

WHAT MOTIVATES HUMEANISM?

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Abstract

The Humean view of scientific laws, where laws reduce to patterns of occurrent facts, is very popular. But it's not particularly clear what the core motivation for the view is. In fact Maudlin, and other anti-Humeans, claim that there is no good reason to be a Humean.

I consider a few influential approaches to motivating Humeanism and raise concerns for them. I then defend a different type of motivation, which has not received much attention in the literature, that rests on considerations of the role of *unification* in scientific understanding.

Maudlin (2007, chapter 2) asks a very good question. He asks 'Why Be Humean?'. The Humean view is, roughly speaking, that the world, at its fundamental level, is just a mosaic of local events spread out across spacetime with no necessary connections between the events. This is a very popular view but, nevertheless, there are reasons why the question 'Why be Humean?' is a pressing one.

Firstly, some anti-Humeans, including Maudlin, claim that there are no good reasons to be Humean. Secondly, even if we focus on the work of Humeans themselves it's hard to discern a single clear motivation. Modern Humeanism is a strange coalition — a mishmash of people who have very different inclinations and are pulled towards Humeanism for different reasons. For example, from some parts of the literature you might get the impression Humeanism is driven by pragmatist or anti-metaphysical tendencies, but you certainly wouldn't get that impression from reading David Lewis, the paradigm Humean.

Consequently, investigating the motivations is important if Humeans are to defend their view from people, like Maudlin, who are skeptical that there is a good motivation. But, even if we are not worried about such skepticism, in order to properly understand the Humean project we need to understand what the motivation is.

So, I'm going to explore why one might be a Humean. But my focus will be slightly narrower than Maudlin's. I'll focus on the motivations for *Humeanism about laws of nature* — that is, on the idea that the laws of nature reduce to the Humean mosaic. The focus of the majority of the modern work on Humeanism has been on Humeanism about laws of nature. The background thought is that if

we can understand how laws of nature can exist, whilst, at the fundamental level, there being no necessary connections between the parts of the Humean mosaic, then we can use this understanding to make sense of how facts about chance, causation, counterfactuals and so on can exist in a way that is friendly to the Humean. And if we can make sense of all that then we have gone a very long way to defending Humeanism as a whole.

So my focus is going to be on Humeanism about laws. In fact, from now on I will use the term 'Humeanism' to refer to Humeanism about laws.

More precisely, take *Humeanism about laws of nature* to be the view that the laws of nature reduce to the *Humean Mosaic* — that is, the intrinsic physical state of each spacetime point and the spatio-temporal relations between those points — and that the Humean Mosaic is not further reduced to anything else.¹

The standard Humean view is that the reduction of the laws to the mosaic goes by way of a version of the Best System account (BSA) of laws (see Lewis, 1983b, p. 42-3). The core idea of the BSA is that the laws of nature are the axioms of a system that best balances *simplicity* — the axioms of the system should be simple — and *informativeness* — the deductive closure of those axioms should tell us a lot about the mosaic.

There are lots of further issues about the details of the BSA. For example, what language are the axioms supposed to be formulated in? How do we to measure simplicity and informativeness? Do all the axioms or just some special subset of the axioms count as laws? These questions, and others, give rise to many variants of the BSA (Loewer (1996), Hall (2010), Cohen and Callender (2009), Hicks (2018), Dorst (2019), Jaag and Loew (forth), Braddon-Mitchell (2001), Schrenk (2006) etc.). But the core idea of balancing simplicity and informativeness is enough for our purposes. In the rest of the paper I'm going to assume that the Humean reduction of the laws works via a version of the BSA.

In sections 1-3 I'm going to explore some natural approaches to motivating Humeanism – in particular approaches based on classic empiricist thoughts, classic pragmatist thoughts, and on the value of respect for science – before defending a different motivation in section 4, one based on considerations of *explanatory unification*. I'm going to suggest that the motivations discussed in sections 1-3 either have problems motivating the Humean view or they successfully motivate the Humean view, but they overgeneralize and motivate views that most modern Humeans would want to reject.

¹This formulation of Humeanism is slightly controversial in light of issues about the relation of Humeanism to quantum mechanics. Perhaps the existence of quantum entanglement motivates a different conception of the Humean mosaic, or perhaps Humeanism in this sense can be made consistent with quantum mechanics. (See, for example, Miller (2014), Bhogal and Perry (2017), Chen (2019), Esfeld (2020b) for discussion.) But these issues won't be important in what's to come so I'm going to stick with this formulation of Humeanism.

The motivation developed in section 4, on the other hand, is a healthy and stable motivation for the Humean to build upon. This motivation does rely on controversial claims about the importance of unification. But, given the depth and strength of disagreement between Humeans and anti-Humeans every motivation is going to rely on controversial premises. So, I don't anticipate my arguments to cause a vast influx of anti-Humeans to the Humean camp. Rather, the hope is that the discussion of section 4 will help the Humean motivate their picture of the world to their own satisfaction – contra Maudlin there is a good reason to be a Humean, even if committed anti-Humeans won't be convinced.

Just before we get going, a note on the type of paper that this is, to help orient the reader. Since the overall aim is to properly understand the Humean project in light of the disparate and conflicting motivations it will be necessary to take a somewhat high-level view of the issues. Zooming out like this will allow us to properly see the contours of the landscape and the connections between the motivations for Humeanism. Inevitably, though, this broad scope will lead to detail being missing. For example, the paper touches on some very classic issues about empiricism and pragmatism. Clearly there is much more to say about those issues than is possible here. But the picture we get from such a high-level view of the landscape is valuable.

1 THE HUMEAN AS EMPIRICIST

The most classic motivation for Humeanism comes from a general inclination towards empiricism. Of course, 'Empiricism' means many different things to different people, and so anti-Humeans can reasonably call themselves empiricist too (Earman (1984, p. 192) notes that Armstrong — the prototypical anti-Humean — regards himself as no less empiricist than the Humean Earman.) But there are typical patterns of arguments associated with empiricism that push in favor of Humeanism.

The central empiricist idea is that there is certain privileged data that we have special 'direct' epistemic access to via our experience² and everything that is not determined by that data is, in some way, suspicious. (Earman (1984, p. 195) clearly expresses this idea in the context of the debate about laws.)

