What Motivates Humeanism?*

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Abstract

The 'great divide' in the metaphysics of science is between Humean approaches – which reduce scientific laws (and related modalities) to patterns of occurrent facts – and anti-Humean approaches – where laws stand apart from the patterns of events, making those events hold.

There is a vast literature on this debate, with many problems raised for the Humean. But a major problem comes right at the start – what's the motivation for Humeanism in the first place? This is rather unclear. In fact Maudlin, and other anti-Humeans, claim that there is no good motivation for Humeanism.

I criticize a few influential approaches to motivating Humeanism – in particular those based on empiricism, pragmatism, and fidelity to science. In their place I suggest 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 '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 metaphysical picture is popular but, nevertheless, the question 'Why be Humean?' is a pressing one.

Some anti-Humeans, including Maudlin, claim that there are no good reasons to be Humean. But even if we focus on those sympathetic to Humeanism, it can be hard to discern a single clear motivation. 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. Understanding the motivation for Humeanism is important for defending the view against anti-Humeans. But it's also needed to make sense of what the modern Humean project even 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

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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 give an account of laws of nature that is consistent with the world, at the fundamental level, having no necessary connections between the parts of the Humean mosaic then we can use this to give Humean-friendly accounts of chance, causation, counterfactuals and so on. And that would go a very long way to defending Humeanism as a whole. So, 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.

The standard Humean reduces the laws to the mosaic 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 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.

Lots of further questions arise. 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 account (e.g. Loewer (1996), Hall (2010), Cohen and Callender (2009), Hicks (2018), Dorst (2019), Jaag and Loew (2018), BhogalPerryHumeanism, Braddon-Mitchell (2001), Schrenk (2006) etc.). But the core idea of balancing simplicity and informativeness is enough for our purposes. I'm going to assume that the Humean reduction of the laws works via a version of the BSA.

In sections 1-3 I will explore some natural approaches to motivating Humeanism – 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 will suggest that the motivations discussed in sections 1-3 either don't effectively motivate the view or they overgeneralize to also motivate views most modern Humeans would reject.

The motivation developed in section 4, on the other hand, is a stable motivation for the Humean to build upon. It does depend on highly 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. Hopefully, the discussion of section 4 will help the Humean motivate their view to their own satisfaction – contra Maudlin there is a good reason to be a Humean – even if committed anti-Humeans won't be convinced.

A quick note, to orient the reader, just before we start. The overall aim of the paper necessitates a

somewhat high-level view of the issues. For example, the paper touches on some very classic issues about empiricism and pragmatism and their implications for motivating Humeanism. 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 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 Humeans.) But patterns of arguments classically associated with empiricism 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 experienceand 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 seem suspicious in this way. They involve necessary connections between events that, as Hume pointed out, we don't seem to directly experience. And anti-Humean laws are underdetermined by the evidence that we do directly experience since the same experiences could arise from a variety of anti-Humean laws.

Maudlin (2007, Chapter 2, section 4) notes that Hume and the logical positivists took this to be a reason to reject the *meaningfulness* of claims about necessary connections. But modern empiricists typically run the argument differently – 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. (This doesn't imply, however, that unknowability is a reason to believe that those entities do not exist – suspension of belief is possible.[1])

However, this reasoning overgeneralizes (Laudan and Leplin (1991, pp. 450-451), Maudlin (2007, p. 75)). It undermines all sorts of fairly ordinary beliefs. Let's focus on the way it undermines our belief in 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. This empiricist reasoning either tells us to not believe in electrons (or other unobservables, like forces, charges, fields, and so on), or that electrons are determined by what we directly experience.

[1] Thanks to a reviewer for discussion here.

Of course, there is a tradition of people accepting the former view – the tradition of scientific anti-realism. But most modern Humeans aren't scientific anti-realists (see Guo (2022) for further discussion of the relation between Humeanism and scientific realism) so a motivation for Humeanism which commits it to scientific anti-realism, and other related anti-realisms, is not what we are hoping for. Hopefully, we can find a motivation that is a little bit more targeted towards Humeanism – one which still allows us to rationally believe in electrons, forces, and the content of modern science, understood literally.

