

# Humean Laws and Explanation

DAN MARSHALL

*Lingnan University*

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## Abstract

A common objection to Humeanism about natural laws is that, given Humeanism, laws cannot help explain their instances, since, given the best Humean account of laws, facts about laws are explained by facts about their instances rather than vice versa. After rejecting a recent influential reply to this objection that appeals to the distinction between scientific and metaphysical explanation, I will argue that the objection fails by failing to distinguish between two types of facts, only one of which Humeans should regard as laws. I will then conclude by rebutting a variant of this objection that appeals to a principle of metaphysical explanation recently put forward by Kit Fine.

## 1 Introduction

Humeanism about natural laws can be formulated in terms of the notion of a broadly explanatory expression. Broadly explanatory expressions include nomic expressions, such as ‘is a natural law’ and ‘it is a natural law that’, causal expressions, such as ‘causes’ and ‘because’ (on its causal reading), natural modality expressions, such as ‘it is physically necessary that’ and ‘it is physically likely that’, and narrowly explanatory expressions, such as ‘explains’ and ‘because’ (on its explanatory reading). Humeanism about natural laws is the view that the property expressed by ‘is a natural law’ and the operator expressed by ‘it is a natural law that’ can be expressed using only expressions that are not broadly explanatory.<sup>1</sup> Traditionally, Humeans about natural laws have also held the more general thesis of Humeanism about all broadly explanatory notions, according to which the properties and operators expressed by any broadly explanatory expression can be expressed using only expressions that are not broadly explanatory.<sup>2</sup> One important motivation for both Humeanism about natural laws and the stronger thesis of Humeanism about all broadly explanatory notions is ideological parsimony: everything else being equal, since Humeans avoid being committed to the fundamental broadly explanatory ideology anti-Humeans are committed to, Humeans are able to endorse a more ideologically parsimonious total theory than anti-Humeans. Humeans have traditionally also claimed that, since fundamental

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<sup>1</sup>Humeans about natural laws include Beebe (2000), Lewis (1983), Loewer (1996), Psillos (2002) and Sider (2001).

<sup>2</sup>Humeanism about natural laws and the more general thesis of Humeanism about all broadly explanatory notions are therefore reductive theses similar to reductionism about modality, tense and morality. See Sider (2003) for an analogous formulation of reductionism about modality.

broadly explanatory notions are obscure or epistemically problematic, Humeans avoid the obscure or epistemically problematic notions anti-Humeans traffic in.

The best Humean account of natural laws is widely agreed to be David Lewis's best systems account (BSA). According to BSA, a natural law is a contingent regularity that is expressed by a theorem in every best system, where a best system is an eligible true deductive system that achieves the best combination of simplicity and strength.<sup>3</sup> BSA may also be taken as holding that 'It is a law that  $\varphi$ ' expresses the same state of affairs as 'The state of affairs of it being the case that  $\varphi$  is a law', and that 'It is a fundamental law that  $\varphi$ ' expresses the same state of affairs as 'The state of affairs of it being the case that  $\varphi$  is a fundamental law'.<sup>4</sup> Given these identifications, BSA also provides an account of how the operators expressed by 'it is a law that' and 'it is a fundamental law that' can be expressed without using any broadly explanatory expressions.<sup>5</sup>

As well as being the best Humean account of natural laws, it is also widely agreed that BSA entails that whether a particular regularity is a natural law is determined by, and hence explained by, all, or nearly all, of the particular matters of fact that make up reality. Loewer, for example, writes that, given BSA:<sup>6</sup>

What makes a proposition a law at a world  $w$  is the "vast mosaic of particular

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<sup>3</sup>An *eligible* deductive system is a deductive system all of whose axioms are true and whose non-logical vocabulary consists of predicates expressing sparse properties. The more possibilities ruled out by a theory's axioms, the stronger the theory is; while the fewer axioms a theory has, and the more syntactically simple those axioms are, the simpler the theory is. For simplicity, a *regularity* can be taken to be a fact that is expressed by a sentence of the form ' $\forall x_1 \dots \forall x_n (Fx_1 \dots x_n \supset Gx_1 \dots x_m)$ ', where  $m \leq n$ , and  $F$  and  $G$  express sparse properties or relations. This notion of a regularity needs to be extended in order to count the laws that appear in our best scientific theories that involve differential equations as regularities, but this complication can be ignored here. Different versions of BSA can be obtained by employing different notions of a sparse property. For definiteness, I will take a sparse property to be a property that is positive, qualitative, intrinsic and non-disjunctive. This notion of a sparse property at least roughly corresponds to the notion of a perfectly natural property employed in Lewis (1983). For discussion of the different notions of perfect naturalness Lewis employed, see (Marshall, 2012, p. 533-5).

<sup>4</sup>A state of affairs is a way things are or a way things fail to be. A fact is an obtaining state of affairs: that is, it is a way things are.

<sup>5</sup>BSA as formulated above has the undesirable consequence that there might be a non-fundamental law that cannot be derived from fundamental laws (and other facts that are expressed by axioms in all best systems). (Fact  $f$  can be derived from fact  $g$  iff  $f$  is expressed by a sentence that can be derived from a sentence expressing  $g$ .) Suppose, for example, there are exactly two best systems, one whose only axiom expresses All  $F$ s are  $H$ s and one whose only axiom expresses All  $G$ s are  $H$ s (where All  $F$ s are  $H$ s is not necessarily equivalent to All  $G$ s are  $H$ s). Then, according to BSA, Anything that is both  $F$  and  $G$  is  $H$  would be a non-fundamental law that cannot be derived from any fundamental laws or from any other facts that are expressed by axioms in all best systems. To avoid this consequence, we might modify BSA by either replacing its account of a law with (i) or replacing its account of a fundamental law with (ii):

- i)  $p$  is a law iff it is a regularity and it is deductively entailed by states of affairs that are expressed by axioms in every best system.
- ii)  $p$  is a fundamental law iff it is a law and either a) it is expressed by an axiom in every best system, or b) it is not deductively entailed by any facts that are axioms in every best system.

<sup>6</sup>See also (Beebe, 2000, p. 580) and (Rosen, 2010, p. 120).

matters of fact at  $w$ ". There is no part of reality that can be isolated that makes a general proposition lawful or accidental. (Loewer, 1996, p. 108)

This consequence of BSA, however, appears to conflict with the fact that laws can help explain their instances. Tim Maudlin puts the objection as follows:

If one is a Humean, then the Humean Mosaic itself appears to admit of no further explanation. Since it is the ontological bedrock in terms of which all other existent things are to be explicated, none of these further things can really *account for* the structure of the Mosaic itself. This complaint has been long voiced, commonly as an objection to any Humean account of laws. If the laws are nothing but generic features of the Humean Mosaic, then there is a sense in which one cannot appeal to those very laws to explain the particular features of the Mosaic itself: the laws are what they are in virtue of the Mosaic rather than vice versa. (Author's emphasis) (Maudlin, 2007, p. 172)

Lange sums up the objection by writing:

[I]f the Humean mosaic is responsible for making certain facts qualify as laws, then the facts about what the laws are cannot be responsible for features of the mosaic. (Lange, 2013, p. 256)

Humeans about natural laws, then, face the following objection from explanation: Humeanism about laws is false since, given the best Humean account of laws, laws are explained by their instances rather than vice versa.

