Bonjour's A Priori Justification of Induction

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Justifications of induction, and certainly a priori justifications of induction, are out of fashion these days. In a chapter of his recent book, In Defense of Pure Reason (1998)[1], however, Lawrence Bonjour, the respected American epistemologist, bucks the trend and makes a valiant attempt to revive the latter. What he claims can be justified a priori is that if the premise of a standard inductive argument obtains, then it is likely or probable that the conclusion will hold. A standard inductive premise, for Bonjour, will state that a certain proportion m/n of observed cases of A have been cases of B, as well as specify that there has been "suitable variation of the collateral circumstances" and that the "observed proportion ... converges over time to the fraction m/n" (Bonjour, 206-07). The standard inductive conclusion will state that there is "a corresponding objective regularity in the world" (212), in other words an objective regularity of the form: m/n of all As are Bs.

Since Hume's day a priori justifications of induction have been received with scepticism, but the alternatives are not altogether satisfying to many of us, to say the least.[2] It would be exciting if Bonjour's project were successful. Sadly, as we shall show, his project fails; indeed, once the hidden assumptions are brought to light, we shall see that it seems to fail for all too familiar reasons.

Part 1 of our paper will sketch Bonjour's overall strategy, a two-step procedure, and argue that the first step, the "some-explanation" step, is crucial. Parts 2 and 3 will criticize this crucial step: Bonjour's supposedly a priori inference to some explanation commits the fallacy of false dilemma and Bonjour shows us no way of excluding the intermediate alternatives (2); nor will couching his argument in terms of possible worlds help to make it more persuasive (3).

We need to make two quick preliminary points before we begin. First, for the sake of the discussion we shall go along with Bonjour and assume that there is a workable notion of a priori justification, which is reasonably close to the traditional one of having a reason that does not depend on experience. Second, although Bonjour's standard inductive premise and conclusion are put in terms of the general case of a fraction m/n of As being Bs, for the sake of clarity and simplicity we shall concentrate on the case where m/n = 1, namely the case of all As being Bs. From now on, then, when we refer to the standard inductive premise we shall be focusing on the case in which all observed cases of A have been (observed) cases of B in a wide variety of circumstances (and hence the observed correlation apparently converges to the fraction, m/n = 1); and when we refer to the standard inductive conclusion we shall be focusing on the claim that there is an objective regularity of the form: all As are Bs.

[1] Bonjour gives a simplified and abbreviated version of this chapter in his latest and more introductory book, Bonjour 2002.

[2] We are thinking of such alternatives as ordinary-language, pragmatic, reflective-equilibrium, and reliabilist justificatory attempts, associated with such philosophers as Peter Strawson, Reichenbach, Goodman, and Alvin Goldman.

1. Bonjour's Overall Argument

Suppose that without exception copper has been observed to melt at 1083 degrees centigrade in a wide variety of circumstances (which include different times, places, and experimenters). Here we have what Bonjour calls a standard inductive premise: all observed As (copper objects) have been observed to be Bs (to melt at 1083 degrees centigrade). Bonjour's project is to show that from such a premise one can derive *a priori* a standard inductive conclusion, namely the "straight" conclusion that it is an objective regularity (a law-like regularity) that all As are Bs, in this case that it is a law that all copper melts at 1083 degrees centigrade.

Bonjour proposes to move from the standard inductive premise to the standard inductive conclusion in two steps, both of which need of course to be *a priori*. The first step argues that there must be some explanation other than chance to account for the inductive premise, since the chance hypothesis would be so improbable as to be miraculous. The explanation in question will cite some objective regularity, but not necessarily the straight law, As cause Bs. Instead the relevant law might be of the form "Being A + C causes being B" or of the "fork" form "Cs cause both As and Bs" (206-09). The second step argues that the conjunction of the inductive premise with the claim that there is some explanation makes it most likely that the straight explanation obtains (209-13).

Bonjour's two step procedure is reminiscent of the idea suggested by Hume and then further elaborated by philosophers such as Mill and, more recently Mackie (1979: 123), that one might first try to establish something like a principle of the uniformity of nature and second, uniformity having been secured, go on to infer from the empirical data what particular laws there are.[3] Of course, if there is any consensus on Hume's views it is that Hume was sceptical about the possibility of demonstrating *a priori* any uniformity principle.

