacities.

Mumford,⁴ where he argues that one can be both a dispositionalist and a nomological realist. I will argue that Bird's account of laws does not meet Mumford's criteria for lawhood, and that only two accounts can: one which takes laws as ontological primitives, or one which looks to theism to ground them. Between these two, I believe the theistic option is to be preferred, which has the interesting implications that if Mumford's criteria for lawhood are correct, and laws are real, then it is likely that God exists; and conversely, to be consistent, an atheist should either reject Mumford's criteria of lawhood in favor of a different conception of law, or accept his eliminativism. Thus, beliefs about God have a decided impact on the acceptability of certain conceptions of law.

I. LAWS IN THE DOCK: MUMFORD'S CASE FOR ELIMINATION⁵

To begin, Mumford makes it clear that in his treatment of laws he is only concerned with those theories which postulate *real* laws of nature. On his view, it is essential to the notion of a law of nature that it be a truth, fact, or thing which somehow accounts for a regularity in nature. A law has an explanatory function: it governs actual occurrences.⁶ Thus, several theories commonly presented as theories of law are not really such.

Hume's regularity theory is one instance of this, as he maintains that laws are simply regularities, such that what we call a "law" is just a record of what actually does happen in nature, when those happenings are sufficiently consistent to admit of grouping into a convenient class.⁷ Nothing modal is implied, no form of necessity invoked. Laws are not something over and above the occurrences of nature, nor have they any governing function; they just *are* the occurrences of nature, and

⁴ See his contribution to Alexander Bird, Brian Ellis, Stephen Mumford, and Stathis Psillos, "Looking for Laws," *Metascience* 15 (2006): 437-69.

⁵ Note that this section is meant for those readers with little or no familiarity with Mumford's work; as such, I have tried to be as thorough as possible, within space constraints. Those who already have a good grasp of this material might wish to skip ahead to the next section.

⁶ Mumford, *Laws in Nature*, 1-3.

⁷ See David Hume, *An Enquiry Concerning Human Understanding*, in *Enquiries Concerning Human Understanding and Concerning the Principles of Morals*, edited by L.A. Selby-Bigge (Oxford: Clarendon Press, 1975).

would be different if the occurrences were different. David Lewis' theory that laws are systematizations of the world's history⁸ is similarly not really a theory of law. Such accounts do not posit anything real in nature that accounts for regularities. Regularities exist, but with no *explanans* there to render them in any way necessary. Humeans *et alia* may of course choose to maintain the terminology of laws and refer to their theories as theories of law, but that will just result in a lack of terminological clarity. Nomenclature aside, the real metaphysical question Mumford wishes to confront is "whether there are any universal governing or controlling features in nature, features which, in some original sense of law, could be described as laws."⁹ Moreover, considered as an ontology in and of itself, regularity theory, whether Humean or Lewisian, leaves a gaping hole in the intelligibility of the natural world. To think that the pervasive regularities of the universe

⁸ See David Lewis, *Counterfactuals* (Oxford: Blackwell, 1973).

⁹ Mumford, *Laws in Nature*, 10. Foster's views here are similar. He also provides a helpful and concise set of distinctions: "The term 'law', as it occurs in the context of a discussion of the natural world, can be used in three distinct, though related, senses. In the first place, it can be used to refer to those claims by which, at various times, scientists have tried to characterize the fundamental ways of working of the natural world.... Taken in this sense, laws are not part of nature, but part of our theorizing about it. They are human artifacts, products of the scientific enterprise. Secondly, the term 'law' can be used to refer, not to these scientific claims, but to the natural regularities—the uniform ways of working—which the claims are attempts to record.... Thirdly, the term 'law' can, as in the second case, be used to denote aspects of the natural world, but aspects that consist not in the regularities which characterize the world, but in the forms of natural necessity which (in a certain sense) control it.... So, in this sense, to recognize a law of gravity would not be merely to recognize that there is a uniform manner in which bodies attract one another, but to recognize a principle of necessity underlying this uniformity.... Now it is in the third of these senses that I am using the term 'law' in these lectures" (John Foster, *The Divine Lawmaker: Lectures on Induction, Laws of Nature, and the Existence of God* [Oxford: Oxford University Press, 2004], 37-38). Clearly, his third use is close to Mumford's view of the proper understanding of a law of nature, although Foster is more willing to grant that the alternative uses of the term are also valid and related to the one he primarily wishes to consider.