To state this objection more precisely, let ' $\phi$ ' symbolise 'the state of affairs of it being the case that  $\phi$ ', and say that  $f$  partly explains (or helps to explain)  $g$  iff  $f$ , together with possibly other facts  $f_1, \dots, f_n$ , jointly explain  $g$ .<sup>7</sup> Suppose that  $a$  is  $F$ , and that it is a law that all  $F$ s are  $G$ s. Given this, if laws help to explain their instances, then (1) is true.

1. The law that all  $F$ s are  $G$ s, together with  $a$  is  $F$ , jointly explains  $a$  is  $G$ .

Given BSA, whether All  $F$ s are  $G$ s is a law is determined by what the best systems are, which is in turn determined by what things there are and how those things are. As a result, given BSA, whether All  $F$ s are  $G$ s is a law is determined by  $a$  is  $G$ , together with many other particular matters of fact, plus plausibly a totality fact (where a totality fact is a fact expressed by a sentence of the form ' $\forall x(x = a_1 \vee x = a_2 \vee \dots)$ ').<sup>8</sup> As a result, given BSA, it is plausible that the fact that All  $F$ s are  $G$ s is a law is jointly explained by  $a$  is  $G$ , together with many other particular matters of fact and a totality fact. Hence  $a$  is  $G$  partly explains the fact that All  $F$ s are  $G$ s is a law. Given  $a$  is  $G$  partly explains the fact that All  $F$ s are  $G$ s is a law, however, it follows from (A) that this fact fails to partly explain  $a$  is  $G$ .

<sup>7</sup>I will also suppose that the predicates  $F$  and  $G$  express sparse properties. (See footnote 3.)

<sup>8</sup>I will take a particular matter of fact to be a fact expressed by a sentence of the form ' $\ulcorner Ra_1 \dots a_n \urcorner$ ', where  $R$  expresses a sparse property, and  $a_1, \dots, a_n$  are names for concrete objects.

A. If  $f$  partly explains  $g$ , then  $g$  does not partly explain  $f$ .

Hence, the law that all  $F$ 's are  $G$ 's does not partly explain  $a$  is  $G$ , which conflicts with (1). Hence, given BSA, laws fail to partly explain their instances. Since laws do partly explain their instances, and since BSA is the best Humean account of natural laws, it follows that Humeanism about natural laws is false.<sup>9</sup>

In this paper I will argue that the objection from explanation against Humeanism fails. In section 2, I will first reject a recent influential response to the objection that appeals to the distinction between scientific and metaphysical explanation. In section 3, I will then put forward what I take to be the correct response to the objection before discussing a variant of the objection in section 4 and arguing that it also fails. As well as defending Humeanism from the objection from explanation, these two sections will also provide an answer to the important question of what explanatory relations Humeans should think nomic facts, regularities, and their instances stand in to each other. I will then finish with a brief conclusion in section 5.

## 2 Loewer's response

Barry Loewer has defended Humeanism from the objection from explanation by claiming that there are two ways in which one fact can explain another fact: a fact can explain another fact by *scientifically* explaining it, or it can explain it by *metaphysically* explaining it. He characterises the difference between these two types of explanation as follows:

The relevant kind of metaphysical explanation is one in which a type of fact—say mental facts—is shown to be grounded in or constituted by some other kind of fact—say neurological fact. Metaphysical explanation need not involve laws and the explanandum and explanans must be co-temporal (if the explanans is a temporal fact or property). Scientific explanation of a particular event or fact need not show that it is grounded in a more fundamental event or fact but rather, typically, shows why the event occurred in terms of prior events and laws. (Loewer, 2012, p. 131)

According to Loewer,  $f$  can both partly explain  $g$  and be partly explained by  $g$ , provided the way in which  $f$  partly explains  $g$  and the way in which  $g$  partly explains  $f$  are different. In particular, while he thinks (A-s) and (A-m) are both valid, he thinks (A) is invalid.

A-s. If  $f$  partly scientifically explains  $g$ , then  $g$  does not partly scientifically explain  $f$ .

A-m. If  $f$  partly metaphysically explains  $g$ , then  $g$  does not partly metaphysically explain  $f$ .

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<sup>9</sup>One way a Humean might respond to the objection from explanation is to simply hold that laws don't help explain their instances. I will assume that this response is unsatisfactory, or at least that it would be better for Humeans if they weren't forced to hold this view.

Loewer thinks that laws partly scientifically explain (but don't metaphysically explain) their instances, while they are partly metaphysically explained by (but not scientifically explained by) their instances. Since this is consistent with (A-s) and (A-m), he thinks there is no conflict between Humeanism about laws and the fact that laws can partly explain their instances.<sup>10</sup> Unfortunately, there are three problems with Loewer's response, each of which plausibly shows that it is unsatisfactory. I will discuss each of these in turn.

## 2.1 Asymmetry

The first problem with Loewer's response is that, the fact (granting that it is a fact) that there are these different types of explanation does not, by itself, provide any reason to think (A) is invalid, and hence does not provide any reason to think that the application of (A) in the argument from explanation fails. For comparison, the fact that there are two types of proper parthood—proper parthood where one of the relata has a smaller volume than the other, and proper parthood where this is not the case—does not provide any reason to think proper parthood is not asymmetric. Similarly, the fact that we can draw a distinction between two types of explanation does not by itself provide any reason to think that explanation fails to be asymmetric. Moreover, no further reason to reject (A) is provided by Loewer's particular way of drawing this distinction. This is illustrated by the fact that, if we assume that all explanation is either scientific or metaphysical, and we slightly simplify his characterisation so that it holds that  $f$  partly metaphysically explains  $g$  only if  $f$  and  $g$  are co-temporal or both non-temporal, and that  $f$  partly scientifically explains  $g$  only if  $f$  is temporally prior to  $g$ , then his characterisation will entail (A) rather than refute it!<sup>11</sup>

Given the high intuitive plausibility of (A), what is needed to shed real doubt on (A) are independently plausible examples of facts  $f$  and  $g$ , where  $f$  partly scientifically explains  $g$  while  $g$  partly metaphysically explains  $f$ . Elizabeth Miller has recently suggested that the following is such an example:

Consider a universe consisting of thirteen particles and fluctuating between two

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<sup>10</sup>Loewer's response to the objection from explanation is endorsed, for example, by Hicks and van Elswyk (2015).

<sup>11</sup>Given the simplification, if  $f$  metaphysically explains  $g$ , then  $f$  and  $g$  are either co-temporal or both non-temporal, and hence  $g$  is not temporally prior to  $f$ , and so does not scientifically explain it. Hicks and van Elswyk 2015, Sect. 2.2 claim that there are a number of different kinds of explanation, and that each of these different kinds of explanation is supported by a different 'backing relation'. They further claim that some of these backing relations fail to be asymmetric (indeed, they claim that some are symmetric), and that, as a result of this, the kinds of explanation that are supported by these backing relations also fail to be asymmetric. If these claims are true, then (A) is invalid. However Hicks and van Elswyk give no reason to think that there are any such backing relations, and the fact that their existence would conflict with (A) provides a good reason to think that there aren't any. The only relation they mention that they claim to be a backing relation and that fails to be asymmetric (at least on a standard understanding of the relation) is the supervenience relation. However, this relation is widely thought not to back explanation, precisely because it fails to be asymmetric, and Hicks and van Elswyk provide no reason to overturn this common judgement.

states,  $S_1$ , in which exactly seven of those particles are blue, and  $S_2$ , in which exactly seven are green. Suppose that, in both cases, every particle is either blue or green, but there are no further facts about which individual particles will be blue or green, except for this: whenever the universe is in state  $S_1$ , then at least one of  $a$  and  $b$  is among the seven blue particles. It seems we might offer a scientific explanation of the fact that  $a$  is blue in part by citing the fact that the universe is in state  $S_1$ . But, plausibly, the fact that  $a$  is blue still could help [metaphysically explain] the fact that the universe is in state  $S_1$ ; what it is for the universe to be in state  $S_1$  in this instance is for it to contain exactly seven blue particles, with  $a$  among them. (Miller, 2014, Sect. 4)

Miller's example, however, is not a convincing case of a failure of (A). While the fact that the universe is in state  $S_1$  epistemically supports the fact that  $a$  is blue, it is not clear why we should think that it explains why  $a$  is blue, anymore than the fact that it looks like someone is hungry explains the fact that someone is hungry, as opposed to merely epistemically supporting that fact.

