

An Enquiry on laws of Nature and Circularity Problem

Vaishali¹ and Shalu Jaiswal²

¹PhD, Research scholar, University of Delhi, Department of Philosophy

²Masters in philosophy University of Delhi, Department of philosophy

Abstract: The most important question in the metaphysics of science is “What is the nature of fundamental laws?”. This paper aims to discuss this question concerning the debate surrounding David Hume’s approach to the problem. According to the Anti-Humean view, laws of nature are not regularity or generalization but are relations between universals. Many philosophers support or defend this like Dretske, Armstrong, and Tooley. There are differences between Dretske and Tooley i.e., according to Dretske, the form of laws should be written as: “F-ness \rightarrow G-ness” but according to Tooley, it can be written as $(x)(Fx \supset Gx)$. According to Dretske, laws support counterfactual, but according to Tooley, laws doesn't support counterfactual. According to the **Humean** view about laws of nature, laws are certain sorts of regularities in particular matters of fact. This paper aims to discuss the debates and approaches of Humean and Anti-Humean regarding laws of nature and further what problems these approaches lead to and what possible responses they could have. There are many objections against humeanism- non-supervenience, explanatory circularity, non-fundamentality, etc. The most common objection to humeanism on which the paper will shed focus on is the “The Circularity problem”. This paper will discuss the problem and responses to it.

Keywords: Hume, Laws of Nature, Universals, Anti-Humeanism, circularity problem.

INTRODUCTION

The notion of a law of nature is fundamental to science. Science is concerned with the discovery of laws such as Boyle’s laws, Newton’s laws, Ohm’s laws, Mendel’s laws, etc. But the question ‘What is a law of nature?’ is a central question for the philosophy of science. David Hume, a Scottish philosopher known for his skepticism and empiricism revolutionized philosophy by questioning causality and thus problematizing knowledge. according to Hume, all knowledge begins with sensibility, we gain sensations through impressions, and impressions hits us with force, liveliness and vividity. Impressions form ideas using memory and imagination. Ideas always follow impressions, no idea can exists prior to impressions, so ideas such as causality, uniformity, personal identity, God, Morality etc.. are all mere association and relation of ideas that we form due to constant conjunction of their existence as priority, proximity and contiguity. we can never find an impression of them in the world. This view of Hume shifted the view of causality that, “every effect has an cause” as a matter of fact to “Events follow each other in constant conjunction and due to induction, memory, imagination and other associations, we draw a necessary relation of idea between two events, but there is no impression of their relation of necessity in the world. This took away principle of sufficient reason of Leibniz, principle of Uniformity of nature, principle of causality and necessary certain knowledge is taken away. This problematized epistemology, science and knowledge. This led to a debate in philosophy of science around laws of nature. Is there a

Uniformity in laws of Nature ? Michael Scriven read a paper in 1959 at the American Association for the Advancement of Sciences annual meeting that made an implied distinction between Laws of Science and Laws of Nature. With very few exceptions, the laws of science, or what he called "physical laws," are imprecise, only loose approximations of reality, and have a narrow field of application. Nancy Cartwright has since taken up and developed the theme. Should scientific laws prove to be erroneous, it is likely that there are other, if perhaps more intricate, rules that are precise and represent the truth in its absolute sense, rather than merely approximations. The laws of nature are those. There are two opposing conceptions of the Laws of Nature within metaphysics.

The Necessitarian Theory, on the other hand, holds that the "principles" guiding the world's natural processes are the Laws of Nature. This is the **Anti-Humean** views which typically claim that laws of nature are the relation between universal¹. There is a necessary connection between laws and particular events. In other words, the natural world "obeys" the natural laws. This seemingly unimportant distinction represents one of the biggest gaps in modern philosophy and has far-reaching, unforeseen effects.

According to the Regularity Theory, the Laws of Nature are merely descriptions of how the universe is; they are declarations of the uniformities or regularities that exist in it. This is the Humean view which is also known as Ramsey- Lewis view.

According to **Humean** view about laws of nature is, that the laws are certain sorts of regularities in particular matters of fact. According to Bhogal, that the laws of nature are just patterns, or ways of describing patterns, in the mosaic of events². Humeanism about the law of nature is that there is no necessary connection between distinct existence. There are many possible versions of humeanism but the most dominant humean approach is Best System Account (BSA). “The core idea of the BSA is that the laws are the axioms of a system that best balances simplicity and informativeness. A system is simple if its axioms are simple. A system is informative if it tells us a lot about the mosaic”. But there are many objections against humeanism- non-supervenience, explanatory circularity, non-fundamentality, etc...

