

No God, No Laws

Nancy Cartwright
Philosophy
LSE and UCSD

Introduction. My thesis is summarized in my title, ‘No God, No Laws’: the concept of a law of Nature cannot be made sense of without God. It is not as dramatic a thesis as it might look, however. I do not mean to argue that the enterprise of modern science cannot be made sense of without God. Rather, if you want to make sense of it you had better not think of science as discovering laws of Nature, for there cannot be any of these without God. That depends of course on what we mean by ‘laws of Nature’. Whatever else we mean, I take it that this much is essential: Laws of Nature are *prescriptive*, not merely descriptive, and – even stronger – they are supposed to be *responsible*

for what occurs in Nature. Since at least the Scientific Revolution they are also supposed to be visible in the Book of Nature, not writ only on stone tablets nor in the thought of God.

My claim here is that neither of these features can be made sense of without God; this despite the fact that they are generally thought to provide some autonomy of the world order from God. I will focus on recent accounts of laws of Nature and describe how the dominant ones fail without the efforts of God; I shall also outline one alternative that tries to make sense of the order of Nature and the successes of modern science without laws of Nature and without immediate reliance on God.

Empiricism. The most dominant view of laws of Nature in contemporary Anglophone philosophy of science is *empiricism*, which takes its starting position from David Hume. Empiricists suppose that there is no such thing as necessity in the empirical world, apart from logical necessity. Nothing in the empirical world makes anything happen. Nature is just a collection of events, one after another.

There are, as it turns out, regular associations among these events – the force experienced by an object is regularly equal to its mass times its acceleration; these are the facts recorded in what we call ‘laws’ in science. This doctrine can thus provide a sense to the idea that laws are writ in the Book of Nature: laws are regularities that occur in Nature.

The problem, I shall point out, is that there is no way in which these laws can be said to govern events in Nature.

There are three decreasingly strict versions of the empiricist approach to laws of Nature:

1. *egalitarian* empiricism: all regularities are equal.
2. *class-ordered* empiricism: some regularities have a higher status than others; these we call 'laws'. What makes for high status in a regularity? There are two chief candidates on offer. The first is that high-status regularities should have universal scope: $f=ma$ universally whereas *All the coins in my pocket are British* has a very narrow scope. The second, which is very popular, is that the high-status regularities are

those that simultaneously maximize simplicity of expression with breadth of coverage.

3. *blue-blood* empiricism: it is not just that some regularities have more of something – like breadth of scope or simplicity; some are qualitatively better in that they hold *necessarily*. How can such a view label itself ‘empiricist’? You will understand one reason for this when see we how much more radically unempiricist the next alternative is. A second reason is in the kinds of accounts of necessity on offer. What seems to be important for empiricists of this stripe is to avoid the idea that anything in Nature makes anything else happen; Hume after all taught that we find no such thing in our experience of the world. The favoured account is that necessary regularities are those that not only hold, but *would* continue to hold

were their antecedents brought about in arbitrary ways.(So, ‘All the coins in my pocket are British’ does not hold *necessarily*. If I were to put the coins in my pocket that I got in change from my gelato, the regularity would break down.)

I think that this last view cannot be carried off. There is no fact of the matter about what would happen if this heavy body were released without further non-Humean facts like *the earth has the power to make heavy bodies fall*. That, however, is not the primary objection of relevance here. What matters for my arguments about God and the laws of [Nature is that the laws we get even from blue-blood empiricism cannot govern.

What after all is a law on this view? It is a regularity, albeit a very special kind of regularity. And a regularity is just a collection of paired events: B follows A once, B follows A again, it does so again, and again and ... It doesn't matter in what mode the regularity occurs, whether for instance this kind of pattern would continue to obtain if A were to occur in different circumstances or in different possible worlds. A regularity is just a collection of paired events and a collection does not make any of its members happen. This would still be true even if we could find some stronger sense of *necessary* to characterize the special collections we call 'laws'. So long as laws are collections of happenings, there is no sense in which they can be taken to be responsible for what happens.

In a sense empiricists admit this. Their project has not been to salvage laws but rather to salvage empiricism in the face of the structure of modern science. Clearly some things are privileged by modern science: the equations of quantum field theory or of the general theory of relativity. Empiricists have to make sense of this given their view that Nature is just made up of one event succeeding another, succeeding another, ... Their view is tailored to achieve this: the 'laws' and equations of science refer to regularities and the regularities that get represented as laws are the high-class ones, by whatever the favoured criterion for class is.

What you cannot do on any of these empiricist accounts is to find something in the empirical world that governs, i.e. a law of nature. To that extent these three accounts

are self-consistent: empiricism rejects governance as a feature of the empirical world and governance does not sneak in the back door in the reconstruction of laws as classy or blue-blood regularities.

