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Transitivity and Humeanism about Laws

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Humeanism about laws has been famously accused of the explanatory circularity by David Armstrong and Tim Maudlin, since the Humean laws hold in virtue of their instances and, at the same time, scientifically explain those very instances. Barry Loewer argued that the circularity challenge rests on an equivocation: in his view, once the metaphysical explanation is properly distinguished from the scientific explanation, the circularity vanishes. However, Marc Lange restored the circularity by appealing to his transitivity principle, which connects the two types of explanation. Lange's transitivity principle has been widely discussed and criticised in the literature. In view of counterexamples, Lange refined both the principle, by taking into account the contrastive nature of explanation, and the requirement of prohibition on self-explanation. Recently, Michael Hicks has developed a new strategy for defending Humeanism about laws from the refined circularity challenge, critically appealing to the contrastive nature of both explanations and meta-explanations. We will argue that his strategy fails.

Keywords: Humean laws; explanatory circularity; transitivity; contrastive explanations.

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1. *Humeanism about laws and explanatory circularity*

According to Humeans, scientific laws are generalisations obtaining in virtue of the totality of facts in the global space-time Humean Mosaic[1] and nothing more.[2] In order to distinguish between accidental generalisations and lawful generalisations Humeans typically appeal to Lewis's Best System Account (BSA),[3] or what Psillos (2002: 8) calls "the web-of-laws view"– laws are those generalisations which are entailed by the ideal axiomatic system for our world, i.e. a system containing all the fundamental true propositions about the Mosaic which obtains the best balance between simplicity, informativeness and other desirable properties.[4]

The Humean account of laws has been confronted with many challenges, the crucial one being that the laws conceived in that manner are explanatorily futile. Namely, if laws are nothing but regularities derived from the Humean Mosaic, it is suspicious if such laws are adept to scientifically explain the very features of the Mosaic. It seems that the laws are (at least partly) explained by the Mosaic, parts of which they are expected to explain. The circularity challenge for Humeanism was raised by David Armstrong (1983: 40):

> Suppose, however, that laws are mere regularities. We are then trying to explain the fact that all observed Fs are Gs by appealing to the hypothesis that all Fs are Gs. Could this hypothesis serve as an explanation? It does not seem that it could. That all Fs are Gs is a complex state of affairs which is in part constituted by the fact that all observed Fs are Gs. 'All Fs are Gs' can even be rewritten as 'All observed Fs are Gs and all unobserved Fs are Gs'. As a result, trying to explain why all observed Fs are Gs by postulating that all Fs are Gs is a case of trying to explain something by appealing to a state of affairs part of which is the thing to be explained. But a fact cannot be used to explain itself. And that all unobserved Fs are Gs can hardly explain why all observed Fs are Gs.

[1] In Lewis's version of Humeanism, the Mosaic contains the totality of facts about the point-size distribution of natural properties and natural relations.

[2] The relation between a generalisation and the Mosaic is described by some relation of ontological dependence: originally it was supervenience, but in the more recent literature it is usually grounding.

[3] See Lewis (1983, 1986, 1994), Psillos (2003), Loewer (1996, 2012), Beebee (2000), Schrenk (2006), Cohen and Callender (2009), Bhogal and Perry (2017).

[4] The plea for BSA is far from being philosophically settled. Many concerns have been raised over the years: the question of criteria for the best balanced system, the issue of its uniqueness, the question of problematic mind-dependence of laws, the issue of the choice of language which would allow for comparison between the competing systems, the problem of justifying a preference for one system over the other if they both contain only true propositions, etc. For more, see Armstrong (1983), Carroll (1990), Maudlin (2007) and Roberts (2008), among others. Moreover, BSA is conceived by some as the *objectively* best system which may or may not be formulated yet (and if we are already in possession of the system, we have no way of knowing that, see Loewer (2012:20)): then it is hard to see how it can provide a standard by which to actually discern between laws and merely accidental generalizations. But while we agree that the idea of the best system is dubious in many respects, it will not be the focus of this paper.

