The ultimate argument against Armstrong's contingent necessitation view of laws

Alexander Bird

I show that Armstrong's view of laws as second-order contingent relations of 'necessitation' among categorical properties faces a dilemma. The necessitation relation confers a relation of extensional inclusion ('constant conjunction') on its relata. It does so either necessarily or contingently. If necessarily, it is not a categorical relation (in the relevant sense). If contingently, then an explanation is required of how it confers extensional inclusion. That explanation will need to appeal to a third-order relation between necessitation and extensional inclusion. The same dilemma reappears at this level. Either Armstrong must concede that some properties are not categorical but have essential powers – or he is faced with a regress.

1. Introduction

Armstrong's view of the relationship between properties and laws is this.

> PROPERTIES Natural properties are categorical in the following sense: they have no essential or other nontrivial modal character (Armstrong 1997: 80–83). For example, and in particular, properties do not, essentially or necessarily, have or confer any dispositional character or power (Crane 1996: 16–17). Being made of rubber confers elasticity on an object, but it does not do so necessarily. Being negatively charged confers on objects the power to repel other negatively charged objects, but not necessarily. In other possible worlds rubber objects are not elastic, negatively charged objects attract rather than repel one another. The essential properties of a natural property are limited to its essentially being itself and not some distinct property (and perhaps to its have the polyadicity it does have[1]).
>
> LAWS Laws of nature are contingent relations among natural properties (Armstrong 1983). If F and G are first-order universals, then a

[1] That is, a property that is in fact a monadic universal is necessarily monadic, etc. Armstrong (1989) indicates that he holds this to be the case. This calls into question Armstrong's reductive account of modality. MacBride (1999) points out that the account fails also to deal with other modal features that suffuse the very notion of universal – such as its being essential that a universal is a universal and not a particular. While such arguments add to the contentions of this paper, the details need not concern us further.

Analysis 65.2, April 2005, pp. 147–55. © Alexander Bird

> law relating them is the fact of a certain second-order universal relating F and G. We may call that second-order relation 'N', so that the law may be symbolized N(F,G).[2] N has certain properties. For example: N(F,G) entails $\forall x(Fx \rightarrow Gx)$. Let us call the relation between F and G that holds whenever $\forall x(Fx \rightarrow Gx)$ the 'extensional inclusion relation', symbolized thus: R(F,G). So N(F,G) entails R(F,G). However, R(F,G) does not entail N(F,G), since the relation of necessitation is not the same as nor coextensional with the relation of extensional inclusion. This is clear because there may be accidentally true generalizations without any corresponding law.

PROPERTIES and LAWS are not entirely independent. PROPERTIES requires that laws of nature be contingent. Otherwise a property engaged in a necessary law would thereby have a nontrivial modal character, that conferred by the law. Thus wherever N holds the relation is contingent and could have been otherwise. It is initially confusing therefore that Armstrong calls N 'necessitation'. The necessitation he has in mind is contingent. He wants to call it 'necessitation' because where it holds between some F and G, if some x is F, it is thereby *required* or *made* to be G. Armstrong wants to capture the idea that nomic necessitation has *some* kind of modal force – not the 'hard' kind associated with full-on metaphysical necessity, but a 'soft' kind associated with nomic modality (including explanatory force and the ability to support counterfactuals) and consistent with metaphysical contingency (Armstrong 1997: 223). It is this soft, nomic necessity that distinguishes laws from regularities, even regularities that are highly systematic in the manner of Ramsey and Lewis (Lewis 1973: 73). If something is negatively charged it *must* repel another negative charge. It is not merely that it just happens so to do. Armstrong's picture is that it is laws that confer modal features on properties, rather than those properties having them essentially. Thus if a ball that is made of rubber is elastic, that is because the laws of nature impose upon the properties involved in being rubber the disposition to deform non-permanently when subjected to moderate forces (Crane 1996: 17).

Nonetheless, the relation of necessitation itself holds contingently. Thus properties that are related by N in this world might not be related by N, and so might not be nomically related in some other world. The rubber ball, with the very same structure of properties, might not be elastic in some other world, since the laws of that world might impose a different set of relations on those properties.

