

## *The oldest solution to the circularity problem for Humeanism about the laws of nature*

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**Abstract:** According to Humeanism about the laws, the laws of nature are nothing over and above certain kinds of regularities about particular facts (the “Humean mosaic”). Humeanism has often been accused of circularity: according to scientific practice laws often explain their instances, but on the Humean view they also reduce to the mosaic, which includes those instances. In this paper I formulate the circularity problem in a way that avoids a number of controversial assumptions routinely taken for granted in the literature, and against which many extant responses are therefore ineffective. I then propose a solution that denies the alleged Humean commitment that laws are explained by their instances. The solution satisfies three desiderata that other solutions don’t: it provides independent motivation against the idea that Humean laws are explained by their instances; it specifies the sense in which Humean laws are nonetheless “nothing over and above” their instances; and it gives an alternative account of what *does* explain the laws, if not their instances. This solution, I will argue, is not only the simplest but also the oldest one: it appeals only to tools and theses whose first appearance predates the earliest statements of the circularity problem itself.

### **1. The circularity problem for Humean laws of nature**

Humeanism about the laws of nature is often characterized as follows. At bottom, all there is is a “mosaic” of particular facts (just “one little thing after another”, as put by David Lewis (1986a: ix), Humeanism’s most influential contemporary defender). The laws are nothing but distinguished regularities about these facts. This picture can be contrasted with views that ascribe a more robust status to the laws, according to which they “govern”.<sup>1</sup> Humean laws don’t have this governing role: they are nothing over and above effective summaries of the Humean mosaic, to which they ultimately reduce. This is a very generic and rudimentary characterization of Humeanism, but it will do for now. I will be more careful later on in the paper.

Humeanism is often accused of an objectionable kind of circularity. An influential statement is due to Tim Maudlin:

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<sup>1</sup> For classic defenses of such views, see Dretske 1977, Tooley 1977, Armstrong 1983, and Maudlin 2007.

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. (2007: 172)

Similar complaints have been voiced by Armstrong (1983: 40), Bird (2007: 86), and others. The gist of the objection is that the Humean account suffers from a problematic kind of circularity: on the one hand, scientific practice indicates that laws often explain their instances, but on the other hand, the laws reduce to or are grounded in the Humean mosaic, which includes those instances. So, the laws both explain and are at least in part explained by their instances – an absurd result.

There are a number of familiar answers to the circularity objection. Most involve fine-grained distinctions between different types of explanation or tweaks on the formal constraints guiding the explanation relation. In this paper, I aim to give a much simpler response, which arguably deserves to be called the oldest response as it pre-dates the earliest formulation of the challenge itself: I will argue that when my preferred version of Humeanism, the Best System Account of Laws (BSA), is stated in full detail – when the metaphors are unpacked and the view's metaphysical commitments are made explicit – the problem simply doesn't arise. Thus, what I will give is really a dissolution of, rather than a solution to, the challenge.

The rest of the paper will go as follows. In section 2, I will give what I take to be the strongest statement of the circularity problem. This statement avoids a number of controversial assumptions routinely taken for granted in the literature, and for this reason many extant responses are ineffective against it. I will then flag the premise I reject and state three desiderata against any solution based on the rejection of that premise. In section 3, I will consider two recent answers to the circularity challenge, by Elizabeth Miller and Dan Marshall. Though these proposals anticipate aspects of my own view, I will argue that they fall short of fully addressing the challenge. In section 4, I will

present David Lewis's classic version of BSA in some detail. From this presentation, I will draw two conclusions. First, when advancing the BSA Lewis himself wasn't concerned with explaining the laws of nature; instead, he was interested in giving a reductive analysis of lawhood, much in line with the general method of analysis that has come to be known as the Canberra Plan. Second, those already sympathetic to Humean accounts of laws have good reasons to accept a number of supplementary theses about explanation that prevent the circularity problem from arising in the first place. These results, I will conclude in section 5, yield a solution to the circularity problem that meets the desiderata stated in section 2.

## **2. What is the circularity problem?**

While the literature on the circularity problem is sizeable, there is little consensus on what the problem *is*. Subtly different statements are present in the literature, and the extant solutions often exploit specific features of these formulations. I will henceforth understand the circularity problem as the following argument against Humeanism:

### **The Circularity Argument against Humeanism (CAH)**

P1) If Humeanism is true, the laws of nature are at least partially explained by their instances

P2) The laws of nature sometimes partially explain their instances

P3) If the laws are partially explained by and also sometimes partially explain their instances, there is widespread and systematic symmetric explanation in the world

P4) There is no widespread and systematic symmetric explanation in the world

So,

(C) Humeanism is false

The argument seems valid (though see below for some fine print). P1 is standardly understood as a commitment of Humeanism. Informally, the view is often stated as the claim that the laws “reduce to” or are “nothing over and above” the mosaic. But these are weasel words, and a fairly standard way to understand them today is in terms of non-causal explanation, typically (though not always) grounding. P2 is plausible given scientific practice, and P4 enjoys broad consensus among philosophers. Given that most scientific laws have lots of instances, P3 seems obviously true.

CAH has two major advantages over more familiar formulations. First, P1 and P2 are silent on the type of explanation at issue between the laws and their instances in either direction. Much of the literature is preoccupied with the type of explanation that the instance of a law bears to that law, how to distinguish that type of explanation from ordinary causal explanation, and how we should classify mixed explanations with both causal and non-causal components.<sup>2</sup> CAH sidesteps these difficulties: all it says is that, according to the Humean, on certain occasions laws *somehow* explain and are *somehow* partially explained by their instances. This way, the argument also doesn’t beg the question against theorists who object to the widespread practice of distinguishing different types of explanation according to the kind of explanatory relation underlying them.<sup>3</sup> What CAH does assume is that the word ‘explanation’ occurs with the same meaning throughout P1–P4, i.e. that the expression is not ambiguous between different *senses* of the word ‘explanation’. This claim is not only compatible with the popular idea that scientific and metaphysical explanation are different kinds of explanation but is in fact entailed by it. For the very statement of the thesis that scientific and metaphysical explanation are species of a general kind, explanation, presupposes that the word

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<sup>2</sup>The standard Humean view today is that laws are metaphysically explained by their instances (Loewer 2012: 131). Variants of this view classify these explanations as involving truthmaking (van Elswyk and Hicks 2015: 439) and constitution (Bhogal 2017: 448). See also Lange 2013, 2018 for chaining metaphysical and scientific explanations.

<sup>3</sup> See Schaffer 2016.