And Tim Maudlin (2007: 172) gave a more succinct formulation of the challenge:

> If the laws are nothing but generic features of the Humean Mosaic, then there is a sense in which one cannot appeal to those very laws to explain the particular features of the Mosaic itself: the laws are what they are in virtue of the Mosaic rather than vice versa.[5]

Barry Loewer (2012) tried to meet the challenge by arguing that the alleged circularity results from the equivocation in the use of the term "explanation". Bottom-up explanations are metaphysical explanations: laws are thus *metaphysically explained* by their instances in the Mosaic, which does not preclude them from *scientifically explaining* their instances. The difference between metaphysical and scientific explanations Loewer (2012: 131) described as follows:

> Metaphysical explanation need not involve laws and the explanandum and explanans must be co-temporal (if the explanans is a temporal fact or property). Scientific explanation of a particular event or fact need not show that it is grounded in a more fundamental event or fact but rather, typically, shows why the event occurred in terms of prior events and laws.

Loewer's response provoked a very fruitful debate which continues until today.[6] He did not offer much in the way of a further clarification about metaphysical or scientific explanations, but the currently popular view is to link metaphysical explanations with grounding: laws, which typically have the structure of universal generalisations, are grounded in the total conjunction of their instances.[7] Loewer's proposal has been criticised from different perspectives, but one of the most interesting objections was raised by Marc Lange (2013).

2. *Transitivity*

Lange pointed out that even though the metaphysical and the scientific explanation are two different kinds of explanation, they are not completely unrelated: what connects them, in his opinion, is the *principle of transitivity*:

(T) If E scientifically explains [or helps to scientifically explain] F and D grounds [or helps to ground] E, then D scientifically explains [or helps to scientifically explain] F. (Lange 2013: 256)

[5] For similar arguments, see Bird (2007: 86) and Lange (2013: 256). Earlier, Dretske also contested the view that mere generalisations could have any explanatory power over their instances: "Subsuming an instance under a universal generalization has exactly as much explanatory power as deriving Q from P & Q. None" (1977: 26).

[6] See Lange (2013), Hicks and van Elswyk (2015), Marshall (2015), Miller (2015), Roski (2018), Shumener (2017), Marshall (2015), Dorst (2018), Emery (2019), Bhogal (2020), Hicks (2020), Kovacs (2020) and Duguid (2021).

[7] However, not everybody endorses that view—according to Emery (2019), it is the other way round: laws ground their instances.

In order to argue against Loewer's solution of the circularity challenge, Lange (2013: 258) also made explicit another important and highly plausible principle—that of the prohibition on self-explanation:

(PSE) A fact q cannot explain [or help to explain] itself.

Lange motivated (T) by evoking the actual scientific practice and offering several plausible examples in its favour, such as:

> suppose that a given balloon expands because of various laws and the fact that the pressure of the gas inside the balloon is greater than the atmospheric pressure outside of the balloon. Then since the fact that the internal pressure is greater than the external pressure is grounded in the value of the internal pressure and the value of the external pressure, it follows from the transitivity principle that the internal and external pressures help to scientifically explain why the balloon expands. That is also correct. The internal pressure, in turn, is grounded in the forces exerted by various gas molecules as they collide with the balloon's interior walls. By the transitivity principle, then, those forces help to scientifically explain why the balloon expands. (Lange 2013: 257)

The principle of transitivity immediately restores the circularity of explanation: if the law L is partly grounded in its instance I, and L partly scientifically explains I, then, according to (T), I partly scientifically explains itself, which violates (PSE). Lange (2013: 257) illustrates such circularity with the following example:

> [A] coin's chance of landing heads explains its actual relative frequency of landing heads, so if the chance were grounded in the actual relative frequency, then […] the actual relative frequency would have to explain itself, which it cannot do.

The general validity of the transitivity principle was immediately questioned. Elizabeth Miller (2015) and Michael Townsen Hicks and Peter van Elswyk (2015) have offered a number of counterexamples to it. All these counterexamples roughly follow the same pattern: an instantiation of a higher-level multiply realizable property P (typically a biological or a psychological one) is considered as an explanation of some observed phenomenon F; the instantiation of P is grounded in one of P's micro-structural realizers, M; it is then argued that M does not explain F, since F might have occurred even if M had been missing—if P, for instance, were realized by a different realizer. Here is an example of Hicks and van Elswyk (2015: 438):

> The position of electron e partially metaphysically explains the position of lion L. The position of L scientifically explains the number of prey animals in region R. But the position of electron e does not explain the number of prey animals in region R. For if the electron were elsewhere, L would still be warding prey animals out of R.