Anti-Humean laws appear to be suspicious in this way. They involve necessary connections between events and, as Hume pointed out, we don't seem to directly experience such connections. And such laws seem to be underdetermined by the evidence that we do directly experience. The same experiences could arise from a variety of anti-Humean laws.

²What this 'directness' is is a hard question. Sometimes it's glossed as us having 'non-inferential' access to certain evidence (e.g. Earman and Roberts (2005, section 4)) This hard question isn't particularly important for our aims, but we will say a little more in section 1.2.

Maudlin (2007, Chapter 2, section 4) notes that Hume himself and the logical positivists took this to be a reason to reject the *meaningfulness* of claims about necessary connections. But more modern empiricists typically run the argument differently — the thought is that since anti-Humean laws are underdetermined by what we directly experience they are in principle unknowable. And that unknowability is a reason to not believe in those entities. As Earman (1984, p. 195) puts it, ‘what isn’t knowable in principle isn’t in principle’.

The obvious objection to this kind of reasoning is that it seems to overgeneralize (Laudan and Leplin (1991, pp. 450-451), Maudlin (2007, p. 75)). If we reject everything that is underdetermined by what we directly experience we are quickly driven to rather radical anti-realisms. At very least, we are pushed towards a view of science where we reject entities, like electrons, that we do not directly experience, rather we infer to on the basis of other experiences. (Such entities are called ‘unobservable’ in the literature on scientific realism.) Perhaps we will be forced even further, to more global anti-realist views. But let’s focus on this rejection of unobservable entities like electrons.

The view we are pushed to if we reject unobservable entities which are underdetermined by our direct experience is one where such unobservables either don’t exist or are determined by the observable entities that we directly experience. Either way this is an extremely radical metaphysical view. It is one which, in effect, takes the macroscopic entities that we directly observe as metaphysically prior to smaller microscopic entities.

I’m not going to claim that this view is untenable, but rejecting unobservables in this way is a very non-standard view, one that isn’t accepted by modern Humeans.³

(Esfeld’s ‘super-Humeanism’ (2017; 2020b; 2020a) is a very radical view that takes properties like *mass* and *charge* as metaphysically derivative, but even that view does accept that there are some unobservables that are basic and underdetermined by our experience. Some parts of Loewer’s (1996; 2007) discussions of his ‘Package Deal Account’ might suggest that he takes macroscopic entities as metaphysically basic. But Loewer (fort) suggests that he does not reject unobservable structure that underlies the macroscopic, rather he is just agnostic about what this structure is.)

Ideally, then, we would have a motivation for Humeanism about laws that doesn’t push us to these very radical metaphysical views which typical modern Humeans don’t accept. This is what I’ll look for.

³Note, this is much more radical than standard ‘scientific anti-realist’ views, which are merely agnostic about the nature of the unobservables, instead of claiming that the unobservables are determined by the observables.

1.1 EMPIRICISM AND EXPLANATION

However, the empiricist argument we have been considering so far is only the most simple and unnuanced version. Perhaps the empiricist could suggest that even though our experience underdetermines claims about anti-Humean laws and scientific unobservables, that isn't a conclusive reason to reject those entities. Rather it's simply a reason to be *prima facie* suspicious of those entities. We can reasonably believe in those entities if we have some other powerful reason to do so. The natural reason to appeal to here is the explanatory power of such entities — their role in explaining certain patterns of events that would otherwise be surprising.

If there were not electrons, for example, then it would be strange that the pattern of events looks just as if there were electrons. The existence of electrons gives us understanding of why this pattern holds. So, a more complex empiricist approach could claim that the fact that electrons are underdetermined by the evidence is a *prima facie* reason to be suspicious, but that we have explanatory reasons to believe in the existence of electrons.

Of course, though, one might appeal to similar explanatory reasoning to motivate anti-Humean laws as well. If there is no anti-Humean law explaining things then certain patterns in the Humean mosaic seem very surprising. For example, if there is no law making it the case that in all collisions momentum is conserved then that pattern seems to be very coincidental. (Or so argue Armstrong (1983), Strawson (1989), Foster (1982) and others.)

So the Humean who takes this complex empiricist approach has to say more to break the symmetry between the case of the electron and the case of laws. That is, they need to argue that we have a reason to believe in scientific unobservables, like electrons, via an inference to the best explanation, but we don't have similar reason to believe in anti-Humean laws.

How might a Humean make this case? The natural way to do this is by denying that anti-Humean laws have any explanatory advantage over anti-Humean ones. To do this the Humean could argue that (i) anti-Humean laws don't explain or (ii) anti-Humean laws do explain, but Humean laws explain just as well. Either way, there is no reason to accept anti-Humean laws on explanatory grounds.

The issues here get somewhat complicated. Exactly how Humean laws explain and whether they leave important things unexplained is a substantial issue. As is the issue of whether anti-Humean laws explain and give us understanding. I'm going to put these issues aside for now, but I'll come back to (i) and (ii) in section 4.

But at this point, just note that the driving force in these arguments are considerations of explanation — the distinctive empiricist reasoning isn't doing a lot of work here. So, the pure empiricist approach

overgeneralizes and pushes us to larger anti-realisms. A more complex empiricist approach might be viable, but it's driven more by explanatory considerations than traditional empiricist reasoning. And in any case, we will consider these explanatory issues later.

1.2 EARMAN AND ROBERTS

There is one variant of the empiricist strategy that we should consider before we move on. The background thought in this discussion was that in order to avoid the empiricist argument overgeneralizing we need to appeal to explanatory considerations. Earman and Roberts (2005), though, have developed an influential empiricist strategy, which claims to avoid overgeneralization, and not via explanatory considerations. So we should briefly consider this approach.

At the heart of their paper is a version of the empiricist argument, that we have been considering, that there is some privileged evidence that we directly, non-inferentially, experience and there is reason to reject things that are underdetermined by that evidence. Again, the concern with this is that both anti-Humean laws, and scientific unobservables like electrons, seem to be underdetermined by our direct evidence. So it seems like the empiricist argument motivates more than we want. Earman and Roberts deny that their argument overgeneralizes in this way.

