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Laws of Nature and Explanatory Circularity

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RESUMEN

En algunas publicaciones recientes [Hicks, M. T. and van Elswyk. P., (2015) pp. 433-443, 2015; Bhogal, H. (2017), pp. 447-460] se ha argumentado que las concepciones no humeanas de las leyes de la naturaleza tienen las mismas debilidades que las concepciones humeanas de dichas leyes. Esto es: ambas concepciones tienen que hacer frente a un problema de circularidad explicativa. El argumento es el siguiente: tanto las concepciones humeanas de las leyes de la naturaleza, como las no-humeanas están de acuerdo en que los enunciados de leyes son generalizaciones universales; en consecuencia, ambas concepciones son vulnerables a un problema de circularidad explicativa entre las leyes de la naturaleza y sus ejemplificaciones. En este artículo, argumento que el punto de vista necesitario de las leyes de la naturaleza que adopta Armstrong es invulnerable a este problema de circularidad explicativa.

PALABRAS CLAVE: *Armstrong, explicación, humeanismo, necesidad, auto-explicación.*

ABSTRACT

Some recent literature [Hicks, M. T. and van Elswyk. P., (2015) pp. 433-443, 2015; Bhogal, H. (2017), pp. 447-460] has argued that the non-Humean conceptions of laws of nature have a same weakness as the Humean conceptions of laws of nature. That is, both conceptions face an explanatory circularity problem. The argument is as follows: the Humean and the non-Humean conceptions of laws of nature agree that the law statements are universal generalisations; thus, both conceptions are vulnerable to an explanatory circularity problem between the laws of nature and their instances. In this paper, I argue that Armstrong's necessitarian view of laws of nature is invulnerable to this explanatory circularity problem.

KEYWORDS: *Armstrong, Explanation, Humeanism, Necessity, Self-Explanation.*

I. INTRODUCTION

Some recent literature [Bhogal (2017); Hicks and Elswyk (2015)] has argued that the non-Humean conceptions of laws of nature have a same weakness as the Humean conceptions of laws of nature: both conceptions face an explanatory circularity problem. Briefly, it is argued that

the Humean and the non-Humean conceptions of laws of nature agree that the law statements are universal generalisations. Thus, both conceptions are vulnerable to an explanatory circularity problem between the laws of nature and their instances.

I begin this paper by distinguishing two explanatory circularity problems: 1) a full circularity problem and 2) a self-explanation circularity problem. I argue that Armstrong's necessitarian view of laws of nature – a non-Humean conception – is invulnerable to these explanatory circularity problems. Finally, I analyse a circular condition for unsuccessful explanations, recently proposed by Shumener.

II. Two Explanatory Circularity Problems

In the literature, the terminology "explanatory circularity problem" has been used to designate two slightly different circularities. A first circularity is a full explanatory circularity (hereafter, *the problem of circularity C*). Synthetically, a law of nature is inferred from an observed phenomenon and, thereafter, it is used to explain that same observed phenomena. Thus, an observed phenomenon explains itself. The other circularity is a problem of self-explanation (hereafter, *the problem of circularity SE*). A law of nature explains an observed phenomenon, but the law includes that same phenomenon in its content.[1] In terms of laws of nature, the problem of circularity C is articulated by an argument along with a transitivity principle:

(1) Observed *FG*s explain Law *L*.

(2) Law *L* explains observed *FG*s.

(3) If observed *FG*s explain Law *L* and Law *L* explains observed *FG*s, then observed *FG*s explain observed *FG*s. [transitivity principle]

(∴) Observed *FG*s explain observed *FG*s.

The problem of circularity SE is a sub-problem of the problem of circularity C.

(1)Law *L* is a generalisation of the form "all *F*s are *G*s".

(2) Law *L* explains observed *FG*s.

(∴) Observed *FG*s explain observed *FG*s.

The transitivity principle is the main difference between these problems. The transitivity principle is not required to articulate the problem of circularity SE. This is an important difference because the transitivity principle is problematic. For example, the transitivity principle encapsulates the "big" problem of induction and the reference problem of the term "explanation". The first problem is on the justification of the transition between observed *FG*s to unobserved *FG*s. Basically, in the problem of induction there is a bottom-up step from observed *FG*s to the law statement; and then there is a top-down step from the law statement to the observed (and unobserved) *FG*s. The transitivity principle connects these two steps. The second problem is on the correct reference of the term "explanation" in the transitivity principle. For example, Loewer (2012) argues for two references of the term: on the one hand, the Humean mosaic (i.e. "the distribution of fundamental categorical properties/quantities and relations instantiated by fundamental entities (particles, fields etc.) throughout all of space–time" [Loewer (2012), p. 116] *metaphysically* explains the laws; on the other, the laws *scientifically* explain the Humean mosaic.[2] In light of the structure of the problem of circularity SE, these two difficult problems can simply be bypassed.