It is also important to note that, even if Miller's example was a case where (A) convincingly fails, this would not provide much of a reason to think that the application of (A) in the objection from explanation also fails. Given its plausibility and utility, if there are pathological cases where (A) fails, then it is plausible that a restricted version of (A) which vindicates most of our applications of (A) will still be valid. Miller's example at most provides reason to restrict (A) so that it does not apply to probabilistic explanation, which is the kind of explanation involved in her example, but instead only applies to deterministic explanation, which is the kind of explanation involved in the objection from explanation. Unless we can find an example that undermines the application of (A) in the objection from explanation, Loewer's response to the objection from explanation therefore appears unsuccessful.<sup>12</sup>

## 2.2 Lange's transitivity principle

The second problem with Loewer's response is that, as Marc Lange has recently pointed out, it is possible to modify the objection from explanation so that it does not rely on (A),

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<sup>12</sup>Ironically, the strongest challenge to (A) doesn't involve the interaction of scientific explanation and metaphysical explanation, but instead concerns purely scientific explanation. If time travel is possible, as a number of philosophers believe, it might be possible to have causal loops where, for example, an older time traveller, travels back in time to give the blueprint of his time machine to his younger self, who then uses it to build his time machine. (See Lewis (1979) and Wilson (MS).) If such a causal loop is possible, then (A) is invalid, since, given the causal loop, the construction of the time machine is explained by the appearance of the blueprint, which is in turn explained by the construction of the time machine. Since time travel cases are so different from the case involving Humean laws and their instances, however, if (A) fails due to such causal loops, and there are no other independently plausible counterexamples to (A), there is no reason to think that (A) cannot be restricted so that its restriction can be validly applied in the objection from explanation. The existence of causal loops, by itself, therefore, isn't sufficient to vanquish the objection from explanation. Barnes (MS) has also suggested that there are counterexample to (A) concerning purely metaphysical explanation, although her examples are arguably much less compelling.

but instead relies on the transitivity principle (T\*) that explicitly recognises the distinction between scientific and metaphysical explanation.<sup>13</sup>

T\*. If  $f$  partly metaphysically explains  $g$ , and  $g$  partly scientifically explains  $h$ , then  $f$  partly scientifically explains  $h$ .

Lange argues in favour of (T\*) by providing several plausible examples of scientific and philosophical arguments that appear to rely on (T\*). Two of Lange's examples are the following:

[S]uppose that a given balloon expands because of various laws and the fact that the pressure of the gas inside the balloon is greater than the atmospheric pressure outside of the balloon. Then since the fact that the internal pressure is greater than the external pressure is grounded in the value of the internal pressure and the value of the external pressure, it follows from [(T\*)] that the internal and external pressures help to scientifically explain why the balloon expands ... The internal pressure, in turn, is grounded in the forces exerted by various gas molecules as they collide with the balloon's interior walls. By [(T\*)], then, those forces help to scientifically explain why the balloon expands. (Lange, 2013, p. 257)

[A] coin's chance of landing heads explains its actual relative frequency of landing heads, so if the chance were grounded in the actual relative frequency, then [as (Hájek, 1996, p. 79) argues] the actual relative frequency would have to explain itself, which it cannot do. (Lange, 2013, p. 257)

The objection from explanation can be reformulated using (T\*) as follows: Given Humeanism, laws are partly metaphysically explained by their instances. If laws also partly scientifically explain their instances, then, by (T\*), laws partly scientifically explain themselves. Since nothing can partly scientifically explain itself, it follows that laws cannot partly scientifically explain their instances given Humeanism about laws. Since laws *can* partly scientifically explain their instances, it follows that Humeanism about laws is false.<sup>14</sup>

Michael Townsen Hicks and Peter van Elswyk have proposed counterexamples to (T\*), as has Miller. Hicks and van Elswyk discuss the following case involving an electron that is part of a lion:

The position of electron  $e$  partly metaphysically explains the position of lion  $L$ . The position of  $L$  scientifically explains the number of prey animals in region  $R$ . But the position of electron  $e$  does not explain the number of prey animals in region  $R$ . For if the electron were elsewhere,  $L$  would still be warding prey animals out of  $R$ . (Hicks and van Elswyk, 2015, pp. 437-8)

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<sup>13</sup>See (Lange, 2013, p. 256).

<sup>14</sup>As (Miller, 2014, Sect. 4) points out, Lange's reformulation of the objection from explanation can be modified so that it doesn't rely on the claim that nothing can scientifically explain itself. This can be done by noting that, given (T\*), and given the law All  $F$ s are  $G$ s partly scientifically explains, and is partly metaphysically explained by, its instances, it follows from  $a$  and  $b$  both being  $F$  that  $a$  is  $G$  partly scientifically explains  $b$  is  $G$ , which is not generally true.

This case, however, is hardly a convincing counterexample to (T\*), since the counterfactual principle (CD) Hicks and van Elswyk rely on is not valid.

CD. If  $f$  partly scientifically explains  $g$  then, had  $f$  not obtained,  $g$  would not have obtained.

(CD) can fail, for example, in a case where a man is simultaneously shot by three bullets that jointly kill him. In such a case, the fact that bullet 1 is fired partly scientifically explains the fact that the man dies, since this fact, together with the fact that bullet 2 is fired, the fact that bullet 3 is fired, and some more facts jointly scientifically explain the fact that the man dies. However, it is still the case, we may suppose, that, had the bullet 1 not been fired, the man would still have died due to the firing of the other two bullets.

The situation in the example Hicks and van Elswyk describe seems relevantly similar. The fact that  $e$  has a certain position, together with facts about the other properties of  $e$ , and facts describing the properties of all the other particle parts of  $L$  and all the other lions in region  $R$  and how they are related to each other may scientifically explain the number of prey animals in region  $R$ , even though, had  $e$  been elsewhere, the number of prey animals in  $R$  would have been the same. If so, then the location of  $e$  does partly explain the number of prey animals in  $R$ , and the example fails to be a counterexample to (T\*).<sup>15</sup>

Miller discusses the following case involving James the snail.<sup>16</sup> Suppose  $p$  and  $q$  are both atomic parts of James the snail,  $l$  is a location property, and  $B$  is a biological property. Suppose that the fact that  $p$  has  $l$  at  $t_1$ , together with facts about the location of James's other atomic parts at  $t_1$  metaphysically explains the fact that James has  $B$  at  $t_1$ , which in turn scientifically explains the fact that  $q$  has  $E$  at  $t_2$ . Suppose also that  $B$  is a member of a plurality of mutually incompatible biological properties such that, for any  $B^*$  that is a member of this plurality,  $p$  having  $l$  at  $t_1$  is compatible with James having  $B^*$  at  $t_1$ . Finally, suppose that James having  $B$  at  $t_1$  is compatible with  $p$  not having  $l$  at  $t_1$ . Miller claims that, in this example, since  $p$  having  $l$  at  $t_1$  is compatible with James having a number of different incompatible biological properties, and since James having  $B$  at  $t_1$  is compatible with  $p$  failing to have  $l$  at  $t_1$ ,  $p$  having  $l$  at  $t_1$  does not scientifically explain  $q$  having  $E$  at  $t_2$ , and hence (T\*) fails in the example.