‘explanation’ expresses the same general notion in ‘scientific explanation’ and ‘metaphysical explanation’.<sup>4</sup> Moreover, the univocality of ‘explanation’ is a fairly standard view, supported by semantic evidence as well as methodological considerations that guide much of the scientific explanation literature.<sup>5</sup>

Another advantage of my formulation is that it doesn’t make substantive assumptions about the formal properties of the explanation relation. It has been routinely taken for granted that explanation is asymmetric and that the circularity objection is an attempt to show that Humeanism violates this constraint.<sup>6</sup> However, while the doctrine that explanation is asymmetric is popular<sup>7</sup>, it’s not universally accepted: putative counterexamples include causal explanations involving time-travel and puzzle cases about grounding.<sup>8</sup> It would be best to formulate the supposedly undesirable consequence of Humeanism without taking a stance on this dispute. My formulation does exactly that. If P2 and P3 are true, then mutual explanation is systematic and extremely widespread: presumably, it has as many examples as cases of laws explaining their instances. This should strike as

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<sup>4</sup> Both Hicks and Elswyk (2015) and Bhogal (forthcoming) go back and forth between saying that there are two kinds of explanation, metaphysical and scientific (or for Bhogal, ‘nomothetic’), and the different claim that the word ‘explanation’ is ambiguous between metaphysical and scientific senses. But as Marshall (2015: 3149) notes, the mere fact that there are two kinds of explanation and that the laws bear the one to their instances, which in turn bear the other one to the laws, doesn’t make the result of widespread mutual (or self-) explanation any more acceptable. Roski (2018: 1987) is also explicit that in order to deny P3 (or a premise playing a similar role in his version of the argument), the Humean has to say that ‘explanation’ is ambiguous; it’s not enough to distinguish different kinds of explanation.

<sup>5</sup> See Shaheen 2017 and Nickel 2010.

<sup>6</sup> See Lange 2013: 259, Miller 2015: 1317, and Bhogal forthcoming: 1.3. Roski (2018: 1993) focuses on the asymmetry of explanation, which entails irreflexivity.

<sup>7</sup> For explicit arguments for the asymmetry of explanation, see Schnieder 2015, Guigon 2015 and Kovacs 2018

<sup>8</sup> See Lewis 1976, Hanley 2004 and Meyer 2012 for the former and Fine 2010, Jenkins 2010, Bliss 2014, Correia 2014 and Rodriguez-Pereyra 2015 for the latter.

unacceptable even those who are willing to relax the asymmetry constraint in light of the puzzle cases. After all, run-of-the-mill explanations that work by subsuming particular phenomena under laws don't look anything like the tricky cases of time travel or the puzzles of ground.<sup>9</sup> Relatedly, CAH doesn't assume that explanation is transitive, either.<sup>10</sup> Since the transitivity of explanation has also been disputed<sup>11</sup>, it's a further advantage of my formulation that it doesn't presuppose it: rather, from the assumptions that some laws partially explain their instances and that the instances partially explain the laws we directly get a violation of asymmetry.

So much for stating the circularity argument against Humeanism.<sup>12</sup> It's noteworthy about my formulation that the most common ways of dealing with the circularity argument (distinguishing between different kinds of explanation and/or revising the formal properties of the explanation relation) don't even get off the ground against CAH. P3 is close to being analytic, and P4 is also extremely plausible. This leaves us with P1 and P2. While rejecting P2 shouldn't be ruled out in advance, it's an option to be taken as a last resort. The reason is that P2 derives its plausibility from scientific practice, whereas P1 is motivated by a philosophical account of laws that doesn't directly concern scientists. Since epistemic conditions are generally better in science than in philosophy, denying a popular philosophical claim is preferable to going against standard scientific practice. Accordingly, I will argue that Humeans should reject P1: Humeanism doesn't imply that the laws of nature are even partially explained by their instances.

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<sup>9</sup> See also Marshall 2015: 3150 for this point; cf. 2017: 2659 n5.

<sup>10</sup> For discussion of transitivity see Lange 2013, 2018, Hicks and van Elswyk 2015: 436, and Miller 2015: 1316–7, among others.

<sup>11</sup> See Schaffer 2012

<sup>12</sup> This is, at least, how I understand the *metaphysical* circularity problem, which is the main topic of the paper. Some authors have recently argued that Humeans also face a problem with *semantic* circularity (Roski 2018, Shumener 2019). In other work (Kovacs ms), I argue that this problem ultimately collapses into the metaphysical problem discussed here.

A Humean response to CAH based on the rejection of P1 needs to satisfy three desiderata. First, the Humean has to give independent motivation against P1. Second, she has to spell out the metaphysical connection between laws and their instances so as to justify often-heard slogans to the effect that the laws of nature “reduce to” and are “nothing over and above” the Humean mosaic. Third, she has to give an alternative story of what *does* explain the laws, if not their instances.

I will undertake this threefold task in section 4. I will first describe Lewis’s BSA in more detail and argue that it doesn’t imply anything like P1; then I will show that it satisfies the three desiderata. But before doing so, I need to discuss two recent responses to the circularity problem by Elizabeth Miller and Dan Marshall. While these views have much in common with the one I will develop in section 4, I will argue that they ultimately fail to address the strongest version of the circularity problem.

### **3. Ways of going ground-free**

I’m not the first to deny that Humean laws are grounded in their instances: Miller (2015) and Marshall (2015) adopt (or at least consider) similar responses to the circularity problem. In this section, I will briefly explain these responses and argue that, though instructive, they don’t fully address CAH.

#### *3.1. Miller: Groundless Humeanism*

In a recent paper, Elizabeth Miller considers a number of different responses to the circularity problem, each attacking different assumptions commonly attributed to Humeans. The one that is most relevant to us is what she calls “Groundless Humeanism”, which denies that the laws are grounded in their instances on the basis of a general skeptical stance about grounding. Miller notes that Lewis himself had a “distrust of fine-grained modal or hyperintensional notions” (2015: 1318)

and for this reason would not have been on board with most popular statements of the puzzle. A Lewis-inspired Humean will agree that the laws asymmetrically supervene on the mosaic but will reject a “more robust notion of grounding” and “robust relations of metaphysical dependence” (1319). But without such robust notions, Miller argues, the circularity problem doesn’t get off the ground.

Miller is clearly right that the currently popular grounding-based understanding of Humeanism is foreign to Lewis’s general metaphysical outlook. Nonetheless, her Groundless Humeanism says both too much and too little at the same time. It says too much in so far as it commits the Humean to a generic kind of grounding skepticism. Ideally, we should be able to find reasons to deny that laws are explained by their instances that don’t presuppose such a sweeping negative verdict on grounding-theoretic notions, even if Lewis himself would have been sympathetic to such a verdict.<sup>13</sup> In another way, the proposal also doesn’t go far enough. To prevent the circularity problem from arising, it’s not enough to deny that the laws and their instances instantiate some metaphysically robust relation of explanation. While Loewer, Lange and others do rely on such a relation when stating the problem, in the previous section we have seen that reliance on specific types of explanation is dispensable. All we need for CAH to be valid is a general notion of explanation. This notion could be as thin and metaphysically non-robust as you wish; the argument would still go through.