lack any grounding whatever, that they are mere coincidences, while logically possible, strains credulity.¹⁰

Rather different concerns apply to Armstrong's much-discussed theory of laws as relations between universals. He developed it simultaneously with Dretske and Tooley, and so it is often referred to as the Dretske-Tooley-Armstrong (DTA) theory.¹¹ However, the three theories are not equivalent in all respects, and Mumford's critique is directed primarily against Armstrong. This theory, very briefly, runs as follows: we normally think of relations as obtaining among particulars (one box being to the left of another, one person being taller than another, etc.), but, according to DTA advocates, relations can also obtain among universals, and one type of relation that can so obtain is that of nomic (law-like) necessitation. Two universals, *F* and *G*, can be linked together via the nomic necessitation relation *N*. This results in a law of nature, which takes the form $N(F,G)$, or "it is a law that *F*'s are *G*'s." For instance, that water freezes at 0 degrees centigrade, *ceteris paribus*, is a relation of nomic necessitation between the universals "water" and "freezing at 0 degrees." Thus, it is a law that if the universal "water" is applied to an object, the universal "freezes when subjected to a temperature of 0 degrees Celsius under normal conditions" will likewise be applicable, due to the necessitation relation obtaining between the relevant universals. Armstrong, in his original formulation of the theory, also sought to retain what he takes as an intuition that the laws of nature are not *absolutely* necessary; that is, that there is some possible world in which the universals *F* and *G* are not linked by *N*. There are possible worlds in which water does not freeze at all, or does so only under very different conditions. The fact that these universals are linked in our world is contingent. Thus, we have a law when we have a contingent, *external* relation of nomic necessitation between instantiated universals.

¹⁰ This has been argued by a number of authors over the years. For good statements of this criticism, see E. J. Lowe, "Dispositions and Laws," *Metaphysica* 2 (2001): 5-23, and Mumford, *Laws in Nature*, 61.

¹¹ See David M. Armstrong, *What is a Law of Nature?* (Cambridge, Massachusetts: Cambridge University Press, 1983); Fred Dretske, "Laws of Nature," *Philosophy of Science* 44 (1977): 248-68; and Michael Tooley, "The Nature of Laws," *Canadian Journal of Philosophy* 74 (1977): 667-98.

Mumford considers several criticisms of the DTA theory, prominent among them being the claim that it involves quidditism.¹² If a law is something external to the thing it governs, separate from it in some way, then what is being supposed is that the object's behavior is determined by the law without reference to the object's intrinsic features. Since, on DTA theory, laws and the things they govern are independent, any combination of them is possible, and, what is more, the instantiated universals can retain their identities through various changes in associated laws. As a result, the water that is freezable today could conceivably become flammable tomorrow and yet remain water. But what then, ultimately, fixes the identity of water? Only the positing of a quidditas, an individual essence of a universal de-linked from any causal role, will do so.¹³ And Mumford takes the notion of a quidditas to be wildly implausible and productive of some very counter-intuitive results. For instance, could two universals swap *all* of their law-connections? That is, could all the causal roles, which the laws provide universal *F*, be completely exchanged for those of *G*, and yet *F* and *G* remain, as before, *F* and *G*? Mumford thinks this is clearly problematic, yet it is what the externalist about laws is driven to.¹⁴

Mumford also critiques Brian Ellis' essentialist perspective on laws. For Ellis, laws are grounded in the essences of natural kinds. Water, if it is really water, must have the dispositional property of being freezable under the appropriate conditions, and there is no possible world in which water exists as water and does not possess that property. Thus, the law that water must freeze at a certain temperature *ceteris paribus* is grounded in the essence of that substance. The same holds for the various other laws applying across different natural kinds.¹⁵ Considered

¹² Mumford, *Laws in Nature*, 152.

¹³ Obviously, the term has here taken on a rather different meaning than it possesses in Scholastic metaphysics.

¹⁴ Mumford observes that this argument is taken from Robert Black, "Against Quidditism," *Australasian Journal of Philosophy* 78 (2000): 87-104.