It should be noted that this way of defending Humeanism has rather dubious effects: all that can be achieved with the counterexamples, like the one cited, is to show that (T) is not a universally valid principle. However, Lange's principle of transitivity *need not* hold universally in

order to raise a challenge for Humeanism. The Humean account of laws is envisaged as having the most general scope, i.e. as being a metaphysical account of *all* laws: it is the thesis that all laws are grounded in the Mosaic. If (T) were true only of *some* laws and their instances, the Humean account would still render the explanation of *those* instances circular, which is enough of a problem already. While it is perfectly adequate to criticise Humeanism about laws by producing counterexamples to it, it does not seem to be nearly as effective as a strategy against Lange's criticism of Humeanism.

Nevertheless, Lange (2018) himself answered these counterexamples by refining his transitivity principle and by bringing into play the contrastive nature of explanations.[8] In order to restore the circularity challenge for Humeanism, Lange appealed to the fact that scientific explanations typically contain hidden contrasts.[9] According to this view, an explanation does not simply connect an explanandum with its explanans: what it combines instead is a specific difference-maker in the explanandum with the appropriate difference-maker in the explanans. Instead of regarding an explanation as a two-term relation, as we are accustomed, we would do more justice to its nature if we considered it, so to say, as holding between four relata: that *A explains B* is thus to be regarded as an abbreviated form for the claim that *A rather than A' explains why it is the case that B rather than B'*. Contrasts are mostly left implicit, as they are determined by the context of an explanation. By stating contrasts explicitly, Lange (2018: 1341–1342) formulated the refined transitivity principle:

(RT) If the fact that E rather than E' scientifically explains [or helps to scientifically explain] the fact that F rather than F', and if the fact that D rather than D' grounds [or helps to ground] the fact that E rather than E', then the fact that D rather than D' scientifically explains [or helps to scientifically explain] the fact that F rather than F'.

When the relevant contrasts are disclosed in the abovementioned example with a lion, we can easily see that it presents no counterexample to the refined transitivity principle (RT): although the explanandum in the metaphysical explanation (in the first premise) seems *prima facie* identical with the explanans of the scientific explanation (in the second premise)—i.e. the position of lion L—the implausible conclusion about the number of prey animals in region R being explained by the position of electron e does not follow by (RT) from the premises since the contrast implicit in the explanandum of the first premise does not match with the contrast implicit in the explanans of the second premise. According to

[8] The idea of contrastive nature of explanations is defended by van Fraassen (1980), Hitchcock (1996), Barnes (1994), Schaffer (2005) and Hicks (2021), among others.

[9] The idea of using contrastive explanations as a strategy for non-Humeans was suggested by Hicks and van Elswyk (2015)—Lange (2018) accepted the challenge.

Lange (2018: 1342–1344), what the presence of the picked out electron e rather than its absence explains is the occurrence of a particular "leonine configuration"—L—*rather than the occurrence of some other leonine configuration*—L minus e—in region R, while, in the second premise, it is the presence of a leonine configuration L in R, *rather than the absence of any leonine configuration* in R, that explains the number of prey animals there. Hence, the true explanandum in the metaphysical explanation, when the contrasts are taken into account, is a different difference-maker than the explanans of the scientific explanation, and, consequently, the explaining is not transferred by transitivity from the first premise to the second, and the untenable conclusion cannot be derived. By appealing to the contrastive nature of explanations, transitivity can be saved from other counterexamples in an utterly analogous fashion.

Dan Marshall (2015), on the other hand, tried to defend Humeanism about laws and to break the explanatory circle by denying that laws, considered as generalisations, are grounded in their instances. In his view, a law L does indeed (partly) scientifically explain its instance I, but what I (partly) grounds is not L itself, but the higher-level fact about L: the fact *that the generalisation L is a law*. Instances thus do not metaphysically explain laws, but rather the *lawhood* of laws.[10]

Lange (2018: 1351) answered Marshall by refining the prohibition on self-explanation:

(RPSE) The prohibition on self-explanation should be interpreted not only as prohibiting a fact q from helping to explain itself, but also as prohibiting q from helping to explain why (if q obtains) some other fact helps to explain q. Both of these are too circular to qualify as explanations.