Miller's argument that (T\*) fails in her example relies on the validity of what might be called Miller's principle (MP).

MP. If  $f$  metaphysically explains  $g$ , and  $g$  scientifically explains  $h$ ,  $f$  does not scientifically explain  $h$  when

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<sup>15</sup>Despite Hicks and van Elswyk's claim to the contrary, their example above does not have the same "short-circuit" structure as the well known problematic cases for the transitivity of causation. (See Hall (2000).) As (Lange, 2013, Fn. 1) in effect points out, if there are examples having this structure that are counterexamples to (T\*), then a restricted version of (T\*) might still be able to be validly applied in Lange's version of the objection from explanation. Given the existence of such counterexamples, then, a proponent of Loewer's response would still have to make it plausible that no such restriction exists.

<sup>16</sup>Miller also proposes a counterexample to (T\*) involving statistical mechanics. Like the case of probabilistic explanation described in section 2.1, a defender of (T\*) might respond to this example by either denying that it is a genuine case of explanation or by restricting (T\*) to cases of deterministic explanation.



- (a)  $g$  is among a plurality of mutually incompatible states of affairs, all of whom are more general, or at a higher level, than  $f$ , and all of whom are compatible with  $f$  obtaining, and
- (b)  $g$  is compatible with  $f$  not obtaining.

It is not clear, however, why we should think that (MP) is valid.

One reason to doubt (MP) is that, if it were valid, it would not only entail that the James the snail example is a case where (T\*) fails, it would also entail that (T\*) fails in Lange's balloon example above, which was meant to illustrate the plausibility of (T\*). In Lange's example, facts about the various forces exerted by various gas molecules when they collide with the balloon's interior walls metaphysically explain what internal pressure the balloon has, which in turn partly scientifically explains the fact that the balloon expands. Each fact about these various forces is individually compatible with the balloon having a different internal pressure than the one it actually has, and hence is compatible with a plurality of more general facts including the fact describing the balloon's actual internal pressure. Since the fact describing the balloon's actual internal pressure is also compatible with the non-obtaining of any one of the facts about the various forces, it follows from (MP) that these facts do not scientifically explain the fact that the balloon expands. However, in Lange's example, these facts plausibly do scientifically explain the fact that the balloon expands.

Another principle Miller might appeal to in order to argue that (T\*) fails both in the James the snail case and in Lange's balloon case is (Sp), where  $f$  is more specific than  $g$  iff  $f$  necessitates  $g$  but is not necessitated by  $g$ .<sup>17</sup>

Sp. If  $f$  is more specific than  $g$ , and  $g$  explains  $h$ , then  $f$  does not explain  $h$ .

The rationale for (Sp) is that, if  $g$  explains  $h$ , and  $f$  is more specific than  $g$ , then  $f$  will be too specific to explain  $h$  since it will contain explanatorily irrelevant information. A plausible instance of (Sp) is the following. Suppose Suzy breaks a window at  $t_2$  by throwing a rock at it at  $t_1$ . The conjunction of the fact that Suzy throws a rock at  $t_1$  with a number of other facts then explains the fact that the window breaks at  $t_2$ . If we conjoin this conjunctive fact with another fact, say the fact that Suzy once ate pancakes, thereby obtaining a more specific fact, then the more specific fact will have some explanatorily irrelevant information, namely information about Suzy having eaten pancakes. As a result, the more specific fact will not explain the breaking of the window.<sup>18</sup>

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<sup>17</sup>Miller alludes to such a principle following her discussion of the James the snail example. A principle in the vicinity of (Sp) is entailed by the theory of explanation of Strevens (2008). See Lange (2012) for a criticism of Strevens's theory that is related to the criticism of (Sp) given below.

<sup>18</sup>If it is denied that the conjunction of the fact that Suzy breaks a window at  $t_1$  with a number of other facts explains the fact that the window breaks at  $t_2$ , but it is agreed that the fact that Suzy breaks a window at  $t_1$ , together with these other facts, jointly explain the fact that the window breaks at  $t_2$ , then this result can instead be obtained from the generalisation of (Sp) given by (Sp\*).

Sp\*. If the conjunction of  $f_1, \dots, f_n$  necessitates the conjunction of  $g_1, \dots, g_m$ , but not vice versa, and  $g_1, \dots, g_m$  jointly explain  $h$ , then  $f_1, \dots, f_n$  do not jointly explain  $h$ .

If (Sp) is valid then it can be used to show that (T\*) fails in both the James the snail example and Lange’s balloon example. In the James the snail example, for instance, if the location of  $p$  at  $t_1$  partly explains  $q$  having  $E$  at  $t_2$ , then it must be that the location of  $p$  at  $t_1$  conjoined with a number of other microscopic facts explains  $q$  having  $E$  at  $t_2$ . Since this conjunction necessitates the fact that James is in  $B$  at  $t_1$  but is not necessitated by it, however, and since the fact that James is in  $B$  at  $t_1$  explains the fact that  $q$  is in  $E$  at  $t_2$ , it follows from (Sp) that this conjunction does not explain the fact that  $q$  is in  $E$  at  $t_2$ . Hence, the location of  $p$  at  $t_1$  does not partly explain the fact that  $q$  is in  $E$  at  $t_2$ , which entails that (T\*) fails. A similar argument shows that, given (Sp), (T\*) fails in Lange’s balloon example as well.

If (Sp) is valid, then, (T\*) fails in both the James the snail example and Lange’s balloon example, and Lange’s modified objection from explanation is greatly undermined. There are reasons, however, to suspect that it is (Sp) that fails to be valid rather than (T\*). First, the fact that (Sp) entails that the facts about the forces in Lange’s example do not explain the expansion of the balloon provides some reason to reject (Sp), since, as noted above, the claim that they do explain this fact is *prima facie* plausible. Second, and more importantly, (Sp) seems to have clear counterexamples. For example, (Sp) not only entails that the fact that Suzy threw a rock at  $t_1$  and once had pancakes fails to help explain the fact that the window broke at  $t_2$ , (Sp) also entails that the fact that Suzy threw the rock at  $t_1$  does not help explain this fact either. The reason for this is the following. If the fact that Suzy threw a rock at  $t_1$  did help explain this fact, then the conjunction of this fact about Suzy throwing the rock at  $t_1$  plus some other facts should explain this fact. However, given (Sp), this conjunction doesn’t explain this fact, since there is a less specific fact that does explain it, namely the purely existential fact that someone having such and such properties throws a rock at  $t_1$ . Hence, given (Sp), while the fact that there is something that throws a rock at  $t_1$  helps to explain the fact that the window broke at  $t_2$ , the fact that Suzy threw a rock at  $t_1$  does not. A Humean might bite the bullet at this point and claim that the fact involving Suzy does not strictly explain the fact that the window broke. However, it would clearly be better if Humeans could respond to the objection from explanation without being forced to make such a commitment.<sup>19</sup>

I will discuss one further kind of proposed counterexample which Hicks and van Elswyk put forward, and which involves a kind of causation they call “immanent causation”. Suppose there is immanent causation, where immanent causation is causation that “proceeds from an object not by way of the object’s parts, but from the object as a whole”

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(Sp\*) can similarly be used in place of (Sp) in the arguments below that (Sp) entails that (T\*) fails in the James the snail example and Lange’s balloon example, and that the fact that Suzy threw the rock at  $t_1$  does not help explain why the window broke at  $t_2$ .