¹⁵ See Brian Ellis, *Scientific Essentialism* (Cambridge, Massachusetts: Cambridge University Press, 2001). In the context of the laws debate, a number of authors have argued for metaphysical perspectives generally similar to that advocated by Ellis, including: Yuri Balashov, "What is a Law of Nature? The Broken-Symmetry Story," *Southern Journal of Philosophy* 40 (2002): 459-75; Alan Chalmers, "Making Sense of Laws of Physics," in *Causation and Laws of Nature*, edited by Howard Sankey (Dordrecht: Kluwer, 1999), 3-15; Crawford

as a metaphysical theory in and of itself, Mumford believes this has much to recommend it, but as a theory of laws it faces a difficulty: in what way could such a law be thought to *govern*? The essentialist sees laws as internal to the relevant objects, rather than external. But, if that is the case, why make reference to laws at all? Why not just explain regularities by reference to the essences of objects, and leave out law-discourse entirely? For there to be any need for laws, it seems they must be in some way external to the things they govern. The governed must be existentially distinct in some fashion from what does the governing, or else the direction of explanation will point the wrong way, making redundant any reference to law.

So what we have here is a dilemma: present an externalist account of laws and we are faced with quidditism; present an internalist account of laws and a reduction of laws to intrinsic dispositions takes place. Either type of account, externalist or internalist, faces serious problems for a realist about laws. Mumford refers to this as the Central Dilemma.¹⁶

Elder, "Laws, Natures, and Contingent Necessities," *Philosophy and Phenomenological Research* 54 (1994): 649-67; Alfred Freddoso, "The Necessity of Nature," *Midwest Studies in Philosophy* 11 (1986): 215-42; and David S. Oderberg, *Real Essentialism* (London: Routledge, 2007), 143-51. Ellis' ontology more generally bears a strong affinity with Thomistic philosophy of nature (to a greater extent, I think, than Oderberg is willing to grant in his discussion of the two), and something like Ellis' view of laws may be found in a number of the older Scholastic textbooks. Thus, compare Ellis' formulation, in chapter six of his 2001 book, with the ontology of laws contained in Celestine N. Bittle, *The Domain of Being: Ontology* (Milwaukee, Wisconsin: Bruce Publishing, 1939), 362-65; Peter Coffey, *Ontology or the General Theory of Being: An Introduction to General Metaphysics* (London: Longmans, Green, and Co., 1912), 416-21; Giovanni Maria Cornoldi, *The Physical System of St. Thomas*, translated by E.H. Dering (New York: Benziger Brothers, 1893), chapter ten; R. P. Phillips, *Modern Thomistic Philosophy: An Explanation for Students, Vol. I: Philosophy of Nature* (London: Burns, Oates, and Washbourne, 1934), 164-66; and R. P. Phillips, *Modern Thomistic Philosophy: An Explanation for Students, Vol. II: Metaphysics* (London: Burns, Oates, and Washbourne, 1935), 357-58. Yet, as we shall soon see, Ellis has more recently made an unnecessary concession to Mumford's eliminativism, which lessens the Scholastic link to some extent.

¹⁶ For a thorough treatment of the Central Dilemma, see Mumford, *Laws in Nature*, chap. 9. Note that John Peterson, in an earlier article, discussed a somewhat similar dilemma, though his work seems not to have influenced

Mumford's own position on laws is both anti-Humean and anti-realist. He accepts that the regularities in nature are in need of explanation, that they cannot rationally be taken as fortuitous or unaccountable. However, he denies that laws can fulfill this explanatory role. It is not a law that makes water freeze, but rather an inherent disposition or capacity of water to do so under appropriate conditions. Water freezes because it has a dispositional property which necessitates that it do so. His account is thus similar to Ellis', except that he remains agnostic about essences¹⁷ and eliminates talk of laws as superfluous.

At this point one might ask, even if laws have been reduced to dispositions, why take the extra step from reduction to elimination? These are often seen as separable moves. In response, Mumford draws attention to the unique features of the notion of law which prevent the reduction from remaining a mere reduction:

Reduction is more than just identity. It is also a claim about an asymmetrical ontological dependence. As laws are reduced to things that are not laws—natural kinds and essential properties—in the essentialist view, laws are thereby dependent on these more fundamental things. But if the reduction is right and successful, then it is the reductive grounding that does all the work.... This is significant because the notion of a law, according to nomological realism, is supposed to be precisely the notion of something that controls, governs, moves or plays at least some role. But you cannot claim credit for compliance with a law if everything already acts that way and is already bound to do so.¹⁸

Mumford's. See John Peterson, "Law and Thomistic Exemplarism," *Thomist* 60 (1996): 81-108.

