LAWS OF NATURE – A SKEPTICAL VIEW

Uwe Meixner

Let me begin by making

1. Some general skeptical remarks regarding laws of nature

The epistemologically unproblematic position on laws of nature is the following. There are regularities in nature, more or less adequately describable by general sentences. Some of these regularities we are particularly interested in, because of the systematizing function the statements describing them can exercise in the formulation of our theories of nature, and because these statements, due to their simplicity, are found to be explanatory by us and can be used in the explanation of a wide range of natural phenomena. Regularities in nature with a high systematizing and explanatory power for us – or rather, the statements describing them, which properly speaking have this power for us – we traditionally call "laws of nature." That's all there is to laws of nature.

The epistemologically problematic position on laws of nature, however, is the following. Behind some regularities in nature there are form-like ontic principles (form-like *archai*) that determine these regularities and confer necessity on them. Moreover, except for the workings of absolute chance, those form-like ontic principles determine just about everything in the world, including its very existence. They are the laws of nature.

It is surprising that this piece of ancient Platonism is found to be attractive by so many modern thinkers. What could make one believe in it? It is clear from the start that there can be no proof for the existence of laws of nature in the epistemologically problematic sense. Hence, if proof is required for the rationality of belief, the belief in laws of nature in the epistemologically problematic sense is quite irrational. But perhaps something less than proof is required for the rationality of belief (although, somewhat unfairly, the usual exception is made with respect to belief in God). Perhaps a plausible argument – for example, an *argument to the best explanation* – is all that is needed. And indeed,

laws of nature in the (it seems now, merely *prima facie*) epistemologically problematic sense are said, by not a few philosophers, to be the best explanation of certain regularities in nature. Can it be, they ask (rhetorically), that those regularities are here by mere chance? Who can believe this? And so and so on, till the desired conclusion is reached.

But this argument for the existence of laws of nature in the epistemologically problematic sense, which is strangely reminiscent of the teleological argument for the existence of God, can be of interest only to those philosophers that believe that some regularities in nature stand in need of explanation - an explanation that consists in more than in deducing them from more basic regularities. And there seems to be nothing irrational in not requiring such an explanation – especially in view of the fact that we need to stop asking for explanation at some point anyway. But if we *do* ask for explanation in the case at hand, by what could we be made to think that laws of nature in the epistemologically problematic sense are the best explanation of certain regularities in nature? I fear, by nothing except a very large piece of begging the question: by considering every explanation of the regularities that does not invoke laws of nature in the problematic sense to be automatically less good than the explanation that does invoke them. In philosophy, alleged arguments to the best explanation usually turn out to be arguments to the metaphysically *best-liked* (the metaphysically *most beloved*) explanation, and here we apparently have a fine example of this. But I will not rest with these very general remarks, but shall take a closer look at the epistemology of laws of nature.

2. Bas van Fraassen and TAD (Tooley-Armstrong-Dretske)

Before presenting my own skeptical argument regarding laws of nature, I will examine the skeptical argument Bas van Fraassen has directed specifically against Michael Tooley's, David Armstrong's and Fred Dretske's, in short: TAD's, views on the nature of laws of nature. It turns out that we can abstract from the specificities of the intended target and can take van Fraassen's argument as being quite generally directed against an objective conception of laws of nature that in some way or other involves the idea of *necessity*.

Van Fraassen basically presents his case against TAD on pp. 94–99 of *Laws and Symmetry*. What he says there is less than clear. But he seems to have the following in mind:

1 TAD thinks that the form of a sentence expressing a simple law of nature is "F necessitates G," where F and G are first-order

universals and necessitation is a logically contingent and objective (second-order) relation between them.

2 TAD thinks that "F necessitates G" logically implies (or entails) "All F are G," but not vice versa.

3 Question: Which relation that satisfies all the constraints contained in 1 and 2 is the relation of necessitation that TAD has in mind?

4 There is no satisfactory answer to 3.

This is a skeptical argument. The conclusion it argues for is that we just don't know – and that TAD doesn't know either – *what* TAD means by "necessitation" and "to necessitate" (or whatever expression is used). If this is correct, then TAD's account of laws of nature turns out to be quite unsuccessful.

