

INDUCTION AND THE GLUE OF THE WORLD

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Abstract

Armstrong, along with many others, criticized Humean views for having a problem with induction. If there is no glue holding the world together, as the Humean believes, then there seems to be no basis on which to infer from past to future. However, Humeans have typically been unconcerned. After all, they say, *everyone* has a problem with induction. But, if we look at the connection between induction and explanation, we can develop the problem of induction in a way that hits the Humean, but not the anti-Humean. The Humean faces an ‘internal’ problem with induction – inductive skepticism naturally flows from their position in a way that it doesn’t for the anti-Humean. This is a major problem for the Humean, but I’ll end by suggesting a possible way that the Humean could respond – this response is based on larger considerations about what different theories can appropriately take as basic and unexplained.

The core idea of *Humeanism* (as that term is used in modern metaphysics and philosophy of science) is that there are no necessary connections between distinct existences. The picture that flows from this is one where the world is, at its base, just a mosaic of disconnected events pushed up against each other in spacetime [Lewis, 1986, pp. ix-xi]. There are no necessary connections to provide the ‘glue’ between events. Although Humeans typically

accept that laws of nature and causal relations exist they do not construe them as entities that glue together the mosaic of events — rather they think that laws and causal relations just reduce to patterns of events.

This is a popular view. However, many philosophers (most notably Armstrong [1983]) have worried that Humeanism has a problem with *induction*. The thought is that if the future is disconnected from the past, in the way that Humeanism says that all events are disconnected from each other, then it's hard to see why we should infer claims about the future from past evidence.

But most modern Humeans don't seem especially concerned. Ned Hall, for example, calls such worries about induction 'silly' [2010, p. 31]. And Barry Loewer quickly rejects them as 'question-begging' [1996, p. 190]. The general Humean attitude seems to be that everyone faces the problem of induction and so the Humean has no special problem (or at least, no special problem that doesn't beg the question against Humeanism). This view comes out clearly in the Loewer article just cited, but also in Beebe [2011]. She influentially argues that anti-Humeans don't have a solution to the problem of induction — even if we accept necessary connections there is still a problem with inferring future claims from past evidence. She concludes that the Humean 'is no more guilty than the realist [about necessary connections] of susceptibility to the problem of induction.' (p. 526)

Consequently, the focus of the Humean vs anti-Humean debate has been elsewhere in recent years — especially on whether Humeanism faces an explanatory circularity (e.g. Loewer [2012], Lange [2013], Hicks and van Elswyk [2015], Miller [2015], Shumener [2019] and many more.) and on the consistency between Humeanism and certain quantum mechanical phenomena (e.g. Esfeld et al. [2014], Callender [2015], Miller [2014], Dewar [fort.] and many others).

But, I want to claim, these Humean problems with induction have been dismissed far too quickly – Humeans need to pay more attention to these issues. In particular, it is not the case that the Humean and the anti-Humean are on the same footing with respect to induction. Although the Humean and the anti-Humean are on the same footing with respect to *one version* of the problem of induction — neither can convince the inductive skeptic — I claim that the Humean faces certain *internal problems* regarding induction that the anti-Humean does not.

So, the main aim of this paper is to develop an objection to Humeanism along these lines. It's a substantial challenge, I claim, for the Humean to avoid such an objection — the Humean needs to give more attention to their problems with induction. After developing the objection, though, I'll very tentatively suggest a way that the Humean could respond — though much more work would be needed by the Humean to flesh out this response.

In section 1 I will setup the dialectic, and discuss how Beebe argues that the Humean and anti-Humean are equally placed with respect to induction. In section 2 I'll discuss two types of skeptical problems that one might face — the first being the problem of convincing the skeptic that you have knowledge, and the second being the problem of convincing *yourself* that you have knowledge. In section 3 I'll consider one argument that the Humean has difficulties with the second type of problem regarding inductive skepticism (while the anti-Humean does not). Ultimately though, that argument fails. In section 4 I'll consider an adapted argument that, I think, does suggest that Humean has a substantial problem with induction. In section 5 I'll tentatively outline a possible Humean response.

1 ARMSTRONG, BEEBEE, AND NECESSARY CONNECTIONS

Take *Humeanism* to be the view that there are no necessary connections between distinct existences. The Humean can say that there are necessary connections between facts about a whole and facts about its parts, for example, since the whole and the parts are not distinct existences — after all, the whole is made up of the parts. But they cannot claim that there are necessary connections between the properties of mass and acceleration, for example, since those properties are (presumably) distinct existences.

A variety of positive views of the world are consistent with this denial of necessary connections, but the typical view that the modern Humean accepts is one where the world, at its fundamental level, is a mosaic of local events in spacetime with no necessary connections between them.¹

Anti-Humeans, on the other hand, accept necessary connections. For example, the view developed by Dretske [1977], Tooley [1977] and Armstrong [1983] says that universals, for example, the universals F and G, can be connected by a higher-order universal — a *necessitation* relation — and the holding of this necessitation relation guarantees that Fs are Gs. (Strictly, since it is contingent whether that higher-level universal links F and G the necessary connection is not merely between F and G — it is not metaphysically necessary that Fs are Gs. Rather the necessary connection is between F, G, and the higher-level universal N so it is metaphysically necessary that if there is this relation N between F and G then Fs are Gs.)

Similarly, Maudlin [2007] holds that there are primitive, *sui generis*, laws of nature, and the existence of these laws makes certain temporal evolutions of the world necessary. Carroll

¹There's a lot more to say about the nature of this mosaic, especially in light of issues arising from quantum entanglement but that detail is not needed here.

[1994] develops a similar view.

A different approach to necessary connections comes from scientific essentialists like Bird [2007] and Ellis [2007]. The basic idea is that it's part of the essence of certain properties that anything that instantiates those properties has certain dispositional characteristics. For example, it is part of the essence of *charge* that anything that is negatively charged attracts things that are positively charged. So, it is necessary that there will be attraction between something that is negatively charged and something that is positively charged.