¹⁷ Mumford is rather strident against essences in *Laws in Nature*, but, more recently, in a reply to Ellis, he writes: "I would like to make it clear that I am not an anti-essentialist by any means. I am yet to be persuaded of its truth but I am not persuaded of its falsehood" (Mumford, in Bird et al., "Looking for Laws," 466).

¹⁸ Mumford, *Laws in Nature*, 121.

I hope the preceding has provided the reader with a fair overview of Mumford's reasoning. His arguments are compelling, but they have not gone unchallenged, as we shall now see.

II. THE DISPOSITIONALIST REPLY

Mumford's work has received a good deal of critical attention, and the reaction from other dispositionalists has varied. Ellis has responded by clarifying his earlier work, specifying that on his view laws—at least in the sense Mumford uses the term—do not exist:

In my view, the laws of nature are not things in the world, but are general propositions descriptive of the kinds of natural necessities that exist in it. They are true, have truthmakers, bear logical relationships to one another, and so on, just like other kinds of true propositions. But they are not items that should occur in anyone's ontology.¹⁹

That is, he accepts law-talk as having a foundation in nature, but agrees with Mumford that laws should not be taken to possess real being in any stronger sense.

Bird has taken a different stance, maintaining that one can be both a dispositionalist and a realist about laws. He first questions Mumford's claim that it is part of the very concept of a law that it should play a governing role in the world.²⁰ Then, granting for the sake of argument that Mumford is correct in this claim, he challenges the second horn of the Central Dilemma, arguing that laws can be both internal to objects and governing. First he asks what exactly it is that laws are supposed to govern, and answers that "what laws govern (if anything) is the possession, acquisition, and loss of properties by particulars." And a bit later, "it is the entities and events making up the world's history that

¹⁹ Ellis, in Bird et al., "Looking for Laws," 439.

²⁰ See Bird, in Bird et al., "Looking for Laws," 442-47. For further arguments to the effect that governance is not a conceptually necessary component of lawhood, see Helen Beebe, "The Non-Governing Conception of Laws of Nature," *Philosophy and Phenomenological Research* 3 (2000): 571-95; and Marc Lange, "Farewell to Laws of Nature?" *Studies in History and Philosophy of Science* 37 (2006): 361-69. For historical background on the issue, see Daryn Lehoux, "Laws of Nature and Natural Laws," *Studies in History and Philosophy of Science* 37 (2006): 527-49; and Jane Ruby, "The Origins of Scientific 'Law,'" *Journal of the History of Ideas* 47 (1986): 341-59.

get explained and governed by the laws.”²¹ There is a bit of ambiguity here, but I think what Bird is intending is that laws govern events, with those events consisting in the gain and loss of properties.²² Dispositions can fulfill this governing role, such that they are the real laws in Mumford’s strong, ontologically relevant sense of “law.” Thus laws can be internal to objects yet still in some way external to what they govern, namely events. As a result, this horn of the Dilemma is avoided:

We may take law to be identified with or supervenient on powers or potencies, that is to say, properties that are essentially dispositional. Since a property P is essentially dispositional, then necessarily, if some x possesses P and receives appropriate stimulus S , then it will yield its characteristic manifestation M . Generalising, $\forall x((Px \& Sx) \rightarrow Mx)$ —and so we have the regularity that is characteristic of the law (which may need a *ceteris paribus* clause). We see how the law is internal to the property—it flows from the essence of the property. That dispositional essence can govern or determine things, as just mentioned, for it makes it the case that should anything possess the potency and experience the stimulus then there will be a manifestation. But the set of events is itself external to the power and the law.²³

One will note the disjunct above between law/power identity and law/power supervenience. A bit later, Bird appears to favor supervenience, holding that, in the final analysis, the reality of laws consists in their being the “fundamental, general explanatory relationships between kinds, quantities, and qualities ... which supervene upon the essential natures of those things.”²⁴

In reply to these criticisms, Mumford first notes that if there is a proper concept of ‘law’ that does not include governance as an essential component, then he is willing to grant that there may be such laws. But they will not be the robust laws that he is interested in, laws

²¹ Bird, in Bird et al., “Looking for Laws,” 448-49.

²² I doubt whether the mere possession of a property can correctly be labeled an event.