Prima facie it seems very easy to refute the skeptical argument: Simply define "F necessitates G" to mean the same as "It is (objectively) necessary that all x that are (have) F also are (have) G," or, alternatively, as meaning the same as "For every x it is (objectively) necessary that if it is (has) F, it also is (has) G." The first definition, at least, seems to provide a very clear answer to the question formulated in 3.[1]

But it is not a definition that TAD would or should allow. For one thing, it takes all the (comparative) novelty away TAD has modestly claimed for his account of laws of nature: it becomes an ordinary modal, *necessitarian* account (as van Fraassen calls such an approach; see van Fraassen, 1989, p. 65). And, true, on a standard logic of "necessary" the constraint in 2 is satisfied if this definition is used. But one can well ask: what, *specifically*, is this necessity that turns up in the definiens? It seems no proper explication of "necessitation" and "to necessitate" has been effected at all, merely a synonym offered, whose only advantage over the original expression is that by giving us a bit more logical structure than the original has, it makes clear *how* necessitation could fulfill the constraint in 2. The real work is still undone: to specify the *right* kind of necessity, which must be a *logically contingent* and *objective* necessity.[2]

[1]The second definiton is a little less clear, at least to some minds, since it involves *de re* necessity.

[2]While indicating this kind of objection, Armstrong also offers a quite different reason against the modal, necessitarian analysis of *necessitation*, a reason that involves the "Paradoxes of Confirmation." See Armstrong, 1983, pp. 87–88. I do not think that Armstrong's reason is a serious reason, because the problem of the paradoxical confirmation of lawhood Armstrong points out may well be taken not to be a problem for the modal analysis of necessitation, but a problem for confirmation theory.

The required logical contingency of necessitation (i. e., that in at least some of its instantiations it is not instantiated by logical necessity) could be taken care of by simply defining "F necessitates G" to mean the same as "all F are G." This definition would also circumvent all difficulties that may be connected with the concept of logically contingent necessity. But it would leave us with an interpretation of necessitation that is *surely not* the interpretation that TAD, or anyone else, has in mind.[3]

Well, what is this interpretation? What is the interpretation of necessitation TAD has in mind? Here is what one of TAD's spokesmen has to say on this account:

> [T]he inexplicability of necessitation just has to be accepted. Necessitation, the way that one Form (universal) brings another along with it as Plato puts it in the *Phaedo* (104d - 105), is a primitive, or near primitive, which we are forced to postulate. (Armstrong, 1983, p. 92.)

Quite obviously, we cannot explicate all concepts at once, and perhaps some concepts are inexplicable in any system of concepts available to us. But if we arrive at a concept that we do not or cannot explicate, then we should at least be able to give some indications of its contents. If not, the concept is a complete *nothing* for us, and all we really have before us is an empty word without legitimate use. Unfortunately, this is just what "necessitation" and "to necessitate" seem to be (at least in TAD's mouth): empty words. The historical reference Armstrong provides is not helpful at all, since in the cited passage Plato is quite clearly speaking about a broadly logical relation: the bringing-along that holds between *being colored* and *being extended*, for example. That relation is well understood, but it is not the relation Armstrong or TAD presume to mean when they talk of necessitation – that is, of some *logically contingent* relation – as being constitutive for simple laws of nature.

Perhaps, in view of this, it is best to return to the modal, necessitarian account – notwithstanding TAD's protests – and make a serious effort to elucidate the concept of necessity that is invoked when we say that "F necessitates G" (assuming this to be the form of a sentence expressing a simple law of nature) just means that *necessarily* (in an objective sense) all F are G.