To drive this point home, it’s worth noting that in recent years a number of theorists offered deflationary notions of grounding and metaphysical explanation that dispense with the realist assumptions typically taken for granted in the grounding literature. These alternative accounts

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<sup>13</sup> In fairness to Miller, she does offer such reasons when presenting an alternative solution to the circularity problem, which she calls “Contrarian Humeanism”. In the present paper I focus only on Groundless Humeanism, which is closer to the account I will offer.



describe grounding as providing a kind of explanation that lacks robust metaphysical relations that would undergird it and may be part-epistemic or (in some cases) even observer-relative.<sup>14</sup> None of this is relevant to the puzzle as I stated it: if the laws explain their instances and the instances explain the laws, we have widespread mutual explanation – perhaps lightweight and metaphysically non-robust explanation, but mutual nonetheless.<sup>15</sup>

A further problem with Groundless Humeanism is that it doesn't meet desideratum (ii): it doesn't tell us in what sense Humeanism *is* a reductive account of the laws of nature. While it's helpful to be told that the laws asymmetrically supervene on the mosaic, this by itself doesn't make Humeanism a reductive account; as is well known, asymmetric supervenience isn't a sufficient condition of reduction. After all, the facts of pure mathematics also supervene on the Humean mosaic: there cannot be two worlds,  $w_1$  and  $w_2$ , that differ with respect to the facts of pure mathematics without differing with respect of the mosaic, for the boring reason that the facts of pure mathematics are necessary and so  $w_1$  and  $w_2$  cannot differ with respect to them, period. Generally, asymmetric supervenience imposes a kind of directionality on the putative reduction relata, but it shouldn't be assumed that its extension will automatically align with our intuitions about

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<sup>14</sup> See Dasgupta 2017, and Miller and Norton 2017, 2019 and Thompson 2019 for a few recent examples.

<sup>15</sup> A referee suggests that a genuinely observer-relative view of explanation would make P4 less plausible. I think that depends on how we understand P4 in an observer-relative framework. Suppose explanation is relativized to observers. Then it may indeed often be the case that A explains B relative to observer  $O_1$  and B explains A relative to observer  $O_2$ . However, what an observer-relativized version of P4 should deny is only that it's a common and systematic phenomenon that a law of nature and its instance explain each other *relative to the same observer*. (To keep the argument valid, the remaining premises should likewise be relativized to the same observer. The scope of the argument might need to be restricted to those who accept and understand the Humean view and grasp the explanations it offers, but the conclusion would still be damaging enough for Humeans.)

reduction.<sup>16</sup> For these reasons, while Miller’s Groundless Humeanism is a step in the right direction, it doesn’t adequately address CAH. We need to keep looking.

### *3.2. Marshall: laws and metanomological facts*

Marshall initially introduces Humeanism about the laws (and specifically, Lewis’s BSA) as a reductive analysis of lawhood – an aspect of his account that I will endorse and elaborate on in the next section. But he also concedes that the thesis that Humean laws are explained by their instances is *prima facie* plausible, and that anyone who rejects it owes an account of why the thesis seemed right in the first place and why it is nonetheless false. In the positive part of his paper, Marshall offers such an account. At its heart lies an important distinction between a law and the fact that it’s a law. The former, Marshall contends, is what Humeanism should identify as (special kinds of) universal generalizations. The latter, by contrast, is a second-order fact to the effect that this or that generalization is a law (following Miller 2015, I will call such facts *metanomological facts*). After drawing this distinction, Marshall argues that while both laws and metanomological facts satisfy one of the intuitions that jointly lead to the circularity problem, neither satisfies both of them.

First, while the laws play an important role in scientific explanations, metanomological facts are unlikely to do so. After all, laws (according to the BSA) are theorems in the best systematization of the Humean mosaic, but the fact that a generalization “is expressed by a theorem in every best axiomatization of all the particular matters of fact [...] does not seem to be of the right kind to be able to help to explain any particular matter of fact” (2015: 3158). Perhaps, Marshall adds, on a

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<sup>16</sup> As I earlier said ‘reduction’ is a weasel word, so in some specific contexts it might even be understood to mean reduction – viz. Lewis’s claim that a “supervenience thesis is [...] a stripped-down form of reductionism” (1983: 358). Nonetheless, I don’t think that (even asymmetric) supervenience is sufficiently fine-grained to capture the notion of reduction Humeans should care about.

“Divine Lawmaker” account of laws it’s more plausible that the lawhood of a general fact helps explain instances of that fact, but Humeans are on record for rejecting such accounts.

Second, Marshall contends that facts of the form [a is G] are parts of the mosaic and therefore play some role in explaining whether [all Fs are Gs] is the best systematization of the mosaic, and hence whether it is a law. In other words, according to Humeans (or at least BSA theorists) the instances of a law help explain the metanomological fact that the law in question is a law. However, he notes, this doesn’t mean that the instances also play a role in explaining the law itself. Humeans should therefore reject P1 and are free to endorse alternative accounts of how universal generalizations are grounded. His own proposal is to bifurcate the treatment of laws and non-law-like universal generalizations. Among the laws, some are fundamental while others are metaphysically explained by other laws and non-law-like axioms in the best system. By contrast, non-law-like universal generalizations are never fundamental and are explained by their instances, sometimes along with laws and non-law-like axioms in the best system (2015: 3163).

How well does this account do on our three desiderata? I’m happy to grant that it satisfies desideratum (iii), since it offers a positive account of what explains the laws (albeit not the account I favor – for more on this, see section 4). While Marshall doesn’t explicitly address the second desideratum (a specification of the sense in which Humean laws reduce to the mosaic), it’s not hard to see how such a story would go, and I suspect that he would be sympathetic to the account I will offer in the next section.

The main weakness of Marshall’s view lies in its failure to satisfactorily address the first desideratum: that of giving some independent justification for thinking that Humean laws aren’t explained by their instances. Now, when I say that he doesn’t give such a justification, I’m not claiming that he has no such justification available. In the next section I will argue that proponents of the BSA of laws (including Marshall) have the means to satisfy the first desideratum; my claim is

only that what Marshall does give by way of independent justification against P1 is not quite satisfactory. There are two moves in his paper that can be understood as offering such justification. The first is the abovementioned distinction between laws and metanomological facts: only laws (but not the corresponding metanomological facts) explain their instances, which in turn explain only the metanomological facts (but not the laws they are instances of). One can think of this as an error-theoretic explanation of the intuition that laws are explained by their instances: perhaps the thesis looked plausible because metanomological facts are indeed explained by instances of the laws they are about, and we are prone to confusing laws with metanomological facts.