Their reasoning is not to do with the explanatory considerations we mentioned in the last subsection – they don't argue that we have reason via inference to the best explanation to believe in electrons, but not in anti-Humean laws. In fact, they reject the whole procedure of inference to the best explanation (pp. 268-272). They claim that it's hard to justify why the explanatory power of theories would give us any *epistemic* reason to believe in them — why explanation would be a guide to accurate belief.

Rather, they avoid overgeneralization by claiming that while facts about anti-Humean laws are underdetermined by our direct, non-inferential, evidence, that's not the case for scientific unobservables like electrons. This is because, contrary to much of the literature on scientific realism, they claim that we directly and non-inferentially experience the existence of electrons. And so it's not the case that our direct experience underdetermines the existence of electrons – rather, such existence is given to us in our direct, non-inferential experience.

In particular, they allow that 'observations made with the help of artificial instruments and informed by sophisticated theory' are part of the empirical evidence that we have 'non-inferentially' (p. 261).

This, I think, seems implausible. If we come to believe that there are electrons on the basis of running an extremely complicated experiment, which took years of science to develop, and seeing certain combinations of pointer readings which, given your sophisticated background theory, suggest that there are electrons, then this seems to be a paradigm example of something we believe inferentially.

(In fact, the published paper describing this experiment would probably describe in great detail the nature of this inference!)

Earman and Roberts have to claim that coming to believe that there are electrons via this kind of process – seeing certain patterns of pointer readings and thinking that there must be electrons making this pattern hold – counts as direct and non-inferential. But they also have to claim that the process via which someone comes to believe that there are anti-Humean laws – e.g. by observing patterns in the world and thinking that there must be some underlying entity that makes that pattern hold – counts as indirect, and inferential. Otherwise their argument would not cast doubt on anti-Humean laws.

But it's hard to see, I think, a clear epistemological difference between these cases. And Earman and Roberts don't give us an account of the difference. So, without some additional story, I don't think their empiricist approach successfully avoids over-generalization. In fact, they explicitly choose not to give an additional story, noting that this choice may lead to concerns with overgeneralization. After claiming that we can directly and non-inferentially observe things like the existence of electrons via complex experiments they say: 'We will not pause to argue the point here, though. For anyone who disagrees with us on this point, our argument will establish an even stronger supervenience claim than the one we endorse' (p.261). But to say that their argument will establish an even stronger supervenience claim is just to say that it will overgeneralize from conclusions about laws to conclusions about things like electrons.

2 THE HUMEAN AS PRAGMATIST

A different motivation for Humeanism is based on a pragmatist thought — Humean laws are exactly what we need them to be, given our interests and our cognitive limitations.

For example, here is David Albert (2015, p. 23) with an influential expression of this thought:

You get to have an audience with God. And God promises to tell you whatever you'd like to know. And you ask Him to tell you about the world. And He begins to recite the facts: such-and-such a property (the presence of a particle, say, or some particular value of some particular field) is instantiated at such-and-such a spatial location at such-and-such a time, and such-and-such another property is instantiated at such-and-such another spatial location at such-and-such another time, and so on. And it begins to look as if all this is likely to drag on for a while. And you explain to God that you're actually a bit pressed for time, that this is not all you have to do today, that you are not going

to be in a position to hear out the whole story. And you ask if maybe there's something meaty and pithy and helpful and informative and short that He might be able to tell you about the world which (you understand) would not amount to everything, or nearly everything, but would nonetheless still somehow amount to a lot. Something that will serve you well, or reasonably well, or as well as possible, in making your way about in the world.

And what it is to be a law, and all it is to be a law, on this picture...is to be an element of the best possible response to precisely this request.

This conception tailors the notion of lawhood to what we want from the laws; to what would be most useful to us in certain respects. It would be useful for us for laws to be 'meaty and pithy and helpful and informative and short' and to serve us well in making our way around the world and, consequently, that's what laws are.

Similarly, Ismael (2015) stresses this pragmatic motivation noting that 'There is a welcome emphasis on the pragmatic motivation for theorizing in Lewis's discussions of the BSA that is even more explicit in the discussions of contemporary Humeans.' (p.192) And that 'the criteria by which best systems are judged need to be filed out in terms that are relative to human abilities and ends'. (p.193) As she notes, many other modern Humeans similarly stress a pragmatic motivation for the account (for example, Hicks (2018), Dorst (2019), Jaag and Loew (fort)).

Anti-Humeans will typically think that the the laws are useful too — that the laws of nature are simple and informative about the world, for example. But for the anti-Humean this is a contingent fact — the world could be unkind to us – while on the pragmatist approach the connection between laws and what is useful is necessary.

The pragmatic approach tailors the notion of lawhood to what is useful to us — to what helps us achieve our aims. In order to develop the approach, then, we need to specify what the relevant aims are. Let's focus, for now, on pragmatic approaches that emphasize the way in which laws help us achieve certain epistemic aims; we will consider non-epistemic aims later. For example, Hicks (2018), Dorst (2019) and Jaag and Loew (fort) all stress the way in which the laws outputted by their favored variants of the BSA help agents make predictions given their epistemic constraints.

But even if we restrict to epistemic aims, defenders of the pragmatic approach need to be careful about specifying what the relevant epistemic aims are. To see this, imagine someone responding to Albert and his story about meeting God like this: 'My central epistemic aim is just to know what the world is like! I want to understand the deep structure of the world, what is there and what isn't. So, if I have a meeting with God and God tells me that there are primitive anti-Humean laws that

govern the particular matters of fact, and tells me what those laws are, then that's great. That would be incredibly helpful for achieving my epistemic aims. Of course, if God told me that there are no anti-Humean laws and fundamentally the world is just a collection of disconnected events pushed up against each other in spacetime then that would help me achieve my epistemic aims too. But it's not as if the Humean approach to laws is more useful to me than the anti-Humean one.'