The latter view, where electrons are determined by what we directly experience is a very radical one. It requires that our direct experiences does not underdetermine, but rather *necessitates* the existence of electrons. This only seems possible with a rather revisionary conception of what electrons are – a view, for example, where macroscopic entities that we directly observe are metaphysically prior to smaller microscopic entities like electrons.

(Some modern Humean views come closer to this position but don't go all the way. Esfeld's 'super-Humeanism' (2017; 2020b; 2020a) is a very radical Humean 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 (2020) suggests that he does not reject unobservable structure that underlies the macroscopic, rather he is just agnostic about what this structure is.)

A motivation for Humeanism shouldn't push us to such extremely radical metaphysical views. This simple empiricist argument for Humeanism overgeneralizes.

1.1 Empiricism and Explanation

The empiricist argument we have been considering so far is only the most simple version, though. A more plausible version says that although our experience underdetermines anti-Humean laws and scientific unobservables, that isn't a conclusive reason to reject those entities. Rather it's a reason to be *prima facie* suspicious of those entities. But we can reasonably accept them if we have some other powerful reason. The natural reason to appeal to is the explanatory power of such entities – their role in making sense of 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. It's reasonable to accept the existence of electrons since they explain why this pattern holds.

Of course, one might appeal to similar reasoning to motivate anti-Humean laws as well. If there is no anti-Humean law explaining things then certain patterns seem very surprising. For example, if

nothing makes it the case that in all collisions momentum is conserved then that pattern seems very coincidental. (Or so argue Armstrong (1983), Strawson (1989), Foster (1982) and others.)

So, the Humean who takes this empiricist approach has to break the symmetry between the electrons and laws. The natural way to do this is by denying that anti-Humean laws have any explanatory advantage over Humean ones. The Humean could either 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. This would contrast with the explanatory reasons we do have to accept electrons.

I'll discuss this explanation-based strategy more in section 4.

1.2 Earman and Roberts

There is one influential variant of the empiricist strategy – that of Earman and Roberts (2005) – which we should briefly consider since it claims to avoid overgeneralization without appealing to explanatory considerations.

They give a version of the empiricist argument that there is some privileged evidence that we directly experience and there is reason to not believe in things that are underdetermined by that evidence. In addition, 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.

Their strategy for avoiding overgeneralization is to claim 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. 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, is implausible. If we come to believe that there are electrons on the basis of running extremely complicated experiments, 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 is a paradigm of something we believe inferentially. (In fact, the published paper describing this experiment would probably describe the nature of this inference in great detail.)

Earman and Roberts claim that coming to believe that there are electrons via this kind of process 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.

It's hard to see a clear epistemological difference between these cases. Without some story about the difference, Earman and Roberts's empiricist approach doesn't avoid over-generalization. In fact, they explicitly choose not to give such a story. 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 electrons and other unobservables.

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.

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.

Here the notion of lawhood is tailored to what we want from the laws. It would be useful 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 (2018)).

Anti-Humeans will typically also think that the the laws are useful, since the laws of nature are simple and informative. But for the anti-Humean this is a contingent fact – the world could be unkind to us. 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 that laws help us achieve certain epistemic aims; we will consider non-epistemic aims soon. For example, Hicks (2018), Dorst (2019) and Jaag and Loew (2018) all stress the way in which the laws outputted by their favored variants of the BSA help agents make predictions given their epistemic constraints.

Defenders of the pragmatic approach need to be very 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 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 the Humean approach to laws is no more useful to me than the anti-Humean one.'

Of course, the pragmatist will likely think that this isn't the relevant epistemic aim. Rather the relevant epistemic aims for the pragmatist 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 discovering the abstract structure of the world but making predictions about and learning to manipulate 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 plausibly this could motivate a Humean

conception of laws. If the laws balance simplicity and informativeness they will plausibly be helpful for making predictions about the macroscopic objects in the way Albert suggests.

