Philosophy of Science // Fall 2015

Handout 10

New riddle of induction: Goodman

Goodman on Hume. In the broadest outline, we can say that, unlike Hume, Goodman takes much more seriously the idea that there *are* good and bad inductive inferences and tries to offer some ways of positively characterising the distinction between them. In the first part of his discussion Goodman argues against some alleged misinterpretations of Hume's argument. We should not seek a global justification of induction. Any such justification would also employ induction (as already observed above). But that does not mean that induction should be arbitrary. Hume himself traced the confidence we have in induction to our 'habits'. And this may point in a right direction. Justification of induction must involve descriptions how induction takes place. That is: inductive practices can justify themselves.

Induction and deduction. As Ramsey said, 'We are all convinced by inductive arguments, and our conviction is reasonable because the world is so constituted that inductive arguments lead on the whole to true opinions.' But is not there a vicious circle?

Goodman's response is indirect. Let us consider deductive inferences where validity is (apparently) not doubted. We will then show that this very validity is *also* rooted in their practices (i.e. deductive practices). There is a system of rules and 'acceptable' inferences where each part is supposed to be tweaked to be brought into harmony with the other. So the old problem—how to justify valid inductive inferences—is dissolved by presenting the alleged analogy with deduction. But there is another problem: how to distinguish between good and bad inductive inferences.

H-D model of confirmation. Goodman discusses Hempel's account of confirmation. Let us elaborate a little. Confirmation is a notion weaker than verification. A general law cannot be verified by a finite body of evidence, yet may well be confirmed by it. What is the relation between theories and the evidence confirming them? Perhaps it is the logical entailment in reverse, since some evidence-statements follow logically from the theory (recall the D-N model of explanation).

Suppose then we have the following two rules: (1) Whatever confirms a given hypothesis H_1 would also confirm a stronger hypothesis H_2 (that is, when H_2 logically entails H_1). (2) Whatever confirms a given hypothesis confirms also a logical consequence of that hypothesis.

These plausible rules lead to a paradox. Let H_1 be any hypothesis (say, Newton's Second Law). Let the observation report R consist of just the statement 'Jack is a raven'. Then R confirms the hypothesis H_2 (that Jack is a raven). But H_2 is entailed by $H_1 \& H_2$. So, R also confirms $H_1 \& H_2$. But H_1 is entailed by $H_1 \& H_2$. Therefore, R confirms H_2.

Nicod's criterion. In response to the paradox let us then impose the following constraint. Consider a hypothesis governing the behaviour of objects:

$$\forall x(Px \to Qx).$$

Then an object a confirms our hypothesis iff Pa and Qa; disconfirms it iff Pa and $\sim Qa$; is neutral iff $\sim Pa$.

We also have the following *Equivalence condition*: whatever confirms (disconfirms) one of two equivalent sentences, also (confirms) disconfirms the other.

Surprisingly, Nicod's criterion gets into trouble with the Equivalence condition. The existence of black ravens confirms this hypothesis:

$$\forall x(Rx \to Bx), \tag{10-1}$$

But it does not confirm—as it should—an equivalent hypothesis:

$$\forall x(\sim Bx \to \sim Rx). \tag{10-2}$$

Nicod's criterion cannot, therefore, be seen as a *necessary* condition of confirmation. That is, an evidence statement that intuitively confirms a hypothesis might not confirm it according to Nicod's criterion.

Perhaps Nicod's criterion should be considered a *sufficient* condition of confirmation. That is, an evidence statement that confirms a hypothesis according to Nicod's criterion would always intuitively ('genuinely') confirm it. Alas, we are facing the notorious *paradox of the ravens*. Since non-black non-ravens confirm (10-2), they would also confirm (10-1). But clearly the existence of green frogs is irrelevant to the status of the hypothesis about ravens. Hence the paradox.

Example 1. Hempel appears to suggest that non-black non-ravens confirm (10-1) to a small degree. Is this a tenable view?

Where we stand. Even if a syntactic characterisation of laws should fail, one could still argue that a justification of induction is possible by inductive means. That is: we give up on proving validity of inductive inference in any acceptable way. But we maintain that such inferences should work where sufficient evidence has been accumulated. Inductive inference, while unjustifiable, are *reliable*.

Example 2 (Copper and electricity). Suppose that in one case 1000 samples of copper were examined and found to conduct electricity (R_1). Suppose that in another case 50 samples of copper were examined and found to conduct electricity (R_2). Then the body of evidence R_1 supports my belief—that the next sample of copper conducts electricity—to a greater extent than R_2. And that is all that matters.

The problem of lawlikeness. Syntactic analysis alone does not provide us with the confirmation relation. While a piece of copper conducting electricity confirms the hypothesis that all pieces of copper conduct electricity, the fact that that piece of copper is owned by Barack Obama does not confirm the hypothesis that all pieces of copper in the world are owned by Obama. The difference between the two hypotheses is not in their logical relation with the respective pieces of evidence, but in that one is a lawlike generalisation, and the other is an accidental one. So we have to attend to the notions of lawlikeness and lawhood. And in doing that we are going to give up a positivist dream dispensing with necessity altogether (see our earlier discussion).

Grue! Now suppose we stick with intuitively lawlike predicates. Take, for instance, 'x is green'. Then even for this predicate there is a problem of using the available evidence to confirm a general law. To this end we devise a new predicate 'grue':

$$x \text{ is grue} \leftrightarrow [(x \text{ is examined before } t \text{ and } x \text{ is green}) \text{ or } (x \text{ is not examined before } t \text{ and } x \text{ is blue})].$$

Observe the difference:

$$x \text{ is grue} \leftrightarrow [(x \text{ is green before } t) \text{ and } (x \text{ is blue after } t)].$$

Question 3. How significant is the difference in the two formulations of 'grue'?

Bleen! So the problem is to distinguish the confirmability of 'green' from the confirmability of 'grue'. It may be thought that the problem is in the temporal (or other indexical) relativisation of the predicate. (That is, such a predicate will not be admissible into a scientific theory, since we will stipulate that any such theory would contain only purely qualitative predicates.)

But consider:

$$x \text{ is bleen} \leftrightarrow [(x \text{ is examined before } t \text{ and } x \text{ is blue}) \text{ or } (x \text{ is not examined before } t \text{ and } x \text{ is green})].$$

$$x \text{ is green} \leftrightarrow [(x \text{ is examined before } t \text{ and } x \text{ is grue}) \text{ or } (x \text{ is not examined before } t \text{ and } x \text{ is bleen})].$$

We are left with a new riddle of induction. Unlike Hume, we do not doubt that the future will resemble the past. But we are unable to say *in which way* it will resemble the past.

YSB