This does not, though, make these empiricisms inconsistent with governance, tout court. In its origins in the Scientific Revolution modern empiricism was neither conceived nor intended to be at odds with governance.

Laws were God's plans: the blueprints according to which God makes things happen. They are visible in the Book of Nature in the way in which an architect's plan is visible in the finished building or the laws of a good society are visible in its functioning. Without God, however, God's plans and God's will, there can be no laws of Nature for an empiricist. There is no other

account on offer that provides empiricist science with laws of Nature.

Platonism. The second most dominant view of laws of Nature in contemporary Anglophone philosophy is *Platonism*. Platonists believe in abstract entities, for instance mathematical objects (like numbers) or properties or quantities. Versions of Platonism differ according to whether all these abstract entities have to appear in concrete objects and events or not. Laws of Nature are relations among abstract entities like *the quantity force*, *the quantity mass* and *the quantity acceleration*. This contrasts with the regularity account, which looks for laws in relations not among the abstract entities but among the concrete events in Nature in which these abstract entities participate.

Platonists' laws are necessary because it is part of the essence of the abstract entities that they relate in the specified way: if they did not, they would not be the abstract entities that they are. This solves the blue-blood problem for regularities. 'F=ma' is a blue-blood regularity appropriate to figure in science because the abstract quantities *force*, *mass* and *acceleration* must relate in the way we record in 'f=ma', otherwise they would not be the very quantities they are. *All the coins in my pocket* is not because *being British* is no part of the essence of the abstract property composed of *being a coin* and *being in my pocket*.

Suppose we accept all this. It still does not provide us with laws of Nature. The best it does is to solve the

problem the empiricists aimed to solve: to explain why some regularities are better than others. The high-class ones, the scientific ones, are the ones whose properties (recall, properties as abstract entities) are related to one another. But how do these relations among abstract entities govern events in the empirical world?

The idea seems to be that if abstract properties bear a certain second-level abstract relation to each other in the Platonic realm, then the systems that instantiate those properties will be related in some ‘corresponding’ way¹ in the empirical world. But what makes that true? We could say, “That is just what we mean by claiming that the corresponding properties are related.”

¹ That is, they will be related in some way that corresponds to the second-level abstract relation.

The problem is that we cannot just say this. We have already fixed what we mean by saying that the properties relate in that way: it is part of the essence of the properties that they do so. And we did this for good reason: to solve the blue-blood problem. Now we need some account of why when abstract properties relate in the way they must given what they are, the systems that instantiate them relate in some corresponding way. In fact we need more than that. For we not only want the relations in the empirical world to hold whenever the abstract ones do; we also want the fact that the abstract relations hold to be what makes the empirical relations hold. That story is lacking.²

² I think this point is similar to that made by Bas Van Fraassen in 'Laws and Symmetry', that accounts of laws of nature must overcome two problems, the problem of inference and the problem of identification.

Worse, I don't think there is any story that can be told. Abstract relations are not the kinds of things that can make other things happen; they are not the kinds of things that have powers. There is nothing internal to the relations themselves that can do the job. If these Platonic relations are to figure in an account of what makes things happen in the empirical world, some outside force is required to make them relevant. They may serve as God's blueprints for what he brings about in the world, but they cannot bring about things themselves. What Platonists call 'laws' as well as what empiricists call 'laws' need God and his direct control of the world if these are to be laws at all.

Instrumentalism. Instrumentalists give up on laws of Nature altogether. The 'laws' and equations of science

are considered as instruments or tools for making very precise predictions, for building things, for making new discoveries. These ‘laws’ need not fit together in any tidy way. They can be at different ‘levels’ of description, use different mathematics and different concepts, cover different kinds of things and even leave a lot uncovered.

I like instrumentalism because of the second feature of laws which we have not focussed on yet: laws are to be visible in the Book of Nature. The usual meaning of this is that the laws are reflected in the regularities of Nature. But I am sceptical that the right kinds of regularities are there. We certainly do not see them. Most of our ‘laws’ have sweeping exceptions; we could not even hope to see them obtain except in very special circumstances – mostly inside the laboratory or in some specially

felicitous natural arrangements like the planetary systems.

Often we are told that despite appearances the regularities really do obtain. Where? “Behind” the phenomena, or perhaps “inside”. But these are metaphors. There isn’t any front and behind to the phenomena, any surfaces and insides. Things in the empirical world do have components. Because of our failure to make sense of regularities holding ‘behind’ the phenomena we have been driven to rely on the notion of components.