But again, there are worries about overgeneralization. If the aim is to 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? We again have failed to find an asymmetry between the cases.

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 suggests that God would give you the whole story by listing which properties are instantiated at which spatiotemporal locations – effectively, that is, fully describing the Humean mosaic.

If this is the relevant epistemic aim then it's plausible that the pragmatist gets the results they want. But now it looks like we have fine-tuned our view of what the relevant epistemic ends are. And what's more, the chosen end only looks like a natural epistemic end if we are already assuming a Humean metaphysics.

If we already accept a picture where what is fundamental is the intrinsic physical state of each space-time point and the spatio-temporal relations between those points – the Humean mosaic – then it's natural enough to say that the laws are the things that are useful for helping us find out about the mosaic. But if we don't have such a Humean metaphysics then the the focus on the intrinsic physical state of each spacetime point and the spatio-temporal relations between those points seems rather unnatural and gerrymandered – why are we ignoring all the other fundamental parts of the world?

The concern here isn't merely that there are lots of epistemic ends and the pragmatist Humean needs to focus on one that is relevant for the account of laws. Rather it's that this pragmatist Humean approach seems compelling only if we already assume Humeanism, and so cannot motivate Humeanism.

One way to see this point is by noting that anti-Humeans can be pragmatists about laws too. Consider, for example, the anti-Humean *powers-BSA* developed by Demarest (2017) and Kimpton-Nye (2017). On this view laws are given by a systemization procedure, but it's not the Humean mosaic that is systemized, rather it's the distribution of certain fundamental dispositional properties, called *powers* or *potencies*. Defenders of such views can plausibly argue – in a way closely analogous to the pragmatist Humean – that their conception of laws is pragmatically very useful, since it helps us to

find out about what is metaphysically fundamental – the distribution of powers. Given that this pragmatic thought can drive anti-Humean views it's hard to see how it can motivate Humeanism in particular.[2]

Importantly, this is not to say that a pragmatic conception of laws is misguided. The point is that the pragmatist thought doesn't provide a good 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.

But 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, largely 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.

3 The Humean as Holding a Mirror to Science

Humeans sometimes motivate their view as the one that most respects the practice of science. In fact, one way to describe the BSA 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 whatever an ideal scientist would believe that the laws are.

Of course, we need to be careful to interpret 'ideal' properly. In one sense an ideal scientist is one who believes all and only the truths. But this trivializes the claim that the laws are what the ideal scientist believes them to be. 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. The laws are what this idealized scientist would believe are laws.[3]

Our scientific methods for discovering laws involve considerations of informativeness and simplicity (perhaps along with some other factors) and so some version of the best system account plausibly describes the idealized implementation of these methods. The Humean view takes the epistemic

[2] Thanks to a reviewer for discussion here.

[3] As constructivists in metaethics often put it, we need *procedural* idealization, not *substantive* idealization e.g. Korsgaard (1983).

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.

The major concern with this motivation is that the Humean view doesn't, in fact, do a good job at mirroring scientific practice. There are classic objections to Humeanism that make clear that the Humean picture diverges from scientific practice. I don't think these objections refute Humeanism, but they do 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 (partly) explain 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), argues that there is no problematic circularity because the laws are *metaphysically* explained by the mosaic while the mosaic is *scientifically* explained by the laws. This response makes clear that the metaphysical explanations Humeans accept diverge substantially from the patterns of explanation in scientific practice. The anti-Humean, on the other hand, does not need to accept this divergence. They can claim that the laws govern, and hence explain, the mosaic in a way that mirrors the patterns of explanation we see in science.

Relatedly, Humeanism implies that the laws supervene on the Humean mosaic and thus 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.). 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. Again, my point is not that this is a fatal objection to Humeanism[4] but rather that it's a clear way in which the Humean metaphysical picture does not mirror science.