In van Fraassen, 1989, chapter 4, van Fraassen also canvasses the necessitarian approach to laws of nature (the approach that TAD's approach simply reduces to, once the above analysis of "necessitates" is accepted, and accepting it, as I said, seems the best thing to do after

[3]It is excluded by the "not vice versa" in 2.

all). Van Fraassen finds the necessitarian approach wanting mainly on account of the realism about possible worlds that seems to be implied by it. But the problem with the necessitarian approach appears to me to be of a much more elementary nature. It is essentially the same difficulty as the one that was pointed out in the above argument against TAD. That argument had the conclusion that we just don't know what "necessitation" means. Now, that conclusion is not at all removed, it is just moved one step backward, if we leave TAD where he stands and point out that necessitation is *necessary extensional inclusion*, where the inclusion is "passive," i. e., "F necessitates G" is taken to be definitionally equivalent to "It is necessary that F *is extensionally included* in G," and where the "necessary" is taken to refer to some logically contingent and objective necessity. For we just don't know *which* concept, exactly, *is* that necessity. Again, we are left with a word that seems condemned to emptiness by the very constraints put on its interpretation: "(*objectively*) necessary (*but not logically necessary*)" – a word that is no less empty if we assume a general logic for it (S4 or S5, or whatever).

Things seem to brighten up for a moment when we add the word "nomologically" to the word "necessary": "nomologically necessary." Yes, this seems to indicate precisely the kind of necessity that is needed for analyzing necessitation – the relation that is constitutive for simple laws of nature. But we are laboring under an illusion. For reflect: In order to know what *nomological* necessity is, we need to know what a law of nature is. But we haven't found that out yet; in fact, we are trying to find it out via finding out what nomological necessity is.[4] The whole move is entirely hopeless.

3. We don't know which regularities are the laws of nature

The skeptical potential in van Fraassen's argument is considerable – especially if we free it from the particularities of its intended target (i. e., the ideas on laws of nature that are peculiar to TAD) and give it wider implications. For skeptical purposes, just like Hume's argument regarding *causation*, it exploits the fearful philosophical difficulty of specifying (*truly* specifying, and not just making words about it) a necessity with normal logical properties (mainly, $\Box A \supset A$, without $A \supset \Box A$) that is at once objective and yet very different from logical necessity.

The following skeptical approach to laws of nature, however, is quite different from the one described above: necessitation, whether analyzed

[4]This, in a nutshell, is the criticism that I offer in Meixner, 1997.

by making use of a concept of necessity or regarded as a primitive, plays no role in it at all, nor does necessity, nor does any particular view about the form of sentences that express simple laws of nature. Moreover, while the above-described skepticism was an instance of *meaning skepticism*, what follows will be an instance of epistemological skepticism in a narrower sense.

I begin by positing

Thesis 1 *Any world w which has the same laws of nature as the real world, w^*, cannot be justifiedly distinguished by its inhabitants from any world w' that is phenomenally*[5] *identical with w, but is merely phenomenally compatible with the laws (of nature) of w^* and has different laws of nature than w^*.*

For suppose w is a world in which the same laws of nature as in w^* hold; and suppose that w' is a world that is phenomenally identical with w, but is merely phenomenally compatible with the laws of nature of w^* and has different laws than w^*. Clearly, w cannot be justifiedly distinguished by its inhabitants from w' (on what grounds could they do so?); for all they know, w is identical with w'.

Thesis 1 has the following obvious corollary:

Thesis 2 *The real world, w^*, cannot be justifiedly distinguished by its inhabitants from any world w that is phenomenally identical with w^*, but is merely phenomenally compatible with the laws of nature of w^* and has different laws than w^*.*

This corollary of Thesis 1, in turn, has the following consequences. Suppose that w_1, w_2 and w_3 are worlds which are phenomenally identical with the real world, w^*, and therefore phenomenally compatible with the laws of nature of w^*. But in w_1 there are laws of nature in addition to those in w^*; in w_2, on the contrary, the set of laws is a proper non-empty subset of the set of laws of w^*; in w_3, finally, there are no laws of nature at all. Now, according to Thesis 2, the real world, w^*, cannot be justifiedly distinguished by its inhabitants (and this means, in particular, by us) from w_1, w_2 and w_3. For all they know, w^* is any one of these three worlds. How, then, can they be justified in assuming that the set of the laws of nature of the real world comprises precisely

[5]The notion of the *phenomenal* is here to be taken in an ontological, not in an epistemological sense: in a sense in which, for example, microphysical facts, states and events are *phenomena*, even though they are not directly observable. In this sense, the phenomenal facts (states, events) are precisely the non-modalized facts (states, events): the facts (states, events) that do not involve any modality (alethic or non-alethic).

