The New Principle
9 October 2006

1. Intuitive counterexamples to the supervenience of chance on 'history' (nonmodal fact)

Pairs of worlds with the same history where the facts about chance are different.

Example: let A be the proposition that the history of the world consists entirely of 100 sequential coin-tosses in the sequence

HHTTTHHTHTTTHTHHTHTHTTTHHHTHTTTHTHHHTHTTTHTTTHTHTH
THHTTHHHTHTTTTHTHHTHTHHTHTHHTHHTHTTHHHHTHHTHTTTHT

A seems to be consistent with at least two different hypotheses about chances: (i) the tosses are independent and the chance of H is 1/2 (ii) the tosses are independent and the chance of H is 1/3.

2. The logic of 'law' and 'chance'

Some of my favourite putative counterexamples to the supervenience of lawhood on the categorical facts can be backed up by arguments of the following form:

(1) It's possible that the laws are exactly L (premise)
(2) It's possible that the laws are exactly L' (premise)
(3) L is consistent with history H (definition of L)
(4) L' is consistent with history H (definition of L')
(5) So it's possible that: H and the laws are exactly L (1, 3).
(6) Also, it's possible that: H and the laws are exactly L' (2, 4).

To justify the inferences here, we can appeal to the principle that the complete truth about what the laws are is itself a consequence of the laws: which is to say, that the modal logic of 'it is a consequence of the laws that' is S5.

Similarly, the above putative counterexample to the supervenience of chance can be backed up by an argument appealing to the principle that the complete truth about what the chances are itself has a chance of 1. Let $P_{1/2}$ and $P_{1/3}$ be the timeless chance distributions corresponding to our two hypotheses about chances.

(1) It's possible that the timeless chance distribution is $P_{1/2}$ (premise)
(2) It's possible that the timeless chance distribution is $P_{1.3}$ (premise)
(3) $P_{1/2}$ assigns nonzero chance to history H (definition of $P_{1/2}$).
(4) $P_{1/3}$ assigns nonzero chance to history H (definition of $P_{1/3}$).
(5) It's possible that there's a nonzero chance that: [H and the timeless chance distribution is $P_{1/2}$] (1, 3)
(6) It's possible that there's a nonzero chance that: [H and the timeless chance distribution is $P_{1/3}$] (2,4)
(7) It's possible that: [H and the timeless chance distribution is $P_{1/2}$] (5)

(8) It's possible that: [H and the timeless chance distribution is $P_{1/3}$](6).

The crucial steps here are from (1) and (3) to (5), and from (2) and (4) to (6): these can be justified by appeal to the principle that the timeless chances have no chance of being anything other than what they actually are: a sort of analogue for S5 for chance.

3. The Principal Principle

We can buttress these intuitions by appeal to the Principle Principle. For timeless chance, it tells us that where C is any reasonable initial credence function,

$$C(\cdot \mid \text{the timeless chance distribution is P}) = P(\cdot)$$

The Principle Principle tells us that $C(A \mid \text{the timeless chance distribution is } P_{1/2}) = P_{1/2}(A) > 0$. Likewise $C(A \mid \text{the timeless chance distribution is } P_{1/3}) = P_{1/3}(A) > 0$. But if chance reduces to history, A entails everything about chance, and hence is inconsistent with at least one of our two hypotheses about how chance works. If so, a rational initial credence function will assign credence 0 to A conditional on that hypothesis.

When $P(A) > 0$ even though A entails that the chance distribution (timeless or at some particular time *t*) is something other than P, say that A describes an *undermining future* for P.

4. The New Principle

The idea: set rational credences conditional on some claim about chance not equal to unconditional chances, but equal to chances conditional on that claim.

Here's how it works when we take timeless chance as basic:

$$C(\cdot \mid \text{urch} = P) = P(\cdot \mid \text{urch} = P)$$

This immediately yields

$$C(\cdot \mid H \,\&\, \text{urch} = P) = P(\cdot \mid H \,\&\, \text{urch} = P)$$

for any H consistent with 'urch = P', and in particular for Hs that are complete specifications of possible history up to some time t. But 'H & urch = P' entails that the chance distribution at *t* is $P(\cdot \mid H)$; call this P_t. So we have

$$C(\cdot \mid H \,\&\, \text{urch} = P) = P_t(\cdot \mid \text{urch} = P) = P_t(\cdot \mid H \,\&\, \text{urch} = P)$$

In words: conditional on a hypothesis that describes history up to *t* and fully specifies the probabilistic laws (the way chance depends on history), a rational credence function coincides with the probability distribution such that that hypothesis entails that it is the chance distribution at *t*.

- Note that this *doesn't* entail that C(· | the t-chances are P_t) = P_t(· | the t-chances are P)! 'The t-chances are P_t' is equivalent to a big disjunction of hypotheses of the form 'H and the ur-chances are P'. The New Principle entails that C and P_t agree when both are conditionalised on each disjunct; but it allows them to differ in how likely they rate the different disjuncts, and if they do they may differ in how they assign probabilities conditional on the whole disjunction.

5. When the New Principle yields results close to the Old

6. Can anyone explain why the New Principle holds?

Lewis: non-reductionists can't!
Can reductionists do any better?

A way to think of what's at stake: are the true fundamental principles of epistemology *topic neutral* or *topic-specific*?

7. Is NP plausible, if chance is what reductionists say it is?

(i) *Unanimity*. If we have this picture according to which there is more than one rational initial credence distribution, is it plausible that there are *any* propositions, other than ultra-specific ones, such that all rational initial credence functions coincide when conditionalised on them?

(ii) *Jaggedness*. Given NP, rational credence functions cannot make a smooth transition from the region of logical space in which they coincide with $P_{1/2}$ (for example) and the region in which they coincide with $P_{1/3}$. The transition between the two patches must be abrupt.

- Also, it's implausible to suppose that all rational credence functions make the transition at exactly the same place.

(iii) *Vagueness*. The notion of chance is surely vague; there will be worlds at which it is a vague matter what the true chance distribution is. But given NP, this means that nothing is determinately a rational initial credence function.

> Problems (i) and (iii) would look less worrisome if we rejected epistemic permissiveness, and thought instead that there was exactly one ideally rational initial credence function (the one that corresponds to the *true evidential probabilities*; the one such that a piece of evidence raises the probability of a hypothesis according to it iff the evidence in fact *counts in favour of* that hypothesis).
>
> - See Roger White, 'Epistemic Permissiveness' for a sense of why one might be accept this *prima facie* implausible view.