

NAILED TO HUME'S CROSS?

John W. Carroll

1. *Lawhood, Causation and Bearing Hume's Cross*

Some scientists try to discover and report laws of nature. And, they do so with success. There are many principles that were for a long time thought to be laws that turned out to be useful approximations, like Newton's gravitational principle. There are others that were thought to be laws and still are considered laws, like Einstein's principle that no signals travel faster than light. Laws of nature are not just important to scientists. They are also of great interest to us philosophers, though primarily in an ancillary way. Qua philosophers, we do not try to discover *what the laws are*. We care about *what it is to be a law*, about *lawhood*, the essential difference between something's being a law and something's not being a law. It is one of our jobs to understand lawhood and convey our understanding to others.

Causation is also central to science and to philosophy. Molecular bonding, planetary orbits, human decisions and life itself are all causal processes. A scientific explanation of an event will include some mention of the causes of that event—you can't say why something will happen without identifying what made it happen. Just as is the case for lawhood, qua philosophers, one job we have is to understand causation and then to share this understanding with others.

As a result of the work of David Hume, many philosophers are influenced by a metaphysical concern and a skeptical challenge that have shaped what is counted as providing understanding of

lawhood and causation. Hume's argument against the idea of necessary connection contains the plausible premise that we lack any direct perceptual or introspective access to the causal relation:

All events seem entirely loose and separate. One event follows another, but we never can observe any tie between them. They seem *conjoined*, but never *connected*. But as we can have no idea of anything which never appeared to our outward sense or inward sentiment, the necessary conclusion *seems* to be that we have no idea of connection or power at all, and that these words are absolutely without meaning when employed either in philosophical reasonings or common life (1955, p. 85).

The skeptical challenge that emerges says that, if lawhood and causation are not analyzable in terms of some more accessible notions, then we would be prevented from having knowledge we ordinarily take ourselves to have. Regarding the metaphysical concern, for various reasons, in trying to say what makes it true that something is a law or that one thing causes another, it can be tempting not to limit oneself to the accessible notions, instead positing necessary connections or other questionable entities as existing in the world. Short of doing so, the concern is that the truth-makers for reports of lawhood and causation would be non-existent, and then the reports couldn't be true; for Hume, they couldn't even have meaning.

To address these worries, philosophers often seek a certain sort of analysis of lawhood. They seek a necessarily true completion of:

(S1) *P* is a law of nature if and only if

The expectation is that the analysis make clear that lawhood is suitably accessible for us to have the knowledge of laws we ordinarily take ourselves to have and make clear what it is about the universe that makes true reports of lawhood true. There has been widespread agreement that certain sorts of completions of (S1) are unsatisfactory in this regard. Analyses of lawhood that use the counterfactual conditional (i.e., if P were the case, then Q would be the case) would do little to address the Hume-inspired worries. Concerns about our knowledge of counterfactuals and their truth-makers are just as prevalent as are the parallel worries about lawhood. The same can be said for completions of (S1) that employ the other nomic concepts: causation, lawhood, explanation, chance, dispositions and their conceptual kin. As a result, the history of philosophy has shown a preference for what I call a *reduction* of lawhood; philosophers have tried to provide a necessarily true completion of (S1) without using any nomic terms.

The history of philosophy includes many attempts to give a similarly reductive analysis of causation, though, at least recently, the constraints on what counts as a satisfactory analysis of causation have been somewhat less severe. There is still much preoccupation with giving an analysis of causation, with finding some necessarily true completion of

(S2) P caused Q if and only if

And no, not just any necessarily true completion will do; for example, no one would bother with P caused Q if and only if P caused Q . But, unlike with lawhood, there has been a lot of attention given to analyzing causation in terms of chance, the counterfactual conditional, lawhood or some combination of these nomic concepts. That is, in the last forty years or so, philosophers have not insisted that (S2)

be completed non-nomically. This difference in attitude is easy to explain. An underlying belief of the philosophical community has been that lawhood is the best place to get off the nomic bus and squelch the Hume-inspired worries. The thought seems to be that, as a practical matter, it is easier to give a thorough reduction of lawhood. So, we are better off analyzing causation, say, in terms of the counterfactual conditional, maybe analyzing this conditional in terms of lawhood, and then letting a non-nomic analysis of lawhood do the last bit of reductive work.