those items that they have hit on in pursuing their scientific enterprises? Suppose they are lucky and have indeed exactly the laws of nature of the real world – that is: *the* laws of nature – in the set of principles they have hit on. But w^* cannot be justifiedly distinguished by them from w_1; therefore, the set of the laws of nature of w_1 must be as good a candidate for them for being the set of the laws of nature of w^* as the set they have hit on. And w^* also cannot be justifiedly distinguished by them from w_2; therefore, the set of the laws of nature of w_2 must in its turn be as good a candidate for them for being the set of the laws of nature of w^* as the set they have hit on. Finally, w^* cannot be justifiedly distinguished by them from w_3; therefore, the set of the laws of nature of w_3, *the empty set*, must again be as good a candidate for them for being the set of the laws of nature of w^* as the set they have hit on. This means: *they really do not have any justified opinion as to which items are the laws of nature of the real world*, even if they are so lucky as to have, in their scientific enterprises, hit on precisely the principles which are in fact the laws of nature of the real world. For all they *know*, there might even be no laws of nature (of the real world) at all.

This skeptical argument is obviously based on the proliferation of worlds which are phenomenally identical with the real world and therefore phenomenally compatible with the laws of nature of the real world, but which nevertheless have laws of nature *differing* from those of the real world. The only way to block this proliferation in such a manner as to make the skeptical argument impossible is to postulate *that a world which is phenomenally identical with the real world, and thus phenomenally compatible with the laws of nature of the real world, has the very same laws of nature as the real world.* But this postulate will not help us if the only reason to believe in it is that it allows us to escape skepticism with respect to laws of nature.

It seems, however, plausible on *independent* grounds that worlds which are phenomenally identical to each other are *simpliciter identical.* If this is true, then the above postulate falls out as a trivial consequence and skepticism with respect to laws of nature is avoided. Yet, on closer examination, the stated identity principle for worlds becomes suspect. It implies that the laws of nature of the real world are *completely determined* by the phenomena of the real world.[6] Can this be true? Only if *every eligibile* regularity found in nature is (or stands for) a law of

[6]According to the stated identity principle for worlds, it cannot be that we have these very same phenomena but laws that are different from the actual laws. For if this could be, then there would be a world which is phenomenally identical with the real world, but different from it (since it has different laws). But, on the identity principle for worlds now under consideration, there is no such world.

nature, or, indeed, *no such regularity*. If the phenomena of the real world completely determine its laws of nature, then there is no reason why they should determine the actual and eligible regularity R to be a law of nature, but not the equally actual and eligible regularity R'. But haven't we all been taught that not all eligible regularities found in nature are laws of nature, but only *some* such regularities?

However, there appears to be yet another way to justify the above postulate. One could *stipulate* the laws of nature of a world that is phenomenally compatible with the laws of nature of the real world to be precisely those features of it that are common to all worlds that are phenomenally compatible with the laws of nature of the real world. Then, by stipulation, a world which is phenomenally compatible with the laws of nature of the real world automatically has the very same laws of nature as the real world, and there is no longer any logical gap between *being phenomenally compatible with the laws of nature of the real world* and *having the same laws of nature as the real world.*

This stipulation requires that any particular instance of a general law of nature of a world w which is phenomenally compatible with the laws of nature of the real world is also a law of nature of w: with $\forall x(Fx \supset Gx)$ being a law of nature of it, $Fa \supset Ga$ must also be a law of nature of it, since if the former feature is common to all worlds phenomenally compatible with the laws of nature of the real world, then the latter certainly is so, too. This consequence is contrary to the usual conception of laws of nature as general regularities. But more importantly, it is unclear what could be a rational motivation for the suggested stipulation – besides the motivation to close the logical gap mentioned above (which motivation, by itself, doesn't count much). Finally, the suggested stipulation still tells us nothing at all about which principles are the laws of nature of the real world. *If* we accept it, we can indeed safely conclude that a world phenomenally identical to the real world has the very same laws of nature as the real world. But this conclusion is still compatible with the laws of nature (of the real world) being so and so, or rather such and such, and, most disquietingly, it is compatible with there being no laws of nature at all. The phenomena of the real world leave all these possibilities completely open.