According to Lange, Marshall's strategy for upholding Humeanism only seemingly avoids the circularity objection: if an instance I of a lawful generalisation L (partly) explains the fact that L is a law, which in turn (partly) explains why L (partly) explains I, then, by the principle of transitivity, I (partly) explains why L (partly) explains I, and this again violates (RPSE).

3. *Hicks's new proposal*

Recently, Hicks (2021) has proposed a new argument in defence of Humeanism about laws. He has argued that even if we granted to Lange the refined version of the principle of transitivity (RT) and the refined prohibition on self-explanation (RPSE), it would still not follow that the Humean account of laws leads to the explanatory circularity.

[10] Stefan Roski (2017) raised doubts as to whether this proposal for solving the circularity challenge was well motivated. He argues that any motivation we might have for claiming that the instances of a generalisation ground the meta-level fact that the generalisation is a law will *eo ipso* motivate the claim that they ground the generalisation itself.

Unlike Marshall, who claimed that instances did not ground laws that they are instances of, Hicks attempts to break the explanatory circle by denying its other part—i.e. he claims that laws do not scientifically explain their instances, but are instead meta-explanations of the first-order (typically causal) explanations.

In Hicks's view, if the fact that Fa is a cause of another fact Ga, then what explains the occurrence of Ga is not Fa together with the law that all Fs are G, but just the fact that Fa (2021: 535). Contrary to the well-known deductive-nomological model of explanation of Hempel and Oppenheim (1948), specific events need not be subsumed under a law (i.e. nomological generalisation) in order to be fully explained. The law explains further, on the meta-level, the explanatory connection between the first-level explanandum and explanans. Hence, the law does not explain its own instances, and the circularity is circumvented. Hicks here approvingly cites Skow (2016: 75),[11] who claims that

> the fact that the rock was dropped from one meter is offered as a reason why it hit the ground at 4.4 m/s, while the law that $s=\sqrt{2dg}$ is offered as a second level reason why, a reason why the drop height is a reason why the impact speed is 4.4 m/s. The law shows up in the answer to the second-level why question, not in the answer to the first level one.

As Hicks puts it, "laws are not themselves reasons why some event occurs, but instead are second-level reasons why the event's causes produce it" (2021: 540). If an event e is caused by another event c, then c explains e, and the law that c causes e (meta-) explains why c (first-order) explains e. One might object that c, by itself, is not enough for deriving e: it seems that it can do so only together with a law. According to Hicks (2021: 539), the law that c causes e does indeed feature in deriving e from c: however, not as a supressed premise at the same level with c, as it is assumed in the deductive-nomological model, but rather as an inference rule which justifies the transition from c to e. The last claim is labelled by Hicks as the inference rule requirement (IRR): the role of the law in an explanation is to enable deriving the explanandum from the explanans; the law itself is not part of the explanans and, hence, cannot be properly said to explain the explanandum; what it explains is the (second-level) fact that the explanans explains the explanandum.

This manoeuvre is sufficient to bypass the circularity issue as formulated with the original requirement of prohibition on self-explanation (PSE): although instances of a law (partly) ground the law, and thus explain it, the law, in turn, does not explain its own instances, but instead it explains (usually causal) connections between its instances and other events. However, it seems to fail (RPSE): instances help explain the law they are instances of, which again helps explain why some other facts explain the very instances in question.

In order to bypass this circularity, Hicks (2021) appealed to the contrastive nature of both explanations and meta-explanations. He claims

[11] Similar ideas can be found in Schnieder (2010), Ruben (1990) and Scriven (1962).

that the accusations of circularity can be supported only by what he labelled as the revised circularity argument (RCA), and then goes on to contest its soundness. The argument is reconstructed in the following way (Hicks 2021: 547):

(P1) An explanation is problematically circular if it uses e to help explain why (if e obtains) a given c can serve as part of the explanans in an explanation of e.