In *Laws of Nature* (1994), I argue that the history of philosophy has been pretty badly wrong about all of this. I maintain that neither causation nor lawhood can be analyzed non-nomically and, further, that causation even resists any (non-circular) analysis in terms of the counterfactual conditional, chance or lawhood. What I propose to do in this paper is defend my brand of anti-reductionism against the Hume-inspired worries. So, after wrapping up this introductory section, I will quickly review in Section 2 an example that challenges the prospects of giving a *Humean* reduction of lawhood, a reduction of lawhood that does not require that we posit any mysterious ontology. (This example will at the same time also provide a nice basis for presenting certain other ways of trying to understand what it is to be a law.) In Section 3, I take on the metaphysical concern as it applies to my anti-reductionism, offering a sketch of a new non-reductive theory of lawhood. In Section 4, I use this analysis to shed light on the skeptical challenge.

In one regrettable way, my defense of anti-reductionism will be limited. I will only directly address the Hume-inspired concerns as they apply to lawhood—defending my anti-reductionism about causation will have to wait. Given the difficulty of the two tasks, I cannot do a good job on both, and it seems to me to be more appropriate to focus on lawhood rather than causation because more attention has been paid in recent years to giving a thoroughly reductive account of lawhood. This is not to say

that this paper is not about causation. As we shall see, my non-reductive theory is non-reductive precisely because it invokes causation (or, strictly speaking, a closely related notion of explanation). I will argue that the laws of nature are exactly those regularities that are caused by nature.

2. Support for Anti-Reductionism and a Glance at Some Alternatives

Suppose that there are exactly ten different kinds of fundamental particles. So there are fifty-five possible kinds of two-particle interactions. Suppose also that fifty-four of these kinds of interactions have been studied and fifty-four laws have been proposed and thoroughly tested. It just so happens that there are never any interactions between the last two kinds of particles; these are arbitrarily labeled as 'X' and 'Y' particles.

One thing that is ingenious about this example of Michael Tooley's (1977, p. 669) is that, at least at first glance, it seems that there could be a law about X-Y interactions. After all, in the example, scientists have already discovered laws for all of the other fifty-four kinds of interactions. Indeed, it is even true that some of these laws are about X particles and that some are about Y particles. Thus, there seems to be some reason to think that there is also a law about what will happen if X and Y particles get together. Another thing that is ingenious about Tooley's case is that it seems that many *different* X-Y interaction laws are perfectly consistent with all the events that might take place during the complete (i.e., past, present and future) history of the ten-particle world. It seems that the totality of events of this universe could fail to determine what the laws are. Even given the complete history of this universe, there might be a law, L_1 , that, when X particles and Y particles interact, the particles are destroyed. But,

then again, even given the complete history of this universe, there might be a law, L_2 , that, when X particles and Y particles interact, the particles bond. It seems that what the laws are does not supervene on (i.e., is not determined by) the non-nomic facts.

Tooley takes his example to make a case against Humean reductive attempts to solve the problem of laws. To see why, consider what such an account might say about his ten-particle world. For example, a naive Humean might hold that P is a law of nature if and only if P is a true, contingent, universal generalization. This account says about Tooley's example that *both* L_1 and L_2 are laws: it is a law of the ten-particle world that any interaction of X and Y particles results in their annihilation and it is a law of that world that when X and Y particles interact they bond. But that is impossible because such annihilation and bonding events are incompatible; it cannot be true that, if there were an X-Y interaction, then there would be both the bonding and the annihilation. This problem for the simplistic Humean account is a consequence of the fact that the account does not differentiate between L_1 and L_2 . Because the two are both true, contingent, generalizations, they both get counted as laws. David Lewis (1973, 1983 and 1986) holds a much more sophisticated Humean account, one that maintains that P is a law of nature if and only if P is a member of all the true deductive systems with a best combination of simplicity and strength. But, at least at first glance, his view is faced with the same problem that faces the naive Humean view. Not only do L_1 and L_2 not differ regarding their logical form, their contingency or their truth, they also do not differ regarding their simplicity or their strength. *Prima facie*, either they both would belong to all the best systems or neither would. Humean reductionists must somehow deny that the ten-particle case is genuinely possible.

In contrast, a *universalist* reductive approach of the sort favored by Tooley and also by David Armstrong (1983) and Fred Dretske (1977) seems to be in better shape. Much simplified, universalists

hold that:

*F*s are *G*s is a law of nature if and only if the universal *F*-ness stands in N to the universal *G*-ness.

(‘N’ and sometimes ‘necessitation’ are names given to the two-placed relation that relates universals. When *F*-ness stands in N to *G*-ness, *F*-ness is said to *necessitate* *G*-ness.) In virtue of its appeal to facts about universals, this is not a Humean reduction of lawhood. Just so, it leaves open the possibility that there is something that grounds the lawhood of exactly one of the generalizations in Tooley’s ten-particle case. For all that has been said, it might be the case that being an X-Y interaction necessitates annihilation but not bonding. It could also go the other way: being an X-Y interaction might necessitate bonding but not annihilation.