²³ *Ibid.*, 449.

²⁴ *Ibid.*, 454. This view accords with his treatment of laws elsewhere; see Bird, “The Dispositionalist Conception of Laws,” *Foundations of Science* 10 (2005a): 353-70, and his “Laws and Essences,” *Ratio* 18 (2005b): 437-61.

which really govern phenomena in the world. Next, he looks at Bird's realist ontology of laws, and answers that "I still don't see that such laws deserve the name. If the powers or potencies are doing all the work in this metaphysics, then such laws are still very much impoverished. They don't provide anything that the potencies haven't already delivered."²⁵ That is, it may be that powers help to determine events, thus governing them in some sense. But then the notion of a law, taken either as identical to or supervening on the powers, is not really adding anything to one's ontology. And so Mumford's worries about reduction, and hence elimination, remain. Further, making more specific reference to Bird's detailed ontology, he writes:

What do such laws consist in, for Bird? He will say something along the lines of a law being that if something has power *D* and receives stimulus *s*, then manifestation *m* will occur, *ceteris paribus*. If so, laws are reduced to some counterfactual made true by the fundamental potencies, and I won't deny that there are such counterfactuals. But can these be our metaphysically substantial laws? Do they determine anything or is all the work being done by that on which such counterfactuals supervene? Bird and I agree that it is the latter. But unless some role can be found for them, I don't see why we should grant the free ride.²⁶

At this point, then, there seems to be a bit of a stalemate, with conflicting intuitions concerning whether powers are sufficient for the reality of laws. If we wish to move the debate forward, it is necessary to pinpoint the source of Mumford's conflicting intuition. I believe it arises from the idea that the laws of nature are supposed to be abstract principles which nonetheless have some sort of explanatory import, explanatory in a strong, causal sense. Their abstractness would certainly be sufficient for his externality requirement. And he admits that there are such abstractions; we can indeed formulate abstract counterfactual propositions whose truthmakers are powers, and we can choose to call the obtaining of those counterfactuals in the real world "lawful." But, on his view, that does not make these abstractions laws. What would? What more is required?

²⁵ Mumford, in Bird et al., "Looking for Laws," 464.

²⁶ Ibid.

I think what Mumford is asking for here is that the abstract entity, the counterfactual proposition, actually play a causal role in the world, rather than its truthmakers, the dispositions, being the sole causal factor. I do not see what else he could be looking for here, since it is apparently not enough that the counterfactuals hold true of the world; they must, in some sense, hold true because of their own explanatory force. The laws must be true of the world and true precisely because they are *laws*, not just because they are counterfactual propositions which, by a matter of historical contingency, happen to have truthmakers in the world in the form of dispositions. Or, to put it a bit differently: Bird presents an account of laws as abstract counterfactuals made true by dispositions. He thus thinks he has met Mumford's criteria for abstraction and causal efficaciousness. The problem is, the efficaciousness he is proposing is located in the wrong place: not in the abstraction itself, as Mumford believes is required for lawhood, but in its truthmakers in the world. Contrary to what Bird thinks,²⁷ his formulation does not in fact meet Mumford's criteria.

III. THE NATURE OF LAWS AND THE THEISTIC OPTION

Mumford is looking for abstract laws that are, in and of themselves, causally explanatory. Is he right in demanding this of nomological realism? In answering this question, it might be helpful to consider, for comparative purposes, another form of law, the civil law. What is a civil law? It is, at least in part, a prohibition or prescription found in official publications issued by a legitimate governing authority. A civil law is thus prescriptive rather than descriptive. Does it exercise causal force in the world? It depends on what one means by "causal." If one intends "causal" in the sense of an efficient cause, then clearly it can exercise no such force. Any particular civil law is not an *object* in the world that engages in causal interactions with other objects. Yet it can plausibly be thought to exist as a final cause. That is, citizens who are aware of the law will be more likely to act in accordance with its prescriptions or prohibitions, whether out of respect for the law or from fear of punishment. The existence of a civil law thus helps to explain, in a strong final-causal sense of explanation, the behavior of citizens. It is

²⁷ He ends his piece by noting that "this account is, I believe, in tune with the metaphysical framework that Mumford presents but nonetheless escapes his argument against laws" (Ibid., 454).

both an abstraction and at the same time exercises causal force in the world.