AIM AND OBJECTIVES

This paper aims to discuss laws of nature and the debates and approaches of Humean and Anti-Humean regarding laws of nature. The problems these approaches lead to and what possible responses they could have will be focused on in this paper. In Anti-Humean view of law of nature, the paper will discuss Dretske and Tooley’s views. Further the paper will bring forth the main objections against humeanism- non-supervenience, explanatory circularity, non-fundamentality, etc. The most common objection to humeanism on which the paper will shed focus on is the “The Circularity problem”. This paper will discuss the problem and will discuss the debates around the responses to the circularity problem.

METHODOLOGY

In the first step, the study uses qualitative descriptive research methodology in the task of a complete and thorough analysis of David Hume’s Theory regarding laws of Nature. Using Hume’s work as a primary source, this study aims to bring out the connective parts and themes of ‘laws of nature and their regularity and universality’ which is the central point of this research work. Then, using “Conceptual Analysis: A Model of Detection Analysis” as the theoretical model of research, we will dig into the secondary sources i.e., the related books and articles on Humean and Anti-Humean approaches about laws of nature. The paper is based on critical interpretations and evaluations from extra systematic references and an analytical study of the contemporary debates. In doing these within system evaluation, we will dig out the circularity problem of Hume and we will draw comparative interpretations of the responses to the

problem. The methodology of this comparison will be non-technical so far as it is possible.

LITERATURE REVIEW

Anti- Humean view of Laws of Nature

According to the Anti-humean view, laws of nature are more than just the pattern of the event, are not a generalization, and not a regularity. According to the anti-humean view, laws govern regularity. Dretske and Tooley believe that laws of nature are the relation between universals. There are many differences between Dretske and Tooley’s theories of laws of nature and share some similarities. According to these two, laws of nature are the relation between universals. Now I will discuss these two philosophers separately.

Dretske view on laws of nature

Dretske in his paper ‘Laws of Nature’ discusses the ‘what is the nature of law?’ Dretske criticized the traditional view, that laws of nature are a universally true statement. According to Dretske, laws of nature are just more than universal truth, because if a statement satisfies all the criteria of a universally true statement e.g. $(x)(Fx > Gx)$ and the predicate expression

“H” coextensive with “F”; i.e., $(x)(Fx = Hx)$ for all time, then we can infer that if $(x)(Fx > Gx)$ is universal truth then $(x)(Hx > Gx)$ also a universal truth. “The class of universal truths is closed under the operation of coextensive predicate substitution. Such is not the case with laws”(Dretske, 1977, 249). If the statement ‘all F’s are G is a law and F coextensive with H, and we substitute the term H in place of term F then we cannot get the same law. So, laws of nature do not come under the universally true statement.

According to Dretske, “the predicate positions in a statement of law are opaque while the Predicate positions in a universal truth of the form $(x)(Fx > Gx)$ are transparent”(Dretske, 1997, 250). But many philosophers criticized this view, according to them, the distinction between laws and the universal statement was not an intrinsic difference. According to them the term opacity, which is associated with laws is not an intrinsic difference between laws and universal truth but it is the special status or function of universal truth to become a law.

According to them, the basic formula of law is:

$$\text{law} = \text{universal truth} + X$$

The ‘X’ is a symbol of a special function or status of universal truth that must have to meet the

requirements of law. And there are some widespread roles given to 'X' are:

- (1) High degree of confirmation,
- (2) Wide acceptance
- (3) Explanatory potential
- (4) Deductive integration
- (5) Predictive use

According to reductionists or Humeans, laws are universal generalizations but with these extra features. And according to them, universal generalization must be widely accepted, has a high degree of confirmation or other functions to qualify as a law. And this epistemic condition makes law opaque or the opacity of law is the result of this epistemic condition.

This view is criticized by Dretske, and according to him, the laws are opaque, because laws are the connection between senses and not between references. According to him, the statement 'All F's are G' is not the statement about the reference of the predicates 'F' and 'G' but the sense of the predicate. According to Dretske, "the law is a singular statement describing a relationship between the universal properties F-ness and G". So, the form of laws is not this $(x)(Fx \supset Gx)$ but it is written as: "**F-ness \rightarrow G-ness**".