There is another way in which this mirroring science motivation for Humeanism looks uncompelling. It's not at all clear that if you started from a detailed study of scientific practice and how laws are used you would generate the standard background assumptions made in the debate between Humeanism and anti-Humeanism. For example, Mitchell (1997, 2000) argues that certain assumptions about, for example, the universality and necessity of laws look more like philosophical projections onto the science rather than philosophers holding a mirror to scientific practice.[5]

Of course, Humeans could, and have, tweaked their views in various ways to capture, for example, the way in which special science laws have exceptions (e.g. Braddon-Mitchell (2001), Schrenk (2006)). But still, the idea that the Humean framework is motivated by reading the view off scientific practice is rather suspicious.

[4] I give my preferred Humean response to this objection in Bhogal (2021).

[5] Thanks to a reviewer for suggesting this line of thought.

4 Humean as Unificationist

I have raised some doubts about a variety of common motivations for Humeanism. Of course, such doubts are far from conclusive. But there is reason to consider a different strategy. Especially since I will consider a very natural and intuitive motivation for Humeanism. 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 as follows. Step One: Laws play an important role in *explaining* matters of fact. Step Two: These explanations give us *understanding*. Step Three: If we hold particular *unificationist* views of understanding, then 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

Start with Step One – the role of the laws in explanation. It's generally accepted that laws have an important role to play in explanation, though the exact details of this role are disputed. The most common view is that laws 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 derivation from the laws is explanatory. But it's widely accepted that when we have a law part of its role is to explain facts about the world.

In fact, anti-Humeans typically assume this in giving the circularity objection to Humeanism that we mentioned in section 3. The objection assumes that that the laws explain particular matters of fact, before arguing that laws are, for the Humean, partially explained by particular matters of fact.

Nowadays, though, an alternative view has started to gain in popularity. That view, notably developed by Brad Skow (2016) and Michael Hicks (2020) denies that laws ever explain events – only causes explain events. However, even on this view laws do play an important explanatory role on this approach – if A causally explains B then there is a relevant law that explains why A explains B. The idea that laws play an important role in explaining matters of fact should be understood as consistent with them playing this metaexplainer role.

4.2 Step Two

The role that laws plays 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.

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..) So, if laws are part of what explains particular facts then grasping the explanatory role of such laws gives us understanding.

Skow (2017) argues against this consensus – claiming that possessing explanations does not, in general, give us understanding. But, this turns out to be an unimportant disagreement for our purposes since Skow, in effect, 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 possessing explanations give us understanding – which is the mainstream view – Skow says that laws back explanations and grasping what backs explanations gives us understanding (Skow, 2017, 2016).

Either way, it's generally accepted that laws have an important connection to understanding via their role in explanation.

4.3 Step Three

Given this connection between laws and understanding we can learn about the nature of laws by looking at the nature of 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 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).

To understand unification along the lines of Friedman does not mean require committing to a unificationist account of *explanation* like those given by Friedman (1974) and Kitcher (1981). I don't commit to such accounts. But my strategy does require that unification is central to explanation in a different sense. We should take a moment to clarify this.

There is an important distinction to make about two ways you can be committed to a unificationism. Strevens (2008, section 1.23) notes that full theories of explanation need to identity 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 it's force. Or, to put it slightly differently, it identifies 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 the explanans making the explanandum expectable (Hempel, 1965, p.337). In other places he says that the story is to do with pattern-subsumption or unification (Hempel, 1966, p.92).

Hempel, then, gave an account of the formal requirement, but was less clear about the explanatory relation. When I say that the Humean should be a 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 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 come 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.

Consequently, I'm not committing to a unificatory account of explanation along the lines of Kitcher's. Of course, there are still questions about how to understand unification as an explanatory relation. Even if we accept Friedman's conception of unification as 'reducing the total number of independent phenomena' that we have to accept, how, for example, do we individuate phenomena? This lack of complete clarity about unification won't be a substantial problem going forward – just the outlines of a story will be enough for the argument. But I'll say a little more on this issue in the conclusion.