The concern for the Humean is that, because they deny such necessary connections, they claim that there is nothing 'gluing' the past to the future – in fact, there is nothing 'gluing' any event to any other distinct event. It's hard to see why we should use the past as evidence for what the future will be like if the future is disconnected from the past. The anti-Humean, on the other hand, seems to have better prospects for dealing with induction. The existence of necessary connections at least provides the anti-Humean with some material to work with.

The most popular anti-Humean strategy with respect to induction was suggested by Armstrong [1983, pp. 51-60]. His basic idea is that the best explanation of the regularities that we observe in the world is that there are necessary connections. For example, when all the Fs we have observed are Gs the best explanation for this is that there is a necessitation relation that holds between F and G. And so, by inference to the best explanation, we are justified in believing that there is such a relation. And given that we are justified in believing that there is a necessitation relation between F and G, we are justified in believing that all Fs will be Gs, even those Fs we have not observed yet.

However, there is a lot of doubt, perhaps even incredulity, that the anti-Humean has solved the problem of induction — that this problem that we've been puzzled about for nearly

300 years is no longer an issue. In particular, Beebee [2011] argues in detail against this solution to the problem, but the basic point is simple — it's not clear why someone who is skeptical about induction should believe that the best explanation of the observed regularity between F and G is the hypothesis that a necessitation relation holds *eternally* between F and G, rather than some weaker hypothesis that implies that F and G have been related by necessitation *so far*. (Beebee also develops similar (but not identical) ideas against putative solutions to the problem of induction based on other approaches to necessary connections, e.g. that of Ellis [2007].)

There is still back and forth over this kind of objection to Armstrong's approach (see, for example, Hildebrand [2016], Psillos [2017], Castro [2016]). I don't mean to claim that Armstrong's approach, or something like, it cannot work. But it does look like the anti-Humean has a very difficult task here. As we know from the history of such debates, the skeptic typically finds a reason to continue to be skeptical.

What I do claim is that even if Beebee is right about Armstrong's argument it doesn't follow that the Humean and the anti-Humean are equally situated with respect to inductive skepticism. Rather, I will argue, the Humean faces greater problems with induction than the anti-Humean.

2 TWO APPROACHES TO THE SKEPTIC

Let's start by looking at how Beebee characterizes the problem of induction and the dialectal position she is taking. She is admirably clear about this. Her paper starts as follows:

For the purposes of this paper, I take the problem of induction to be a genuine sceptical problem. The challenge is to provide a reason to believe that inductive

inferences are rational – a reason that does not beg the question against the sceptic by enshrining presuppositions that the sceptic will reject. [2011, p.504]

So, Beebe is understanding the problem of induction as, effectively, the problem of convincing the skeptic — of finding an argument that starts from premises that the skeptic will accept to the conclusion that induction is justified.

Traditionally, debates over skepticism were construed in this way — the aim was to force to skeptic to give up their position. But that is often not the aim in discussions nowadays (perhaps due to the difficulty of making progress on convincing the skeptic). Nozick's classic *Philosophical Explanations* [1981] describes this shift nicely. It will be worth quoting him at some length:

Consider the philosophical problem of skepticism: this has been presented as pursued as the problem of *refuting* the skeptic, of proving to him that he does know what he doubts he knows, or of proving to him that you do know what he denies you know...

My purpose is not to refute the skeptic...If I attempt to convince the skeptic of P, that is a task for the foreign relations department of my belief system. ...In trying to convince the skeptic, what is relevant is how *his* beliefs fit together — that is why it is foreign relations.

But the attempt to explain how knowledge is or can be possible, given what the skeptic says, is a task for my belief system's bureau of internal affairs. Some of the things the skeptic says or points out (for example, that certain situations are logically possible) I accept...My problem is that I don't see (or not longer see, after the skeptic has spoken) how these things go along with yet other

things in my belief system...My task here is to remove the conflict, to put my own beliefs in alignment...In this trying to explain to myself how knowledge is possible, what is relevant is what I accept; the explanation is no less acceptable to me because the skeptic rejects part of it.² (pp. 15-16)

So Nozick is approaching the problem of skepticism as an internal challenge. The aim is for you reach a kind of internal stability of your beliefs — you need to remove the tensions in your beliefs that the skeptical arguments highlight and reach a state where your beliefs are consistent. And further, where you can understand why knowledge is possible. But none of this requires you to only use premises that the skeptic will accept. To put it another way, on this approach you don't need to convince the skeptic, but you do need to convince yourself. Again, this kind of approach to the problem of skepticism is popular nowadays (see, for example, the survey of responses to skepticism in Feldman's [2003, Chapter 6.IV] introductory epistemology textbook).

So we have, in effect, two skeptical problems — one about convincing the skeptic, the other about putting your internal beliefs in alignment and explaining to yourself how knowledge is possible. When Beebe argues against Armstrong's solution to the problem of induction she is arguing that he cannot solve the first type of skeptical problem. And I'll assume she's right about that.

However, it's possible for views to be better positioned with respect to the second problem even if they are equally positioned with respect to the first. In fact, I'm going to argue that is the case with Humeanism — the Humean does have a internal problem with inductive skepticism in a way that the anti-Humean does not, even when we assume, which I will from now on, that neither can convince the skeptic.

²Emphasis in original.

3 A FIRST ARGUMENT

Let's start by considering an argument that the Humean is forced towards inductive skepticism:

(1) If we think that there is no explanation of an observed pattern then we shouldn't believe that this pattern will continue to further, unobserved, cases.

(2) For the Humean there is no explanation of the observed regularities.

So,

(3) The Humean shouldn't think that the observed regularities will continue to further cases.

Again, the aim is to show that the Humean has an internal problem with inductive skepticism. For this argument to cause an internal problem for the Humean there should be pressure from within the Humean position to accept (1) and (2).

Perhaps you already think that this argument can't cause an internal problem because the Humean will just reject (2). I agree. I'm not endorsing this argument, but it will be useful to explore it in some detail in order to develop a better argument. I'll consider the rejection of premises (1) and (2) soon.