III. A Necessitarian Reply to the Problem of Circularity C

Hicks and Elswyk (2015) propose the following argument for the problem of circularity C.

(P1) The natural laws [law statements] are generalizations. (HUMEANISM)

(P2) The truth of generalizations is (partially) explained by their positive instances. (GENERALIZATION)[3]

(P3) The natural laws [law statements] explain their instances. (LAWS)

(P4) If A (partially) explains B and B (partially) explains C, then A (partially) explains C. (TRANSITIVITY)

(C1) The natural laws [law statements] are (partially) explained by their positive instances. (P1 & P2)

> (C2) The instances of laws [law statements] explain themselves. (P3, P4, & C1) [Hicks and Elswyk (2015), p. 435][4]

This argument falls on the side of the problem of explanatory circularity C, where the transitivity principle is invoked. They claim that this argument also applies to the non-Humean conceptions of laws of nature:

> Humeans and anti-Humeans should agree that law statements are universal generalizations (…) If we're right about this much, anti-Humeans are vulnerable to a *tu quoque*. When laws are statements taking the form of universal generalizations, even if the statements are rendered laws by something else (e.g. essential natures, relations to other laws), the statements are made true by instances of whatever the law is about. It is here that *the specter of circularity* appears. How can a law explain its instances if it is also made true by those instances? [Hicks and Elswyk (2015), p. 435 my italics].

Bhogal (2017) seems to argue in the same vein:

> [The problem of explanatory circularity] applies just as well to non-Humean accounts that say that laws are generalizations. Take, for example, a view saying that laws are generalizations but what makes those particular generalizations laws is the existence of certain primitive nomic entities. This is clearly an anti-Humean view—there are facts about the laws that are not reducible to (nor do they supervene on) the occurrent facts—but it does face this problem [Bhogal (2017), p. 448].

Armstrong's view of laws of nature is one of the targets of the above passages, as this is a non-Humean conception. Armstrong defend the view that laws of nature govern the events. They confer order upon the observable world. They are additional entities above the regularities of the Humean mosaic. However, considering Armstrong's view, the premises (P2) and (P3) of the above argument are false.

Let us begin by premise (P2). Armstrong claims that the laws of nature are states of affairs. A second-order relation, called N, binds first-order universals F and G (i.e. $N(F,G)$). The law of nature, $N(F,G)$, entails and explains the regularity, "all Fs are Gs" [Armstrong (1983), p. 41, (1988), p. 225, (199), p. 422]. "All Fs are Gs" is not a law of nature. The generalisation "all Fs are Gs" is a law statement. For example, the law statement "all ravens are black" is entailed and explained by the law $N(F,G)$, where F is the universal *ravenhood* and G is the universal *blackness*. A particular raven *a* is black because it instantiates the universals *ravenhood*

and *blackness* and these universals are necessary related by *N*. In sum, (P2) is false because the truthmakers of the law statements are (metaphysical) laws of nature [Armstrong (1991), p. 507].

It might be objected that my reply misconstrues the argument of Hicks and Elswyk. Even if the laws of nature explain the law statements, it does not follow that the truth of generalisations of the law statements is not (partially) explained by their positive instances. The argument is as follows. *The positive instances of the laws of nature explain the laws of nature*. The laws of nature explain the law statements. Thus, by transitivity, the positive instances of the laws of nature explain the truth of the generalisations of the law statements. Given that, for a necessitarian, any positive instance of a law of nature implies a positive instance of the correspondingly law statement, then the truth of generalisations of the law statements is (partially) explained by their positive instances. That is, (P2) is true.

The controversial premise of the above objection is this one: *the positive instances of the laws of nature explain the laws of nature*. As far as I can see, this premise is supported by the following ideas. Armstrong's metaphysics is committed to an Aristotelian immanent realist general theory of universals. That is, universals exist only in their instances. Given that the laws of nature are universals, then there are not actual uninstantiated laws of nature. Every law of nature must have at least one instance. Laws are somewhat Humean supervenient on their instances and, thus, instances of the laws may explain the laws of nature.

First, not every necessitarian on laws must undertake an Aristotelian immanent realist general theory of universals. For example, Tooley (1977) accepts a Platonic realism about universals. Precisely, he accepts that it is logically possible for there to exist uninstantiated universals. Thus, there is room for actual uninstantiated laws. However, if uninstantiated laws of nature are logically possible, then actual uninstantiated laws of nature cannot be explained by inexistent instances. A necessitarian does not need a full adoption of Armstrong's metaphysics to reply to the circularity problem. Tooley's actual uninstantiated laws refute the claim that positive instances of the laws of nature explain the laws of nature.