Mumford is looking for laws which are likewise prescriptive²⁸ and not merely descriptive, which are abstractions yet causally efficacious. Given the use of 'law' in other realms, this seems a reasonable requirement from a conceptual perspective. However, the causal efficaciousness of laws in the natural realm is more difficult to posit. At first glance, it is difficult to see how the laws of nature could operate as final causes. After all, inanimate objects do not choose to obey laws, do not opt to conform themselves to abstractions.

The prospect of meeting Mumford's criteria for a real law of nature thus appears bleak, even though the analogy with civil law makes those criteria seem reasonable. One could reject that analogy and respond that laws of nature should be understood as counterfactuals which have dispositions as truthmakers, such that they meet the abstractness requirement but not the causal efficaciousness requirement. Thus, this latter requirement would not be seen as a proper part of the concept of "law" at all. I believe this is what Bird would have to say. Or one could accept Mumford's conception of law as both abstract and causally efficacious, and admit that, in this sense of "law," there is no such thing. This is what Mumford would wish to say. But is there some way that a law could exercise causal force over events in the physical world, even while remaining abstract?

Imagine that Merlin the magician decides to create two rabbits out of two separate hats. To make the upcoming show more interesting, he decides that the two rabbits will have a gravitational attraction between them much greater than normal. He thinks through the equations in his head, determining the precise degree of attraction required to cause the rabbits to fly up out of the hats and gently bump into each other in the air. He has thus developed a new, highly localized law, one governing the attraction between these two rabbits at any time during their existence. The law exists as an abstraction in his head, and, simultaneous with the rabbits being created, exercises causal force. This causal force is real, because the formulation of the law existing in Merlin's mind is the final cause according to which

²⁸ Beebee would disapprove of this use of "prescriptive," but I believe she is restricting the term too narrowly; see "The Non-Governing Conception of Laws of Nature," 581-82.

Merlin acts as efficient cause, determining that the rabbits both exist and behave in accordance with the abstract formulation. And sure enough it works; they really do bump into each other upon creation during the show. They follow the law that has been externally prescribed for them, even though they have no say in the matter and no awareness of the law.

Now imagine Merlin doing things a bit differently. The first show went fine, but to spice things up he decides to give the law a mediate truthmaker. Rather than have the law obtain of the rabbits simply by virtue of his decree, and nothing more, he decides that the rabbits will follow the law by virtue of their intrinsic dispositions. Thus he creates two new rabbits which also fly up out of the hats and bump into each other not only because Merlin externally determines them to do so, but because they each have an intrinsic power to fly, and, moreover, an innate desire to fly toward other rabbits. As a result, precisely the same type of event occurs as in the first show. In fact, to the audience, nothing different has taken place between the two shows: the two instances of the rabbits flying out of the hats and bumping into each other look identical. But the nature of the two events was nonetheless quite different, because, in the second show, the rabbits followed the law via intrinsic causal dispositions rather than merely following Merlin's external and immediately efficacious decree.²⁹ Yet, in the dispositional case, the law is still real and still causally efficacious, as a final cause; for it was the formulation of the law, the abstract entity in Merlin's mind, that he followed when creating the particular set of dispositions that he did, rather than some other set, such that the rabbits unwittingly obeyed the prescriptions of that abstract law.

I am sure the reader sees where I am going with this. It is possible to meet all of Mumford's criteria for lawhood, whether or not laws have dispositions as further truthmakers. Laws can exist as abstractions and have a causally explanatory role. The only catch is that one must posit an intelligent entity with creative power. This entity must be a being for whom the laws exist as mental abstractions and function as final

²⁹ Note that I very much doubt whether *all* laws of nature could be instantiated in that manner, unmediated by dispositions. Such a position would seem to approach too closely to a view whereby real objects could wholly lack intrinsic causal powers, which in turn gets us back to something very much like quidditism (or to some forms of occasionalism).

causes of the relevant efficient causal activities of that being, who creates objects that behave in certain regular ways. As applied to theorizing about nature as a whole, this clearly leads us into some variety of theism.³⁰