But let's start by motivating the premises, before we look at possible Humean responses.

3.1 DEFENDING (1)

Consider this case:

Anemia: In a medical study that looked at a sample of the population you find that everyone with a certain gene also has anemia. However, given your background knowledge of the relevant gene and of anemia, you think it is unlikely that there an explanation of the pattern, rather, you think, it is a fluke, or coincidence.

There is a powerful intuition that to the extent that we don't think that there is an explanation of this pattern — that it's merely a coincidence — then we shouldn't expect to see this correlation between the gene and anemia outside the sample.

This is a compelling thought, but we should pause to clarify it. In particular, we should be a little more careful about what it means to say that there is no explanation of the pattern found in the sample.

Someone might claim that the regularity connecting the gene and anemia in our sample will always have an explanation, because for each person in the sample there is some explanation of why they have that gene, presumably one to do with how it was inherited, and there will be some explanation of why they have anemia. Conjoining all these explanations, someone might claim, constitutes an explanation of the regularity we found in the sample.

Whether or not this really counts as an explanation of the regularity it's clear that this isn't the relevant type of explanation for induction. The existence of this type of conjunctive explanation doesn't make the pattern non-coincidental [Lando, 2017, Bhogal, fort.a]. If we think that this type of conjunctive explanation is the only explanation there is of the regularity connecting anemia and the gene in our sample then we should not expect the pattern to continue outside the sample. So when I talk about explanations of a pattern or regularity I will be excluding these types of conjunctive explanations.

Similarly, someone might argue that there is a different type explanation of the pattern we find in the sample. Specifically, there is a constitutive or grounding explanation of the pattern. The pattern linking anemia and the gene is constituted by a very complex configuration of atoms — that configuration is the realizer of the pattern. So, it might be reasonable to say that that configuration explains the pattern. But, again, clearly this is not the relevant type of explanation. The existence of this explanation doesn't make the pattern

non-coincidental and it doesn't make it reasonable to expect the pattern to continue. So when I talk about explanations of a pattern or regularity I will be excluding these types of constitutive explanations too.

Given these clarifications, this case suggests that to the extent that we don't think that there is an explanation of this pattern then we shouldn't expect to see this correlation between the gene and anemia outside the sample.

There are many ways an explanation of the pattern could go. Perhaps we could think that the gene causes anemia. Or maybe there is some common cause, or more complicated connection between the gene and anemia. Or perhaps we can explain why everyone in the sample with that gene has anemia by noting that anemia is, in fact, very common in the relevant population, so it's not surprising that we observed such a pattern in the sample. However it goes, we need to believe that there is some explanation if we are to believe that the pattern will continue. (But obviously, we don't need to believe in any *particular* explanation, just that there is some explanation.)

Here is another case that suggests (1) is true:

Strawson's Screen: '[Imagine that] a true randomizing device determines the colour value of each pixel on a standard 800×400 computer screen, running on a ten-times-a-second cycle – so that each pixel can take any colour value for each 1/10th second period. On the screen it appears that there is a film showing. A woman enters a house, walks over to a stove, and puts on a kettle. Life – a world, as it were – goes on in an ordered, regular fashion, exactly as regularly as in our own world. But the image is being generated by the true randomizing device. It is pure fluke that what happens on the screen appears to tell a coherent story of a regular, ordered world, rather than filling up with – or suddenly switching to – a fizz of points of colour.' [Strawson, 1989, p. 24]

There's a lot that we might take from this passage, but let's focus on a thought about induction that seems to be there. The thought is that if we look at the screen and see the woman entering the house, walking over to the stove and putting on the kettle, and if we know the setup — that the pixels take on colors randomly — then we should not expect the 'film' to continue. We should not expect to see the kettle boil and for the woman to make a cup of tea. Rather, we should expect the screen to suddenly switch to 'a fizz of points of colour'. We should not expect the regularities we have seen on the screen to continue.

Again, this seems highly plausible, and in fact, Beebe herself accept this in her [2006]. She says that 'Given what we take ourselves to know about how the computer operates, we cannot possibly make any predictions about what will happen on the screen. (Or rather, our best prediction will be that there will be some sort of jumbled mess appearing – though of course we cannot say which out of the billions of possible jumbled messes will appear.)' (p. 528)

Generalizing away from these cases, (1) seems to be an important part of scientific practice. Imagine how strange scientific practice would be if we expected patterns that we think do not have an explanation — patterns that are merely coincidences, or flukes — to continue. Consider, for example, cases of spurious correlations. Between 2000 and 2009 there was an extremely high correlation between the per capita cheese consumption in the USA and the number of people who died by becoming tangled in their bedsheets in the USA. In the same period the divorce rate in Maine was highly correlated with the per capita consumption of margarine. And the volume of US crude oil imports from Norway was highly correlated with the number of drivers killed in collisions with railway trains in the USA (see <http://www.tylervigen.com/spurious-correlations> for these and many other spurious correlations).

I take it that in all of these cases we think that there is no explanation for the correlation. (Again, except for the types of merely conjunctive or constitutive explanations that we are explicitly excluding.) All of these correlations are coincidences. And consequently we do not, and should not, expect these patterns to continue. To deny this would seem to run vastly counter to scientific practice and to everyday reasoning – something that the Humean does not want to do.

The general intuition here is that if there is no explanation of a pattern — say, the pattern connecting anemia and the gene — then that pattern is a coincidence. And if the pattern is a coincidence then we shouldn't expect it to continue because if it did it would just be an even bigger coincidence! And we should be wary in accepting big coincidences, at least when there is a plausible alternative.

Of course, there will always be coincidences — it is extremely likely that some strange and unlikely things will occur. So it's not the case that we should never accept that a certain pattern is a coincidence. But, when we are faced with something that seems like a significant coincidence we should be suspicious. For example, if we see the link between anemia and the gene continue outside our sample that looks like a very big coincidence. And so we should be very suspicious about the situation. Maybe we should think, there is some explanation of the connection between anemia and the gene after all. Or perhaps we should think that the data showing that the connection continued outside of our original sample is unreliable.