We need not draw the conclusions drawn by the universalists. Armstrong, Dretske and Tooley are clearly still very much stuck with the Hume-inspired skeptical challenge. Prima facie, identifying the truth-maker for lawhood reports with a relation (itself taken to be a universal) that holds between universals does nothing to make it clear how observational data could support knowledge of what the laws are. Furthermore, despite *appearing* to have identified a reductive truth-maker for lawhood reports, the metaphysical concern really is still an issue for the universalists. Tooley’s example exposes a void in the universalist approach, at least insofar as that view has been presented here. It is awfully convenient that the universals line up so nicely in Plato’s Heaven, doling out lawfulness to exactly the regularities that are laws. But, why should we believe that they really do line up so nicely? What do we really know about this necessitation relation, besides its name? What relation is it? Without a specification of the

relation, the universalists have not really given a reductive analysis of lawhood. They haven't given an analysis period.

Some philosophers react to the ten-particle case differently than do the Humean reductionists and the universalists. At a loss to identify the missing truth-makers, or troubled by the skeptical challenge, they conclude that lawhood sentences do not describe reality. They are *anti-realists* about lawhood. Some anti-realists, e.g., Bas van Fraassen (1989) and Ronald Giere (1999), go so far as to assert *that there are no laws*. Other philosophers, e.g., Simon Blackburn (1984, 1986) and Barry Ward (2002, 2003), adopt a different sort of anti-realism. Though they will utter sentences like 'It is a law that no signals travel faster than light', they are anti-realists in virtue of thinking that the purpose of such sentences is not to describe the facts. On their view, lawhood sentences convey no information over and above what is conveyed by their contained generalization sentence. Instead, these sentences project a certain non-cognitive attitude about the conveyed generalization. All anti-realists sidestep the Hume-inspired skeptical and metaphysical worries: if lawhood reports are not even meant to describe the way our world is, or do have that purpose but are all false, then we certainly do not need to worry about their truth-makers or how we could know what the laws are.

Certain features of my own view stand out when contrasted with the other standard positions on lawhood. I am an *anti-reductionist* in denying that there are any necessarily true Humean completions of (S1), but also in denying that there is any ontologically rich non-Humean reduction of the sort defended by the universalists. I am also an *anti-supervenience theorist* because I accept Tooley's ten-particle case at face value, and indeed use examples like it in my book *Laws of Nature* as the centerpiece of my arguments for anti-reductionism. So, as I see it, the non-nomic does not determine what the laws are: there are possible worlds that agree on their non-nomic facts and disagree about what the laws are.

Yet I am also a *realist*; I do think that there are utterances of lawhood sentences that try (and even sometimes succeed) in describing reality—it is true and I know it is true that it is a law that no signals travel faster than light. Thus, my realist, anti-supervenist, anti-reductionism seems to put me in a horrible position in relation to the Hume-inspired worries. On my view, it is true that there are laws and some of us know what some of the laws are, but there is no reductive analysis of lawhood that could explain how this knowledge of lawhood is attainable or even say what makes it true that the laws are the laws. What can a realist, anti-supervenist, anti-reductionist say to Hume?

3. *The Metaphysical Concern*

Sometimes the metaphysical concern takes the form of a worry about how uninformative anti-reductionism about lawhood is bound to be. Tooley has this to say about an account of lawhood offered using dispositional terms:

[I]n offering this sort of answer one is not really making any progress with respect to the problem of explaining nomological language in the broad sense (1987, p. 68).

This lack of progress, however, does nothing to establish even a presumption in favor of reductionism. True, the anti-reductionist denies that there is a reductive answer to the question of what makes something a law. But, failure to provide that sort of answer cannot count against the anti-reductionist and in favor of the reductionist without begging the question. As the anti-reductionist sees it, it is the

reductionist that commits the transgression in giving a reductive answer to a question that does not have one.

In any case, questions about informativeness aren't really what scares philosophers away from a realist anti-reductionism. What does that is a demand for truth-makers. When saying why he believes that there needs to be a relation of necessitation between *F*-ness and *G*-ness for *F*'s are *G*'s to be a law, Armstrong makes such a demand:

Suppose that one is a Nominalist in the classical sense of the term, one who holds that everything there is is a particular, and a particular only. Because there is nothing identical in the different instantiations of the law, such a Nominalist, it seems, is forced to hold a Regularity theory of law. For if he attempts to hold any sort of necessitation theory, then he can point to no ontological ground for the necessity. He is nailed to Hume's cross (1983, p. 78).