Thus we find ourselves caught in a dilemma: The very concept of a law of nature demands that such laws transcend the phenomena (and therefore: which principles are laws of nature, and which are not, is not completely determined by the phenomena). But this transcendence, on the other hand, as we have seen, puts laws of nature outside of our epistemic reach. In this respect, the concept of law of nature is strikingly like the concept of God. And, indeed, in atheistic metaphysics the former

concept functions in many respects just like the latter: the concept of law of nature has replaced the concept of God. It is appropriate to quote Wittgenstein here:

> The whole modern conception of the world is founded on the illusion that the so-called laws of nature are the explanations of natural phenomena.
>
> Thus people today stop at the laws of nature, treating them as something inviolable, just as God and Fate were treated in past ages.
>
> And in fact both are right and both wrong[7]: though the view of the ancients is clearer in so far as they have a clear and acknowledged terminus, while the modern system tries to make it look as if everything were explained. (Wittgenstein, 1961, 6.371 and 6.372)

There is, of course, a way to escape from the dilemma that has just been described. One *can* have the transcendence of laws of nature over the phenomena *and* keep laws of nature within our epistemic reach. But only if the status of law of nature is conferred *by us*, is our making, is relative to our beliefs and decisions, and hence can also be taken away by us.

I have come back to the epistemologically unproblematic position on laws of nature I started out with, with the addition of a philosophical argument for it. Yet, it must be conceded that laws of nature are *normally* intended to be more than what the unproblematic position allows them to be. The very expression "law of nature" demonstrates this fact, and the above quote from Wittgenstein effectively underlines what the modern mind more or less consciously expects from laws of nature: a rational substitute, so it believes (consciously or not), for God. But, as I hope to have made clear, it is epistemological foolhardiness, and far from rational, to believe in laws of nature in the epistemologically problematic sense, since nobody can know which items are the laws of nature in this sense.

4. Hume's Dream

Let me close by recounting a philosophical story, totally apocryphal of course.

David Hume dreams that he comes into a gigantic hall where he has never been before, the floor of which is covered by a huge carpet. But only a small portion of the carpet can be seen, displaying a very beautiful

[7]Why are they both right and both wrong? Presumably Wittgenstein is suggesting that the urge for explanation that motivates both the ancient and the modern view is natural and somehow valuable, and in this sense "right," but that it is nevertheless (since it is ultimately a *metaphysical* urge that aims at saying what cannot be said) philosophically misguided, and in this sense "wrong."

pattern. The rest of the carpet is concealed by a white sheet, which, as Hume quickly finds out, cannot be removed. Hume, in his dream, looks at the pattern on the portion of the carpet he can see, and announces to someone he knows is waiting for an answer (he has to answer the question "What do you know about the pattern of the carpet covering the floor of this hall?" and is allowed only two attempts; he vaguely feels that something important depends on his answer, but doesn't know what it is): "This pattern here displayed is the pattern of the *entire* carpet covering the floor of this hall." There is no response. Hume, dismayed, is not sure what this is supposed to mean; perhaps the answer was wrong, perhaps not sufficient. After anxiously staring at the revealed portion of the carpet a bit longer, he announces with regained confidence ("This must be it!"): "Even better, there can be no carpet fit to cover the floor of this hall that does not in its entirety have the pattern that is here displayed." Barely are these words out, when Hume hears a voice from nowhere pronouncing calmly and distinctly, "You have answered very foolishly," which for some reason frightens him so much that he wakes up with a start. From this moment on, so the story goes, Hume really started *to think* (with the results so well known, and so often not heeded), although he quickly forgot all about his dream: the hall, the carpet, and the voice.

References

Armstrong, D. M. (1983). *What is a Law of Nature?* Cambridge University Press, Cambridge.

Dretske, F. (1977). Laws of nature. *Philosophy of Science*, 44:248–268.

Meixner, U. (1997). *Ereignis und Substanz.* Schöningh / mentis, Paderborn.

Tooley, M. (1997). The nature of law. *Canadian Journal of Philosophy*, 7:667–698.

van Fraassen, B. C. (1989). *Laws and Symmetry.* Clarendon, Oxford.

Wittgenstein, L. (1961). *Tractatus logico-philosophicus.* Routledge and Kegan Paul, London.