According to Dretske, the universal truth is expressing a relation between the extension of the term but the statement of law expressing a relation between the property or magnitudes. Dretske maintained that "law-like statements are singular statements of fact describing a relationship between properties or magnitudes". Dretske claims that laws support counterfactuals.

So, according to Dretske, "*Laws are (expressed by) singular statements describing the relationships that exist between universal qualities and quantities*"

Tooley's views on laws of nature

Tooley in his paper '**The Nature of Laws**' criticized the most popular account the regularity theory of laws of nature and give an argument in support that laws of nature are the relation between universal.

The regularity theory of laws of nature is that a "generalization express a law if and only if it is both true and lawlike, where lawlikeness is a property that a statement has" (Tooley, 1997, 668). Tooley criticized this view, by giving the e.g., of vacuous truth (vacuous laws i.e., newton's first law of motion- all inertial bodies have no

acceleration –is law, even though there are no inertial bodies) which lack conformity.

Regularist responds to this objection is that "a vacuously true generalization is a law only if it is derivable from generalizations that are not vacuously true"(Tooley, 1997, 669). According to Tooley, this view is wrong, because, he gave an example of '*The Fundamental particles case*', where he imagines a world that contains ten particles, only ten types of fundamental particles. The behavior of the particle is that they interact with the same type of particles and as well as other types of particles. There are 55 cases of interactions of the particles. He supposes that only 54 interactions of particles are known, and 54 laws have been discovered. But the 55th interaction of particles F-types and H-types is impossible in past, present, or Future. So, the 55th law, the interaction between F-types particles and H-types particles is, unknown to us. Tooley, claims that there is a reason to believe that there would be underived or uninstantiated laws dealing with the interaction of F-H particles.

Now, the question arises that 'what makes generalization a law'? According to Tooley, there would be two plausible conclusions, first, "nonnomological facts about particulars cannot serve as the truth-makers for all laws"(Tooley, 1997, 671). Because in the universe, where F-type particles never interact with H-type particles, there would be law if they interact, and an event 'D' occurs or might be an event 'E' occur. There are no positive instances, and there is no reason to hold one generalization as law and the other not. So, according to Tooley, in uninstantiated laws, nonnomological facts about a particular cannot serve as the truth-maker for laws.

The second conclusion is, "no facts about particulars can provide a satisfactory account of the truth conditions of such laws"⁸(Tooley, 1997, 672). According to Tooley, facts about particulars cannot provide truth-makers for laws. Therefore, Tooley claims that facts about universals can serve as truth conditions for laws without any positive instances. In the *In fundamental particle case*, there must be a relation between those universals that make an F-type particle a particle of the F-type, and the universals make an H-type particle a particle of the H-type (Armstrong, 119). According to Tooley, there would be uninstantiated, and transcendent universals.

In the **emergent property case**, Tooley claims that if there are uninstantiated laws i.e., F-H laws; when F-type particles interact with H-type particles then an unknown simple property emerges because all the instantiated laws emerge as simple properties. So, if the conjunction of F-H is uninstantiated at any time, then the simple property is uninstantiated at any time. Since the property is simple, it can have no instantiated constituents. So, the truth-maker for the uninstantiated F-H law includes one uninstantiated universal.

Humean view of Laws of Nature

According to **Humean** view about laws of nature is, that the laws are certain sorts of regularities in particular matters of fact. According to Bhogal, that the laws of nature are just patterns, or ways of describing patterns, in the mosaic of events². Humeanism about the law of nature is that there is no necessary connection between distinct existence. There are many possible versions of humeanism but the most dominant humean approach is Best System Account (BSA). “The core idea of the BSA is that the laws are the axioms of a system that best balances simplicity and informativeness. A system is simple if its axioms are simple. A system is informative if it tells us a lot about the mosaic”³. But there are many objections against humeanism- non-supervenience, explanatory circularity, non-fundamentality, etc..

Circularity Problem

The most common objection to Humeanism in recent years is that it leads to a kind of explanatory circularity. The Circularity problem is going like this:

P (1) - The laws explain the particular matter of fact.

P (2) - The particular matter of fact explains the law.

C - The particular matter of fact explains itself.

As Maudlin puts it: “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.”

Response to the Problem

Loewer solves the Circularity problem by distinguishing between metaphysical explanation and scientific explanation. According to Loewer, there are two types of explanation first is, “Metaphysical explanation is shown to be

grounded in or constituted by some other kind of fact. The metaphysical explanation need not involve laws and the explanandum and explanans must be co-temporal. The second type of explanation is a scientific explanation, 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.