If we are unable to say what makes a generalization a law, then, especially given Tooley's ten-particle example, it can appear that *nothing* does. What could it be that makes it true that L_1 is a law rather than L_2 ? What makes it true that L_2 is a law rather than L_1 ? What the laws are *floats on nothing* (cf., Armstrong 1983, p. 31).

It is important to recognize that anti-reductionists about lawhood need not be *primitivists*. The standard arguments for anti-reductionism leave open that there might be some analysis of lawhood in terms of some other nomic concepts. For example, Marc Lange (2000) has analyzed lawhood in terms of membership in a counterfactually stable set of propositions. Lange's idea is that the set of laws is

special in that each of its members would still be true under any counterfactual supposition consistent with the set itself. Prima facie, this analysis makes substantive and interesting claims about what lawhood is. We can make enough independent judgments about which counterfactuals are true and about which propositions are laws to test his proposal. If the analysis is correct, it speaks to any leftover concerns stemming from the supposed un informativeness of anti-reductionism. Obviously, though, Lange's approach will do nothing to convince anyone to set aside Armstrong's float-on-nothing worry. Counterfactuals live too close in logical space to lawhood and behave in all too similar ways. About Tooley's example, what would make it true that, *if some X particle were to interact with some Y particle, then an annihilation event would occur?* What would make it true that, *if some X particle were to interact with some Y particle, then a bonding event would occur?* Nothing, it seems, would make either of these counterfactuals true.

I am not endorsing the truth-maker concern. Anyone who has a primitive concept playing some role in their metaphysics (i.e., everyone with a metaphysics) has something that in a certain sense lacks a truth-maker of the sort Armstrong demands regarding lawhood. And, it has always seemed to me, and still does, that the counterfactual conditional is a pretty good candidate to be primitive in a respectable metaphysics. So, I am not moved to abandon my anti-reductionism, and Lange will not be moved to abandon his either. Nevertheless, I will propose an alternative analysis of lawhood, one open to anti-reductionists, that may speak to the metaphysical concern in a way that Lange's non-reductive analysis does not.

It is often alleged, though primarily in informal discussions of our topic, that no laws are *accidentally true*. Such remarks stem from two different sources: their plausibility and the feeling among philosophers that such remarks are no big deal because this is not where any real work will get done.

Prima facie, the metaphysical and skeptical worries about lawhood apply in a straightforward way to non-accidentality, and this notion is no better understood than lawhood itself. Investigating accidentality is usually not considered a step in the right direction.

Well, I say that, in this case, we have underestimated the power of an intuitive gloss. Idea: What is an accident equates with what is a coincidence, where a coincidence is something that is unexplained.¹ I run into an old friend at a Durham Bulls game. I did not even know he was in North Carolina; he moved away more than three years ago. Our meeting at the game is a coincidence. What makes it a coincidence? Well, it is a coincidence because it just happened. In other words:

P is a coincidence if and only if there is no *Q* such that *P* because *Q*.

The key notion here is the one expressed by ordinary uses of ‘because’. Strictly speaking, it is a kind of explanation. It is, however, different from causation in only uninteresting ways. If *b*’s being *F* caused *c*’s being *G*, then *c* was *G* because *b* was *F*. The other direction is not as straightforward. The number 3 is a square root of 9 because 3² is 9, but we are reluctant to say that 3²’s being 9 caused 3 to be a square root of 9. In general, we are reluctant to take mathematical explanations, explanations underwritten by definitions, and explanations involving universal generalizations to be causal ones. For some reason, when the explanandum and the explanans are too closely connected, connected in some more-or-less analytic way, and not by some paradigmatically causal process (e.g., colliding), or when the

¹Richard Sorabji (1979, p. 9) attributes this account of coincidence to Aristotle. David Owens (1992, p. 6) defines a coincidence as an event whose constituents are produced by independent causal processes, but maintains that his definition has the consequence that all coincidences are inexplicable.

explanandum or explanans themselves are sufficiently unlike paradigmatic causes and effects (e.g., moving billiard balls), philosophers tend not to consider these explanations to be causal. That, however, seems to me to be the extent of the difference. Causation and the relevant notion of explanation amount to pretty much the same thing. So, unofficially, and a bit more stylishly, I like to say that *P* is a coincidence if and only if *P* is uncaused.