Of course, the pragmatist can respond that this isn't the relevant epistemic aim. Rather the relevant epistemic aims for the pragmatist approach are smaller scale and more concrete than the aim of discovering the true structure of the world. Perhaps the pragmatist could claim that the relevant epistemic aim is not about finding out about the very abstract structure of the world but about finding out about, and making predictions about, the stuff that we have direct access to: the macroscopic, observable objects that we are familiar with. If this is the relevant epistemic aim, then it's somewhat plausible to think that the the pragmatic approach motivates a conception of laws in line with the BSA. Perhaps a conception of law where the laws balance simplicity and informativeness will be very helpful for us making predictions about the macroscopic objects in the way Albert suggests.

But, there's a concern that the pragmatic approach, when coupled with this conception of what the relevant aim is, seems to motivate a pragmatic approach to much more. If the aim is to find out about, and make predictions about, the macroscopic, observable objects and this aim motivates a pragmatic approach to the laws, then it also appears to motivate a pragmatic approach to scientific unobservables. If our conception of what the laws are is tailored to help us find out about the macroscopic objects then shouldn't our conception of what an electron is, for example, be tailored in the same way?

As we discussed in last section, this type of pragmatism or anti-realism about unobservables might perhaps be a defensible view. On this view, what it is to be an electron is for it to be determined by facts about usefulness and macroscopic objects. And similarly for other unobservables – those unobservables are metaphysically posterior to the macroscopic objects. But, this is not the type of view that modern Humeans typically accept. (As we noted in the last section, even authors like Esfeld (2017; 2020b; 2020a), Loewer (1996; 2007) and Bhogal and Perry (2017) who seem to take some steps in this direction allow that there are microscopic unobservables that are metaphysically prior to the macroscopic objects.) And, consequently, it's not the type of view that I'm trying to motivate.

The defender of the pragmatic approach could respond that their approach is only meant to apply to laws, and not scientific unobservables, or any other entities. But it's not clear what the justification is for restricting the scope of the approach in this way. Of course, if you already had independent reason for accepting reductionism or anti-realism about laws, but not about scientific unobservables, then that could be a justification for being a pragmatist about laws, but not about scientific unobservables. But that is not the position that we are in since we are considering what the motivation is for holding

such views.

But maybe this isn't the relevant epistemic aim either. The relevant aim, the pragmatist might say, is not to find out about the basic structure of the world, and it's not to find out about the observable objects that we are familiar with. Rather, the aim we should focus on is finding out about the Humean mosaic, no more no less. In fact, this seems to be what Albert is thinking — he seems to suggest that the way God would give you the whole story is by just listing which properties are instantiated at which spatiotemporal locations. This, I take it, is information about the Humean mosaic — the intrinsic physical state of each spacetime point and the spatio-temporal relations between those points.

If this pragmatist focuses on this aim — of finding out about the Humean mosaic in particular — then it's plausible that they get the results they want. But it starts to look like the work is being done less by the pragmatist approach and more by the specific choice of what the relevant aim is. Sure, we can identify a particular epistemic aim such that if we focus on that aim that could motivate a BSA approach to laws without overgeneralization. But it's not clear why we should focus on that aim in particular.

Perhaps the pragmatist could accept all this, and instead claim that their approach doesn't focus on one of these aims in particular. Rather, if we take the totality of our epistemic interests together then we can see that having a BSA conception of laws, but not a pragmatic approach to scientific unobservables is what best promotes our epistemic interests.

Undoubtedly there is a way to balance all our epistemic aims that gets the right results but again, it's not clear why this particular balance of aims is the right one. Perhaps some case can be made that all reasonable ways of balancing our epistemic aims leads to a pragmatist approach to laws, but not scientific unobservables. But this seems like a difficult case to make.

Of course, we have just been focusing on epistemic ends so far. Would adding consideration of our non-epistemic ends — our desire for happiness, or money, or to live a flourishing life — help the situation? It's hard to see how. Our non-epistemic aims are, presumably, to do with the manipulation of macro-level, observable entities, so adding these aims would not help motivate a pragmatist view of laws but not scientific unobservables

I don't think, then, that the pragmatic approach is a motivation that the Humean can rely on. In order for it to get the results we want we have to fine tune our view of the relevant aims in a way that is ad hoc.

Importantly, this is not to say that a pragmatic conception of laws is misguided. Rather, the point is that the pragmatist thought doesn't provide a good motivation for Humeanism. As we noted earlier, if we are already inclined to think that Humeanism is true then it seems perfectly reasonable to have

a view of laws where pragmatic considerations play a central role. But this, of course is to already assume a motivation for Humeanism. Indeed, perhaps this is the position that Albert, and some of the other Humeans mentioned in this section, intend to take – they have a pragmatic Humean view of laws, but don't take the pragmatism to motivate their view.

3 THE HUMEAN AS HOLDING A MIRROR TO SCIENCE

Humeans sometimes motivate their view by claiming that the Humean picture of laws is the one that most respects the practice of science. The Best System account of laws sticks very closely to the actual practice of science — in fact, one way to describe the view is that it takes the actual methodology of science and it mirrors that methodology in the account of the metaphysics of laws. Hall (2010) calls this the 'unofficial guiding idea' behind Humeanism about laws. The idea is a 'kind of "ideal observer" view, according to which the fundamental laws are whatever a suitably placed observer, implementing the best scientific standards for judging what laws are, would take them to be.' (p.11) To put it another way, the laws are just whatever an ideal scientist would believe that the laws are.

Of course, we need to be careful to interpret 'ideal' in a way which gives this idea content. In one sense an ideal scientist would be one who believes all and only the truths. But then the claim that the laws are what the ideal scientist believes them to be would be trivial. Instead, take the methods for discovering laws that are implicit in actual scientific practice, and imagine that those methods and their implementation are idealized in certain ways — we idealize away from our ignorance of the non-modal facts, our limitations on computational power, and so on. Then consider the propositions that a scientist who implemented this ideal procedure would believe are laws. On this view those propositions just are the laws. So what it means for the scientist to be ideal is that they ideally implement the methods that are implicit in science.⁴ And the the methods for finding out about the laws that are implicit in actual scientific practice involve considerations of informativeness or simplicity (perhaps along with some other factors) and so the best system account, or some variant, describes the idealized implementation of these methods.

This view takes the epistemic principles that scientists use and elevates them to principles that constitute the nature of laws. This is a very extreme way of having your metaphysics stick closely to your science!