<sup>19</sup>A Humean might instead respond by denying that the purely existential fact that someone throws a rock at  $t_1$  helps to explain why the window broke. Even if this denial is credible, however, in order to be consistent a Humean who adopts this response should presumably also deny that the relatively general fact that James has  $B$  at  $t_1$  scientifically explains the fact that  $q$  has  $E$  at  $t_2$ , and instead claim that it is the fact that  $p$  has  $l$  at  $t_1$ , together with other particular facts about the parts of James, that scientifically explain this fact. Such a Humean would therefore not be able to claim that (T\*) fails in the James the snail example.

(Hicks and van Elswyk, 2015, p. 439). Given there is such causation, we could have a case where microscopic facts about a macroscopic object metaphysically explains a macroscopic fact about that object, which is then causally responsible for another fact  $h$  that is not caused by the microscopic facts, and hence is arguably not scientifically explained by them. Hicks and van Elswyk do not give any specific example of such a case, but such an example might be the following. Suppose that, whenever something is a perfect solid sphere of 1 m radius the fact that it is a solid sphere of 1 m radius is causally responsible for each of its atomic parts going into state  $E$ , and suppose that this is always a case of immanent causation. Suppose  $x$  is a solid sphere of 1 m radius. Then, according to Hicks and van Elswyk, while the microscopic facts describing the locations of the atomic parts of  $x$  metaphysically explain the fact that  $x$  is a solid sphere of 1 m radius, which in turn scientifically explains each fact describing an atomic part of  $x$  being in state  $E$ , these latter facts are not scientifically explained by the former microscopic facts due to the lack of a causal connection between them. If this is the case, then (T\*) fails.

As a counterexample to (T\*), the above case has several problems. First, the case relies on the claim that immanent causation is possible, but it would be better if Humeanism could be defended without having to rely on such a controversial thesis. Secondly, the counterexample relies on a principle concerning scientific explanation such as (CSE), where ‘nomic connection’ is Hicks and van Elswyk’s name for the relation that backs explanation in the case where a natural law helps to explain one of its instances.

CSE. If  $f$  scientifically explains  $g$ , then  $g$  is either causally responsible for  $g$ , nomically connected to  $g$ , or a combination of these.

It is not clear, however, whether the distinction between scientific explanation and metaphysical explanation needs to be drawn so that (CSE), rather than for example (CSE\*), is true, where metaphysical grounding is a relation that backs metaphysical explanation.

CSE\*. If  $f$  scientifically explains  $g$ , then  $g$  is either causally responsible for  $g$ , nomically connected to  $g$ , or a combination of these, or a combination of one or both of these together with metaphysical grounding.

Finally, even if (T\*) fails due to the possibility of immanent causation and a principle like (CSE), Lange’s modified version of the objection from explanation can arguably be easily fixed to avoid this problem by replacing (T\*) with (T), which avoids the distinction between scientific explanation and metaphysical explanation altogether.

T. If  $f$  partly explains  $g$ , and  $g$  partly explains  $h$ , then  $f$  partly explains  $h$ .

(T) is supported by Lange’s examples just as much as (T\*).<sup>20</sup> If (T\*) faces problems due to where the precise division between scientific and metaphysical explanation should be drawn, Lange can therefore forsake the distinction and use (T) instead in formulating his version of the objection from explanation. Without more convincing counterexamples to

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<sup>20</sup>As a result, Lange’s examples also provide support for the original version of the objection from explanation, since (T) entails (A) given the fact that no fact can explain itself.

(T\*) (or to (T)), then, Loewer’s response to the objection from explanation again appears to be inadequate.<sup>21</sup>

## 2.3 Metaphysical laws

The final problem with Loewer’s response is that it does not apply to Humeans who wish to be Humeans about metaphysical laws as well as natural laws. Three possible examples of metaphysical laws are (P), (S) and (L).

P. For any  $xs$ , there is a mereological fusion of the  $xs$ .

S. For any  $xs$ , if there are finitely many  $xs$  then there is a set whose members are all and only the  $xs$ .

L. For any  $x$ , if  $x$  has location  $l$ , then  $\{x\}$  has location  $l$ .

According to Humeanism about metaphysical laws, the property expressed by ‘is a metaphysical law’ and the operator expressed by ‘it is a metaphysical law that’ can be expressed using only expressions that are not broadly explanatory. Humeanism about metaphysical laws is entailed by Humeanism about all broadly explanatory notions and is motivated by the same considerations that motivate Humeanism in general: namely, ideological parsimony and the avoidance of obscure or epistemically problematic primitives. It is therefore natural for Humeans about natural laws to also endorse Humeanism about metaphysical laws.

If there are metaphysical laws, such as (P), (S) and (L), a Humean about metaphysical laws needs to be able to explain how a fact like the fact ascribing lawhood to the fact expressed by (L) can be expressed using only expressions that are not broadly explanatory. The natural way of attempting to do this is to extend Lewis’s BSA so that it applies to metaphysical laws as well as natural laws. For example, a Humean might claim that the key difference between metaphysical laws and natural laws is that the former are necessary while the latter are contingent. They might then claim that the fact that  $p$  is a metaphysical law is the fact that  $p$  is a necessary regularity that is expressed by a theorem in every best system. Similarly, they might claim that the fact that  $p$  is a fundamental metaphysical

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<sup>21</sup>As noted in footnote 11, Hicks and van Elswyk claim that there are a number of different kinds of explanation, that these different kinds of explanation have different backing relations, and that these backing relations have radically different features, so that, for example, some are asymmetric while others are symmetric. They claim that this provides a “simple recipe” for constructing counterexamples to (T\*). Unfortunately, at least in my case, Hicks and van Elswyk fail to enumerate enough examples of relations they take to be backing relations for me to know how to apply their recipe, and, as noted in footnote 11, some of the examples they do give are commonly not thought to back explanation. The two products of the recipe they describe—the immanent causation case described above, and the case of explanation involved in the objection from explanation—do not help in this regard. Hicks and van Elswyk also argue that (T\*) is incompatible with Kim’s 1993 principle of causal exclusion and the anti-reductionism of Fodor 1974. Even if this is the case, however, it would be better if Humeans could respond to the objection from explanation without being committed to these controversial theses.

law is the fact that  $p$  is a necessary regularity that is expressed by an axiom in every best system.