However, even if this explanation is plausible, it solves the circularity problem only if Marshall is also correct that the metanomological facts play no role in scientific explanations (otherwise, the problem would reemerge in the form of metanomological facts and law-instances explaining each other). And this latter claim is questionable. In recent years, a number of authors defended the claim that metanomological facts play an important role in some scientific explanations, and their defenses in no obvious way rely on what Marshall calls the “Divine Lawmaker” theory. Miller (2015: 1330) argues (specifically on the Humean’s behalf) that explanation by metanomological facts is an acceptable type of scientific explanation. Emery (2019: sec. 3) makes a strong case that such explanations are common in scientific practice and rebuts a number of attempts to explain away this practice as unreflective of the goals of science. Since the jury is still out on metanomological explanations, it would be risky to base a solution to the circularity problem on the distinction between laws and metanomological facts.

Marshall’s second motivation for denying that laws are explained by their instances stems from considerations of simplicity and parsimony. The best reason for thinking that universal generalizations are grounded in their instances, he reasons, is that this would give us a fully general

grounding story of such generalizations, thereby raising the overall simplicity of our theory. Such increase 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 [universal generalizations are explained by their instances], 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...”

(Marshall 2015: 3163)

I'm sympathetic to Marshall's focus on simplicity, and in the next section I will argue on similar grounds (stemming from considerations about explanatory unification) that BSA theorists should deny that universal generalizations are explained by their instances. Nonetheless, I think the quoted passage does little by way of independently motivating the rejection of P1. To be clear, simplicity *does* play a role in why laws are widely taken to explain their instances. However, that laws can explain their instances for something like this reason is something we already knew; indeed, this is part of the usual setup of the circularity problem. Why should we think, *in addition*, that laws aren't also explained by their instances? Of course, that they aren't is something that logically follows from the claim that the laws sometimes explain their instances and that it's either the one way or the other. But in the absence of an account of why instance-based explanations are unparsimonious, saying this much amounts to little more than tollensing the circularity argument: due to simplicity considerations, laws explain their instances; but explanation is asymmetric; so, the laws cannot be explained by their instances; thus, since Humeanism is true, P1 has to be false. This is unlikely to convince those who already harbor doubts about Humeanism for circularity-related reasons.

Some may think that the Humean shouldn't have to give an independent argument against P1 since the premise (once we properly understand what the BSA says) just isn't plausible. In light of the brief recap I will give of BSA in the next section, I have some sympathy with this reaction. Yet it remains true that many philosophers (including self-described Humeans) do find P1 plausible. For this reason even if the absence of an independent argument against P1 isn't decisive, it would be preferable to have a story about why we ought to reject P1, based on general principles about explanation. I will offer such a story in the next section, along with a more general response to CAH that satisfies all three desiderata.

#### **4. Lewis's Best System Account: the oldest response to CAH**

The best-known Humean account of laws is David Lewis's BSA (also known as the Mill-Ramsey-Lewis account). Unfortunately, no particular work in the Lewis corpus is specifically dedicated to the BSA; the account can be reconstructed from scattered remarks across his various works on other topics.<sup>17</sup> The following is a fairly standard recap of his view.

The word 'law' may be used either for states of the world or for propositions (or sentences) that describe those states. Lewis has in mind the latter when theorizing about laws, and accordingly, by 'law' I will mean a kind of proposition.<sup>18</sup> A *systematization* is a set of propositions about the world organized into a deductive system, in which some propositions are accepted as axioms whereas others are derived from them. Systematizations can be evaluated for certain theoretical virtues; Lewis focuses on three of these. The *stronger* a systematization is, the more propositions we can derive from its axioms. *Simplicity* is slightly less straightforward but plausibly encompasses the number of axioms (the fewer, the better) and their similarity to one another (the more similar they

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<sup>17</sup> See Lewis 1983: 366–8, 1986b: 122–5 and 1994: 478–80 for some of Lewis's more elaborate presentations of the BSA.

<sup>18</sup> In this, I follow Nolan (2005: 83).

are, the better). Finally, Lewis adds *naturalness* as a constraint on acceptable systematizations: every predicate of every sentence expressing an axiom needs to have a natural property as its semantic value. (The purpose of this constraint is to rule out systematizations that are artificially made simple and strong, for example the infamous one that derives everything from a sentence that uses one simple predicate that describes the total state of the world.) The *best system* is the one that strikes the best balance between simplicity and strength.<sup>19</sup> According to Lewis, a proposition counts as a law iff it's a contingent universal generalization that occurs as an axiom in the best system or, in case of ties, in every system tied for the first place.

This rather compact description of the BSA leaves many questions open and raises a number of further issues. I won't discuss them here, not because they aren't important but because they are unrelated to the circularity problem.<sup>20</sup> Instead I will focus on the sense in which BSA provides an

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<sup>19</sup> Lewis himself presents strength as just one theoretical virtue, which could potentially be traded off against simplicity. This would allow systematizations in which some propositions are *neither axioms nor* derived from axioms; they are, as it were, casualties suffered by strength in exchange for a gain in simplicity. My impression is that later interpretations of the BSA tacitly assume that any admissible systematization is maximally strong in the sense of being complete: any proposition that is not an axiom in the systematization is derivable from the axioms. However, some authors explicitly reject this requirement. For example, Braddon-Mitchell (2001) recommends an interpretation of laws that admit exceptions as “lossy laws”: laws that allow us to derive some false propositions (their negation is simply an exception to the law in question) but figure in the best systematization. The argument that follows doesn't hang on the choice between these interpretations, for the following reasons: I will mainly be interested in cases where a proposition is both explained by and derived from certain Humean axioms, and I assume that the conservative and the “lossy” BSA theorist agree on these cases. If there are propositions that are neither axioms nor derived from axioms, they are not explained by anyone's light. (Thanks to an anonymous referee for requesting clarification on this.)

<sup>20</sup> An incomplete list includes the questions of how the account deals with probabilistic laws (Lewis 1994, Hall 2012), how it can distinguish between laws and background conditions (Hicks 2018), the proper understanding of the simplicity and strength criteria (Hicks 2018, Dorst 2017, 2019, Jaag and Loew forthcoming), whether BSA can accommodate

*account* of the laws of nature. What does this mean? In part due to the influential work of Loewer (1996, 2012) and Schaffer (2008), it has become standard to understand Humeanism (and so the BSA as well) as a theory of *in virtue of what* the laws of nature are what they are. This, however, isn't faithful to the original intent of Lewis, who was notoriously suspicious of metaphysical notions of priority<sup>21</sup> and even non-causal explanation.<sup>22</sup>

When offering a “reductive” account of laws, Lewis himself wasn't concerned with the question of whether the laws were themselves metaphysically fundamental or grounded in the mosaic. Instead, he sought to analyze ‘law’ in other terms, rather than keeping it as a primitive piece of vocabulary. By ‘analysis’, I don't mean a short list of necessary and sufficient conditions implicitly grasped by ordinary speakers. What I mean is a more liberal sense of analysis that fits what has come to be known as the Canberra Plan, Lewis's general method of analyzing philosophically significant concepts. Canberra Plan-style analyses of a concept, C, consist of two stages. First, we collect the platitudes we have about C and write them up into C's Ramsey sentence: an existentially quantified sentence that replaces occurrences of names with variables of which the sentence predicates all the platitudes. In the second stage, we look for the best satisfier of this Ramsey sentence; this will be the “best deserver” of being called C. When there isn't any perfect satisfier of C's Ramsey sentence (an entity that satisfies all our platitudes), we pick the best (and still good enough) candidate that satisfies most of the platitudes about C. Things are no different with the laws of nature. We have a number of platitudes about the laws: they are counterfactually stable, play certain roles in scientific theorizing, could have been different (in a sufficiently broad sense of ‘could’), and perhaps govern

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special science laws (Cohen and Callendar 2009), and problems about the notion of naturalness at work (Loewer 2007, Cohen and Callendar 2009, Hildebrand 2019).