⁴There are lots of interesting questions here about exactly what types of idealizations are appropriate and which are not. One way to understand the view of Dorst (2019), for example, is saying that the standard version of the BSA idealizes too far away from the actual characteristics of scientists and scientific practice and that we should, when thinking about what an ideal scientist would say about the laws, construe the ideal scientist as creature like us who has certain kinds of epistemic and practical constraints.

The major concern with this approach is very simple. It's that the Humean view just doesn't seem to do a good job at mirroring scientific practice. In fact, there are some classic objections to Humeanism that make clear the ways in which the Humean picture diverges from scientific practice. (To be clear, I'm not claiming that these objections refute Humeanism, but I do think that they illustrate this divergence.)

For example, it's often been objected that Humeanism leads to explanatory circularity — that the Humean laws are explained by the mosaic, but they are part of explanations of events that make up the mosaic (Armstrong (1983, p. 40), Bird (2007, p. 86), Maudlin (2007, p. 172), etc.). The now standard response to this, deriving from Loewer (2012), involves saying that there is no problematic circularity because the laws are *metaphysically* explained by the mosaic while the mosaic is *scientifically* explained by the laws. There is lots of debate about is a good response, but even assuming it is, it does make clear that the patterns of explanation within the Humean metaphysical picture diverge substantially from the patterns of explanation in scientific practice. The anti-Humean, on the other hand, does not need to accept this divergence — their metaphysical picture of the laws can accept that the laws govern, and hence explain, the mosaic in a way that mirrors the patterns of explanation we see in science.

Similarly, it's common to observe that situations that seem to be taken seriously in scientific practice are taken to be metaphysically impossible by the Humean. For example, a physicist would tell us how a single particle Newtonian world would evolve but, according to the Humean, such a world is metaphysically impossible because the best system for a single particle world would not output the laws of Newtonian Mechanics. More generally, it's a classic objection to Humeanism that the Humean commits to the laws supervening on the Humean mosaic and in doing so has to say that certain situations that are taken seriously in scientific practice are metaphysically impossible (see, Tooley (1977, p. 669), Carroll (1994, pp. 57-67), Maudlin (2007, pp. 67-68) etc.). Again, my point is not that this is a fatal objection to Humeanism but rather that it's another clear way in which the Humean metaphysical picture does not mirror science.

Bhogal (forth, section 3) discusses further ways in which the Humean picture diverges from scientific practice — this comes out when considering certain counterfactual claims and claims about chance, for example.

The Humean shouldn't motivate their view by claiming that their view best respects and mirrors scientific practice — since in very important ways the Humean view substantially diverges from scientific practice.

4 HUMEAN AS UNIFICATIONIST

So we have a high-level overview of different approaches to motivating Humeanism and some reasons to be concerned with these approaches. Of course, as I noted in the introduction, there is a lot of detail that can be added, and the objections I considered are not conclusive. And I've obviously not considered all possible strategies. But, I think worries I've raised are reason to consider a different strategy.

The strategy I will consider is a very natural and intuitive motivation for Humeanism. Perhaps some might even call it obvious. But it has typically been ignored by modern Humeans, apart, perhaps, from one paragraph in Loewer (1996).

The basic structure of the motivation is as follows. Step One: Laws play an important role in *explaining* matters of fact. Step Two: These law-involving explanations give us *understanding*. Step Three: If we hold some particular views about what understanding is, then we will see that the laws outputted by the BSA properly play this role while anti-Humean laws do not – or, at least, adding anti-Humean laws does not improve our understanding and explanations of the world.

4.1 STEP ONE

Let's start by discussing Step One — the role of the laws in explanation. Although it's generally accepted that laws have an important role to play in explanation, the exact details of this role are disputed. Traditionally, it was thought that laws, along with certain background information, play an important role in *covering law* explanations — we can explain facts by showing how they follow, in a certain way, from the laws.

Of course, not every way in which we can show that something follows from the laws counts as an explanation. It is not explanatory to derive the height of the flagpole from the position of the sun and the length of the shadow, along with a law about light moving in straight lines. And perhaps, though this is more controversial, there are some explanations which don't appeal to the laws — for example, I can explain why a glass of wine spills by saying that I knocked the table on which it is standing with my knee but this explanation doesn't obviously involve citing a relevant law (though maybe it implicitly appeals to laws) (see Scriven (1975), Woodward (2003, Chapter 4)).

But regardless of these caveats, it was, and still is, widely accepted that when we have a law, part of its role is to explain facts about the world.

In fact, anti-Humeans typically appeal to the explanatory role of the laws in order to generate the circularity objection to Humean accounts of law that we mentioned in section 3. The objection

assumes that the laws explain particular matters of fact, before arguing that laws are, for the Humean, partially explained by particular matters of fact and so there is explanatory circularity.

Nowadays, though, an alternative view has started to gain in popularity. That view, notably developed by Brad Skow (2016) and Michael Hicks (forth) denies that laws ever explain events — only causes explain events. Laws do play an explanatory role on this approach — they ‘back’ explanations. Or, to put it another way, if A causes B and therefore A causally explains B there is a relevant law that explains why A causes B, and so explains why A explains B. For example, if one billiard ball hits a second, causing it to move, what explains the second ball moving is that it was hit by the first. But the relevant physical laws are what explain why the first billiard ball hitting the second explains why the second moves.

Even on this alternative view — where the laws are not part of the explanans itself, but are rather the reason that certain explanations hold — laws still have an important explanatory role. Either way it seems like laws have a central role to play in explanation.

4.2 STEP TWO

On to Step Two: The role that laws play in explanation is importantly connected to *understanding* — grasping the role that laws play in a particular explanation provides us understanding of the phenomenon in question.

For example, if we are trying to understand why the second billiard ball moves upon being hit by the first then it’s important to grasp the role of the relevant Newtonian laws and the law of conservation of momentum. And this is true regardless of whether we say that those laws are strictly part of the explanation of the second ball moving or not.

It is very widely accepted that grasping or possessing an explanation gives us understanding of the phenomenon explained. (See, for example, Friedman (1974), Strevens (2013), Woodward (2003), de Regt (2009, 2017) etc..) Different authors, however, have very different conceptions of what it is to grasp or possess an explanation. For example, while de Regt requires that you have certain competencies in working with the theory that underlies the explanation, Strevens has a much weaker conception of what it is to grasp an explanation. But, regardless of these details, the consensus is that grasping explanations gives us understanding — so if laws are part of what explains particular facts then grasping laws gives us understanding.