(P2) If the Inference Rule Requirement is true, then the laws explain why (if e obtains) a given c can serve as part of the explanans in an explanation of e.

(P3) If the laws are Humean, then e helps explain why the laws are what they are.

(IC) If the laws are Humean, and the Inference Rule Requirement is true, then e helps explain why (if e obtains) a given c can serve as part of the explanans in an explanation of e (from P2 and P3 via the transitivity of explanation).

(C) If the Inference Rule Requirement holds, and the laws are Humean, the explanation of e is problematically circular (from P1 and IC).

The premise (P1) in (RCA) is Hick's reformulation of Lange's refined prohibition on self-explanation (RPSE). Premises (P2) and (P3) are implications, with explanations in their consequents: while the explanation in (P3) is a first-level explanation, (P2) contains a meta-explanation as its consequent. The derivation of the claim of the explanatory circularity in the conclusion (C) of (RCA) proceeds in the following way: (P2) and (P3) imply, by the principle of transitivity, the intermediary conclusion (IC), which, together with (P1), gives (C). If we are correctly interpreting Hicks, he wants to claim that (RCA) is not a sound argument: in his view, (RCA) is either invalid or at least one of its premises is false. To defend his case, Hicks appealed to the contrastive nature of both explanations and meta-explanations: hence, the consequents of both (P2) and (P3) contain implicit contrasts. The principle of transitivity, by which (IC) should be derived from these two premises, can only be, accordingly, the refined principle of transitivity (RT) which takes contrasts into account. Now, Hicks maintains that, when the hidden contrasts in (P2) and (P3) are properly spelled out, it is either the case that the difference-maker in the explanandum in the consequent of (P3) does not coincide with the difference-maker in the explanans in the consequent of (P2)—invalidating thus the application of (RT) to those premises in deriving (IC)—or the premise (P3) is false. He believes that there is no way to specify the unstated contrasts in (P2) and (P3) so as to make them both true and connectable by the principle of (refined) transitivity. We will argue that he is wrong and that (RCA) is not only valid, but also sound. Hereinafter, we will proceed in the following manner: we will first outline Hicks's interpretation of (RCA) and the way he determines the hidden contrasts in premises (P2) and

(P3). Then we will argue that his proposed contrasts are neither the only feasible nor the most plausible ones. And finally, we will provide reasons for another reading of (RCA), which restores the argument's soundness and the circularity challenge for the Humean account of laws. However, before we turn to determining the relevant contrasts in (RCA), we would also like to point out two more general worries with Hicks's new defence of Humeanism about laws.

First, Hicks identifies first-level explanations of events with their causes. This is evident in (RCA) in the premise (P2), in which the laws are, according to the inference rule requirement, regarded as meta-explanations of the fact that the occurrence of an event e is, at the first level, explained by its cause c. In our view, conflating causes and explanations *prima facie* looks like mixing categories. Causes are usually events which cause other events; they bring them into existence, but do not explain them. Explanations, on the other hand, explain already existing events, but do not produce them. It seems that it is precisely the law that does the explaining; and if it is a causal law, in doing the explaining it will refer to the (kind of the) event's cause.[12] However, we are aware that to raise this concern means exactly to overturn some of the assumptions upon which Hicks rests his case for Humeanism.

The second concern is related to the status of laws in Hicks's account. A true generalisation is a law, according to BSA, only if it is derivable as a theorem in the best system (or, if it is not unique, in all the best systems). Hence, it is a theorem—a *proposition*. On the other hand, in order to respond to the circularity challenge, Hicks claimed that the laws were *inference rules*.[13] Thus, they would have to be both propositions and inference rules. But nothing can be both in a single context: propositions are truth-apt, while inference rules are not. Maybe the contexts in which the laws have the role of inference rules could be separated from those in which they function as propositions, but so far no such demarcation has been proposed by Hicks.