<sup>21</sup> Lewis 1983: 358

<sup>22</sup> Lewis 1986d



natural phenomena.<sup>23</sup> Lewis proposes that regularities that occur in the best system are overall the best satisfiers of these platitudes (though not perfect ones; they don't "govern") and on that account should be called 'laws'.

I don't think any of the above is controversial as far as Lewis interpretation goes. It was nonetheless worth describing the account in some detail, since the details will play a significant role in the rest of this section. Let's move on to seeing how the view sketched above satisfies the three desiderata I set out at the end of section 2: (i) giving some independent motivation for rejecting P1, (ii) justifying the often-heard slogan that the laws of nature "reduce to" and are "nothing over and above" the Humean mosaic without endorsing P1, and (iii) giving an alternative story of what explains the laws, if not their instances.

Before we continue, it's worth noting that these three desiderata are not independent. While Lewis himself put forth BSA as a reductive analysis of the notion of lawhood (rather than an account of what explains the laws), one could nonetheless insist that he *should* have accepted P1, and I can think of two positive reasons for thinking so. One is that the only way to make sense of the slogan that the laws reduce to the mosaic involves saying that the laws are somehow explained by their instances. The other is that we have no plausible story about what *does* explain the laws, if not their instances. So, meeting the second and the third desiderata goes some way toward meeting the first one in so far as it helps us block arguments *for* P1. Below I will start by arguing that Humeans are independently motivated to reject P1; then I will return to the second and the third desiderata.

I have two arguments on the Humean's behalf for thinking that the laws aren't explained by their instances. I don't claim that either is knockdown, but they do show that we shouldn't simply assume that P1 is default or even natural for Humeans. The first argument begins with the observation that at least part of the explanatory force of a scientific explanation derives from its

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<sup>23</sup> Though Beebe (2000) argues that it is at least not a conceptual truth that the laws govern.

potential to *unify* seemingly diverse phenomena. Indeed, if laws play some part in explaining their instances, this is plausibly how they do it: the explanations subsume these instances under a general law, thereby contributing to the unity of our total theory. This story is independently plausible but is also widely endorsed by Humeans in particular, and it fits well with the BSA of laws.<sup>24</sup> Moreover, it doesn't presuppose anything as strong as the unification theory of explanation.<sup>25</sup> One doesn't have to accept that what ultimately *makes* something an explanation is its unifying power; it's enough to claim that unification is *an* important criterion of explanatoriness in scientific explanations.

However, if one already accepts this much about scientific explanation, it's unclear why one should stop there and not apply the criterion to metaphysical explanation, too. But if metaphysical explanations also need to unify, it's no longer plausible that the laws are explained by their instances. Now, how to make sense of unification is a complex issue, and I have no space to provide a complete theory of explanatory unification in the present paper. One influential view (developed by Kitcher 1981, 1989) is that unification is a holistic virtue of total systematizations, i.e. sets of patterns of deductively valid arguments in which some (but not necessarily all) names and predicates are replaced with schematic letters. A set of patterns is unified when they minimize the number of premises assumed, maximize the number of conclusions derived, and also adhere to a criterion of "stringency", i.e. when sufficiently demanding logical and non-logical constraints are placed on admissible substitution instances of the schematic letters.

Needless to say, this is an involved notion of unification that is bound to invite objections. However, we don't need this particular account to make the much less committal point that *some* kind of unification is *a* virtue of explanations. The relatively uncontroversial common core of any conception of unification as a theoretical virtue is that good explanations derive a large number of

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<sup>24</sup> See, e.g., Loewer 1996: 113, Cohen and Callendar 2009: 3, Miller 2015: 1326–7, and Bhogal forthcoming: sec. 2.1.

<sup>25</sup> See Friedman 1974 and Kitcher 1981, 1989 for influential defenses of unificationism.

phenomena from a relatively meager explanans base. In light of this, it's remarkable that the traditional grounding-theoretic approach to logically complex propositions, which proceeds strictly from atomic to logically more complex propositions (e.g. conjunctions are explained by their conjuncts, disjunctions by their disjuncts and, most importantly for the issue at hand, universal generalizations by their instances), scores poorly on this criterion. For it doesn't seem true that invoking a great number of disparate things that are either Gs or not Fs in order to explain that  $\forall x (Fx \supset Gx)$  derives a large number of phenomena from a meager base of explanantia – if anything, it does the opposite. From the point of view of unification as a desideratum, it makes more sense to start with some universal generalizations and use them to explain particular facts. As I said, this is already how Humeans approach scientific explanation. I merely propose is that we extend this way of thinking about explanation to metaphysical explanations.

To be sure, extending the unification desideratum to metaphysical explanations is not the standard practice among Humeans; most of them prefer to offer completely separate treatments of scientific and metaphysical explanation and think that the desideratum only applies to the former.<sup>26</sup> I think this is a mistake: other things equal we shouldn't bifurcate the general relation of explanation too much and should prefer theories that treat its different species not as disparate phenomena only united in name. Moreover, while removing the unification desideratum from metaphysical explanation is defensible, the best defense of such a move is not one that should impress Humeans. Namely, one could argue that Humean laws are universal generalizations, which in turn are equivalent to infinitary conjunctions amended by a totality fact. Since it's already widely accepted among grounding theorists that conjunctions are grounded in their conjuncts, it may not seem like much of a leap to infer that universal generalizations, too, are grounded in their instances. However,

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<sup>26</sup> Bhogal (forthcoming: sec. 2.1) is particularly explicit about this.

we need to ask why we should accept in the first place that conjunctions are grounded in their instances. Fine (2012), who was influential in making this formal principle (along with a number of others) widely accepted, provided little by way of independent justification. But the best reason I'm aware of is that the rule follows from the essence of conjunction as a logical connective: P&Q is grounded in P and Q because conjunction is the connective *in whose essence it lies* that if P and Q are true, then a complex sentence that results from the concatenation of 'P', that connective, and 'Q', is also true.<sup>27</sup> At this point it's clear why this reasoning should hold little sway on Humeans: they are already on record for rejecting primitive, metaphysically robust laws, and there is no clear reason for them to be any more sympathetic to primitive essences. At the end of the day, contemporary Humeans' widespread acceptance of explanatory principles that are in tension with the unification desideratum against metaphysical explanation is a hangover from a deeply anti-Humean way of thinking about explanation.<sup>28</sup>

The objection I addressed above has a less involved version. Forget about Fine's formal principles, one could interject; focus instead on whether a Humean can say that universal generalizations occur as premises in metaphysically explanatory arguments, some of which have

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<sup>27</sup> See Rosen 2010: 131 for a similar justification.