Skow (2017) argues against this consensus and claims that grasping explanations does not, in general, give us understanding. But, in the context of our discussion, this doesn’t turn out to be an important disagreement. This is because, as we noted, Skow claims that laws do not explain particular matters

of fact — rather they are the reasons why certain explanations hold. And, further, he claims that understanding doesn't just derive from grasping the explanation of a phenomenon, rather we need to know why that explanation counts as an explanation (Skow, 2017, 2016).

So he agrees that laws play a special role in explanation and grasping the relevant laws give us understanding. But instead of saying that laws explain and grasping explanations give us understanding — which is the mainstream view — Skow says that laws back explanations and grasping what backs explanations gives us understanding.

Either way, laws have this important connection to understanding via their role in explanation. When we grasp the role that the laws play in a particular explanation, either as part of an explanans or as backing an explanation, that helps us to understand the explanandum.

4.3 STEP THREE

Step Three: Given this connection between laws and understanding we can learn about the nature of laws by looking at the nature of understanding. Our account of laws and understanding must fit together, such that the laws can provide understanding.

In particular, if we think that understanding comes from *unification*, then, I claim, this motivates a best system approach to laws. The intuitive idea of unification is that it consists in bringing disparate phenomena together — taking a certain set of facts and viewing them together as instances of single pattern or a small set of patterns. Consequently, when we unify facts we no longer have to view them as separate and independent, rather we can view them together as constituting this pattern.

Consider a toy example: Imagine I have a small piece of cardboard with some complicated coloration on one of the sides. I'm puzzled about why the cardboard is colored like this. Someone then tells me that it's part of a jigsaw puzzle. In fact, the jigsaw puzzle is of a picture of Albert Einstein. And then they show me where in the picture this piece fits — it has this specific coloration because it's part of Einstein's forehead and his hair. Now I can look at this piece, along with all the other pieces of the jigsaw puzzle that I have, and I can stop considering them all separately. Rather, I can see them together, as all parts of a larger pattern that they constitute. In this way, I've gained a lot of understanding. In particular, I understand why the pieces have the coloration that they do.

Similarly, the unificationist will say, we gain understanding from seeing how particular facts constitute the larger patterns that there are in the world. That is, we gain understanding by subsuming particular facts to general patterns.

For specificity I'm going to understand unification along the lines of Friedman (1974). We gain unification, on this approach, by subsuming particular events to more general patterns hence 'reducing

the total number of independent phenomena' that we have to accept (Friedman, 1974, p. 16). For example, consider how Newtonian physics subsumed both celestial and terrestrial phenomena to the same patterns, hence reducing the number of phenomena that we need to accept independently (see Kitcher (1981) for a discussion of this case).

There is a very important distinction to make here about the type of unificationist I am talking about. Strevens (2008, section 1.23) notes that full theories of explanation need to identify two relations — the *formal requirement* and the *explanatory relation*. The formal requirement identifies the criteria according to which the explanans explains the explanandum. It's this formal requirement that is often thought of as an account of explanation. The explanatory relation identifies the relation between the explanans and explanandum that gives the explanation its force. Or, to put it slightly differently, the relation between explanation and explanandum that generates understanding.

An easy way to see the difference is to think about Hempel's (1966) Deductive-Nomological (D-N) account of explanation. The formal requirement is that a set of facts A, B, C...explains Z when there is a sound deductive argument from those facts to Z where at least one of the facts is a law of nature. But this formal story doesn't tell us what the explanatory relation is – what it is about such an explanation that gives understanding. In places Hempel says that what generates understanding is to do with the explanans making the explanandum expectable (Hempel, 1965, p.337). In other places he thinks that the story is to do with pattern-subsumption or unification (Hempel, 1966, p.92).

Hempel, then, was clear about the formal requirement, but less clear about the explanatory relation. It's very important to be clear, that when I say that when I'm talking about the unificationist, I'm not talking about unification as an account of the formal requirement for explanation. Kitcher (1981), for example, gives a detailed unificationist account of the formal requirement. I'm not committing to anything like that, or saying that the Humean should commit to something like that. The unificationist that I'm talking about commits to unification as a story about the explanatory relation — a story about what, in an explanation, generates explanatory force and understanding.

The idea that explanatory force and understanding coming from unification — that is, from reducing the total number of independent phenomena — is consistent with a variety of stories about the formal requirements. It's consistent with a Kitcher-style account, but also with much more. For example, a Humean could accept a D-N account of explanation, but given the Humean account of laws, it would be natural to think that the understanding such explanations give derives from unification — from fitting particular events into the very general patterns described by the laws. More on this very soon, but again, the point here is that our focus is on the underlying explanatory relation.

Consequently, I'm not giving a full unificatory account of explanation. I'm not giving an account of when one set of facts provides a unificatory explanation of another fact, because that would just be

an account of the formal requirements of explanation.

Of course, there are still questions about how to understand unification as an explanatory relation. Even if we accept the Friedman conception of unification as ‘reducing the total number of independent phenomena’ that we have to accept, how, for example, do we individuate phenomena? Still though, I don’t think this lack of complete clarity about unification is a problem going forward — just the outlines of unification as a story about the explanatory relation will be enough for the argument.

This idea of unifying by pattern subsumption and hence ‘reducing the total number of independent phenomena’ that we have to accept has a long history in the literature on explanation. It goes back at least to Hempel (1966) who claimed that ‘what scientific explanation, especially theoretical explanation, aims at is...an objective kind of insight that is achieved by a systematic unification, by exhibiting the phenomena as manifestations of common, underlying structures and processes’. Here ‘objective kind of insight’ is, I take it, a synonym for understanding. Similar ideas can be found in Kneale (1949, p. 92), Feigl (1970), Kitcher (1981) and many others.