Second, even within an Aristotelian immanent realist general theory of universals, there is room for uninstantiated laws of nature. However, in this case, uninstantiated laws of nature are based on counterfactual laws. These laws are higher-order laws. Let us suppose that instances of the universal *F* do not exist. According to immanent realism, then the universal *F* does not exist. However, let us suppose that there is some

empirical evidence that suggests that it is a law of nature that *F*s are *G*s. Then, he can assert the counterfactual law: if there were *F*s, then it would be a law of nature that *N*(*F*,*G*) [Armstrong (1983), Chapter 8]. It seems to me that these actual counterfactual laws may challenge the claim that positive instances of the laws of nature explain the laws of nature.

Third, for a necessitarian, *if* the positive instances of the laws of nature explained the laws of nature, then the laws of nature would not explain their instances. Mumford speculates about this:

> [T]he instances to an extent determine the laws, rather than vice versa, and this is a surprising situation for a supposedly realist account of laws. It might be wondered, therefore, whether laws explain their instances as the singular causal transactions appear primary. Is it the case, therefore, that the instances instead explain the laws? If laws do not explain their instances, in what sense is the DTA theory a theory of nomological realism? [Mumford (2004), p. 93].

If the positive instances of the laws of nature explained the laws of nature, the laws of nature would be incapable of any external and governing role. However, for a necessitarian, it is a sort of first philosophical principle that the laws of nature do have a governing role concerning the regularities in space-time. Thus, by *modus tollens*, it is not true that the positive instances of the laws of nature explain the laws of nature.

Now, premise (P3). The Humean claims that the law statements explain the observed instances. Then, the Humean faces the following necessitarian argument.

(1) The laws of nature explain the law statements. [necessitarian conditional]

(2) The law statements explain their instances. [(P3) of Hicks and Elswyk]

(3) The instances of the law statements are also instances of the correspondingly laws of nature.

(4) The law statements explain the instances of the correspondingly laws of nature. [(2) and (3)]

(5) If A explains B and B explains C, then A explains C. [transitivity]

(∴) The laws of nature explain the instances of these laws. [(1), (4) and (5)]

This is a valid argument, where, for the Humean, the conclusion is false. Instead, the law statements explain their instances. Thus, one of the premises of the argument is false. Premise (1) is a necessitarian conditional that Hicks and Elswyk do not question in the support of their argument (see the above passage, i.e., "the statements are rendered laws by something else"). I am assuming that there is a law of nature for the correspondingly law statement, thus, premise (3) is a metaphysical consequence of premise (1). Finally, premises (2) and (5) are also premises of the above argument of Hicks and Elswyk. In this paper, I am not questioning transitivity (5). We are left with premise (2). Accordingly, premise (2) is false. It is not true that "the law statements explain their instances". This is the premise (P3) of the original argument of Hicks and Elswyk.

The Humean wants to bring into the discussion the necessitarian conception of laws of nature. For that reason, he must buy some of the metaphysical necessitarian package, namely, the claim that the laws of nature entail and explain the law statements (premise 1). It does not seem that premise (1) can be a sort of Humean gambit move. To assume that the laws of nature explain the law statements implies that the law statements cannot explain their instances, whereas from a necessitarian point of view, this is correct. Behind the law statements there are laws of nature. These laws of nature are the entities responsible for the explanatory role. For a necessitarian, the law statement "all Fs are Gs" does not explain the instances of the law statement. It is the universal $N(F,G)$ that explains the instances of the law statement.

IV. A Necessitarian Reply to the Problem of Circularity SE

Given that the problem of circularity SE is a sub-problem of the circularity C, the replies above may only be applied to the problem of circularity C. That is, the replies above may uncross the problem of circularity SE. However, this is not the case. The replies above on premise (P3) are also applicable to the problem of circularity SE.

As far as I can see, if we try to reframe the above argument of Hicks and Elswyk to underpin the problem of circularity SE, we obtain the following argument (where (P2) is a new premise):

(P1) The law statements are generalizations. (HUMEANISM)

(P2) If the law statements are generalizations, then the law statements are (partially) constituted by their instances.

(P3) The law statements explain their instances. (LAWS)

(C2) The instances of the law statements explain themselves.

Considering what I said above, premise (P3) is false. It is $N(F,G)$ that explain the instances of the law statements. The problem of circularity SE does not threaten the necessitarian.