There is a prima facie tension between the idea that all nontrivial characteristics of properties and relations (e.g. being involved in laws together) are contingent and the idea that laws can confer some kind of

[2] Armstrong (1997: 228–29) does register some dissatisfaction with this notation.

necessitation that goes beyond mere regularity. While the tension seems to be manifest in Armstrong's talk of 'contingent necessitation', identifying a genuine contradiction (rather than an infelicitous opposition of words) is not straightforward. It is the purpose of the paper to identify the contradiction.

2. *Does necessitation entail regularity?*

Consider the following partial characterization of N from LAWS:

(I) ⟨N(F,G)⟩ entails ⟨R(F,G)⟩

This gives N a nontrivial modal property. Compare the second-order relation $P(\chi,\xi)$ which holds between F and G whenever possession of F raises the chances of G:

(II) ⟨P(F,G)⟩ does not entail ⟨R(F,G)⟩

N has a modal property that P does not. According to PROPERTIES, however, no natural property or relation has a nontrivial modal character. So either PROPERTIES is false, or (I) is false, or N is not a natural relation.

The idea that N is not a natural relation can be discounted immediately. Armstrong's view is that N is a genuine universal, rather than its being the case that 'N' is merely a predicate corresponding to no real ontological item. This has to be in order for laws to be genuine parts of the world that provide explanations of the way things are. The rejection of N as a genuine universal would force a retreat to Humean regularism about laws or similar.

Since PROPERTIES is a key part of Armstrong's view we should preserve it as long as possible. That requires admitting the falsity of (I).

To admit the falsity of (I) is to say that there are worlds where N holds between F and G but not all Fs are Gs. This is as we should expect things to be, given PROPERTIES. Compare:

(III) ⟨x and y are negatively charged⟩ entails ⟨x and y experience a repulsive force component⟩ (Abbreviated: ⟨Neg(x,y)⟩ entails ⟨Rep(x,y)⟩.)

(III) is false, according to PROPERTIES. In the actual world the property mentioned on the left hand side, Neg, always confers that on the right hand side, Rep. But because universals have no nontrivial modal character there will be other possible worlds where Neg does not confer Rep. In the same way (I) should be false. (I) has exactly the same form as (III) except that (III) concerns first-order relations among particulars while (I) concerns second-order relations among first-order properties. PROPERTIES, however, does not distinguish between different order universals. So what goes for (III) should go for (I) also: in the actual world the relation N always confers the relation R on its relata; however there are other possible worlds where N does not confer R.

This may also be seen as a consequence of Armstrong's combinatorial view of possibility. Simple universals (of the same polyadicity) ought to be modally interchangeable (Armstrong 1997: 45–49). That is, where K and L are both dyadic universals, then if in w_1 K and L exist in a certain set of relations to each other and everything else, then there is a world w_2 where things are as in w_1 except that the roles of K and L are reversed. Thus there ought to be worlds where N plays the role that P plays in the actual world. In those worlds N does not confer the universal R, since P does not do so in the actual world.

3. Does necessitation merely imply regularity?

The claim (I) is part of LAWS. So already we see a contradiction between PROPERTIES and LAWS. However, it may be that the entailment claim is one that is readily dropped from the picture without significant loss. The question then is, what should replace (I) in LAWS, in explicating the relationship between N and R? There seem to be two candidates:

(I*) ⟨N(F,G)⟩ (merely) implies ⟨R(F,G)⟩

and

(I**) ⟨N(F,G)⟩ (contingently) necessitates ⟨R(F,G)⟩.

In (I*) the idea is that it is merely a regularity that, whenever in the actual world N(F,G), it is also the case that R(F,G). It is *merely* such since there is no more to the relation between N and R than material implication – the extension of R includes the extension of N. In (I**) the necessitation is not, of course, entailment, but is rather the same kind of contingent necessitation as N.