Similarly, these unificationist ideas are central to the literature in epistemology on understanding. For example, Grimm (2012, p. 103), in his survey of the literature, characterizes the notion of understanding discussed by epistemologists as roughly, the good of being able to “grasp” or “see” how the various parts of the world were systematically related’. And de Regt (2009) identifies the unificationist approach to understanding to be one of the two main contenders in the literature on understanding — although, of course, it is developed in rather different ways by different people.

One might reasonably hold the view, then, that understanding is about unification – we understand a phenomenon by identifying its place in the jigsaw of events – by seeing its connections to other events in the world and the patterns in those events. Now is not the time to mount a full defense of this view of understanding — that would take us far afield. And of course the role of unification in understanding and explanation is highly controversial. My claim is simply that this conception of understanding, where it is unification that generates the understanding in law-involving explanations, is a plausible option, which it would be reasonable to accept.

If we do accept that understanding is about unification and if laws give us understanding via their connection to explanation then this, I think, can naturally motivate the Humean view.

If understanding is about unification then it is clear how laws, as understood by the BSA, could give us understanding. Precisely what the BSA does is take the vast numbers of disparate facts that constitute the Humean mosaic and draws out the general patterns that these facts constitute. These general patterns are the laws. So, if I explain a particular fact and the explanation involves, or is backed by, a BSA-law then I’m viewing the fact in question as an instance of one of these most

general patterns.

It's not a coincidence that my example of the jigsaw, designed to explain the notion of unification, and the Humean metaphor of the mosaic are just the same metaphor — the BSA is intimately connected to ideas of unification. They are both driven by the idea of discerning patterns, and fitting smaller scale events into these larger patterns.

4.3.1 Do Anti-Humean Laws Unify?

Now though, we have to argue that the unificationist conception of understanding does not motivate an anti-Humean approach in the same way. Do anti-Humean laws unify as well? After all, there is a sense in which anti-Humean laws are closely connected to Humean laws. As we noted in section 3 we can understand the BSA as identifying the procedures that the anti-Humean thinks are good epistemic guides to the laws and taking them to be, in fact, constitutive of lawhood. So, as long as those epistemic procedures really are reliable, it looks like the anti-Humean laws can also unify.

There are two responses to this line of thought. Firstly, on typical anti-Humean approaches laws are not patterns or regularities. For example, on Armstrong's (1983) view the law that *all Fs are Gs* is not the pattern of all the Fs being Gs. Rather, the law is the holding of a distinctive higher-order universal – the *necessitation relation*, *N* – between the universals F and G. Similarly, on Maudlin's (2007) primitivist approach laws are not regularities, they are *sui generis* entities.

(There's a good reason that laws are not patterns or regularities on standard anti-Humean views. If laws are regularities then the view faces the problem of explanatory circularity mentioned in section 3. The law that all Fs are Gs is meant to explain particular Fs being G, but the regularity that all Fs are Gs is constituted by those instances. So, it is better for the anti-Humean to identify the laws with the distinctive anti-Humean ontology that they postulate, rather than with regularities.)

And since these laws are not patterns or regularities, then it seems that they cannot explain via unification. An explanation using Humean laws involves particular events being subsumed to the general pattern that is the law – thus unifying the event in question with other events. But the same does not apply to explanations involving anti-Humean laws, since those laws are not general patterns – the law is, for example, just the instantiation of a higher-order universal, or a *sui generis* entity.

But, an anti-Humean might say in response, even if the laws are not regularities or patterns, they necessitate the relevant regularities. For example, the holding of the necessitation relation *N* between F and G necessitates that all Fs are Gs. And similarly, the primitive, *sui generis* law that all Fs are Gs necessitate the actual world pattern of Fs being Gs. Consequently, when we appeal to such anti-Humean laws in order to explain a particular event we do, indirectly, gain understanding via unification because that particular event is subsumed to the regularity that is associated with the law.

So, there is a second response to the concern that the unificationist motivation equally motivates an anti-Humean view. Take, for example an anti-Humean law that $F=MA$. For simplicity, imagine that this is a Maudlin-style *sui generis* primitive law. And imagine that the anti-Humean claims that explanations involving such laws implicitly subsume particular events to the general Newtonian regularities and so gain understanding on this unificationist approach.

However, such unification derives merely from the existence of general Newtonian regularities, like $F=MA$, to which we can subsume particular events. The fact that such regularities, are on Maudlin's view, associated with, and generated by, a *sui generis* law does not allow us to subsume events under the regularity any better. The explanations of particular events are no more unificatory and hence generate no more understanding in virtue of the anti-Humean part of the ontology. (And clearly this doesn't just apply to Maudlin's particular version of anti-Humeanism, but to anti-Humeanism more generally.)

One way to put the point is that anti-Humean laws can unify, and hence generate understanding, but they do so merely by replicating the most general patterns of the world that are the Humean laws. The anti-Humean aspects of the ontology are something like explanatory danglers, then – they are an additional piece of ontology that does not contribute to our understanding of the events of the world. So, it seems like we do not have reason to accept this extra part of the ontology.

(Of course, this is all still assuming a unificationist conception of understanding – it is given this conception that adding the anti-Humean elements of the ontology doesn't improve understanding.)

This appeal to unification as the source of scientific understanding is, as I noted earlier, a very natural motivation for Humeanism. In fact, a paragraph in Loewer (1996, p. 197) seems to point towards an argument along these lines. (Though other parts of that paper and other work by Loewer seems to suggest that his Humeanism is motivated more by pragmatic considerations.) But having the motivation for Humeanism be driven by considerations of the nature of explanation and understanding is extremely rare in the literature. In fact, even explicitly committing to a unificationist approach is surprisingly uncommon in the Humean literature. But I think it's a powerful motivation that the Humean can rely on.

4.4 LOCATING THE STRATEGY

So, I've argued, grasping the role of laws in particular explanations gives us understanding of the phenomenon under investigation, and if understanding is to do with unification then that suggests that laws are given by something like the BSA. Of course, this appeal to unification is controversial, but, as I noted at the start, every attempt to motivate Humeanism is going to involve controversial premises.

In section 1 I discussed two options for motivating Humeanism by appeal to explanatory considerations — we could say that anti-Humean laws don't explain and so we should favor Humean laws. Or we could say that anti-Humean laws do explain but Humean laws explain just as well or better and so there is no explanatory reason to accept anti-Humean laws.