This kind of reasoning, as well as the cases we considered, suggests that the Humean would accept (1).

3.2 DEFENDING (2)

As I noted earlier, I think most Humeans will end up rejecting (2), so I'm not going to give a full-blown defense of it.

But there is a clear idea underlying (2): For the Humean, the mosaic of events is taken as basic and unexplained. There is nothing that is standing behind or outside of the mosaic making the mosaic what it is. Consequently, observed regularities, that are part of the mosaic of events, won't have an explanation either.

This is the idea that motivates (2). We will see how the Humean might reject it soon, but first we will consider a couple of other possible responses to the argument.

4 RESPONDING TO THE ARGUMENT

How will the Humean respond to this argument that they are forced to inductive skepticism? I'll consider three responses.

4.1 REJECT (1)

The Humean might reject (1). That is, they might say that even if we don't believe that there is any explanation of a pattern, we should, sometimes, believe that the pattern will continue to further cases.

But the discussion above seems to suggest that the Humean shouldn't reject (1). As we noted, this connection between explanation and induction seems to be a central part of scientific practice. And the Humean typically does want to respect scientific practice. When we find

one of the spurious correlations that we considered in section 3.1, for example, the Humean should agree that we should not believe that correlation will continue.

However, Beebee [2006] does seem to reject (1).³ As we noted, in her discussion of **Strawson's Screen** she accepts that 'we cannot possibly make any predictions about what will happen on the screen.' So she is skeptical about making inductive inferences in the screen case. And she seems to accept that the Humean has no explanation of the observed regularities of the world — she says that 'the continued orderliness of nature is what Strawson calls an "outrageous run of luck"' (p. 527).

But she claims, there is a 'relevant epistemological difference' between the the case of Strawson's screen and the case of the Humean mosaic. The difference is that, unlike in the case of the screen 'we take ourselves to know (fallibly, of course) that the universe is, in fact, an incredibly ordered place' (pp. 527-528). And this belief allows the Humean to continue to infer from the past to the future.

This seems to be a rejection of (1) — accepting that the Humean has no explanation for the patterns that we observe, but still accepting that the Humean can reasonably expect them to continue.

However, this is a somewhat puzzling move. If we really believe that there is no process making the mosaic the way that it is — if we really think that the regularities that we have seen are merely coincidences, or flukes, or outrageous runs of luck — then that seems to undermine our belief that the universe is an incredibly ordered place.

Consider an analogy with **Strawson's Screen**. I might take myself to know (fallibly, of course) that images on computer screens are incredibly ordered. This seems like a reasonable belief

³I'm not totally confident of this interpretation of Beebee, but it doesn't really matter for our ends. Perhaps the view I discuss was actually Beebee's view, or perhaps it is just an interesting view in the spirit of some of her claims.

— after all, my computer screen, and most others, typically do exhibit such order. And I might initially have this belief about Strawson's screen. But when come to learn that the images on the screen are formed in the random way Strawson describes then this undermines the belief I initially had in the orderly nature of the images on this screen. I should no longer be confident that the screen is an incredibly ordered place. Similarly, a Beebee's belief that regularities that we observe are flukes, or outrageous runs of luck' should undermine their belief in the orderly nature of the world.

Clearly there's more to say here, but I don't think that appealing to this initial belief in the regularity of the world helps the Humean to reject (1).

4.1.1 SPECIAL INFORMATION

But there is another way to reject (1). This is much more plausible, but it doesn't seem like it will help the Humean to avoid the conclusion.

Again, premise (1) says that if we think that there is no explanation of an observed pattern then we shouldn't believe that this pattern will continue to further, unobserved, cases. But in a certain way this premise is obviously too strong. Imagine that all the Fs you have observed have been Gs, but you think that there is no explanation for this — it is a fluke. Then you talk to an oracle who tells you that yes, it is a fluke that the observed Fs have been Gs but, purely coincidentally, this fluke will continue. So that in the future Fs will be Gs too. In fact, all Fs are Gs. Clearly you should believe that the pattern you have observed will continue, since you trust the oracle, but you think that there is no explanation of the observed pattern. So premise (1) is false.

Or here's another case, imagine that you find out that there is some very powerful figure, perhaps an evil demon, who enjoys making flukish patterns continue. So all Fs you have

observed have been Gs, and you think, correctly, that this is a fluke. But, knowing about this demon and their preferences you believe that the pattern will continue in the future because the demon will step in and adjust things so as to guarantee that future Fs will be Gs. So in this case again, you think that there is no explanation of the fact that all observed Fs are Gs, but you should think that the pattern will continue.

What these cases suggest, I think, is that when we think an observed pattern doesn't have an explanation there is pressure towards thinking that this pattern will not continue, but this pressure can be overcome in some cases. Sometimes we have 'special information', analogous to the oracle or our knowledge of the evil demon, that a flukish observed pattern will continue to unobserved cases, even though we typically shouldn't expect flukish patterns to continue.

So premise (1) needs to be tweaked. Instead of saying 'if we think that there is no explanation of an observed pattern then we shouldn't believe that this pattern will continue to further, unobserved, cases' we should say that 'if we think that there is no explanation of an observed pattern then we shouldn't believe that this pattern will continue to further, unobserved, cases, *unless we have some special information that the observed pattern will continue*'.

Of course, tweaking premise (1) in this way does suggest a Humean response to the argument. Maybe the Humean can avoid inductive skepticism by saying that they do have some special information that the observed regularities will continue to unobserved cases — something similar to our knowledge of the oracle or the evil demon. It's somewhat hard, however, to see how the Humean can say this. If a Humean observes a pattern in the mosaic — for example, that in all cases in the past force has been equal to mass times acceleration — they won't typically have access to any oracle to guarantee that this pattern will continue. And neither do they think that there are any powerful forces, whether of an evil demon kind

or otherwise, that are will make force equal to mass times acceleration in the future.