This idea of unifying by 'reducing the total number of independent phenomena' that we have to accept has a long history. 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'. Similar ideas can be found in Kneale (1949, p. 92), Feigl (1970), Kitcher (1981) and many others.

Similarly, these unificationist ideas are discussed in 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 the ability to 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 it's place in the jigsaw of events – by seeing it's connections to other events in the world and the patterns in those events.

Now is not the time mount a full defense of this view of understanding. But here is one important point. You might worry that understanding can't, in general, derive from unification because there are cases of explanation without unification – cases, in particular, of explanations that don't appeal to a law or a generalization. But the natural Humean view, I think, is that the understanding that explanations give us derives from unification, even in such cases.[6]

Take, for example, Scriven's (1959) famous example of explaining why there is a stain on the carpet

[6]Thanks to a reviewer for discussion here.

by describing how you knocked over an ink pot on the table. This seems to appeal to causal relations but not generalizations. But most Humeans think that such causal relations ultimately hold in virtue of the patterns of events that hold in the world. The exact way in which such causal relations are determined by patterns is under dispute. It can be rather indirect. For example, some, in the spirit of Lewis, might take causal relations to be fixed by counterfactuals which themselves are analyzed in terms of laws. But typically the Humean will require such a reduction of causal relations to the patterns.

So an attractive view is that the understanding that explanations gives us stems from unification, even in such cases. Of course, there is lots more to say about such causal explanations. And the role of unification in understanding and explanation is highly controversial in other ways too. My claim is simply that this unificationist conception of understanding is a natural option for the Humean.

But this view can naturally motivate Humeanism. If understanding is about unification then it is clear how laws, as understood by the BSA, could give 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 anti-Humean laws can also unify.

But, such anti-Humean laws only unify because they necessitate corresponding regularities or patterns. On Armstrong's (1983) view, for example, the law that *all Fs are Gs* is the holding of a distinctive higher-order universal – the *necessitation relation*, N – between the universals F and G. This unifies the phenomena that we see – the particular instances of Fs being Gs – because the law

entails the generalization that all Fs are Gs. We no longer need to accept all of these instances as independent phenomena.

However, the Humean accepts the existence of such generalizations and that they unify the relevant phenomena. Adding the anti-Humean postulate that the generalization is necessitated by anti-Humean laws does not allow us to unify more. It does not further reduce the amount of independent phenomena that we have to accept. The explanations of particular events are no more unificatory in virtue of the anti-Humean part of the ontology. So, the unificationist conception of understanding does not motivate adding these anti-Humean elements.

4.4 The Inference Problem

I've argued that law-based explanations give 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 highly controversial but, as I noted at the start, every attempt to motivate Humeanism is going to involve highly 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. In the last subsection I discussed my view as an instance of the second strategy.

Some readers, though, may be thinking of a different way of developing the first option. This involves consideration of the *inference problem* (van Fraassen, 1989, chapter 5): Consider 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)

Lewis's thought here is that anti-Humean laws seem rather disconnected from the the particular matter of fact – they can't make their instances hold. But this disconnection makes such anti-Humean laws seem unexplanatory.

This is an attractive line of reasoning but it doesn't provide much independent motivation for Humeanism. Lewis cannot see how it could be absolutely impossible to have N(F,G) and Fa without Ga. But that is just to say that he cannot see how there could be a necessary connection between N(F,G) and its instances. And the reason he cannot see this, one suspects, is due to his view that since N(F,G) and a are distinct existences there cannot be a necessary connection between them. But this is just an instance of the core Humean intuition.

The intuitive force behind the inference problem seems to be too close to the intuitive force of Humeanism for it to be a good motivation.

4.5 Overgeneralization

Earlier I argued that some approaches to motivating Humeanism overgeneralized to motivate a similarly reductionist or anti-realist view of scientific unobservables. Does my suggested motivation overgeneralize?