One might object that, despite what I said, my seeing my friend at the ball game has an explanation, lots of them even, and that it certainly wasn't uncaused. Wasn't the meeting the result of each of us deciding to take in a ball game over the weekend? Didn't we run into each other at that game because we both like baseball? Fair enough, but also notice how strange it is to pair these explanations with the attribution of coincidentalness. For example, notice how odd and even contradictory it is to say all in one breath: *we met because we both like baseball and that we met was a coincidence*. Insofar as our both liking baseball does explain why my friend and I met, the meeting was *not* a coincidence. As I see it, 'because' utterances are context sensitive and their context sensitivity carries over to 'coincidence' utterances. In an ordinary context, like the one present when I first introduced the baseball example, the sentence 'My friend and I met at the game because we both like baseball' is false. It is a bit of a long story (see my 2005) but such utterances are false because, without a context change, that we both like baseball is not sufficient for my friend and I to meet at the game. In such a context, that we both like baseball together with what was presupposed or common ground in the context does not entail that we would meet. Context can shift so that such utterances are true, but then an utterance of 'Our meeting at the ball game was a coincidence' would not be true in the new context.

What about laws? Laws are not coincidences. They are not things that just happen; they are

explained.² Not being a coincidence, however, is not all there is to being a law. For example, some particular states of affairs, like there being tobacco in North Carolina, are not coincidences but are not suitably general to be laws. Or, for a more interesting case, it might be true that there are no gold spheres greater than a mile in diameter because there is not enough gold. In that case, strictly speaking, it would be true, suitably general and not a coincidence that all gold spheres are less than a mile in diameter. Nevertheless, that still would not be a law; it is not enough to be a law to be general and not coincidental. What seems important about this gold-spheres example is *how* the regularity turns out not to be non-coincidental. What blocks it from being a law is that something *in nature*, or really a certain sort of initial condition of the universe, *an absence of something in nature*, explains the regularity. Contrast this with the law that no signals travel faster than light. With this generalization it seems that it is true because of *nature itself*. Lawhood requires that nature itself—understood as distinct from anything in nature or the absence of something from nature—make the regularity true.

P is a law of nature if and only if *P* is a regularity caused by nature.

While this is a catchy way to put my favored analysis of lawhood, there are certain aspects of my view that require comment. First, we should keep in mind the point made earlier about explanation and

²This may sound a little odd. My claim that all laws have explanations will strike some as counterintuitive. Aren't there any laws that are fundamental or basic? Don't some laws explain though they themselves are unexplained? It is important to keep in mind that what has to be explained in order for *P* to be a law is *P*. It is that generalization that cannot be coincidental if it is also to be a law. This leaves open that the lawhood fact, the fact *that P is a law*, is unexplained; it may be a coincidence. So, for example, it may be a fundamental law that all inertial bodies have no acceleration, even though something explains why all inertial bodies have no acceleration. It would be a fundamental law in virtue of there being no explanation why *it is a law* that all inertial bodies have no acceleration.

causation. My official view is not that laws are *caused* by nature but that they hold *because* of nature. Second, and more important, self-respecting metaphysicians will surely ask what exactly nature is. Think of nature as the universe—not the objects and events in the universe, but whatever *it* is that the objects and events are in. Along this same line, we can think of nature as something like the universe’s spacetime manifold or the totality of its space and time. Better yet, think of nature as something like an omnipresent and eternal field, a big-as-big-can-be magnetic field that is also as long-lasting as long-lasting can be whose effects need not have anything to do with magnetism. On my view, a scientist who posits that there are laws of nature is thereby committed to our world being causal/explanatory in exactly this way.

Some will object to the idea that something like nature can stand in the causal/explanatory relation that is being employed in my analysis. Nature is not an event. It is also not a state of affairs (i.e., an object or event having some property). Yet, it is a long-standing opinion of many metaphysicians that only events or states of affairs can cause anything. To some it may even sound like I am taking seriously the idea of substance causation, an idea that is often in disrepute.³ Nature is not a substance, exactly. It is more like a humongous and ancient field—it contains objects and other substances, but is not itself one. Admittedly, nature is more like a substance than it is like an event or a state of affairs and that will still worry some. But taking it to be causal really should not be any more worrisome than thinking of a magnetic field as causing an electron to move. Furthermore, my account leaves room for properties to play a role. Nature does cause what it does in virtue of being a certain way. On my view, the job of scientists set on discovering what regularities are laws of nature is precisely to describe what these

³Randy Clarke (2003, pp.196-217) in his discussion of agent causation surveys the few arguments actually given against the possibility of substance causation.

properties are. Roughly, stating that P is a law is science's way of describing how nature is in virtue of which it causes P .