Could (I*) be the required replacement for (I)? No, for the very same reason that Armstrong rejects the regularity view of laws. According to Armstrong (and I have amplified his claim (Bird 2002: 525–29)) a mere regularity cannot be used to explain its instances. The fact that all Fs are Gs cannot be enough to support the claim that *a* is G because it is F. (That there is a *law* that Fs are Gs can be used to support the claim that *a* is G because it is F. Hence laws cannot be mere regularities.)

Similarly, if (I*) were true we could not explain why Fs are always Gs (viz. (R(F,G)) by reference to the fact that Fness necessitates Gness (viz. N(F,G)). The mere regularity that, for any F and G, if N(F,G) then also R(F,G) is not enough to support an explanation of R(F,G) by reference to N(F,G). In which case laws cannot explain regularities. Correspondingly the modal character that Armstrong wants to reintroduce to nomic relations is lost.

4. Does necessitation necessitate regularity?

So we are left with (I**), that N(F,G) necessitates R(F,G) (for all F,G). We may symbolize this: N′(N,R). N may or may not be identical with N′. Arguably a second-order universal (N) cannot be identical with a third-order universal (N′). This doesn't much matter, for even if N and N′ are not the same, it is clear that N′ is the third-order analogue of N. N′ is more than extensional inclusion – otherwise N′(N,R) would be the same as (I*), which we have just seen in §3 to be false. N′ is also not entailment – otherwise N′(N,R) would be the same as (I), which we rejected in §2. So N′ is something between extensional inclusion and necessitation, something which explains, if N′(N,R), why whenever N(F,G) also R(F,G) – and indeed makes it the case that N(F,G).

N′ is the third-order analogue of N because it was introduced to do precisely the job that N was required to do. F*a* cannot explain why G*a* if it is merely a regularity that Fs are Gs; there needs to be a relation of necessitation between F and G (which nonetheless isn't the same as entailment). Similarly, that N(F,G) cannot explain why R(F,G) if it is merely a regularity that whenever N then also R; there needs to be a relation of necessitation between N and R (which also isn't the same as entailment).

For just this reason it is clear that we will need a fourth-order universal N″, and similarly a fifth-order universal and so on. There is a regress of ever higher order universals of necessitation.

Is the regress vicious? Yes. The mere existence of an infinite hierarchy of such relations is not itself objectionable. Consider the claim that every set has a singleton set with which it is not identical. That immediately leads to an infinite hierarchy of sets, but that is no reason to reject the claim. But the case of the infinite hierarchy of N and its relatives is not like this. In the necessitation hierarchy N^n is supposed to have certain quasi-modal and explanatory properties, but it can have them only if they are conferred upon it by some N^{n+1} that has precisely the same kind of quasi-modal and explanatory properties. If so the source of this modality and explanatory force has not been located. There is nothing in the hierarchy that generates these features. In each case they are passed on from the higher-order N to the lower-order N, but we have no explication of whence they come. Another way to see the difference with the hierarchy of sets is this. Imagine we modified the original claim to say that a set *is* identical with its singleton set. Now that hierarchy collapses into just the *Urelemente*. That is clearly not problematic. Now suppose that we do the same for the necessitation hierarchy and assert that a third-order universal may be identical with a second-order universal and so on, and that in particular N = N′ and N′ = N″ etc. We wanted to explain how it is that N has the power, if N(F,G), to make its first relatum, F, imply its second relatum, G. Our answer was that N and R are related by N′, which has the power to make its first relatum, N, imply its second relatum, R. If N = N′ that explanation is blatantly circular. So in the necessitation case the collapse of the hierarchy leads to a circularity, while in the case of the singleton sets the collapse is innocuous. I claim that the fact that the collapse of the hierarchy yields a blatant circularity shows that the uncollapsed hierarchy is the product of a vicious regress.

5. *Simple universals and the principle of independence*

The argument above employs an assumption that I shall now address. In rejecting (I) I am assuming that N is a simple universal and that N(F,G) is a simple state of affairs. The claim that properties are categorical and have no nontrivial modal character holds only for simple universals. Complex universals will have modal relations to their constituent universals – ⟨being one kilo in mass⟩ entails ⟨having a proper part that is one pound in mass⟩. Armstrong's doctrine of INDEPENDENCE states that if two states of affairs are wholly different, then there is no entailment from one to the other (Armstrong 1997: 140). Atomic states of affairs are wholly different when not identical. However, complex states of affairs may not be identical yet may not be independent either, for the complex state of affairs may have another state of affairs as a constituent, as a consequence of which there may be entailment relations between them. This also restricts the application of the recombination of constituents of states of affairs mentioned above. We can interchange entities *salva possibilitate* only if they are simple.