And now we turn to our main argument against Hicks. We claim that he does not succeed in avoiding circularity by appealing to the contrastive nature of explanations and meta-explanations in (RCA). Let us consider in more detail why he thinks that the contrasts contained in

[12] An anonymous reviewer suggested that a charitable reading of Hicks demands that we make room for a distinctive kind of causal explanation in which an event can both cause and explain some other event. We believe, however, that a cause would be able to explain its effect only if they are described in a certain way, and that a proper description would eventually include a lawful connection between these events. We cannot delve into details here, but we wish to emphasise that allowing for causes alone to explain their effects does not affect our main argument against Hicks, which is given below.

[13] Hicks seems here to subscribe to the best system account; see (Hicks 2021: 549). In an earlier article (Hicks 2018) he criticised BSA and suggested that it should be replaced by his Epistemic Role Account (ERA). However, our objection applies to ERA as well: in ERA, laws are theorems of the system which best balances strength and breadth, and hence propositions.

premises (P2) and (P3) either disable the application of transitivity to these premises or falsify the premise (P3). Hicks (2021: 548–549) himself gives an analysis of contrasts implicit in the meta-explanation in the consequent of (P2). (P2) says that the laws, which serve as inference rules according to the (IRR) contained in its antecedent, (at the second level) explain why c (at the first level) explains e. To be more precise, the fact that *if c then e* is an instance of a law, and not an accidental truth, enables the derivation of e from c. If the connection between the occurrence of c and the occurrence of e were merely accidental, c would not be able to explain e. It is now clear how the difference in the explanandum is related to the difference in the explanans in the consequent of (P2); hence, what (P2) claims, with contrasts spelled out, is the following:

(P2') If the Inference Rule Requirement is true, then the fact that *if c then e* is an instance of a law (rather than a mere accident) explains why c explains e (rather than not explaining e).

Hicks points out that both contrasts in (P2') presuppose that e occurs (and, for that matter, that c occurs as well). In the explanandum, it is presupposed that c and e are facts: the difference expressed by the contrast is that *between* there being an explanatory relation between those facts *and* there not being such a relation. The same holds for the explanans in (P2'): the relevant difference is that between the connection between c and e being lawful and it being accidental—but there would not have been any connection between c and e in the first place had they not both occurred. Hence, Hicks concludes that the difference between the occurrence and the non-occurrence of e is not relevant for the contrast in the explanans of (P2').

However, in order to deduce (IC) from (P2') and (P3) by the application of (RT), the difference-maker in the explanandum of (P3) has to coincide with the difference-maker in the explanans of (P2'), i.e. the appropriate contrasts have to match. Since, according to the considerations above, the difference between the occurrence and the non-occurrence of e does not affect the difference-maker in the explanans of (P2'), whether e occurs or not cannot be relevant for explaining the contrast in the explanandum of (P3) either. But Hicks seems to believe that the only possible ascription of contrast in the explanans of (P3) is exactly that between e's occurrence and its non-occurrence, i.e. he thinks that (P3), when the contrasts have been spelled out, expresses the following claim:

(P3') If the laws are Humean, then the occurrence of e (rather than its non-occurrence) helps explain why *if c then e* is an instance of a law (rather than a mere accident).

What the consequent of (P3') *says* is that the difference between e occurring and it not occurring *is* relevant for the difference-maker in the explanandum of (P3'): hence, (P3') is either false, or, if it is true, the difference-maker in the explanandum of (P3') cannot coincide with the

difference-maker in the explanans of (P2')—as the difference-maker in the explanans of (P2') is not affected by the difference between the occurrence and the non-occurrence of e. In the latter case, we would have an equivocation: behind their common expression, the explanans in (P2') would really not be the same as the explanandum in (P3'), which would be sufficient to block the application of the refined transitivity (RT) and to invalidate the argument (RCA).

The problem with Hicks's reasoning is that (P3'), as we announced earlier in the paper, is neither the only possible nor the most plausible interpretation of (P3). We believe that the contrasts which Hicks has set in the consequent of (P3) are not fitting, and we want to argue that, when the hidden contrasts in (P3) are properly determined, (P3) becomes both true and connectable by the principle of refined transitivity (RT) with (P2').[14] More precisely, a proper interpretation of (P3), in our view, will show that the mere occurrence of the fact e is equally irrelevant in the premise (P3) as it is in the premise (P2), thus making the two connectable by (RT). First we will analyse (P3) and offer another, more appropriate interpretation (P3"), in which the contrasts are determined by (P3)'s antecedent and which makes (P3) trivially true. Then we will argue that the interpretation (P3'), proposed by Hicks, amounts to a thesis unacceptable to Humeans.