Note that the preceding “must” is a qualified one; perhaps there are other ontologies where laws can exist as abstractions, but outside any mind, and still function as final causes. In fact, I believe Latham’s and Maudlin’s accounts, which take laws as ontologically real, primitive, and efficacious, may plausibly be interpreted along such lines.³¹ If these hold true, they will also serve to meet Mumford’s criteria, but without explicitly bringing in God. My main difficulty with them arises from an inability to shake the intuition that abstract objects can exist only in minds, and that final causes can exist and operate only with an ultimately mental grounding. Now, one might interpret these theories as allowing for such a mental grounding without explicitly raising this possibility; if so, then I think they are incomplete as stated, but compatible with the view presented above. Otherwise, they are problematic. I would require considerably more space to lay out these positions in detail and argue for my no-abstractions-without-minds view.³² But, for now, I will simply note that I believe my intuitions on this score are plausible and widely shared, and that if we are to meet

³⁰ I am pleased to note that Peterson likewise concludes to a theistic account of laws, based on the need to explain the formal identity obtaining between a law and that which obeys it. I reach the same conclusion, but from the need to meet Mumford’s criteria of abstractness + causal efficacy. I believe our arguments are quite compatible, and the fact that we reach the same conclusion from different starting points tells in our favor. (Although one might argue that Mumford’s criteria can be derived from Peterson’s.)

³¹ See Noa Latham, “Fundamental Laws,” (manuscript); and Tim Maudlin, *The Metaphysics Within Physics* (Oxford: Oxford University Press, 2007), chapter one. Some of Marc Lange’s work—such as his “A Note on Scientific Essentialism, Laws of Nature, and Counterfactual Conditionals,” *Australasian Journal of Philosophy* 82 (2004): 227-41—and also David Banach’s “What Killed Substantial Form?” *Saint Anselm Journal* 5 (2007): 1-14—may fall into this category, although I am less confident of such an interpretation of their work.

³² See Peterson, “Law and Thomistic Exemplarism,” for such arguments relevant to the laws debate.

Mumford's criteria while remaining nomological realists, then between these options I cannot help but favour an explicitly theistic account.

So what conclusions can be drawn from all of this? (1) If one thinks that Mumford's criteria for lawhood are reasonable, such that anything not meeting them could not really be a law, and (2) if one thinks that we ought to posit real laws meeting those criteria due to their explanatory usefulness, the prevalence of law-talk in science, or for some other reason—such as the one we shall consider in the next section—then (3) one will have a new reason to maintain that God exists. Mumford would reject the second point, and Bird would, I believe, reject the first (since his own account does not quite meet the criteria). But if one accepts both premises, then we have an argument for theism. Another conclusion we can draw here is that, if one considers the existence of God to be *a priori* highly unlikely or impossible, one will have further reason to reject the truth of one or both of the two premises above. Any atheist intending to remain an atheist should reject one or both of them. So the idea that only a theistic account of laws plausibly meets Mumford's criteria has some interesting implications, because it makes it clear that certain ideas about laws are live options for the theist but should be rejected by the settled atheist. Whatever the truth of theism, I take that to be an interesting result for the ontology of laws.

However, are there any further reasons for actively favoring a theistic view of laws? I believe so, and will briefly outline one of them.

IV. A FRINGE BENEFIT OF A THEISTIC VIEW OF LAWS: SOLVING THE GLOBAL LAWS PROBLEM

One difficulty with Bird's account, in which laws have dispositions as sole truthmakers, or with Ellis' and Mumford's views, is that the very distribution of dispositions appears to be lawful. That is, some laws apply across a wide variety of natural kinds, or even all of them. The law of gravity, for instance, appears to apply to all material objects, as does the law of conservation of energy and certain other global laws.³³ If the dispositions of objects are the sole truthmakers for laws, it is not clear how one gets these global regularities. Unless it is a coincidence, it seems as if these must be based on some law or laws not wholly

³³ See Ellis, *Scientific Essentialism*, 204-06, for further discussion of such laws.

reducible to dispositions, some law that determines certain dispositions be instantiated and others not, such that a genuinely global regularity obtains. Adams puts this point particularly well:

Perhaps the 'reality' of laws of nature can be understood in terms of the powers and liabilities, or the natural tendencies, of substances or things. The reality of laws of motion, for example, might consist in real forces in each particle of matter, by virtue of which they tend to move in accordance with the laws. I assume that this is indeed a possible approach to the metaphysics of laws of nature. But it may lack something desired by the causal realist. For if the 'real force' of the law is identified with forces in each particle of matter considered individually, its universality, its applicability to all particles of matter, remains merely a generalization, so far as this account of the subject goes. For this or for other reasons one might wish to assert the metaphysical priority of laws of nature, to ascribe to them an explanatory reality independent of the powers and liabilities of natural objects.³⁴