In general, we 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. Nothing about the unificationist conception rules out that postulating unobservables increases unification.

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.

There's another way in which you might worry that the arguments I gave against prior Humean motivations might hit my suggested motivation too.[7] You might worry that my view is very closely

[7] Thanks to a reviewer for raising this point.

related to the kind of pragmatist view I discussed earlier. Isn't the motivation that I defend one which stresses that laws help us with our epistemic interests? In particular, the aim of understanding, and understanding in this distinctively unificatory way? This threatens to reintroduce the concerns we discussed before – about whether we are fine-tuning some particular epistemic interest as relevant to the account of laws.

But the approach I defend here is not pragmatist one. The idea isn't that laws are the things are particularly useful for achieving the things we happen to value. Rather, the view I think Humeans should take is that unification is of objective, non-pragmatic, epistemic value. And that the distinctive value of explanations – understanding – derives from this. If we accept that the value of explanation comes from unification then there is no explanatory reason to accept anti-Humean laws over Humean ones. The strategy is therefore more in line with the sophisticated empiricist approaches discussed in section 1 than pragmatist approaches.

5 Conclusion

I've argued that an appeal to a unificationist conception of understanding provides a natural motivation for Humeanism – one which has advantages over other commonly suggested motivations. Of course, an appeal to unificationism is highly controversial but, given the depth and strength of the disagreement between Humeans and anti-Humeans, any motivation for Humeanism will rely on extremely controversial premises. So, anti-Humeans will respond by happily rejecting the unificationist conception of understanding. But, the unificationist motivation is one that people who have some attraction to Humeanism can rely upon – 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.

Of course, this all relies upon the attractiveness of a unificationist approach to what is of explanatory value. But can such an approach be developed properly? In particular, we might worry about this since unificationist accounts of explanation as expressed in Friedman (1974) and Kitcher (1981) face technical problems (see, e.g. Woodward (2003, chapter 8)) and haven't been developed in the intervening years as much as one might have hoped.

Again, a full evaluation of the unificationist approach is not possible here. But remember that the motivation I've given does not assume a Friedman/Kitcher-style account of explanation. I drew the distinction between an unificationist account of the formal explanatory relation and a unificationist account of the value of explanations. Again, I commit to the latter but not the former, and I think this is a very natural approach for the Humean. The Humean could accept a covering law approach to explanation, for example, but when combined with a BSA approach to laws it's natural to think that the underlying value of such explanations is unification.

But notice that if this is the right idea for the Humean then we can interpret lots of work developing the BSA as effectively, developing our idea of what unification is. Consider, for example, the discussion of the so-called *predicate F* problem in developing the BSA. Take a predicate F that holds of all and only the things in the actual world. Then consider a proposed systemization of the Humean mosaic: a system with a single axiom $\forall x F(x)$. Such a system would be informative – it rules out all possible worlds except the actual one – and would be simple – it consists of one simple axiom. But clearly the Humean should not say that $\forall x F(x)$ is the single law of nature. A variety of strategies for dealing with this problem have been suggested. The most influential is Lewis's (1983b, p. 42) suggestion that the problem is with the property F and we should restrict the properties we use in our systemizations to perfectly natural properties. Loewer (2007) develops a different strategy based on changing Lewis's conception of informativeness.

I'm not going to defend any particular reply to the predicate F problem here. But notice that these strategies can be understood as developing our idea of what unification is – as distinguishing genuine unification from merely apparent unification. Similarly, other Humean discussions of what makes for simplicity and informativeness, and what makes for the best balance between these values, can be understood in this way.[8]

Contrary to what I said a few paragraphs ago, then, there is a sense in which unificationism has been well studied over the past few decades, not via explicit developments of Friedman or Kitcher's formal accounts of explanation but rather in a somewhat hidden and implicit way as part of the development of the Humean picture. Not only, I think, is Humeanism naturally motivated by a unificationist view of understanding but the two views can grow and develop together.

6 *

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