Given a Humean endorses a best systems account of metaphysical laws along the above lines, she is going to face the same objection from explanation with respect to metaphysical laws as she faces with respect to natural laws. Given there are metaphysical laws, such laws can presumably help explain their instances just as much as natural laws can. For example, given (L) expresses a metaphysical law, this law, together with the fact that Dan has location  $l$ , presumably explains the fact that {Dan} has location  $l$ . A best systems type account of metaphysical laws, however, just like the best systems account of natural laws, plausibly entails that what the metaphysical laws are is partly explained by the instances of those laws. Hence, we have the same conflict as we have in the case of natural laws: metaphysical laws partly explain their instances, but, given Humeanism, they appear unable to do this. In this case, however, Loewer's response to this conflict appears clearly inadequate, since metaphysical laws presumably help metaphysically explain their instances rather than merely help scientifically explain them.

### 3 A better response

I argued in section 2 that Loewer's response to the objection from explanation against Humeanism, which involves distinguishing between scientific and metaphysical explanation, and rejecting (A), (T\*) and (T), is unsuccessful. In this section, I will argue that, fortunately for Humeans, there is a more straightforward response that is successful. Instead of distinguishing between two kinds of explanation, this better response merely distinguishes between regularities, such as All  $F$ s are  $G$ s, and facts that ascribe lawhood to regularities, such as the fact that All  $F$ s are  $G$ s is a law. The former kind of facts are distinct from the latter kind of facts since, at least if the former are contingent, the former can obtain without the latter obtaining. With the distinction between these two kinds of facts firmly in mind, Humeans can respond to the objection from explanation as follows.

Given BSA, whether All  $F$ s are  $G$ s is a law is determined by what the best systems are, which in turn is determined by  $a$  is  $G$ , together with a multitude of other particular matters of fact and a totality fact. As noted in section 1, it plausibly follows from this that  $a$  is  $G$  partly explains the fact that All  $F$ s are  $G$ s is a law. However, as pointed out above, the fact that All  $F$ s are  $G$ s is a law is distinct from the fact All  $F$ s are  $G$ s. Hence, it does not follow from it being the case that  $a$  is  $G$  partly explains the fact that All  $F$ s are  $G$ s is a law that  $a$  is  $G$  partly explains All  $F$ s are  $G$ s. Hence there is no conflict with (A) in accepting that  $a$  is  $G$  partly explains the fact that All  $F$ s are  $G$ s is a law, while also holding that All  $F$ s are  $G$ s partly explains  $a$  is  $G$ . Since Humeans think that it is the regularity All  $F$ s are  $G$ s that is the law that all  $F$ s are  $G$ s, rather than the second order fact that All  $F$ s are  $G$ s is a law, there is therefore no problem with Humeans holding that the law that all  $F$ s are  $G$ s partly explains  $a$  is  $G$ .

On this response to the objection from explanation, Humeans should accept the following two claims. First, laws are certain regularities, such as All  $F$ s are  $G$ s, and these regular-

ities partly explain their instances but are not partly explained by their instances. Second, higher order facts that ascribe lawhood to other facts, such as the fact that All  $F$ s are  $G$ s is a law, aren't themselves laws, don't partly explain the instances of their associated laws, but are rather partly explained by those instances. Given these two claims, there is no incompatibility between laws partly explaining their instances, their instances partly explaining higher order facts ascribing lawhood to laws, and the principle of asymmetry (A). As a result, the conflict alleged by the objection from explanation is resolved.

The claim that facts ascribing lawhood to laws don't partly explain the instances of those laws might at first seem counterintuitive, since (2) might at first seem plausible.

2. The fact that All  $F$ s are  $G$ s is a law, together with  $a$  is  $F$ , explains  $a$  is  $G$ .

While the above response provides a simple resolution to the apparent conflict between laws explaining their instances, the instances of laws determining what the laws are, and (A), the fact that the response requires rejecting (2) might be thought to provide a good reason to reject the response. A Humean who endorses the response, however, can make the following two points.

First, there is a good reason to think that, provided they endorse BSA, any Humean, no matter how they respond to the objection from explanation, should reject (2). Given BSA, the fact that All  $F$ s are  $G$ s is a law is the fact that All  $F$ s are  $G$ s is expressed by a theorem in every eligible true deductive system that achieves the best combination of strength and simplicity. In short, given BSA, the fact that All  $F$ s are  $G$ s is a law is the fact that All  $F$ s are  $G$ s is expressed by a theorem in every best axiomatization of all the particular matters of fact. The latter fact, however, does not seem to be of the right kind to be able to help to explain any particular matter of fact, since facts of the form 'the fact that  $p$  is expressed by a theorem in every best axiomatization of facts of type  $T$ ' plausibly cannot help to explain any fact of type  $T$ . The claim that this fact cannot help to explain any particular matters of fact can be bolstered, given (A), by the similarly plausible claim that this fact is explained by particular matters of fact. However, even without (A), and hence even without this extra support, the claim remains highly plausible. In other words, even if  $p$  can help to explain  $q$ , even though  $q$  helps to explain  $p$ , the above case appears not to be an instance of this. Hence, given BSA is the best Humean theory of laws, Humeans should arguably reject (2), even if they also reject principles like (A) and (T).

Second, Humeans can give the following plausible argument that they incur no significant cost in rejecting (2).<sup>22</sup> Humeans should admit that there is a traditionally important

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<sup>22</sup>Helen Beebe 2000, Sect. 4 has argued that it is not a conceptual truth that laws "govern" their instances. Beebe's argument can be adapted to produce an argument in the vicinity of the argument given here that (2) is not a conceptual truth. If Beebe is right, Humeans need to endorse this argument in order to respond to anti-supervenience arguments against Humeanism put forward, for example, by Tooley (1977), Carroll (1994) and Menzies (1993). It is not entirely clear what Beebe means by "laws governing their instances". On one interpretation that is suggested by some, but not all, of what Beebe says, a law  $L$  governs an instance  $q$  iff the fact that  $L$  is a law partly explains  $q$ . (This interpretation of 'governing' is adopted, for example, by (Sider, 2011, p. 270).) Given this interpretation, Beebe's denial that laws govern their instances is just the denial of (2).

and still influential concept of lawhood on which (2) is true. This is the concept of lawhood on which lawhood requires a divine lawmaker. On this concept of lawhood, the fact that it is a law that  $\varphi$  is the fact that God commands that  $\varphi$ . Since God is omnipotent, if God commands that all  $F$ s are  $G$ s, then the fact that God makes this commandment explains why all  $F$ s are  $G$ s, and hence explains why  $a$  is  $G$  given  $a$  is  $F$ . Hence, on the divine lawmaker concept of lawhood, the fact that it is a law that all  $F$ s are  $G$ s partly explains the instances of the law that all  $F$ s are  $G$ s. Hence, given the identification of the fact that it is a law that all  $F$ s are  $G$ s with the fact that All  $F$ s are  $G$ s is a law, it follows that, on the divine lawmaker concept, the fact that All  $F$ s are  $G$ s is a law does partly explain  $a$  is  $G$ , just as (2) claims.<sup>23</sup>

Humeans, however, do not aim at giving an analysis of the divine lawmaker concept of lawhood. Instead, they aim to give an analysis of the concept of lawhood that those who wish to have a concept of law not involving God either do, or should, adopt. Hence, the fact that (2) is true on the divine lawmaker concept does not entail that Humeans should not reject (2). Moreover, the fact that the divine lawmaker concept remains influential, that (2) is true on the divine lawmaker concept, and that people who officially reject the divine lawmaker concept aren't always clear about this rejection or about what concept they are employing in its place, provides an explanation for why (2) might seem true, even to those who officially wish not to employ the divine lawmaking concept.