The discussion of the last subsection shows how our strategy can be seen as an instance of these options. If, in developing the strategy we commit to the claim that anti-Humean laws cannot unify, and so cannot generate understanding, then the strategy is an instance of the first option. If we admit that anti-Humean laws can unify, but only to the extent that they replicate Humean laws, and that the distinctively anti-Humean features of the ontology add no extra unifying power, then this is an instance of the second option.

At this point, though, and perhaps earlier, some readers will be thinking of a different way of developing the first option. A different way, that is, of arguing that anti-Humean laws cannot explain. This involves consideration of the *inference problem* (van Fraassen, 1989, chapter 5).

Here is the inference problem: Consider, for example, the law that all Fs are Gs. The holding of that law should necessitate that actual instances of F are also Gs. The problem is that it's not clear how anti-Humean accounts of law guarantee that this necessitation holds.

Lewis made this point when discussing Armstrong's view of laws, where the law that all Fs are Gs consists in a necessitation relation, N, holding between the universals F and G.

Whatever N may be, I cannot see how it could be absolutely impossible to have $N(F,G)$ and Fa without Ga ...The mystery is somewhat hidden by Armstrong's terminology. He uses 'necessitates' as a name for the lawmaking universal N; and who would be surprised to hear that if F 'necessitates' G and a has F, then a must have G? But I say that N deserves the name of 'necessitation' only if, somehow, it really can enter into the requisite necessary connections. It can't enter into them just by bearing a name, any more than one can have mighty biceps just by being called 'Armstrong'. (Lewis, 1983a, p. 366)

If Lewis is right that the anti-Humean law that all Fs are Gs doesn't necessitate that actual Fs are Gs then that may be a reason to think that the law that all Fs are Gs cannot explain why actual Fs are Gs.⁵ The general thought is that if Lewis is right then the anti-Humean laws seem rather disconnected from the particular matter of fact – they can't make their instances hold – and this disconnection makes the laws seem unexplanatory. And, consequently, we shouldn't accept such laws.

⁵Of course, sometimes laws can explain without necessitation, for example, if the law is indeterministic. But that is not the situation here.

The problem with this line of reasoning is that it doesn't seem to provide much independent motivation for believing Humeanism. The doubt that $N(F,G)$ could guarantee that actual Fs are Gs seems to be an instance of the general thought that there are no necessary connections between distinct existences. The reason, one suspects, that Lewis cannot see how it could be absolutely impossible to have $N(F,G)$ and Fa without Ga is not anything to do with the specific characteristics of the relation $N(F,G)$ and the object a . Rather, it's that $N(F,G)$ and a seem to be distinct existences, and so, Lewis thinks, they must be able to vary independently of each other – there can't be a necessary connection between them.

And of course, the denial of necessary connections between distinct existences is definitional of the Humean worldview. So I don't think an appeal to the inference problem is a good way to motivate Humeanism — it comes too close to being a restatement of the Humean view. (This is not to deny that there is intuitive force behind the inference problem. Rather, it's to say that the intuitiveness of the inference problem is extremely close to the intuitiveness of the Humean view more generally.)

So again, I think the appeal to unification is an attractive, and compelling, way to develop the idea that anti-Humean laws do not have an explanatory advantage over Humean laws.

4.5 OVERGENERALIZATION

A criticism I had for some other approaches to motivating Humeanism is that they overgeneralized. They do motivate a view where the laws are reduced to the Humean mosaic. But they also seem to motivate a similarly reductionist or anti-realist view of scientific unobservables, like electrons – where what it is to be an electron is metaphysically posterior to the observable facts.

For any good analytic philosopher that immediately raises the question of whether my preferred, unificationist, motivation overgeneralizes too. I don't think that it does.

In general, we are able to motivate the postulation of new entities on explanatory grounds. In the context of a unificatory conception of the explanatory relation that means that we have reason to postulate new entities when they increase unification, and consequently, increase our understanding of the world. Sometimes, postulating unobservables can do this; sometimes, postulating entities like electrons can allow us to unify lots of other phenomena that would otherwise be separate — seeing them together as to do with the behavior of electrons. Of course, going into detail about how this works for each unobservable would require a lot of scientific detail, but it's clear that motivating the postulation of unobservable entities in this way is at least possible. Noting about the unificationist conception rules it out.

But, I argued, on the unificationist view, adding anti-Humean elements of the ontology doesn't help the laws explain and give us understanding of the world. The general patterns of the world, the

Humean laws, give us this understanding via unification – adding necessitation relations between universals or primitive anti-Humean laws or other anti-Humean whatnots doesn't help with this. We don't get any additional understanding of the world by appealing to anti-Humean laws, given the unificationist conception of understanding.

So it's open for the unificationist to motivate the existence of scientific unobservables but it doesn't look like they can motivate the existence of anti-Humean laws.

(Of course, if we were to reject the unificationist approach, the anti-Humean might be able to argue that their laws can give us understanding in a way that Humean laws cannot, perhaps by claiming that regularities *depend* on the existence of anti-Humean laws. An interesting discussion is to be had here, but, since it involves a commitment to a *dependence*-based conception of explanation and understanding it doesn't tell against the claim that the Humean should motivate their view via appeal to the unificationist approach.)

The unificationist motivation for Humeanism about laws doesn't push us to unpalatable conclusions about electrons.

5 CONCLUSION

I've argued that an appeal to a unificationist conception of understanding gives us a clear and natural motivation for Humeanism. Other motivations that we considered either lead to pictures of the world that the modern Humean doesn't not typically want to accept or don't seem to successfully motivate Humeanism. Perhaps there are other possible motivations that we have not considered, but I think the unificationist motivation is a particularly attractive one.

As I noted, this appeal to unificationism is controversial but, given the depth and strength of the disagreement between Humeans and anti-Humeans, any motivation for Humeanism will rely on controversial premises. So, anti-Humeans will respond to the argument here by happily rejecting the unificationist conception of understanding. But, the unificationist motivation is one that people who have some attraction to Humeanism can be happy to rely upon — and it's a natural and clear motivation one that the Humean can appeal to in response to Maudlin-style worries that their view is unmotivated.

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