So it's a challenge to the Humean, and seemingly a difficult one, for them to say exactly what special information they have. Perhaps the Humean can develop this response, but as it stands it's hard to see how it will be successful.⁴

4.2 THE HUMEAN HAS NO SPECIAL PROBLEM

Instead of rejecting premise (1) the Humean might respond by accepting that the above argument highlights a problem they have with induction but claiming they are in no worse a position than the anti-Humean, since the anti-Humean has problems with induction too.

As we discussed earlier, we are assuming that neither the Humean nor the anti-Humean could convince the inductive skeptic. So both views on a par with respect to that version of the problem of induction.

The question then, is whether the Humean has a greater internal problem with induction than the anti-Humean. The Humean response that we are considering accepts that the argument (1)-(3) creates an internal problem for them, but says that the anti-Humean has analogous problems.

The anti-Humean, though, can easily avoid the argument (1)-(3) since they do think that there is an explanation of the observed regularities. For example, to take a very simple case, the anti-Humean might say that an observed regularity — like the regularity that all observed Fs have been Gs — is explained by a law that all Fs are Gs. And this law backs our belief that future Fs will be Gs.

⁴Perhaps we could interpret Beebee's claim that 'we take ourselves to know (fallibly, of course) that the universe is, in fact, an incredibly ordered place' to be an assertion that the Humean does have some special information that observed patterns will continue. But, the point made in section 4.1 still applies — it seems like this belief in the regularity of the world should be undermined by a belief that the observed regularities are merely a fluke or an 'outrageous run of luck'.

But aren't there still concerns for the anti-Humean here? For example, how do they know that the law won't change? If we are worried that the laws will change in the future then it seems like we can't be confident that the next F we see will be a G. And how does the anti-Humean know that the laws are not very complicated? Because if the laws can be complicated then we don't have reason to think that the fact the all observed Fs are Gs is explained by a law that all Fs are Gs. Perhaps it is explained by some much more complicated law and this more complicated law implies that at some point in the future Fs will no longer be Gs.

These are legitimate concerns for the anti-Humean. In fact, they are exactly the type of concerns that Beebe raises against the anti-Humean — the concerns that will stop the anti-Humean from being able to convince the inductive skeptic. But they are not internal problems for the anti-Humean.

To see this, consider the Humean approach to (1). As we noted, there is internal pressure for the Humean to accept (1) — it seems to be an important part of scientific practice that the Humean wants to accept. And accepting (1) leads to problems with induction. (Though again, the Humean could reject (2) to avoid those problems — we will consider that response next.)

But there is no analogous internal pressure for the anti-Humean to accept the relevant premises that cause problems for their view. They do not accept as part of scientific practice any principle that suggest that laws change, or anything that suggests that laws are very complicated. So even though they can't convince the skeptic that, for example, laws cannot change, there's no internal problem with them holding that laws can't change.

These concerns for the anti-Humean are not on a par with those that the Humean seems to face. The argument from (1) and (2) to (3) suggests that Humean has to have an un-

stable position with respect to induction. But the anti-Humean does not appear have such instability.

(Of course, I've not ruled out the possibility that someone in the future will come up with a novel argument showing that any version of anti-Humean faces an internal problem with induction. If this could be done then I think that would validate this response that the Humean has no special problem. But as it stands it doesn't look like anti-Humeans in general face such an internal problem.)

4.3 REJECT (2)

Now let's consider perhaps the most plausible Humean response to the argument — rejecting premise (2).

Again, the idea motivating (2) is that for the Humean, the mosaic of events is taken as basic and unexplained. There is nothing that is standing behind or outside of the mosaic making the mosaic what it is. Consequently, observed regularities, that are part of the mosaic of events, won't have an explanation either.

But the Humean will likely reject this reasoning. Although they take the mosaic to be basic and unexplained they don't take every event in the mosaic to be unexplained — they don't reject all instances of scientific explanation.

But how is this possible? The idea is that just because the mosaic is unexplained doesn't mean that parts of the mosaic are unexplained — bigger patterns in the mosaic can explain smaller ones. In particular, Humeans typically accept that the laws of nature are general patterns in the mosaic — ones that are simple and informative⁵ (though saying exactly what simplicity

⁵See Lewis [1986, p. 42-3], and many refinements of this idea, e.g. Loewer [1996], Hall [2010], Hicks [2018], Dorst [2019], Jaag and Loew [fort.].

and informativeness come to is very complicated) — and that these general patterns can explain events in the mosaic.

Broadly speaking then, we can think of such Humean explanation as having a *pattern subsumptionist* or *unificationist* flavor — the general patterns in the mosaic explain the particular events. Particular events are explained, it seems, by fitting them into the more general patterns of events. This conception of explanation has a long tradition. For example, Hempel [1966, p. 488] claims that ‘The understanding [an explanation] conveys lies...in the insight that the explanandum fits into, or can be subsumed under, a system of uniformities represented by empirical laws or theoretical principles’. Kneale [1949], Feigl [1970], Friedman [1974], Kitcher [1981] and many others express similar ideas.

Loewer [1996, p. 113] explicitly accepts that Humean laws explain in this pattern subsumptionist way — by fitting events into larger patterns. As do other Humeans like Smart [2013], Miller [2015, section 4] and Bhogal [fort.b, section 2.1].

So, the Humean has a way to accept that particular events in the mosaic are explained, even when the mosaic as a whole is taken as basic.

And the Humean can say that the observed *regularities* are explained in much the same way — by being subsumed to more general regularities. Consequently, the Humean will reject (2). And they seem free to do so — there is no obvious internal pressure for them to accept (2). Therefore the argument from (1) and (2) to (3) doesn’t cause an internal problem for the Humean.

5 ANOTHER ARGUMENT

So, the first argument doesn't cause an internal problem for the Humean. In this section I'm going to discuss an adapted argument that might do better.

