Non-reductionist realist theories of lawhood
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1. Primitive intensional ideology versus properties of propositions

One view: claims of the form *it is a law that P* are, fundamentally speaking, just as primitive as claims of the form *it is not the case that P*.

- We don't need to understand 'it is not the case that P' as referring to a certain entity, the proposition that P, and describing it as untrue. The true primitive here is a *sentential operator*—it's less misleading to write 'Not P'.
- Likewise, according to the view at hand, for 'it is a law that P': this too is better understood as involving a sentential operator. It would be less misleading to just write something like 'Law P'.

In favour of the primitive intensional ideology view:

- It lets us avoid having to regard *propositions* as fundamental entities.

In favour of the properties-of-propositions view:

- It lets us hold on to some not-entirely-toothless version of the doctrine of 'the supervenience of truth on being'.

2. What sort of notion of lawhood to take as primitive?

Should the primitivist take the fundamental, primitive notion of lawhood to be closed under logical and metaphysical consequence, or not?

- Well, we certainly don't want to be able to make ultra-fine distinctions along the lines of 'It's a law that Hesperus is bright but it's not a law that Phosphorus is bright'.
- Nor is it clear that we should want there to be a genuine question, e.g., over whether it is '$\forall x(Fx \supset Gx)$' or '$\sim\exists x(Fx \wedge \sim Gx)$' that is the fundamental law. We can imagine a community that didn't have a symbol for '$\forall$' but spelled out everything with $\exists$ (or in Begriffschrift, etc.) We don't want to say, do we, that these people's language is objectively inadequate in that it cuts them off from the truth about what's a law?
- Similarly, do we really want there to be worlds that differ only as regards whether P and Q are both laws, or whether it is the conjunction P $\wedge$ Q that it is the law, or whether the conjunction and its conjuncts or all laws?

(A clue as to what one might find primitive intensional ideology objectionable...?)

3. Lawhood in sparse theories of properties and relations

Hallmarks of Armstrong's view:

- Rejection of disjunctive, negative properties

- Acceptance of conjunctive and "structural" properties—even relational properties (*bearing R to an F* is a genuine property when *R* is a genuine relation and *F* a genuine property), though not propositions generated in a corresponding way.
- Rejection of uninstantiated properties and universals.
- Universals are 'in' their instances (?).
- Realism about 'states of affairs': when an object instantiates a property, there really is this thing, the state of affairs of that object's instantiating that property.

Analysing 'it is a law that' in terms of a relation between sparse properties

- Initial take: it is a law that all Fs are Gs iff F bears N to G.
- Later take (?): it is a law that all Fs are Gs iff F bears N to G and no property that entails F bears N to any property inconsistent with G.

Can all laws be shoehorned into a form that allows them to be grounded in this way in N-relations amongst the universals Armstrong is prepared to recognise? Seems a tall order when you consider the fact that our best candidates to be laws are differential equations.

- Think about what 'F = d(mv)/dt' means, for example. Standardly, something like this: for every particle *p*, for every time *t*, for every real number ε, there is a time t' such that $|m(p)v(p, t') - m(p)v(p, t) - F(p, t)(t' - t)| < \varepsilon$.
- Immediate obstacle: I don't think Armstrong is or should be OK with building properties out of relations by universal quantification (yield properties like *bearing R to every F*).
- This way of putting things will be acceptable only to mathematical Platonists; for nominalist reformulations of Newtonian laws, see Hartry Field's *Science without Numbers*. Things don't look any better on this approach.

The program of analysing attributions of objective chance to arbtirary propositions in terms of relations between sparse properties and relations strikes me as even more hopeless.

4. Metaphysical objections: explaining metaphysical necessities

Lewis's focus: the metaphysical entailment from 'It's a law that P' to P. Why should this be? In what sense does one implicitly contradict oneself in maintaining that it's a law that P, but not-P?

Other things we might focus on: the entailment of 'It's not a law that not-P' by 'It's a law that P'; the Kolmogorov axioms for objective chance; ...

- One possible response: analyse 'it's a law that P' as 'P and it's a law-candidate that P', where 'it's a law-candidate that P' doesn't entail P. But this would force us to countenance possible worlds with the same history and laws that differ only as regards what's a law-candidate.

- Another possible response: just deny that 'it's a law that P' entails 'P'. [One motivation for this: the "miracles" theory of counterfactuals under determinism.] But it seems too much to claim that there is no metaphysical constraint here whatsoever.
- Armstrong's mysterious response: states of affairs in which N holds between two universals are not only states of affairs, they are also universals in their own right, and they are instantiated by first-order states of affairs in which F and G hold. I don't understand how this is supposed to address the problem. I couldn't see anything in Armstrong's story that would explain the following asymmetry: N(F,G) entails that all Fs are Gs, but not that all Gs are Fs.
- Another possible view: lawhood is a property not of *propositions* but of *facts*; there are no false facts.

5. Epistemological objections

How could we know / be justified in believing that the various 'logical' principles about lawhood and chance obtain—e.g. that lawhood entails truth?

More generally: how could we know / be justified in believing as much as we do about lawhood / chance, if these things are primitive.

Need for *special purpose* epistemological principles—abrogation of the 'topic-neutrality' of epistemology.

- A good example to focus on: how can we justifiably be as confident as we actually are that it is not the case that *every* truth is a consequence of the laws?
- It's not enough here to say that we are justified in inferring to the best explanation, and that positing laws can be constitutive of explanatory goodness—we also need to be told why this isn't always justified.

6. Objections from vagueness

If lawhood is primitive, 'it is a law that' is precise; and claims of the form 'it's a law that P' are precise if P is.

There are cases where there is hard to believe; questions about lawhood where we have some impulse to think that there's no determinate fact of the matter in dispute.

- EG: in Albert-style statistical mechanics, the question 'just how low did the initial entropy have to be'? (And similarly for other striking facts about initial conditions.)
- EG: is it a law, supposing it to be true and not derivable from any other simpler truths, that the fine-tuning constant is always and everywhere 137.whatever?
- EG: is it a law, assuming it is true, that there are no spacetime manifolds wholly disconnected from ours? That spacetime has the dimensionality it has?

7. In what sense are facts about the laws intrinsic to a time?