V. SHUMENER'S CIRCULARITY CONDITION

Shumener proposes a problem of *semantic* circularity. She argues that the DN model of scientific explanation illustrates this problem. The DN model of scientific explanation proposes that the structure of scientific explanation is deductive, where the *explanans* comprises law statements and initial/antecedent conditions. The *explanandum* is derived from the *explanans* by means of logic deductive rules. In light of the DN model, the law statements are generalisation statements. Thus, it follows that the *explanandum* is included in the *explanans*. The problem of semantic circularity reframes the problem of circularity SE as follows:

ARGUMENT 1

Explanans (1) All *F*s are *G*s. [law statement]

(2) *a* is *F*. [antecedent condition]

Explanandum: *a* is *G*.

Given that "*a* is *G*" is included in the first premise, "all *F*s are *G*s", it follows that "*a* is *G*" is used to explain "*a* is *G*". Synthetically, "*a* is *G*" (partially) explains "*a* is *G*".

Shumener advances the following circularity condition for unsuccessful explanations.

> CON: If the content of a sentence E is part of the content of a set of sentences, Γ, then an explanation of E in terms of Γ is unsuccessful. [Shumener (2019), p. 794]. [5]

Shumener claims that the problem of semantic circularity does not apply to a necessitarian view of laws of nature:

> An anti-Humean who takes laws to be necessitation relations between universals will be able to avoid the circularity charge as well. Let's consider the explanation of 'Ga' by 'Fa' and the law 'all Fs are Gs'. Here, the anti-Humean can claim that it is the sentence 'F-ness necessitates G-ness' or 'N(F, G)', conjoined with 'Fa' will explain 'Ga'. The verifier for 'N(F, G)' will involve universals standing in a higher-order relation to one another, and the state [Ga] need not be involved [Shumener (2019), p. 805].

Basically, Shumener proposes the following explanatory structure:

> ARGUMENT 2
>
> *Explanans*: (1) *N* (*F*, *G*)
>
> (2) *Fa*
>
> *Explanandum*: *Ga*

Shumener's answer is correct at its core. As I argued before, for a necessitarian, the law statement "all Fs are Gs" does not explain *Ga*. It is the universal *N*(*F*,*G*) that explains *Ga*. However, there are some problems in the condition CON.

First, the circularity condition CON simply points to a larger circularity problem of most deductive arguments: the conclusions of most deductive arguments are part of the content of one of the premises of the argument. She insists, however, that in some arguments the conclusion may be validly deduced from premises but the conclusion is not part of the premises of the argument. She advances the following example:

> 'George is in the philosophy department' does not have 'It is raining or it is not raining' as part of its content, for example, even though the latter is a logical consequence of the former [Shumener (2019), p. 794].

The conclusion of the above example is an instance of the *tertium non datur*. It is a logical truth. However, the conclusions of our explanations, inferred from laws of nature, are not logical truths. Rhetorically, what is the point of trying to explain logical truths by means of laws of nature?

Second, and contrary to Shumener, the explanatory structure of argument 2 violates the circularity condition CON. An instance of the law,

N (F, G), is given by Rab, where $R = N(F,G)$, $a = a$'s being F and $b = a$'s being G, that is: ($N(F,G)$) (a's being F, a's being G) [Armstrong (1983), p. 90]. The *explanandum*, Ga, continues to be part of the *explanans*.[6] This is not surprising. The fact that observed FGs instantiate a law of nature means that observed FGs are member of a class of types, where all Fs are necessarily connected with Gs. Thus, in light of CON, argument 2 is circular. If CON were true, that would good news for the Humean. The necessitarian view of laws of nature would succumb to a semantic circular problem.

The root of this misunderstanding is the condition CON. A semantic condition cannot be used to assess metaphysical explanations. "All Fs are Gs" is exhausted by "all observed Fs are Gs" and "all unobserved Fs are Gs". However, N (F, G) is not metaphysically exhausted by "all Fs are Gs". The premise N (F, G) is what differentiates the argument 1 from the argument 2. N (F, G) is the *tertium quid* which mediates the observed and the unobserved. This is a new postulated entity – a strong law. It unifies the regularities. Without this strong law no explanation in terms of laws of nature is successful.

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NOTES

[1] Hempel and Oppenheim (1948), p. 162, also underline this distinction between the two circularity problems.

[2] In the literature there is a huge discussion around the transitivity principle. For example, see Lange (2016), Hicks and van Elswyk (2015), Marshall (2015) and Miller (2015).

[3] Bhogal (2017), p. 448, also defends this premise. Erroneously, he claims that "Armstrong and Maudlin suggest that instances explain universal generalizations".

[4] In what follows, I use the term "law statements" to refer to the natural laws, as the first term is more usual in the literature. [See also the passage below of Hicks and Elswyk (2015), p. 435].

[5] I corrected a typo. The first "Γ" is missing in the original paper.

[6] In light of Armstrong's view, argument 2 does not seem to be explanatory. For him "explanation is more than just deduction" [Armstrong (1991), p. 507]. It is not clear that Shumener's argument 2 is a formal deductive argument.

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