So we must now ask whether N is simple? If N is not simple then it may be that R(F,G) is a constituent of the complex state of affairs N(F,G), and the denial of (I) is illegitimate. Armstrong himself states the hope that 'the basic nomic connection respects the principle of Independence' (Armstrong 1997: 235). By 'basic nomic connection' Armstrong means either N or the relation that N supervenes upon. If N does satisfy INDEPENDENCE then N(F,G) entails no other state of affairs, and (I) is false. If N is not simple but supervenes on some simple, basic nomic connection N*, then the argument of the preceding sections may be run with respect to N*.

Let us therefore consider the possibility that neither N nor any more basic nomic connection upon which N supervenes is simple. In that case (I) might turn out to be true, for N(F,G) might be a complex state of affairs of which R(F,G) is a proper part. In which case we may write: N(F,G) =

M(F,G) + R(F,G). where M(F,G) is whatever is added to the regularity R(F,G) to give us the law N(F,G). We may ask about M(F,G) whether it itself entails R(F,G). Presumably not. For if it did, then M(F,G) + R(F,G) = M(F,G), and so M(F,G) = N(F,G), in which case we would not have explained what N's constituents are and M would not be what we *add* to R to get N. So it must be that N is a combination of R plus something independent of R. Which is just to say that a law is a regularity plus some additional factor. This now makes Armstrong's view of laws just another version of the regularity view. Correspondingly, it suffers from the problems that Armstrong identifies in the regularity view. For example, laws are supposed to explain regularities. But if laws just are regularities, they cannot (since something cannot explain itself). Can N(F,G) explain R(F,G) if N(F,G) = M(F,G) + R(F,G)? The R(F,G) component cannot explain R(F,G), on the given principle that something cannot explain itself. Indeed, for that reason, R(F,G) ought not to be even a part of what explains R(F,G). Hence the M(F,G) element alone ought to be able to explain R(F,G). But it cannot, since M is entirely independent of R. Similarly, Armstrong argues that the regularity view of laws cannot explain how laws support counterfactuals. The fact that all Fs are Gs (i.e. R(F,G)) does not explain why it is that if *a* were F, then *a* would be G. Can M(F,G) explain such a fact? Consider *b* which actually is F. M(F,G) does not entail that *b* is G – if it did, then M(F,G) would have the same consequence for all the other Fs and so would entail R(F,G) after all. But if M(F,G) does not have the consequence that an actual F is G, how does it have the consequence that some possible F would be G, were it F?

My argument in §§1–4 assumes that N, or the basic nomic connection upon which N supervenes, obeys INDEPENDENCE (i.e. is simple). Armstrong himself needs this assumption, because without it he would have to regard N as a complex of R plus some other component not entailing R. But this opens his view to the same criticisms that he launches against the regularity theory of laws.

6. *Conclusion*

Armstrong requires an intimate relationship between laws and regularities. He assumes that it is entailment. But then he has difficulty in explaining how this entailment arises. It cannot be in virtue of full identity between law and regularity, for this is the regularity view of laws that he rejects. Laws are more than regularities. But they cannot be complexes of regularities plus something else, for such a position also suffers from the objections to the regularity view. So laws must be simple yet entail a distinct fact, the regularity. But that conflicts with Armstrong's principle of Independence and the related view that all simple properties are categorical. So the intimate relationship between laws and regularities is not entailment. It cannot itself be a mere regularity, for that relationship is not intimate enough and leaves the ability of laws to explain regularities unaccounted for. So the last option is that laws necessitate regularities where 'necessitation' is just the same kind of modal relation that holds between universals in a law. This option leads to a vicious regress.