The unspecified contrasts in the explanation contained in the consequent of (P3) are determined by that explanation's context, which, in turn, is dictated by (P3)'s antecedent. Unfortunately, in deciding which contrasts are left implicit in (P3)'s consequent, Hicks at no place appeals to its antecedent (which contains the claim *that the Humean account of laws is a true one*)—which is a different way of proceeding than in the treatment of (P2). When he spelled out the contrast in the meta-explanation contained in the consequent of (P2), Hicks paid due attention to the fact that the antecedent of (P2) is the inference rule requirement (IRR). According to (IRR), it is only the laws and not accidentally true generalisations that enable deriving a first-level explanandum e from its first-level explanans c. It is exactly the antecedent of (P2) that helped determine the supressed contrasts in its consequent. Now, following the same method, let us take a closer look at what is claimed in (P3)'s antecedent in order to arrive at its hidden contrasts.

The antecedent of (P3) is the thesis of Humeanism about laws. It claims that laws are grounded in the Mosaic: whether a certain generalisation is a law depends on what the Mosaic contains. According to

[14] It should be noted that Hicks (2021: 549–550) himself anticipated that some readers might be dissatisfied with his suggested contrasts in (P2') and could devise different contrasts instead: he considered several such competing proposals and found them all wanting and unable to support (RCA). However, none of the criticisms of his reading of (RCA) and rival proposals which he envisaged corresponds to what we wish to claim: in our view, Hicks's interpretation of (P2), as stating (P2'), is quite adequate—what we contest is his reading of (P3) and the contrasts he expressed in (P3').

the most influential version of Humeanism—that of David Lewis—the Mosaic determines the best system for our world, which in turn determines what laws are. In Lewis's view, a true regularity is a law if "it fits into some integrated system of truths that combines simplicity with strength in the best way possible" (1986: 122). Such integrated system is to be understood as a deductive systematisation, its strength being determined by the set of its consequences and its simplicity by the number and mutual similarity of its axioms.[15] The universal generalisations which appear as axioms in the best system are fundamental laws, while the universal generalisations which are deduced as theorems are derived laws. Predicates in the fundamental laws should refer to perfectly natural properties only, while predicates which appear in the derived laws can also designate properties which are natural to a sufficiently high degree (Lewis 1983: 368). Since the best system is the result of a trade-off between considerations of strength and considerations of simplicity, which pull in different directions, Lewis allowed that some of the system's strength could be sacrificed for an appropriate increase in the system's simplicity: the result is that the best system for our world need not be complete.[16] Consequently, if e is some particular fact, not only need it not be in the Mosaic, but it need not be derivable from it either. And although in most of the contemporary literature on Humeanism about laws it is tacitly assumed that the best system is deductively complete, this, as Kovacs (2021) points out, is neither the case in Lewis's original version of the best system account nor is it universally accepted within the Humean camp: thus, for example, in Braddon-Mitchell's (2001) version of Humeanism the best system is incomplete.

What Humeanism about laws therefore prohibits is that laws be determined by facts not in the Mosaic. Hence, the assumption that the laws are Humean, in the antecedent of (P3), naturally induces in its explanans the contrast between facts which are in the Mosaic and those which are not. Consequently, (P3) should be understood, *pace* Hicks, as stating the following claim:

(P3") If the laws are Humean, then e (rather than some fact not in the Mosaic) helps explain why *if c then e* is an instance of a law (rather than a mere accident).[17]

Now, (P3") is obviously true. If (P3) is read, as Hicks reads it, as abbreviating (P3') instead of (P3"), its truth will immediately become

[15] We are here roughly following the outline of Lewis's best system account as given in Kovacs (2021).

[16] Hicks (2018) seems to believe that strength always trumps simplicity. In his view, the best system is achieved by a trade-off between strength and breadth. However, such a system can also be incomplete, which is all that is required for our argument against his reconstruction of (RCA).