One piece of terminology first: Take an observed pattern. For example, that all observed Fs are Gs. Then call a pattern that includes all the observed cases but also continues to unobserved cases an *extended pattern*. For example, the pattern that all Fs are Gs extends the pattern that all observed Fs are Gs.

Given this, we can formulate the argument. This argument, especially premise (4), is a bit more complicated than the previous argument, but we will explain the premises in detail after stating them.

Here's the argument:

(4) If we think that there is no explanation of the extended pattern (even if it were to hold) then we shouldn't think that the observed pattern will continue to the extended pattern, unless we have some 'special information' that the observed pattern will continue.

(5) The Humean thinks that there is no explanation of the most general regularities of the world (even if such regularities hold).

(6) The Humean has no 'special information' that the observed pattern will continue.

So,

(7) The Humean shouldn't think that the observed regularities will extend to the most general regularities of the world.

This argument is more complicated than the argument (1)-(3), so the premises needs some clarification, as well as defense.

5.1 PREMISE (4)

The formulation of premise (4) is a little complicated but the motivating idea is simple. Let's look at the motivation first – we will come back to the exact formulation.

The motivating idea is that for an explanation to license your belief that a pattern will extend from observed cases to unobserved cases that explanation must itself extend, so to speak, to those unobserved cases.

For example, consider again **Anemia** and the correlation between anemia and the gene in our sample. (1) says that to believe that the pattern will continue outside the sample we must think that there is some explanation of the correlation in the sample — it's not just a coincidence. This seems right (modulo the discussion of 'special information' in section 4.1.1). But we can also say something stronger.

If we believe that the correlation will continue outside the sample, then we must think that there is some explanation of the correlation *that applies outside the sample*. For example, imagine an adapted **Anemia** case, where there is an explanation of the correlation between anemia and the gene that we observed, but the explanation is just that there was some bias in the way that the sample was formed which led to this correlation. If we think that this is the only explanation of the correlation then we shouldn't believe that the correlation will continue outside the sample because this explanation only applies within the sample. We shouldn't believe that the pattern will continue to unobserved cases because we don't think that there is an explanation that extends to unobserved cases.

For another example imagine a variant of Strawson's screen. This screen has been designed to show a movie, played from a standard computer, using standard software, for the first 5 minutes after it's turned on. But after this time it turns into the random screen that Strawson described — with each pixel taking on a color value at random. If we, knowing this, watch

the film for the first 2 minutes then we should believe that the patterns of the movie will continue for 3 more minutes, but after that we shouldn't expect the patterns to continue. Our beliefs about how a pattern will continue to unobserved cases should mirror our beliefs about how far an explanation will extend.

In fact, this thought is implicitly accepted by Humeans like Beebee who argue against Armstrong's anti-Humean solution to the problem of induction. As we noted in section 1 Armstrong argues that his anti-Humean view can solve the problem of induction. The idea is that when all the Fs we have observed have been Gs the best explanation for this is that there is a necessitation relation that holds between F and G. And so, by inference to the best explanation, we are justified in believing that there is such a relation. And given that we are justified in believing that there is this necessitation relation between F and G, we are justified in believing that all Fs will be Gs, even those Fs we have not observed yet.

As we noted, the basic idea of Beebee's response is that the best explanation of the observed regularity (by Armstrong's lights) between F and G is not that there is a necessitation relation holding eternally between F and G, rather it is the claim that F and G have been related by necessitation *so far*. Implicit in this response is the idea that this second explanation doesn't give us license to believe that future Fs will be Gs, because the explanation doesn't extend to those unobserved future cases.⁶

So that's the motivating idea. How do we formulate the idea precisely though? Well, what is it to think that there is no explanation of an observed pattern that extends to unobserved cases? It is to think that, even if the unobserved cases do fit with the observed pattern then that would be merely coincidental — there would be no explanation of the extended

⁶Further, anti-Humeans who disagree with Beebee also implicitly accept this premise e.g. Hildebrand [2016], Castro [2016].

pattern.⁷ And so premise 4 (ignoring for a moment the clause about ‘special information’), says that in such a case – a case where we think that there would be no explanation of the extended pattern, even if it were to come about – we should not expect the observed pattern to continue.

This way of formulating the idea is very much in the spirit of White’s [2005] discussion. For example, when he discusses observing a run of heads coin tosses he says ‘Suppose we are quite certain that the coin is evenly weighted and tossed in the ordinary way, and so if it does land heads every time this is just a fluke. In this case we have no reason to expect any other tosses [other than the ones we have observed] to land heads.’ (p. 10) That is to say, if there is no explanation of the extended pattern of coin tosses landing heads (even if it were to hold), then we shouldn’t expect the observed pattern of coin tosses landing heads to continue.⁸

So, the formulation of premise (4) expresses this idea that if we don’t believe that there is an explanation of the observed pattern that extends to the extended pattern then we shouldn’t believe that an observed pattern will continue to extended pattern.

There’s one thing we have ignored so far though, the clause ‘unless we have some special information’. That clause is included for exactly the same reasons as discussed in section 4.1.1 — sometimes there can be special information, like that of the oracle or the evil demon, which would provide a reason to think that the observed pattern will continue.

⁷We have to be a little careful here, because there are two ways of reading this ‘even if’ conditional. Take the anemia case again. We think that the correlation between the gene and anemia is a coincidence. It seems natural, then, to say that if the correlation extended outside the sample that would be a coincidence — there would be no explanation. But it might also seem natural to say that if the correlation extended outside the sample then there must, contrary our initial claim, be some explanation for it. We might loosely call this second conditional a kind of ‘backtracking’ conditional, where the antecedent undermines our initial belief in the explanatory structure of the situation. The first conditional might be called a ‘foretracking’ conditional — where we hold fixed our initial beliefs about the explanatory structure of the situation. It’s important to note that I mean the conditional in (4) to be read in this foretracking way.

⁸Peacocke [2003, Chapter 5] expresses a similar idea.

But this won't matter much going forward, because, as we noted, it looks like the Humean doesn't have such special information.