Humeans can also claim that those who don't employ the divine lawmaker concept of lawhood either do employ, or should employ, a concept of lawhood according to which laws are those things that play all of the most important roles laws play in science, such as supporting counterfactuals, constraining physical possibility, and helping to explain particular matters of fact. Humeans can then claim that the things that play these roles are the things that are laws according to BSA.<sup>24</sup> Since being such that the fact ascribing lawhood to one partly explains one's instances is not an important role laws play in science, Humeans can therefore claim that they incur no significant cost in rejecting (2).<sup>25</sup>

While Humeans cannot allow facts about which facts are laws to partly explain the instances of those laws, it is important to note that they can easily account for the fact that scientists are interested in such facts: Scientists are interested in knowing such facts as the

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<sup>23</sup>As Beebe 2000 points out, the idea that laws of nature represent something like God's cosmic plan for the universe is an old and still pervasive one, even among leading contemporary scientists such as Hawking (1988). See Wertheim (1997) for more discussion.

<sup>24</sup>See (Beebe, 2000, pp. 576-7), for example, for an explanation of how BSA can account for the fact that laws support counterfactuals and constrain physical possibility.

<sup>25</sup>An anti-Humean might claim that the concept of lawhood we should adopt is one according to which laws are those things that satisfy (2) as well as satisfying the most important roles laws are meant to play in science. A Humean, however, can claim that, on this concept, there are no laws, and that this is a good reason not to adopt this concept. An anti-Humean might instead claim that we have a primitive concept of lawhood that cannot be elucidated in terms of God's commandments or the roles laws are meant to play in science, that (2) is true on this concept, and that we have good reasons to think that, given this concept, there are laws. The claim that our concept of lawhood is primitive in this way, however, is much less credible than corresponding claims about other concepts such as the concept of causation, and a Humean can simply reject it.

fact that All  $F$ s are  $G$ s is a law because they want to know what the laws are, and they want to know what the laws are because laws are explanatorily powerful. Moreover, although Humeans cannot allow facts about which facts are laws to partly explain the instances of laws, they can allow such higher order facts to play another important explanatory role. In particular, they can claim that, while the fact that All  $F$ s are  $G$ s is a law cannot partly explain  $a$  is  $G$ , it can partly explain why All  $F$ s are  $G$ s partly explains  $a$  is  $G$ . In defence of this claim, they can claim that the fact that All  $F$ s are  $G$ s is a law necessitates that All  $F$ s are  $G$ s explains  $a$  is  $G$  when combined with  $a$  is  $F$ . They can also point out that, if All  $F$ s are  $G$ s was not a law, then, if it obtained at all, it would only be an accidental regularity, and hence would not be able to combine with  $a$  is  $F$  to explain  $a$  is  $G$ . They might then claim that this provides a good reason to think that it is only because All  $F$ s are  $G$ s is a law that All  $F$ s are  $G$ s can combine with  $a$  is  $F$  to explain  $a$  is  $G$ , and so conclude that there is good reason to think that the fact that All  $F$ s are  $G$ s is a law partly explains why All  $F$ s are  $G$ s partly explains  $a$  is  $G$ .

Given Humeans hold that facts that ascribe lawhood to laws can explain the ability of those laws to partly explain their instances, they can give a further reason why (2) might seem true, even though it is false. (2) might seem true since we might fail to distinguish between a fact explaining another fact and a fact explaining why a related lower order fact explains a further fact.<sup>26</sup> That is, (2) might at first seem true because we fail to distinguish it from the true (3).

3. The fact that All  $F$ s are  $G$ s is a law partly explains the fact that (All  $F$ s are  $G$ s, together with  $a$  is  $F$ , explains  $a$  is  $G$ ).

Since it is easy to confuse (3) with (2), or to falsely infer (2) from (3), the fact that (3) is true provides a good explanation for why (2) might at first seem true, even to someone who transparently disavows the divine lawmaker concept of lawhood.

To sum up: Humeans have a straightforward response to the objection from explanation. While it is true that, given Humeanism, facts about what regularities are laws cannot help to explain the instances of those laws, this does not prevent the laws themselves from explaining those instances. Humeans, then, can allow laws to help explain their instances.<sup>27</sup>

<sup>26</sup>I am indebted to Alex Skiles for suggesting an explanation along these lines in personal correspondence.

<sup>27</sup>(Miller, 2014, Sect. 5) suggests a response to the objection from explanation that is in some respects similar to the response urged here, but which also differs in important respects. Simplifying slightly, according to what Miller calls the contrarian Humean response, a Humean should deny that laws are metaphysically explained by their instances, and should instead claim that particular matters of fact are metaphysically explained at least partly by the conjunction  $C$  of all particular matters of fact (plus perhaps a totality fact), and possibly also partly metaphysically explained by the laws. On this response, Humeans should also deny that particular matters of fact metaphysically explain  $C$ , and claim that facts that ascribe lawhood to laws do partly explain the instances of those laws, although they do not partly explain the laws themselves. There are two serious problems with Millers' contrarian Humeanism. First, it conflicts with the principle that a highly complex fact cannot metaphysically explain a much simpler fact, since it holds, for example, that the highly complex  $C$  can explain simple particular matters of fact, where this explanation is presumably metaphysical since it involves a conjunction explaining one of its conjuncts. Secondly, it doesn't resolve the objection from explanation, since it doesn't resolve the clash with (A):



## 4 Fine's principle

Some philosophers might think that a variant of the objection from explanation poses a greater threat to Humeanism than the version considered in the previous three sections. Instead of appealing to features of BSA, as the original version does, the variant objection appeals to the principle that regularities are metaphysically explained by their instances, which is a principle that has recently been endorsed by Kit Fine. It is, in fact, this variant of the objection that Miller, as well as Hicks and van Elswyk, in effect address, rather than the original one.

The principle endorsed by Kit Fine is (FP), where ' $T(a_1, a_2, \dots)$ ' expresses the totality state of affairs that obtains iff  $a_1, a_2, \dots$  are all the things there are.<sup>28</sup>

FP. If  $a_1, a_2, \dots$  are all the things there are, then  $\varphi(a_1), \varphi(a_2), \dots$  and  $T(a_1, a_2, \dots)$  jointly metaphysically explain  $\forall x \varphi(x)$ .

The variant objection is the following. Suppose  $a$  is  $F$  and that it is a law that all  $F$ s are  $G$ s. Then (4) follows from (FP).

4. If  $a_1, a_2, \dots$  are all the things there are, then  $\neg Fa_1 \vee Ga_1, \neg Fa_2 \vee Ga_2, \dots$  and  $T(a_1, a_2, \dots)$  jointly metaphysically explain All  $F$ s are  $G$ s.

It follows from  $a$  being  $F$ , and it being a law that all  $F$ s are  $G$ s, that  $a$  is  $G$ . Since  $a$  is  $G$  metaphysically explains  $\neg Fa \vee Ga$ , it therefore follows from (4) and the transitivity of metaphysical explanation that  $a$  is  $G$  metaphysically explains All  $F$ s are  $G$ s. Hence, by (A), All  $F$ s are  $G$ s doesn't partly explain  $a$  is  $G$ . Hence, laws cannot partly explain their instances given Humeanism about laws, and hence Humeanism about laws should be rejected.