That Armstrong's view generates such problems is not surprising. In his view there is no real modality in the basic components of the world. Yet he wants laws to have some kind of modal character, such as the ability to support counterfactuals. Lewis's response is to invoke other, non-actual, worlds as the source of modality. But Armstrong rejects any but the actual world. If modality comes neither from the actual world nor from (relations to) other worlds, then there seems nowhere for it to come from at all. Armstrong's official position is correspondingly a version of fictionalism (Armstrong 1997: 49–51). But he does not extend this to the kind of modality involved in laws and counterfactuals. Can Armstrong divorce the two kinds of modality, one 'hard' kind that deals with metaphysical necessity and possibility and which requires a fictionalist treatment, and another, 'soft' kind found in laws and counterfactuals, which is real and is symbolized by 'N'? Armstrong himself does not divorce them, because he takes instances of soft modality to have entailment properties (laws entail regularities). And entailment is a hard modality. But if he drops the entailment property and employs anything less than hard modality he is unable to explain how we are entitled to infer regularities from laws. After all, there would then be worlds with just the same laws (relations of soft necessitation) but which do not have corresponding regularities. This, it seems to me, is the nub of van Fraassen's Inference Problem for Armstrong (van Fraassen 1989: 96). The argument of this paper is that it is not just that Armstrong has provided no satisfactory answer to the problem but rather that there *can be no* consistent response to the problem.

The argument thus applies not only to Armstrong's view specifically but also to the similar views of Dretske and Tooley (Dretske 1977; Tooley 1977). All take the modal character of laws seriously, which motivates their rejecting the regularity view. They nonetheless take nomic necessitation to be soft, a contingent relation, because of which they cannot answer the Inference Problem. The Inference Problem is solved only if necessitation has an essence (essentially, if N(F,G) then R(F,G)). But if we allow N to have an essence by which it is related to a distinct property, R, then there can be no objection to allowing F to have an essence whereby it is related to the distinct property G. In which case we may dispense with N altogether. Put most generally the conclusion is this. If we take the modality associated with laws seriously, and we are not willing to employ non-actual possible worlds, then an intermediate 'soft' modality is not an option. The existence of a 'hard', metaphysical modality in the world must be accepted. And the most natural way of so doing is to take laws to be necessary truths reflecting the essences of their constituents.[3]

University of Bristol
9 Woodland Road
Bristol BS8 1TB, UK
Alexander.Bird@bristol.ac.uk

References

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

Armstrong, D. 1989. *A Combinatorial Theory of Possibility*. Cambridge: Cambridge University Press.

Armstrong, D. 1997. *A World of States of Affairs*. Cambridge: Cambridge University Press.

Bird, A. 2002. Laws and criteria. *Canadian Journal of Philosophy* 32: 511–42.

Bird, A. Forthcoming. Potency and modality. *Synthese*.

Crane, T., ed. 1996. *Dispositions: a Debate*. London: Routledge.

Dretske, F. 1977. Laws of nature. *Philosophy of Science* 44: 248–68.

Handfield, T. Forthcoming. Armstrong and the modal inversion of dispositions. *Philosophical Quarterly*.

Lewis, D. 1973. *Counterfactuals*. Oxford: Blackwell.

MacBride, F. 1999. Could Armstrong have been a universal? *Mind* 108: 471–501.

Tooley, M. 1977. The nature of laws. *Canadian Journal of Philosophy* 7: 667–98.

Tweedale, M. 1984. Armstrong on determinable and substantival universals. In *D. M. Armstrong*, Profiles, ed. R. J. Bogdan, 171–89. Dordrecht: D. Reidel.

van Fraassen, B. 1989. *Laws and Symmetry*. Oxford: Oxford University Press.

[3] Martin Tweedale also argues that the logic of Armstrong's position pushes him in the direction of laws with 'hard' necessity and properties with nontrivial essences (Tweedale 1984). Toby Handfield takes considerations similar to those above to show that the (alleged) modal problems that Armstrong raises for dispositional essentialism would also affect his own view, while pointing out that Humeanism is an alternative way out (Handfield forthcoming), which is a view I endorse elsewhere, on slightly different grounds (Bird forthcoming).