[17] Of course, if we make room for non-fundamental explanations, e need not be part of the Mosaic, but it still has to be grounded in the Mosaic. The relevant contrast in that case would be the one between e and some fact not grounded in the Mosaic.

suspect: in that case, (P3) would claim that a difference between e's occurring and its failing to occur would be responsible for a difference between laws being what they are and them being different. And if all that is assumed about e were that it occurred (i.e. that e were a fact), accepting (P3') would mean adopting the view according to which every change in facts produces a change in laws, which is highly contestable, to say the least. What Humeanism about laws, in its original formulation with supervenience, was designed to exclude is the claim that there are two possible worlds indistinguishable from one another with regard to facts they contain, but different with regard to laws which hold in them, that is, Humeans originally claimed that every change in laws implied a change in facts, and not that every change in facts implied a change in laws, which is what (P3') amounts to. While the former claim means that laws supervene on facts, the latter claim, contained in (P3'), is tantamount to saying that facts supervene on laws. Thus, if (P3') were accepted, together with the Humean thesis that laws supervene on facts, the supervenience which holds between facts and laws would become symmetric. And this should strike any advocate of the Humean account of laws as unacceptable: when the Humeans claim that the laws supervene on facts, what they have in mind is that *asymmetric* supervenience holds between them. Tolerating symmetric supervenience (or some other symmetric relation of ontological dependence) is hardly any better than admitting the initial charge of circularity, indeed it amounts to a form of circularity, only not of scientific but of *metaphysical* explanation: if there can be no difference at the subvenient level without a difference at the supervenient level, then such symmetric supervenience is bound to produce widespread cases of circular explanation.[18]

Now, conceding that the laws are not supposed to yield to every change in facts but are typically considered as being more resilient, nevertheless it may still be objected that whether an event e occurred or did not occur does affect the lawhood status of *if c then e*. Let us suppose that c occurred. If e failed to occur, then *if c then e* would not be true and, hence, would not be a law.[19] As much as this reasoning seems incontestable,[20] it is of no avail to Hicks. The occurrence of e rather than its non-occurrence does help explain why *if c then e* is a true rather than a false generalisation, but the latter contrast does not match the contrast in (P3')'s explanandum, for that contrast is between *if c then e* being a lawful generalisation and it being a merely accidentally *true* generalisation. In the explanandum in (P3'), it is already presupposed that *if c then e* is true; what needs explaining is why it is

[18] Kovacs (2021) makes similar points.

[19] We are grateful to an anonymous reviewer for raising this issue.

[20] Braddon-Mitchell (2001) in fact contested it: he believes that laws need not be true and allows for what he calls "lossy laws". We cannot consider his view in more details here.

moreover an instance of a law rather than a mere accident,[21] and for that purpose the difference between e occurring and it failing to occur is not relevant.

To sum up, (P3') is surely not the only possible reading of (P3), as Hicks seems to believe, since there is an alternative reading on the table, namely (P3"). Moreover, if our considerations above are correct, (P3') is not an admissible reading either: the choice of contrast in its explanans is neither motivated by the contrast in its explanandum nor by its antecedent; and what it claims seems highly implausible, especially to the Humeans. Contrary to (P3'), our suggested reading (P3") not only makes (P3) more plausible but also trivially true. However, since the explanandum in (P3") is the same difference-maker as the explanans in (P2'), the refined principle of transitivity (RT) can be applied to them. Together they give (IC), which with (P1) enables deriving the circularity challenge in the conclusion (C). (RCA) is thus both valid and sound. Somewhat imitating Lange's response to the counterexamples to the principle of transitivity (T), Hicks tried to demonstrate that the argument for the explanatory circularity of the Humean account of laws cannot be sound. We believe to have shown that his attempt failed and that appealing to the contrastive nature of both explanations and meta-explanations is not enough to save Humeanism about laws from the charge of circularity.

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[21] This point is readily acknowledged by Hicks himself. He writes: "Thus the question we're concerned about is not whether *if c then e* had not been a law, would it have been true. Rather, we are wondering whether had it been accidental, it would have been true. This is the question guided by the contrast in the explanandum. And the obvious answer is that yes, it would have been accidentally true" (Hicks 2021: 549).

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