Now we can see clearly what (4) comes to it's hard to see how a Humean could reasonably reject it. The cases we discussed above makes (4) seem to be a part of scientific practice that the Humean should accept. And, as we noted, Humeans seem committed to it in their response to Armstrong's approach to induction.

One last point on (4) before we move on: The most general way to put the motivation for (4) is that if the pattern continued to unobserved cases, even when there is no explanation that extends to those cases, then the pattern would be a substantial coincidence — one that we should be very suspicious about accepting. This way of formulating the motivation will be important later.

5.2 PREMISE (5)

As we noted, in section 4.3, the Humean can make sense of parts of the mosaic being explained in a broadly pattern subsumptionist or unificationist way. Particular events are subsumed to the general patterns of the mosaic. This appears to be how Humean laws explain.

But obviously, there is a limit to how far this pattern subsumption could go. Particular Fs that are Gs can, perhaps, be explained by being subsumed to the general pattern that all Fs are Gs. Similarly with certain patterns, like all observed Fs being Gs. But the general pattern itself — the fact that all Fs are Gs, obviously cannot be explained in this way. We cannot explain a pattern by subsuming it with itself.

We need to be a little careful here, because some higher-level patterns might be explained,

not by subsuming them to more general patterns at the same level, but by unifying them with lower-level patterns. For example, take some chemical regularity — all reactions of magnesium with oxygen are exothermic, for example. Physical chemists can subsume this fact to regularities at the physical level.

But again, this process of subsumption to more general patterns has to end somewhere. At some point we are left with the most general regularities of the world — those cannot be explained by subsuming them to more general patterns. And, given the Humean picture, those most general patterns of the mosaic can't be explained in any other way either. There is nothing standing outside the mosaic to explain those patterns. (As we initially discussed in 3.1 we are still excluding constitutive explanations, or those that purport to explain a regularity by merely conjoining explanations of the instances. The premises should be understood with this in mind.)

So, it looks like the Humean will have to accept (5) — they will say that there is no explanation of the most general regularities of the world.

5.3 PREMISE (6)

The notion of special information at work here is exactly the same as the one discussed in section 4.1.1. As we noted in section 4.1.1 and section 5.1 it doesn't look like the Humean has any information, analogous to that of the oracle or the evil demon that the observed pattern will continue.

5.4 (7) AND A PROBLEM WITH INDUCTION

But putting (4), (5) and (6) together gets you (7). And (7) is a problem for the Humean.

Imagine that all Fs are Gs is one of those most general regularities of the world referred to in (5). Then it seems that the Humean, when they are faced with the fact that all observed Fs are Gs, shouldn't think that this observed pattern will continue to the extended pattern than all Fs are Gs, because there is no explanation of this extended pattern.

So, it seems that the Humean should be skeptical of at least a certain type of inductive inference – inferences from observed regularities to the most general regularities of the world. To pick one example, perhaps it is one of the most general regularities of the world that in all interactions energy is conserved — perhaps that regularity cannot be explained by the subsuming it to some more general pattern. If this is so then the Humean should be skeptical of inferring from the fact that in all the interactions we have observed energy has been conserved to fact that in all interactions energy is conserved.

And again, this is an internal problem for the Humean. The issue is not that the Humean cannot convince an intransigent skeptic. It's that principles that they themselves are inclined to accept lead them to be skeptical of certain inductive inferences. And there does not seem to be any analogous problem for the anti-Humean. As we noted in section 4.2, the anti-Humean has problems convincing the skeptic, but doesn't seem to have internal problems with skepticism.

It's important to be clear here about what the problem is for the Humean. The argument here doesn't raise problems for every instance of induction for the Humean. Only some inductive inferences are in the target of the argument. The argument works by claiming that we cannot infer from an observed pattern to an extended pattern where we don't think that there's an explanation of the extended pattern. But for many inductive inferences Humeans can claim that there is a explanation of the extended pattern. For example, imagine that there are 10,000 ravens in the history of the world and they are all black (although you

don't know this). You've seen 20 ravens and they are all black, so you infer that the next 5 ravens you see will be black. The argument I've given doesn't cause a problem for this inference, because here the extended pattern is that 25 ravens are black, and for the Humean who accepts pattern subsumptionism that pattern could be explained by subsuming it to the pattern that all ravens are black.

In light of this, perhaps the Humean might accept the argument (4)-(7) but declare themselves unconcerned — sure they have problems with some very large scale inductive inferences, but there is no problem for most piecemeal inferences. But I don't think this is a particularly satisfying response. It is a problem if the Humean cannot infer from the fact that in all the interactions we have observed energy has been conserved to fact that in all interactions energy is conserved. More generally it's a problem if a scientist can't use past observations to become justified in believing very general regularities about the world. These inductive inferences to the most general patterns may be rare in everyday life but they are very important when we are forming beliefs about the basic structure of the world.

Given the argument (4)-(7), then, it looks like Humeans really do face a problem with induction. The objection that they should be skeptical of certain inductive inferences isn't a silly one, and it can't easily be brushed off as question-begging. If the Humean cannot develop an adequate response to this argument then we have a powerful reason to reject Humeanism. That's the main point of the paper.

But I'm going to end by very tentatively suggesting a possible way in which a Humean response could be developed. Fully developing this response, and properly judging whether it is an adequate, is a task for other work.

6 WHERE IS THE HUMEAN ALLOWED TO START?

One way to put the general motivation behind (4) (and (1)) was to do with the notion of a *fluke*, or a *coincidence*. (But I'm going to use terminology of coincidence for now.) If there is no explanation of an observed pattern that extends to unobserved cases, then it would be a puzzling coincidence if the the observed pattern did continue to those unobserved cases.

And, importantly, there is a theoretical norm against accepting coincidences. If your theory (or your belief set) countenances significant coincidences then that's a reason to be suspicious of your theory. If the correlation between anemia and the gene continues outside the sample but your theory says that there is no explanation for this — it's just a coincidence — then this is reason to be suspicious of your theory. Consequently, if you have good reason to believe your theory you shouldn't think that the correlation will continue outside the sample.