<sup>28</sup> A referee suggests that a more deflationary understanding of 'essence'-talk might reduce the tension. For example, it might be just a matter of convention that it belongs to the essence of conjunction that if P and Q are true then so is P&Q. My response is that if this notion of essence is to underlie the relevant explanation claim, the notion of explanation in 'P and Q explain P&Q' would need to be similarly conventional. However, it strikes me as false that there is a standing convention according to which conjunctions are explained by their conjuncts. As a response to the question, 'Why is it dark and rainy?', most ordinary speakers would not accept as a satisfactory answer 'Because (i) it is dark; (ii) it is rainy' (cf. Kovacs forthcoming). The principle of conjunctive grounding is very much a philosophers' invention, and I suspect that so is the entire "impure logic of ground" (see Kovacs forthcoming and McSweeney forthcoming).

instances of these generalizations as conclusions. Doesn't this imply that some laws are metaphysically prior to their instances? And isn't that obviously incompatible with Humeanism? My answer to this second question is 'No': as I will argue below (when discussing desideratum (ii)), properly understood the BSA of laws is a thesis about the proper analysis of 'law' rather than the metaphysical explanation of laws. Consequently, it cannot be incompatible with any view about the explanatory connection (if any) between laws and their instances. My answer to the first question is a qualified 'Yes': in a certain sense Humean laws are indeed metaphysically prior to their instances. But this just means that the best systematization of the world will contain some Humean laws as axioms, and this is something we already knew from the BSA as stated by Lewis! If we keep in mind that in explanations by unification, 'metaphysically prior to' amounts to 'occurs as a premise in an explanatory argument for the conclusion that', the claim that some laws are metaphysically prior to their instances should no longer strike us as anti-Humean in spirit.<sup>29</sup>

Let me move on to my second argument against P1, which in a nutshell can be stated as follows. BSA theorists need to assume that an explanandum is deductively entailed by the totality of its explanantia. If that is true, then universal generalizations aren't fully explained by their instances, which (given a standard definition of partial explanation) is a good reason to think that they aren't partially explained by them, either. Moreover, if we attempt to honor the deductive constraint by amending the instances with a totality fact, the resulting account is one that Humeans in particular should find unappealing. So, universal generalizations aren't partially explained by their instances.

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<sup>29</sup> The same goes for the status of particular facts, some of which the BSA theorist derives from universal generalizations. The explained (and so non-fundamental) status of these facts is likewise consistent with the BSA account of laws because the BSA has no commitment to any particular thesis about explanation, given that it's not a thesis about explanation at all. (Thanks to an anonymous reviewer for pressing me on these questions.)

More slowly, the argument proceeds as follows. First, notice that BSA theorists are implicitly committed to a deductive theory of explanation, at least in so far as non-probabilistic cases of explanation are concerned, according to which some explanantia to explain an explanandum only if the former deductively entail the latter. For suppose otherwise. Then it's conceivable that there is a systematization,  $S_1$ , that comes out on top according to Lewis's criteria of simplicity and strength and in which every theorem is deductively entailed by the systematization's axioms, and a weakening of it,  $S_2$ , which uses a proper subset of  $S_1$ 's axioms and in which every "theorem" is still fully explained by  $S_2$ 's axioms, despite some of them not being entailed by those axioms.  $S_2$  is not a systematization in Lewis's sense, since not every argument in it is deductively valid. Call it a "merely explanatory systematization" or "e-systematization" instead. Assuming that in  $S_2$  every theorem of  $S_1$  is fully explained but not deductively entailed, we cannot quite evaluate  $S_2$  for strength and simplicity, since these notions (as Lewis understood them) can only be the features of deductively closed systems. Instead, we can evaluate an e-systematization for "e-strength" and "e-simplicity", which refer to the number of conclusions explained (but not necessarily deductively entailed) and the number of axioms we used to explain (but not necessarily derive) them. The question now is: why should we care about simplicity and strength as theoretical virtues in Lewis's sense, instead of e-simplicity and e-strength? Once we have  $S_2$ , a maximally e-simple and e-strong e-systematization in which everything is explained, why should we care about  $S_1$  in the first place? Why use  $S_1$  instead of  $S_2$  to decide which universal generalizations are laws? No reason, it seems. The only answer I can think of is that there is no such thing as  $S_2$ ; contrary to our starting assumption, a set of axioms *cannot* explain a proposition unless they deductively entail it. In other words, the BSA theorist needs to demand that a genuinely explanatory argument deductively entail its conclusion.

The deductive constraint on BSA is significant because it rules out the simplest and most obvious way in which Humean laws could be explained by their instances. For take some universal

generalization  $\forall x (Fx \supset Gx)$ . Suppose  $a_1 \dots a_n$  are all the Fs that there are, and that they are all Gs. This doesn't rule out a possible world in which  $a_1 \dots a_n$  are just like in the actual world but in which there is also some extra thing,  $a_{n+1}$ , that is F but not G.<sup>30</sup> Skiles (2015) has recently argued that this is a bad reason for thinking that universal generalizations aren't fully explained by their instances; rather, it's a reason to reject Grounding Necessitarianism, the thesis that grounds necessitate what they ground, and adopt Grounding Contingentism instead.<sup>31</sup> But whatever one thinks of Grounding Contingentism, the BSA theorist's cannot adopt it, since if explanantia deductively entail what they explain, they a fortiori necessitate it, too. So universal generalizations aren't fully explained by their instances taken together. But according to a fairly standard definition of partial explanation,  $\phi$  partially explains  $\psi$  iff some set of facts  $\Gamma$  fully explain  $\psi$  and  $\phi \in \Gamma$ . So, the instance of a universal generalization partially explains that generalization iff it's the member of a set of facts that fully explain it. But we have seen that by the BSA theorist's light, a universal generalization cannot be fully explained by its instances taken together. So, our easiest way to the conclusion that a universal generalization is even partially explained by any of its instances is blocked.