Large things may not behave in properly regular ways, but their components do...or the components of the components, or... In the end at last we reach the

fundamental particles. These do behave regularly – or so we say. In the end the only genuine laws of Nature then are the laws of the physics of fundamental particles. I am suspicious of all this. Why are these very central regularities all just where we cannot see them? By contrast, the one regularity I am really sure of is highly visible: All men are mortal.

These questions about the scope of the regularities of contemporary physics are a central concern of mine. Let me summarize one main line of thought. Physics is dense and highly interconnected; there's nothing you can say that doesn't have countless implications that themselves have implications, and so on. This is to a good extent why physics is so powerful. If you find out just the right

kind of information for your problem, that can have an amazing rich set of precise consequences.

The drawback is that this thick set of interconnections places enormously strict constraints on when any particular physics concept can apply. This can very much narrow the scope of where these concepts do apply – and I think it does so. Not a whole lot of the world can satisfy these constraints. We have good evidence, for instance, that quantum constraints are satisfied in the material structure of superconductors, but little evidence that they can be satisfied for other kinds of macro-systems. As the Nobel prize-winning quantum physicist Willis Lamb has told us in lectures at LSE, it is very hard to get a system into a quantum state.

Those who believe in the universal scope of these laws have a familiar reply. What Lamb is talking about is the difficulty of getting a system into a known quantum state. All systems are always in quantum states – we just can't ascertain them. Again, I am suspicious. I have positive evidence that a variety of kinds of systems can satisfy the constraints; I will await positive evidence before I believe the others can.

To return to laws of Nature. Despite the fact that instrumentalism eschews laws, I think it provides the best fit between God and the laws of Nature. Suppose we admit God into either the empiricist or Platonist frame, in order to show how the laws can govern. We still wish to see that these laws are writ in the Book of nature.

Regularities are essential to both the Platonist and the

empiricist account here. For the empiricist, laws are visible in Nature since laws just are regularities in Nature. For the Platonist, although the laws are in the Platonic realm, they are “mirrored” in Nature, again in Nature’s regularities. The whole picture does not work if these vaunted regularities are not there after all.

Instrumentalism offers an alternative. God uses the ‘laws’ of science in making things happen in the world in much the same way that we do, as an instrument for calculating what is to happen. The laws are indeed writ in Nature but not in the questionable regularities of the empiricist or Platonist account. They are writ rather in the more complex, untidy particulars of everything that does in fact happen.

Aristotleanism. The last of the contemporary views about laws finds its source in Aristotle. Like instrumentalism, it does not suppose that there are laws of Nature. The laws of science describe the powers that systems in Nature have by virtue of certain facts about them.³ For instance, material systems, by virtue of having gravitational mass, have the power to attract any other system that has mass.

This kind of view has long been out of fashion, especially among empiricists who take their cue from Hume and who altogether reject talk of powers, causings, makings and necessity in the empirical world. But it has not always been so with empiricists. Early British empiricists – before the spread of the Cartesian doctrine of ideas and long before Hume – were committed to

³ For Aristotle, by virtue of their “Natures”.

basing science on what is given in experience. But this does not rule out powers, though it does make talk of them difficult for post-Lapsarian man. For instance Joseph Glanvill, apologist for the Mechanical Philosophy, tells us that Adam could see the exercise of powers: "...the influence of the Moon upon the Tides was no question in his Philosophy."

I endorse this kind of pre-Cartesian/pre-Humean empiricism and I have spent a lot of effort trying to show that notions like powers and causings are not only compatible with an empiricist view of science but that we cannot make sense of science without them. This is a long story. The one thing I should note here is that in the right circumstances powers can play themselves out in

regularities. But when the circumstances are not felicitous what happens may be highly variable.

With respect to our central issue my major claim about Aristotleanism then is this: Aristotleanism rejects laws of Nature. But (if I and other recent advocates of powers in science are right in our claims about them) it can make sense of the laws of science in a way that respects the two requirements we placed on laws of nature (governance and visibility in Nature itself) and it can do so without God. On the Aristotle-inspired account, there is necessity and governance in Nature: natural systems have powers and events in Nature are made to occur in the way that they do by the exercise of these powers. The laws of science describe these powers. As in the case of instrumentalism, the results predicted from the laws of

science are indeed visible in Nature and without the need for hidden and secret regularities.

Conclusion. None of the 4 contemporary accounts of laws that I have reported on can make sense of laws of Nature without God. The last, Aristotleanism, can offer a stand-in for laws – natural powers – that satisfies the major requirements on laws without the need to call on God.⁴ For those who cannot abide powers, I think there are no options left. Without God there cannot be laws of Nature, nor anything else with their crucial characteristics.

⁴ This does not of course have consequences one way or another for the prior question, “Is God necessary to create the material world with its powers?”