One problem with the variant objection is that, if it works, then it also raises problems for anti-Humean accounts of laws. According to typical anti-Humean accounts, laws aren't facts of the form All  $F$ s are  $G$ s, but are instead facts of the form It is a law that all  $F$ s are  $G$ s, where this fact might get identified with a fact like Being  $G$  is causally necessitated by being  $F$ .<sup>29</sup> Anti-Humeans also typically claim that laws like It is a law that all  $F$ s are  $G$ s help to explain both the regularity All  $F$ s are  $G$ s and the instance  $a$  is  $G$ , given  $a$  is  $F$ . It is natural for them to go further and hold that It is a law that  $\varphi$  directly explains  $\varphi$ , where  $f$  directly explains  $g$  iff i)  $f$  explains  $g$ , ii) there is no fact  $h$  such that  $f$  explains  $h$ , and  $h$  explains  $g$ . Given this, it is natural for anti-Humeans to hold that It is a law that all  $F$ s are  $G$ s and  $Fa$  jointly explain  $Ga$  by virtue of the fact that It is a law that all  $F$ s are  $G$ s explains All  $F$ s are  $G$ s, and the fact that All  $F$ s are  $G$ s and  $Fa$  jointly explain  $Ga$ . However, this natural claim for an anti-Humean to make conflicts with the combination of (FP) and (A).

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Given BSA, facts that ascribe lawhood to laws are plausibly explained by the instances of those laws. But according to contrarian Humeanism, the former facts explain those instances.

<sup>28</sup>See (Fine, 2012, p. 62). Fine's notion of a totality fact is slightly different from that defined in section 1. For Fine,  $T(a_1, a_2, \dots)$  is not identical to  $\forall x(x = a_1 \vee x = a_2 \vee \dots)$ , although it is necessarily equivalent to it.

<sup>29</sup>See Armstrong (1983).

The reason for this is that it follows from (FP) that *a* is *G* partly explains All *F*s are *G*s, which is impossible given (A) and the fact that All *F*s are *G*s partly explains *a* is *G*. If (FP) is valid, then, both Humeans and anti-Humeans have difficulty allowing laws to partly explain their instances.<sup>30</sup>

The other problem with the variant objection is that it is unclear why we should believe (FP), especially given Fine (and also Hicks and van Elswyk who also endorse a version of the principle) do not give any argument for it. In particular, it is not clear why we should think *a* is *G* partly explains All *F*s are *G*s as (FP) dictates, as opposed to thinking that All *F*s are *G*s and *a* is *F* jointly explain *a* is *G*. Given (A), we need to choose between these options. However, *prima facie*, the first option is not more plausible than the second option.

One reason Fine might give for endorsing (FP) is that it allows a simpler account of the principles that govern metaphysical explanation. It is plausible to think that purely accidental regularities are explained by their instances rather than the other way round. For example, if there are only two people, Jack and Jill, that own exactly 217 pairs of shoes and they each have 20 cents in their pocket, then the accidental regularity expressed by ‘Everyone who owns exactly 217 shoes has 20 cents in their pocket’ is plausibly explained in terms of particular matters of fact about Jack and Jill, rather than vice versa. (FP), then, plausibly works for accidental regularities, and so simplicity considerations might be thought to suggest that it should work for all regularities. This small gain in simplicity, however, comes at a terrible cost in terms of explanatory parsimony, and hence in terms of overall simplicity. If laws can partly explain their instances then a vast number of particular matters of fact can plausibly be explained in terms of a much smaller number of particular matters of fact, together with a small number of laws. If (FP) is true, on the other hand, and laws cannot partly explain their instances, then a vast number of particular matters of fact will instead have to be foundational, where a fact is foundational iff it is not explained by any other fact (and is not explanatorily trivial).<sup>31</sup> (FP) therefore plausibly entails there being a much greater number of foundational facts than there would be if (FP) was false, and this great increase in explanatory bruteness greatly outweighs the small increase in simplicity in the principles governing explanation that (FP) provides. Therefore overall simplicity considerations provide no support for (FP). As a result of this, and the fact that it lacks any intuitively compelling support, Humeans and anti-Humeans should both reject (FP).

Given Humeans and anti-Humeans reject (FP), what account of what explains universal facts should they endorse in its place? In the case of Humeanism, an attractive alternative to (FP) is the following. If a universal fact is a law then it is either foundational (if it is

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<sup>30</sup>(Hicks and van Elswyk, 2015, p. 435) also argue that anti-Humeans face a conflict with (A) given a principle like (FP). Their argument, however, relies on the premise that laws are regularities, which many anti-Humeans will reject.

<sup>31</sup>A fact is explanatorily trivial iff it is explained but is not explained either singly or collectively by any facts. An explanatorily trivial fact is analogous to a theorem in a logical system that is not an axiom and that can be derived using the system’s inference rules without applying those inference rules to any of the axioms. Cf. (Fine, 2012, p.47).

a fundamental law), or it is metaphysically explained by other laws (and perhaps by some other facts that are expressed by axioms in every best system). If a universal fact is not a law, on the other hand, then it either metaphysically explained by its instances in the way (FP) claims, or it is metaphysically explained by a combination of laws, facts expressed by axioms in every best system, and instances. Anti-Humeans can similarly claim that a universal fact  $\forall x\varphi(x)$  is metaphysically explained by the fact that it is a law that  $\forall x\varphi(x)$ , given it is a law that  $\forall x\varphi(x)$ , and is otherwise metaphysically explained by its instances as (FP) dictates or by a mixture of particular matters of fact and laws.<sup>32</sup>

Humeans, therefore, can respond to the variant objection from explanation by arguing that both Humeans and anti-Humeans should reject Fine's principle (FP) and instead endorse a more sophisticated account of what explains universal facts which distinguishes between those that are laws and those that are mere regularities.

## 5 Conclusion

I have argued that Humeans about laws can successfully respond to both the objection from explanation that relies on Lewis's best systems account of laws, and the variant of this objection that relies on Kit Fine's principle that holds that regularities are metaphysically explained by their instances. In order to respond to these objections, Humeans do not need to reject plausible principles governing explanation, such as the principles that explanation is asymmetric and transitive. Instead they need to get clear about what account of the explanatory structure of reality they should endorse. The account they should endorse is one on which the foundational explanatory facts consist of a relatively small number of fundamental laws and particular matters of fact. These explanatorily foundational facts can then be held to explain all the other facts, including all the other particular matters of fact and the second order facts that ascribe lawhood to laws. Universal facts, on this picture, are either foundational, if they are fundamental laws, or they are explained either by laws, or by particular matters of fact, or jointly by both of these kinds of facts. Endorsing this picture allows Humeans to respond to both the original objection from explanation and its variant. They can respond to the original objection from explanation by claiming that, while laws partly explain their instances, and their instances partly explain facts ascribing lawhood to laws, no explanatory circle results, since the latter facts do not partly explain either of the former facts. And they can respond to the variant objection from explanation by rejecting Fine's principle (FP) as being too simplistic and claiming that it is only accidental universal facts that are partly explained by their instances.

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<sup>32</sup>This anti-Humean account is in effect that given by (Rosen, 2010, Sect. 8). As Rosen notes in the anti-Humean case, if one believes in Finian essences, one might wish to add to these accounts by allowing that some universal facts are explained by essences. On some ways of drawing the distinction between scientific and metaphysical explanation, 'metaphysically explains' in these accounts might have to be replaced with just 'explains'.

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