A natural move is to augment the instances with a totality fact to generate a necessitating explanans base. That is, say that  $\forall x (Fx \supset Gx)$  is explained not merely by the fact that  $a_1$  is F and G,  $a_2$  is F and G, ...,  $a_n$  is F and G, but also by the fact that  $a_1 \dots a_n$  are all the things there are that are Fs and Gs, i.e. that  $\forall x [Fx \supset (x=a_1 \vee x=a_2 \vee \dots \vee x=a_n)]$ . There are at least two issues with this

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<sup>30</sup> I'm assuming that the instance of a restricted universal generalization is an instance of the consequent of its embedded conditional, rather than a negation of an instance of its antecedent. This shouldn't make much difference to the discussion that follows.

<sup>31</sup> Skiles focuses on accidental generalizations, which he thinks pose a tougher problem; certain necessary generalizations (including law-like ones) may be grounded in laws or facts about essences. But of course, these options aren't available to a Humean anyway, which in the present context makes the restriction unnecessary.

proposal, one general and one that should resonate especially strongly with Humeans. The general one is that, as Skiles points out, the aforementioned totality clause is itself a universal generalization, also in need of a (by assumption) necessitating explanans base. Moreover, Skiles shows that the best candidate for that job consists of (i) sentences asserting that  $a_1$  is F,  $a_2$  is F, ...,  $a_n$  is F; (ii) sentences asserting that  $b_1$  is not F,  $b_2$  is not F, ...,  $b_m$  is not F; and (iii) *another* universally quantified sentence, stating that  $a_1 \dots a_n$  and  $b_1 \dots b_m$  are all the things that there are. One problem Skiles notes with this proposal is that this last totality clause mentions things that are intuitively irrelevant to the fact we want to explain. For example, part of the explanation of why every chloride ion has one free electron is that my laptop is not a chloride ion. That seems bad.<sup>32,33</sup>

However, and this is my second objection, a Humean in particular has especially little reason to adopt such a proposal. For one, the proposal gives up on the ambition that universal generalizations are explained by particular facts about the mosaic and concedes that there are universal generalizations all the way down. This undercuts the motivation for saying that laws are explained by

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<sup>32</sup> The same problem arises with the proposal that uses the same maximal totality fact, a complete description of the mosaic followed by a ‘that’s all’ clause, to explain all universal generalizations. While this strategy would appeal to only one totality fact instead of many, most of the information involved by this totality fact is completely irrelevant to the universal generalizations it was invoked to explain. (Thanks to an anonymous referee for this suggestion.)

<sup>33</sup> Skiles 2015: 733-4. Similar problems arise with a close cousin of this view, which operates with atomic rather than quantified totality facts, and which Skiles models on similar views defended by Armstrong (1997: 199) and Fine (2012: 62) about unrestricted totality facts. The idea is that for each generalization  $\forall x (Fx \supset Gx)$  with certain instances,  $Fa_1 \dots Fa_n$ , there is a primitive property of being such that  $a_1 \dots a_n$  are the only F-s that there are, such that  $a_1 \dots a_n$  plurally instantiate this property (alternatively, perhaps there is a primitive “totaling” relation that  $a_1 \dots a_n$  bear to the property of being F). I don’t think that the switch to atomic facts changes much of substance for the present discussion: because of how much is built into the primitive property or relation in question, such facts still look explanatorily irrelevant to the restricted universal generalizations they are invoked to explain, and since they aren’t parts of the Humean mosaic, using them to explain the laws is still anti-Humean in spirit.



their instances. Recall: the intuition driving this claim was that laws were “nothing over and above” the mosaic in the sense of being explained solely by the mosaic, and that their instances were part of the mosaic. But on the present proposal, that intuition is false: part of what explains the laws are highly complex totality facts that aren’t among the particular facts that make up the mosaic. And to make things even worse, the totality facts in question are quantified conditionals whose consequent is a disjunction of identity claims. From a Humean point of view this is a particularly odd feature of the proposal, since it means that we explain the laws – supposedly qualitative propositions that involve no essential reference to individuals – partly in terms of propositions that specify which individuals there are. Note that I’m not assuming that fundamental identity facts are incompatible with the Humean position; this is not quite true, although doing away with such facts would be a natural Humean desideratum. I make the weaker claim that appealing to such facts in explaining a law, and especially a fundamental law that is supposed to involve only natural properties and relations, is in tension with the spirit of Humeanism.

We have seen that adherents of the BSA have good reasons to reject P1. One might think, though, that the premise is easily replaced with P1\*: that if Humeanism is true, the laws of nature *depend* on the Humean mosaic (which includes their instances).<sup>34</sup> The rest of CAH could be modified accordingly: the dependence of the laws on something that they in turn are supposed to explain introduces a problematic kind of systematic symmetry; there is no such systematic symmetry in the world; thus, Humeanism is false. To evaluate this objection, we need a clearer understanding of the relevant notion of dependence at issue. Occasionally ‘dependence’ is used as more or less a synonym of ‘grounding’. But as several authors have recently pointed out, this is a mistake.<sup>35</sup> Perhaps the most

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<sup>34</sup> I thank an anonymous referee for offering this modified version of the argument.

<sup>35</sup> See Kovacs 2019: n1 for a long list of recent works focused on the distinction between grounding and ontological dependence.

important reason for this is that explanatory and dependence notions have different modal profiles: when  $x$  bears an explanatory relation to  $y$ ,  $x$  (the prior relatum) in some way constrains how  $y$  (the posterior relatum) can be. Grounding Necessitarianism is a special case of such constraining; causal determinism in the case of causal explanations is another.

By contrast, dependence relations have exactly the converse of this modal profile: when  $y$  bears a dependence relation to  $x$ , it is  $y$  (the posterior relatum) that constrains how  $x$  (the prior relatum can be). More specifically, in cases of *rigid dependence* if  $x$  depends on  $y$ , it's necessarily the case that if  $x$  exists then  $y$  exists; and in cases of *generic dependence*, if  $x$  depends on a  $K$  then it's necessarily the case that if  $x$  exists then some  $K$  exists. Examples of explanation without either rigid or generic dependence include cases of causal overdetermination by events that don't belong to the same kind and grounding with "type-heterogeneous" multiple realizability in which the different realizers belong to different natural kinds. (I believe there are also cases of dependence without explanation, but since they are not needed to make my argument, I will forego discussing them.)

Once the distinction between explanation and dependence is clarified, it's clear that P1\* is not plausible. First, it's not the case that if a Humean law holds then a particular mosaic needs to exist: a law can be consistent with several Humean mosaics. Indeed, there can be two possible worlds with entirely different distributions of particular facts whose best systematizations nonetheless yield the same laws. So, laws don't rigidly depend on the mosaic. Second, the laws don't generically depend on the mosaic, either. This claim is more difficult to evaluate because it's not clear what the kind is that the mosaic belongs to. But I cannot think of any non-trivial kind that would need to have a member in order for a Humean law to hold.<sup>36</sup> In sum, Humeans have no good reason to accept that

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<sup>36</sup> In fact, I already improved on the formulation that would be strictly required for a formulation in terms of ontological dependence. For keep in mind that the BSA theorist's laws are propositions. When the first relatum of dependence is a proposition, questions of ontological dependence will concern not that proposition's *truth* but its *existence*. But it's clear

laws ontologically depend on the mosaic. Now, ‘dependence’ has been used in many ways in metaphysics. But the use in which it clearly refers to something distinct from grounding or metaphysical explanation is the sense of ontological dependence, and this relation doesn’t hold between Humean laws and the Humean mosaic. Therefore this modified version of CAH fails.