But what is a coincidence? There's a literature on this which gets slightly technical [Owens, 1992, Lando, 2017, Bhogal, fort.a], but the central idea is that a coincidence is a striking pattern that calls out for explanation, but doesn't have one.⁹

For example, if I am drawing numbered balls from urns and I pick 72, then 9, then 33, that is not a coincidence. If I pick 11, 11, 11, that might be a coincidence, because that is a striking pattern that calls out for explanation. Another example: In **Strawson's Screen** it is striking if there are regularities on the screen — it's a huge coincidence if we see something that resembles a whole movie on the screen. It is not striking if we see some particular 'fizz of color'; one of the many billion possible 'jumbled messes' appearing on the screen is not coincidental. (Even though for any particular fizz of color that we observe it's very low probability that exactly that one would have come about.) Exactly what this idea of strikingness, or calling out for explanation, comes to is a very interesting and underexplored

⁹Again, not counting the constitutive or conjunctive explanations that we have been ruling out.

question.¹⁰ But I'm going to leave a full analysis of strikingness for other work.

Understanding coincidences in this way opens up the possibility of denying that something is a coincidence by claiming that it doesn't call out for explanation. This suggests a way that the Humean might respond to the argument (4)-(7). The key idea underlying this response is that your view on the nature of explanation affects what things you take to call out for explanation.

To illustrate this idea, consider a particular anti-Humean view. Imagine that you hold the primitivist view of Maudlin [2007] and Carroll [1994]. On this view laws of nature are irreducible *sui generis* entities. And then imagine that you think that scientific explanation is about showing how things follow from the laws. That is to say, you have a broadly *covering-law* conception of explanation.¹¹ Then it is natural for you to say that the laws, or at least the fundamental laws, have a different explanatory status from other facts. They are our explanatory starting points — they are the things doing the explaining and are not themselves explained. And further, it's not problematic, you might think, that these laws are not explained — given that all explanation is about showing how things follow from the laws then *of course* some laws are going to be taken as unexplained. Such fundamental laws don't call out for explanation, you might think; it's not a mark against your theory that these fundamental laws are unexplained. It doesn't seem suspicious or coincidental that such fundamental laws are taken as unexplained. (While it would seem suspicious, for example, if I kept picking the number 11 from urns and this pattern was unexplained.)

The general thought here is that given this view on explanation — that explanation is just about showing how things follow from the laws — these fundamental laws are *appropriate*

¹⁰Though see Baras [fort.a.f] for detailed discussion of the notion and of the (sparse) existing literature.

¹¹Though there would have to be some further conditions on explanation in order to avoid the classic problems with simple covering-law approaches to explanation (see, for example, Salmon [1989, pp.46-50]).

starting points and so are just not in need of explanation.

To be clear, I'm not committing to this line of thought, but it is a somewhat natural one. And the Humean might use this kind of idea in response to (4)-(7). As we have discussed, the Humean naturally accepts a kind of pattern subsumptionist conception of explanation — that explanation is about fitting things into more general patterns. Given this, you might think, that the appropriate explanatory starting points are going to be the *most* general patterns of the world — the ones that cannot be subsumed to a larger pattern. Those, the pattern subsumptionist might say, have a different explanatory status from other facts. They are our explanatory starting points — they are the things doing the explaining and are not themselves explained. And further, it's not problematic, one might think, that these patterns are not explained — they don't call out for explanation. Given this view on explanation the the most general patterns of the world are *appropriate starting points* and so are just not in need of explanation.

So, the Humean might think that the most general patterns of the world don't call out for explanation. And so, they are not coincidental, even if they are not explained. It's not problematic that they are not explained, because they don't call out for explanation.

If this is right (and again, I'm not at all confident that this is right, I'm just suggesting it as a possible option for the Humean) then the Humean would deny that it's a puzzling coincidence when the observed regularities continue to the most general regularities of the world, even when the most general regularities do not have an explanation. And so, they might say, it's totally fine for them to believe that the observed regularities will continue to the most general regularities — it doesn't involve them thinking that some strange coincidence will come about.

In effect, this is a partial denial of (4). My imagined Humean is saying that even though we

think that there is no explanation of the most general regularities of the world it's still ok, *in this special case*, to believe that the observed pattern will continue to those unobserved cases. Zooming out even further, and abstracting away from the notion of coincidence, the basic idea is that there is something special, for the Humean, about the most general patterns of the world. They are the natural Humean starting points. And because they have this status as theoretical starting points they also have a different status regarding when we should believe that they will come about. I gestured at a version of this story using the idea of coincidences, but perhaps it can be developed in other ways too.

Of course, I don't think anti-Humeans will be convinced by this as a response to argument (4)-(7). But that's not particularly important in this context. Our dialectical position is that (4)-(7) caused an internal problem for the Humean — premises that they themselves are inclined to accept push them to skepticism about certain inductive inferences. Perhaps the strategy gestured at above can allow the Humean to untangle themselves, and remove the internal problems that they have.

But obviously, fully determining whether that is the case needs a lot more work. The discussion in this section is very rough and impressionistic. But I think this is an option that the Humean should explore.

7 CONCLUSION

The Humean, I have argued, faces a substantial problem with induction. Modern Humeans have been inclined to brush off such concerns, either by saying that the arguments beg the question against the Humean, or that they are mere skeptical concerns that face everyone, and so are not a special problem for them. I have argued that the Humean faces a problem

with induction that cannot be brushed off in this way. The argument I gave starts from premises that the Humean is inclined to accept, so it is an internal problem for the Humean. And the anti-Humean doesn't seem to face an analogous problem.

Committed anti-Humeans can stop there and claim that this is a fatal problem for the Humean. But I also pointed towards a way that the Humean might respond. However, it isn't a quick, easy, response — it requires some very substantial claims about what we can appropriately take as unexplained and how that connects to what we can expect to occur. Plausibly there are other possible responses the Humean could give, but it will take a lot more work.

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