I do not here provide anything like a full defense of my analysis of lawhood. It will suffice for my purposes if I have said enough to make it seem plausible. My analysis is not reductive; a notion of causation/explanation expressed by the word 'because' occurs in the analysis, and that concept is a nomic one. Nevertheless, there is no circularity and the analysis provides understanding. Besides being informative, my analysis also seems to metaphysically ground lawhood in ways that non-reductive analyses normally do not. Of all the nomic concepts, causation seems the most grounded, the one that seems the least to float on nothing. It does not seem to float at all. It is a relation that only holds between existing, occurrent or obtaining things. Sometimes we can scientifically describe an underlying causal mechanism when the causal relation is instantiated. Some authors have even argued that, despite Hume, causation is directly observable.⁴ It certainly seems right that I can see that Nomar hit the ball and it is clear that this fact is causal; Nomar couldn't have hit the ball unless the ball moved because of Nomar. I am less sympathetic to there being some causal percept or an impression of causation in Hume's sense, but I do not see that this matters. We make causal and explanatory judgments easily and without much thought all the time. And, yet, all being a law of nature amounts to is holding because of nature.

4. *The Skeptical Challenge*

To my mind, the most careful and the most confounding formulation of the skeptical challenge comes

⁴See Anscombe (1971), Fales (1990) and Armstrong (1997).

from John Earman and John Roberts (2005). Their paper will be the focus of my reply.

a. *The Challenge from Earman and Roberts*

Let T be a theory that posits at least one law. Label one of the laws ‘L’ and reformulate T as the conjunction that L is a law of nature and X. (So, X is the rest of T aside from the part of T that posits L as a law.) Let T* be the theory that L is true, L is not a law, and X. T and T* cannot both be true because they differ on whether L is a law.

The argument is straightforward:

- (1) If HS (Humean Supervenience) is false, then no empirical evidence can favor T or T* over the other.
 - (2) If no empirical evidence can favor T or T* over the other, then we cannot be epistemically justified in believing on empirical grounds that T is true.
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- (3) If HS is false, we cannot be epistemically justified in believing on empirical grounds that T is true.⁵

HS is defined by Earman and Roberts as the thesis that what is a law and what is not cannot vary

⁵This is *close* to the exact wording of Earman and Roberts’ argument (pp. 257-258). Premise 2 has been simplified by removing words from its antecedent to the effect that realism about lawhood is true. Anti-reductionist anti-realists are not targets of this skeptical attack.

between worlds with the same Humean base, where a world's Humean base is the set of non-nomic facts at that world that are detectable by a reliable measurement or observation procedure (p. 253). It follows from the premises that, if HS is false, then we cannot be justified in believing in T. That is an apparent problem for my anti-supervenience, realist, anti-reductionism because Earman and Roberts made no assumptions about T other than that it attributes lawhood to a least one proposition. So, if Earman and Roberts' argument is sound and HS is false, then no one is justified in believing on empirical grounds that any proposition is a law. It is only a short step from there to the conclusion that no one—not us, not the scientists—know what any of the laws are. As Earman and Roberts are averse to skepticism, they ultimately see this as an argument for HS.

b. Empirical Evidence Against Cosmic Coincidences

To begin my response, I will describe one basic way empirical evidence can support the judgment that something is a law. It is a way suggested by the non-reductive analysis of lawhood given in Section 3. But, be warned. Contexts for utterances using the verbs 'to know' and 'to justify' are fragile. Without a lot of work, Earman and Roberts could (and may have already) spoiled the present context in such a way that some of the epistemological claims I am about to make will not ring true. That is why it will be important, in the next subsection, to say something about context dependence of epistemological terms.

Here is John Foster's insightful description of a hypothetical case of an inference to there being a law. It is in line with the picture I want to sketch:

The past consistency of gravitational behavior calls for some explanation. For given the infinite variety of ways in which bodies might have behaved non-gravitationally and, more importantly, the innumerable occasions on which some form of non-gravitational behavior might have occurred and been detected, the consistency would be an astonishing coincidence if it were merely accidental—so astonishing as to make the accident-hypothesis quite literally incredible (1983, p. 89).

In this spirit, regarding Earman and Roberts' argument, I want to suggest that believing T^* sometimes would be to implausibly believe that L does not hold because of nature. Since Earman and Roberts grant that we may have reason to believe L is true, believing T^* means believing either that L is caused by nothing (and so is a coincidence) or else that L holds because of something in nature. Sometimes we have good empirical evidence against each of these disjuncts, evidence that thus favors T over T^* , and so we may be justified in believing T .