One could respond that global laws apply because they are rooted in the nature of matter *qua* material. But this seems highly suspect. It seems conceivable that there are other possible worlds in which matter obeys slightly different laws of motion, for instance; or, if not our matter, then perhaps "natter," which is precisely like our matter except that it obeys different laws of motion.³⁵ The proposal that global laws are grounded in the essences of worlds is another possible explanation,³⁶ but it has met with stiff resistance.³⁷ If neither of those options works, then an intelligent being who decides which dispositions get instantiated and which do not, in accordance with an

³⁴ See Robert M. Adams, in Christopher Hughes and Robert M. Adams, "Miracles, Laws of Nature and Causation," *Proceedings of the Aristotelian Society, Supplementary Volumes* 66 (1992): 212-13.

³⁵ By "matter" here I do not intend prime matter.

³⁶ See John Bigelow, Brian Ellis, and Caroline Lierse, "The World as One of a Kind: Natural Necessity and Laws of Nature," *British Journal for the Philosophy of Science* 43 (1992): 371-88.

³⁷ See Joel Katzav, "On What Powers Cannot Do," *Dialectica* 59 (2005): 331-45; Lange, "A Note on Scientific Essentialism, Laws of Nature, and Counterfactual Conditionals"; and the cited works by Chalmers and Elder.

abstract law functioning as a final cause, might be an attractive alternative.³⁸

V. CONCLUSION

To briefly recap. I first examined Mumford's case for the elimination of laws, followed by Bird's dispositionalist reply and Mumford's counter-reply. I then attempted to provide a precise diagnosis of the root cause of their disagreement and their conflicting intuitions concerning the governing role of laws. Following this, I argued that a theistic conception of laws is the best candidate for meeting Mumford's criteria for genuine lawhood. Consequently, if those criteria are correct, then only a theist can be thoroughly justified in maintaining the existence of real laws. Finally, I briefly adverted to an argument for the reality of laws and hence of God.

I hope the preceding discussion has shown that bringing a theistic perspective to the table has important conceptual implications for a key debate in contemporary philosophy of science. Though hardly *comme il faut* in that field, a number of theistic accounts have been proposed, and are worthy of greater attention.³⁹ At the very least,

³⁸ Adams again puts the point well, arguing that "the efficacy by which the laws of nature apply in particular cases will be explained, at least partly, in terms of the real powers and liabilities of the natural agents involved in those cases, while the universality of the laws, their applicability to *all* natural objects, will be explained in terms of the planning, decisions, and actions by which God has ordered the world, endowing natural objects with powers and liabilities in accordance with the laws" (Adams, "Miracles, Laws of Nature and Causation," 217). Of course, there are still other ways in which one could attempt to account for the phenomenon of global laws, and various objections to the theistic explanation. (Mumford himself argues against a theistic account of laws in *Laws in Nature*, 147-48; however, I do not think his criticisms tell against the case made here. See also Evan Fales, "The Divine Lawmaker," *Notre Dame Philosophical Reviews* [2004], <http://ndpr.nd.edu/review.cfm?id=4943>, in which he critiques Foster's 2004 book, *The Divine Lawmaker*.) It is also worth noting that Aquinas, borrowing from Averroes, is quite aware of theism's ability to resolve this issue. See the *Summa Contra Gentiles* I, c. 13, concluding paragraph.

³⁹ See the previously cited pieces by Adams, Foster, and Peterson; also Del Ratzsch, "Nomo(theo)logical Necessity," in *Christian Theism and the Problems of Philosophy*, edited by M. Benty (Notre Dame, Indiana: University of Notre Dame Press, 1990), 184-207; and Richard Swinburne, "Relations Between

discussing these allows us to see that certain theoretical options are closed off for the atheist, a hardly insignificant result.

So, do the laws of nature, conceived as abstract principles with causal force in the world, really exist? Only if God exists. Otherwise, they have been eliminated.⁴⁰

Universals, Or Divine Laws?" *Australasian Journal of Philosophy* 84 (2006): 179-89.

⁴⁰ I would like to express my sincere thanks to Steven Weinstein and Noa Latham for their valuable comments on earlier drafts.