Let’s move on to desideratum (ii): if the laws are not grounded in their instances, what entitles the Humean to say that the laws “reduce to” the mosaic? My response to this question consists of two steps. First, as I said earlier, Lewis’s statement of the BSA is best understood as a Canberra Plan-style reductive analysis of lawhood: certain generalizations are good enough candidates for playing the law role, and the expression ‘law’ is dispensable in favor of ‘is a generalization that occurs as an axiom in the best system’. Second, an orthodox Lewisian could insist that since Humean laws are universal generalizations and everyone needs such generalizations, she doesn’t face any special pressure to further reduce *them*. Yet in a loose sense it’s appropriate to say that the analyzability of lawhood makes the laws reducible, since in many contexts the phrase ‘the Fs are reducible’ is elliptical for ‘the property of being an F is reducible’. For example, it’s not too misleading to describe Lewis’s own modal realism (1986c) as offering a reductive analysis of necessary truths, even though what’s being analyzed is strictly speaking only the *necessity of* these necessary truths. The proposition that  $2+2=4$  is a necessary truth, but modal realism doesn’t offer any analysis of *it*; what it analyzes is the proposition *that*  $2+2=4$  is necessary (analyzed as the proposition that in every possible world,  $2+2=4$ ), but that’s not the same thing as dispensing with primitive necessary truths.

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enough that whether laws depend on the mosaic in this sense turns on general questions about the metaphysics of propositions that have nothing to do with laws *per se*. Thus, I assume that if there’s any question in the vicinity that Humeans have a reason to be interested in, it concerns the dependence of a law’s truth (rather than existence) on the mosaic.

Nonetheless, it's appropriate to say that the modal realist "gives a reductive account of the necessary truths".

I submit that the slogan "the laws reduce to the mosaic" can be given a similarly liberal reading. Strictly speaking, the laws (for all the BSA theorist cares) don't themselves reduce to anything; the fact *that* they are laws reduces to their being universal generalizations that occur as axioms in the best system, where 'x reduces to y' means 'x plays the theoretical roles specified by y's Ramsey sentence'. The word 'reduces' is a piece of philosophical jargon with many different uses. Accordingly, the slogan that "the laws reduce to the mosaic" is nothing more than that: a *slogan* that can be precisified in many different ways. I maintain that the BSA is a legitimate precisification of the slogan. Lewis's important point is that we don't have to accept primitive lawhood, since certain universal generalizations can play the law role. As it's not controversial that the things that are invoked to play the law role exist, whether they are themselves reducible to or grounded in or analyzable in terms of something else is a question of detail that doesn't affect the reductionist thrust of the account. So, in a perfectly good sense the laws do reduce to the mosaic, despite not being explained by them. Hence, desideratum (ii) is satisfied.

Finally, let me say a few words about desideratum (iii). Here I will be brief, since as I said above, the grounding status of universal generalizations isn't a problem peculiar to the BSA. True, Humeans cannot accept that these truths are grounded in their instances, but as I argued above, they have reasons to reject that account independently of the circularity problem. On my view, some universal generalizations are fundamental while others are metaphysically explained by other universal generalizations. How should we decide which generalizations are fundamental? We can simply let the BSA legislate on this: if a universal generalization occurs as an axiom in the best system, it's fundamental; if it doesn't, it isn't. There are other options, too, of course (like the one by Marshall that I mentioned in the previous section); the main point is that the view that universal

generalizations are grounded in their instances is far from mandatory, and BSA theorists have a wide palette of alternatives to choose from that are consistent with their Humean commitments.<sup>37</sup>

## 5. Conclusion

The best version of the circularity challenge is the simplest: it doesn't make substantive assumptions about different types of explanation, the status of mixed metaphysical-scientific explanations, or the formal properties of explanation. All it presupposes is that the word 'explanation' univocally expresses a generic notion of explanation. The best response to the circularity challenge is also, in many ways, the simplest: rather than burdening the Humean with dubious theoretical commitments, it involves a return to a fairly orthodox Humean view, Lewis's BSA of laws. Lewis's account is a Canberra Plan-style analysis of lawhood rather than a theory of what explains the laws. When spelled out in proper detail, this account gives us all the necessary tools to provide a solution to (or if you like, a dissolution of) the circularity problem that meets our three desiderata: it gives us independent motivation to deny that laws are explained by their instances, gives justice to the programmatic slogan that the laws nonetheless "reduce" to the mosaic in some important sense, and provides an alternative account of what explains the laws.

In closing, I want to make a general observation about much of the literature on the circularity problem. One moral emerging from the discussion is that if we understand Lewis's BSA in line with

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<sup>37</sup> The main difference between Marshall's view and mine is that while according to him at least some universal generalizations (non-laws) are explained by their instances, on my view this never happens. So how are non-fundamental universal generalizations explained? There is no general answer to this question. For example, universal generalizations about composite material objects are plausibly explained by universal generalizations about their parts: that every coin in my pocket is a 20c coin is explained by the fact that every set of particles arranged coin-wise within the spatial region bounded by my simples arranged pocket-wise are also arranged 20c-coin-wise. (I owe this example to an anonymous referee.) Other cases will have to be treated differently.

his own formulation rather than in grounding-theoretic terms, the problem doesn't even arise. This is symptomatic of a general tendency that characterizes much contemporary metaphysics: to reframe old debates once understood to revolve around conceptual analysis, necessary and sufficient conditions, supervenience and the like in terms of what grounds what. Tendentially, we could call this phenomenon "grounding imperialism". Grounding imperialism is not a theory but more of an attitude: it's the tendency to use grounding as a hammer and see everything as a nail. One doesn't have to be a grounding skeptic to be wary of grounding imperialism.<sup>38</sup> Grounding and related non-causal notions of explanation are (for all I argued here) useful theoretical tools that can bring clarity into a variety of philosophical disputes. But there is no guarantee that they will always do that, and in some cases reformulating old disputes in grounding-theoretic terms poses an obstacle to understanding and hinders philosophical progress. If the argument of this paper is along the right lines, the so-called circularity problem for Humeanism is a case in point.

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<sup>38</sup> Opponents of grounding imperialism who don't endorse full-blown skepticism about grounding involve Turner (2016) and Sider (2020: Ch. 2).

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