It is not mysterious how we justifiedly judge whether *certain* generalizations are coincidences. This is especially true about some very local regularities. Suppose I come upon a bag of marbles. I open it up, peek in and see that all the marbles in the bag (right now) are black. I am not likely to take seriously in this situation the possibility that nature explains why the generalization holds. Indeed, I am likely to presuppose that this is not the case. Still, it might be that *there is some explanation* of that generalization. For instance, it might be that the marbles were selected from an urn that contained only black marbles. In contrast, it might also be that *nothing explains* why all the marbles in the bag are black. It might be that the marbles were selected blindly from an urn that contained a mix of black and white marbles, a mix with many more white marbles than black marbles. The important point to notice about

these two kinds of possibilities—one kind that includes an explanation for the generalization and the other kind that does not—is that empirical evidence can favor one kind over the other. I might have seen someone picking the balls from an urn containing only black marbles. Then again, I might have seen someone blindly selecting the marbles from an urn with only a small proportion of black marbles. So, on the local scale anyway, there are straightforward ways of gaining evidence that would decide whether a regularity was a coincidence or instead was explained. With cosmic regularities, we are more likely to take seriously the idea that they might be caused by nature. Indeed, I suspect that physicists dealing with fundamental particles and properties are likely to presuppose that, if a generalization of interest to them is true, then it is not a coincidence, and so must be the result of something in nature or nature itself. Consider the principle of the conservation of energy. Years of investigation and careful theorizing reveals that it has no in-nature explanation. The absence of any in-nature explanation supports the hypothesis that this principle holds because of nature, and so is a law.

What is important is that sometimes we find no in-nature explanations of a regularity, but we are also reluctant to conclude that it is a coincidence. We are faced with the choice of its being nature that explains it or its being unexplained. Sometimes the latter fits better with the rest of what we believe. When it does, we are justified in believing a proposition corresponding to Earman and Roberts' T*. With the right sort of empirical evidence, however, the coincidence hypothesis may be much less credible than the lawful one. So, we may be justified in believing a proposition exactly parallel to Earman and Roberts' T. In short, we sometimes have evidence of what nature causes and that is all the evidence we need to distinguish laws from non-laws.

c. *Contextualism and Relevant Alternatives*

My guess is Earman and Roberts will disagree, and my suspicion is that even you, the reader, will have doubts about my conclusion that scientists sometimes justifiedly infer that a true generalization is caused by nature. Even supposing we know that energy is always conserved, there is no getting around the fact that, on my account, it is consistent with all the evidence that our scientists have that this regularity is uncaused (and so a cosmic coincidence), and it is consistent with all that same evidence that it is caused by nature (and so a law of nature).

There are skeptical arguments that seem to show we don't know much of *anything*. Sometimes these take the form of a skeptical-alternative attack. If I am at the zoo in front of a cage labeled 'Zebra' and see, standing in front of me, a four-legged striped mammal that I take to be a zebra, a friend might give me pause by claiming that it might be a mule disguised to look like a zebra. Since such a mule might look just like the animal before me, it can seem that I do not know the animal before me is a zebra. In pointing out that, even given all the observational evidence, if HS is false, then there might be no explanation of why energy is conserved, Earman and Roberts would be raising a possibility like the possibility of a cleverly disguised mule at the zoo.

An epistemological contextualist maintains that the truth-value of an utterance of a sentence containing certain epistemological terms (e.g., the verb 'to know' or the adjective 'justified') may vary depending on the context.⁶ So, said in one context, 'I know that animal is a zebra' may be true. For example, this might be the case in a discussion between me and a young child who is insisting that the

⁶There are many versions of contextualism. See, for example, DeRose (1995). My own version is sketched in Carroll (2005).

animal is a gazelle. But, said in another context, say one in which I admit that I do not know that the animal is not a cleverly disguised mule, my utterance of that very same sentence would be false. As contextualism is sometimes described, in the first context, the only *relevant* alternative was that the animal was a gazelle, but, in the second context, there was the relevant alternative that it was a cleverly disguised mule. What is required for a knowledge utterance to be true in a context *C* is that the cognizer be able to rule out all the alternative hypotheses that are relevant in *C*. (Keep in mind that in different contexts, different alternatives will be relevant.) This hypothesis about the context sensitivity of epistemological utterances is then used to explain why skeptical arguments of various sorts can seem so convincing and also to mitigate the damage done by those arguments. As the contextualist sees it, even though certain skeptical arguments generate contexts in which many or all knowledge sentences turn out false, this leaves open that there will be lots of important contexts in which utterances of those same sentences will turn out true.