One further difference between metaphysical and scientific explanation is that the latter but not the former may be probabilistic”. According to Loewer, laws scientifically explain the particular event, while the particular matter of fact metaphysically explained the laws. So, there is no circularity problem because two different explanations are explaining different things. **Lange** (2013) has replied that Loewer’s view violates the prohibition on self-explanation because even if we grant “for the sake of argument” the distinction between grounding and scientific explanation, these two kinds of explanation are linked by a “transitivity principle”

According to **Lange**, the transitivity principle is this, 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, p. 256)

According to **Bhogal**, Loewer’s distinction between metaphysical explanation and scientific explanation does not fully develop a response against the circularity problem because, Bhogal suggested, some metaphysical explanations are related to science. So, he makes a distinction between *metaphysical explanation* and *nomothetic explanation*. “Nomothetic explanations to be a type of scientific explanation – they are those where the laws of nature play an explanatory role”. Bhogal suggested that both explanations have different aims – the epistemic value of those explanations.

So, for Bhogal, the epistemic aim of nomothetic explanation is *unification* - “A theory possesses more unificatory power if it is applicable, in a uniform manner, to phenomena in very different domains” and the epistemic value of metaphysical explanation is elucidating metaphysical dependence structure – the grounding structure of the world. So, metaphysical explanation is distinct from explanation in science. If both explanations have a different aim – epistemic value- then there is no circularity problem.

Dorst also answered against the circularity problem. Dorst has a similar approach but instead of unification, he focuses on the pragmatic role of scientific explanation. He gave the new version of Humeanism i.e., Best Predictive System Account (“BPSA”). “The BPSA maintains that the laws are the regularities of the systematization of the totality of the particular matters of fact which is maximally predictively useful to creatures like us. The BPSA also includes desiderata regarding spatial, temporal, and rotational symmetries”. According to Dorst, explanations have explanatory virtues which are valuable because they contribute to the predictive utility of the resulting theory. These explanatory virtues are- conceptual simplicity, extrapolative simplicity, unificatory power, and precision, given by Dorst.

According to Dorst, the fundamental aim of science is prediction, because predictive capabilities help plan actions and control aspects of our environment. Whereas explanation is a derivative aim of science and the purpose of scientific explanations is to increase predictive value. Dorst maintains that metaphysical explanation does not aim primarily at the predictive utility. If the explanatory virtue is different in metaphysical explanation and in scientific explanation, so there is no chain between metaphysical explanation and explanation in science. So, Lange’s transitivity principle is not working, and there is no circularity problem.

Duguid also responded against the circularity problem and try to solve the transitivity principle in his paper “Lawful Humean explanations are not circular”. According to Duguid, there are two possible responses against the circularity problem:

- (1) There are no scientific explanations i.e., laws don’t explain their instances.
- (2) Humeans can use the notion of pattern subsumption.

Duguid suggested that the first response is too extreme to solve the circularity problem. So, we work on the second response to solve the circularity problem. Duguid maintains that “Humean laws are nothing more than particularly efficient ways of marking out important patterns in the world’s events. All scientific explanations that involve an appeal to laws must thereby involve an appeal to generalizations. To appeal to generalizations in this way is to draw the current explanandum into a wider network of events, treating it as another instance of a general pattern.

In other words, scientific explanations that involve laws should be treated as cases of subsumption under a pattern”. According to Duguid, an explanation based on pattern subsumption does not support the circularity problem.

Hicks in his paper “Breaking the explanatory circle” criticizes Lange’s transitivity principle and replies against the circularity problem. According to Hicks, the transitivity principle is too naïve. That problem can be solved by contrastivism. “Contrastivism is the view that both the explanans and explanandum in an explanation include (often unstated) contrast cases” (Hick, 2020: 540). According to Hicks, Lange’s transitivity principle (If m explains n, and n explains o, then m explains o) is not correct but the correct transitivity principle is the contrastive transitivity principle i.e. “If a rather than a’ explains b rather than b’, and b rather than b’ explains c rather than c’, then a rather than a0 explains c rather than c’

Lange in his paper “Transitivity, self-explanation and the explanatory circularity argument against Humean accounts of natural law” refines the original transitivity principle in contrastive transitivity principle i.e.,

“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’ metaphysically explain [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”.