How does all of this apply to the skeptical argument advanced by Earman and Roberts in favor of HS? As Earman and Roberts describe it,

The contextualist maneuver might run as follows: “In contexts where scientists are evaluating a law-positing theory such as *T*, which is well-supported according to the ordinary standards of scientific inference, alternatives such as *T** which differ from *T* only in that they call one or more laws posited by *T** nomologically contingent, are not relevant alternatives. Hence, it is not necessary, in order to be justified in believing *T*, to have evidence that favors *T* over *T**. So Premise 2 of our epistemological argument for HS is false (p. 274).

Now, obviously, Earman and Roberts don't think that this maneuver will work, but we need not delve into their reasons for thinking so. We need not, because the quote just given misrepresents contextualism. Earman and Roberts bill the contextualist way out as a way of objecting to Premise 2 of their argument. But, in fact, what is crucial to the contextualist reply is that in certain contexts (maybe all contexts!) an utterance of the sentence expressing Premise 2 will be true.

The antecedent of Premise 2 and the statement of Premise 1, in virtue of including both expressions of T and T* makes (or tends to make) T* a relevant alternative to T, and it is one that cannot be ruled out. To argue as Earman and Roberts do is like arguing: (1) For all we know, given all the evidence presently available to us, nothing favors it being a zebra over a disguised mule and nothing favors it being a disguised mule over a zebra. (2) If nothing favors it being a zebra and nothing favors it being a disguised mule then we can't know it is a zebra. When such premise sentences are uttered and taken seriously by the audience, the contextualist wants to "concede" that then the premise sentences are true and that the conclusion sentence is as well. The contextualist gambit is now to argue that, once we properly understand the contextual nature of 'to know', the fact that an utterance of the conclusion sentence is true is hardly worrisome. This does not rule out that there are other much more ordinary contexts in which an utterance of 'I know T' is perfectly true. Science can go on, claims of lawhood are sometimes made, reports of knowledge that such and such is a law sometimes turn out true. The fact that the conclusion sentence of Earman and Roberts' argument is true, perhaps even as uttered by Earman and Roberts, is no more worrisome than is the fact that utterances of 'I don't know the animal is a zebra' are true in contexts in which the disguised-mule hypothesis is a relevant alternative. Regarding laws, there will be contexts where we presuppose that *L* is not a coincidence. If I have ruled out that there is some in-nature explanation of *L*, and the presupposition of our conversation is true, then it will be true

to say ‘I know T’.

Is this enough for science? I think so. According to contextualism, even ‘No one has ever known or will ever know that they have hands’ is true in some contexts, ones in which the evil-demon hypothesis is a relevant alternative. That there are some contexts arising in philosophical discussions in which the sentence ‘No scientist has ever known or will ever know what the laws of nature are’ is true seems mild in comparison. As well it should. That there are contexts where an utterance of ‘I know that I have hands’ is false does not in the least bit undermine the value of my utterance of that sentence in certain contexts in which it is true. The contextualist can concede that Earman and Roberts have generated a context in which ‘Scientists know what the laws are’ is false. But, as far as I can tell, that does not generate any absurd or undesirable consequences about science or scientists. What contextualism does is allow us to explain why the Hume-inspired skeptical challenge, at least as raised by Earman and Roberts, can seem so utterly convincing. If the context is right, what they say is convincing because the argument they advance is sound.

5. Avoiding the Cross

I hope that the controversial nature of my replies to the foregoing Hume-inspired metaphysical and skeptical worries provide further evidence that anti-reductionism is not any sort of philosophical dead end. Indeed, the position described here puts in special focus some particularly interesting issues that have the benefit of potentially being more manageable than the search for a reductive analysis of lawhood. First, there is the analysis of coincidence. I have offered what I take to be a plausible account,

but coincidence is not a notion that has received anywhere near the attention that lawhood has. Second, the analysis of lawhood offered here depends crucially on the possibility of *regularities* holding because of nature. While there has certainly been discussion and awareness that regularities are sometimes explained in science, philosophers of science have seemed much more comfortable when the explanandum is some singular or particular fact. My analysis provides new reason to explore the nature of explanations of regularities. Finally, there is the issue in the philosophy of language and linguistics as to how best to describe and understand the context dependence of ‘because’ and ‘knows’. As is the case with many philosophical problems, attention to the language we use to present and address the philosophical problem of laws is a sensible precaution that may help squelch the lure of reductionism.⁷

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