Lange maintains that through this transitivity principle, the humean explanation is still viciously circular. He presented the revised circularity argument against humeanism.

According to **Hicks**, there is no circularity problem, because laws don’t directly feature in scientific explanation and explanations are contrastive. Hicks maintained that laws do not explain their instances but instead features in meta-explanation. According to Hicks, the law is not an explanans in the D.N model of Hempel and Oppenheim (1948), it mediates the explanatory relationship, and so ground the explanation. Hicks gives the IRR (Inference Rule Requirement) where laws use as inference rules- laws can be relied on in deriving a conclusion, but need not be thought of as premises or be explicitly stated.

Hicks maintains that the laws partially explain the explanatory relation between the explanans and

explanandum, and partially ground the causal relationship between cause and effect.

According to him, there is a constitutive connection between laws and scientific explanation and the role of laws is not to explain the event themselves but the connection between them. And the nature of scientific explanation is contrastive according to Hicks. Hicks responds to the revised circularity argument.

The revised circularity argument is this, given by Lange,

“(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)”¹⁴

But Hicks criticizes this argument, according to him there is no same contrast between (P2) and (P3). So, if there is no same contrast between them, then we cannot get IC because “Contrasts in the explanans ought to fit the contrasts in the explanandum”. According to Hicks, the explanandum here is that *c* explains *e*, rather than not explaining it. So, the connection between them is not accidental but lawful. The fact that *c* explains *e*, recall, is explained by the lawhood, rather than accidenthood, of if *c* then *e*, not the distinct fact that *c*'s usually produce *e*'s, so no circularity can arise.

So, there is no circularity according to Hicks.

CONCLUSION

To sum up, according to the Anti-humean view, laws of nature are not regularity or generalization. According to the Anti-humean view, laws of nature are relations between universals. Many philosophers support or defend this like Dretske, Armstrong, Tooley. This paper discusses Dretske

and Tooley's view. Dretske and Tooley, both share similarities. According to them, laws of nature are relations between universals. It is not a necessary relation but contingent relation. There are differences between Dretske and Tooley i.e., according to Dretske, the form of laws should be written as: “F-ness \rightarrow G-ness” but according to Tooley, it can be written as: $(x)(Fx \supset Gx)$. According to Dretske, laws support counterfactual, but according to Tooley, laws doesn't support counterfactual. Dretske thinks that laws of nature make sure that you behave according to the laws of nature but whereas Tooley thinks that there are laws that do not participate in the particular. Humean view of the law of nature faces many problems. So many objections against humean view by anti-humean or non-humean like non-supervenience, circularity problem, many others but it has potential to deal with all objection. Many philosophers try to solve these problems very gently, which has been discussed in the paper. The paper, have tried to show different views against the circularity problem and responses to it.

REFERENCES

1. Armstrong, D. M. "What is the law of Nature?" *Cambridge University Press*, (1983).
2. Bhogal, H. "Humeanism about laws of nature." *Philosophy Compass*, 15. 4 (2020): e12696.
3. Bhogal, H. "Nomothetic explanation and Humeanism about laws of nature." *Oxford Studies in Metaphysics*, Oxford University Press 12 (2020).
4. Dretske, Fred I. "Laws of Nature." *Philosophy of Science*, 44. 2 (1977): 248-268.
5. Armstrong, D.M. "What is the Law of Nature." *New York: Cambridge University Press*, (1983).
6. Dorst, C. "Humean Laws, explanatory circularity, and the aim of scientific explanation." *Philosophical Studies*, 176.10 (2019a): 2657–2679.
7. Duguid, C. "Lawful Humean explanations are not circular." *Synthese*. (2021).
8. Tooley, M. "The Nature of Laws." *Canadian Journal of Philosophy*, 7.4 (1977): 667-698.
9. Hicks, M. T. (forthcoming). "Breaking the explanatory circle." *Philosophical Studies*, 1–25.
10. Lange, M. "Transitivity, self-explanation, and the explanatory circularity argument against Humean accounts of natural law." *Synthese*, 195.3 (2018): 1337–1353.
11. Loewer, B. "Two accounts of laws and time." *Philosophical Studies*, 160.1 (2012).

Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:

Vaishali and Jaiswal, S. "An Enquiry on laws of Nature and Circularity Problem." *Sarcouncil journal of Arts humanities and social sciences* 3.1 (2024): pp 8-14.