Bonjour's first step of establishing his claim that there is some explanation for the inductive premise is really the crucial one. We shall be concentrating on it. If we could establish that there is some explanation for the observed regularity we would be well on our way to establishing the straight explanation. But how can we establish, indeed establish *a priori*, that there is some explanation? It is important here to see that Bonjour is not trying to establish *a priori* the categorical claim that for any event that happens there is an objective law that covers it. Rather what he wants to establish is the conditional claim, "In a situation in which a standard inductive premise obtains, it is highly likely that there is some explanation (other than mere coincidence or chance) for the convergence and constancy of the observed proportion …." (208). Let us call this the some-explanation principle.

Can Bonjour's some-explanation principle be justified *a priori*? The rest of our paper will argue that it cannot, or at least that Bonjour has failed to show that it can.

[3] Indeed, if the uniformity principle were restricted enough, it might even be possible to deduce from such a principle, in conjunction with empirical evidence, that certain particular causal laws hold!

2. Can the Some-Explanation Principle be Justified A Priori?

Bonjour's some-explanation principle, which he thinks can be justified *a priori*, is that if a standard inductive premise holds then it is highly likely that there must be some explanation other than chance for the observed regularity.

How does he think that this principle can be justified *a priori*? His idea is that, helping ourselves to the familiar tools of the probability calculus, including Bayes's Theorem, and assuming that these are *a priori* (under appropriate interpretations), we can reason as follows. Suppose that a standard inductive premise holds, say that all observed As have been observed to be Bs in a wide variety of circumstances. What hypothesis best accounts for this regularity? There are two possibilities. Either the observed correlation is due to chance or there is some explanation, some objective regularity, which accounts for it. "Of course, [says Bonjour] it is logically possible that the results in question represent the operation of nothing more than mere random coincidence or chance, but it seems evident, and as far as I can see evident on a purely *a priori* basis, that it is highly unlikely that only coincidence is at work … " (208).

Here is a simple analogy. I flip a coin 1000 times and it turns up heads every time. Either the coin is a fair, or in other words chance is operating, or the coin is biased (some explanation is at work). It is obvious that it is extremely unlikely that the chance hypothesis holds here. This will be true even if the initial, or prior, probability of the chance hypothesis is high (suppose that before I flipped the coin I had strong evidence that it was freshly government-minted). Since the only other possibility is that the coin is biased, the hypothesis that this is so (and thus that there is some explanation) is highly probable.

This reasoning looks good, does it not? Unfortunately, there are flaws, some of which may be irreparable. At the very least Bonjour gives us little guidance in how to repair them.

The main flaw in Bonjour's reasoning above is that it commits the fallacy of false dilemma. The some-explanation hypothesis, interpreted in the needed way, and the chance hypothesis are not exhaustive. There are many, indeed an infinite number, of intermediate hypotheses. Types of intermediate hypotheses, most quite familiar, include: Goodman's grue-like hypotheses, wild curve-fitting hypotheses (Swinburne, 2001: 83), and hypotheses that invoke temporally or spatially limited objective regularities, e.g. the hypothesis that there is a causal law, As cause Bs, which holds only for a million years starting with 10,000 BC (Mackie, 1979: 125). These intermediate hypotheses are of course more or less "crazy" in the sense that they would be not be entertained, or if entertained then quickly dismissed at the outset, by common sense or science. Bonjour, however, needs not only to dismiss all such intermediate hypotheses, but also to dismiss them *a priori*, if his reasoning is to go through.

But why does Bonjour's some-explanation hypothesis have to be restricted to "sane," or "normal," explanations? Briefly, this is because without such a restriction Bonjour's second step to the "straight" conclusion, namely, that it is an objective regularity that all As are Bs, will not succeed. Suppose that all examined emeralds have been observed to be green in a wide variety of circumstances. Such evidence may well make the "sane" straight explanation --- it is a law that all emeralds are green --- much more probable than the "sane" fork explanation --- there was some third factor present in each case that caused the object to be an emerald and also caused it to be green. That evidence, however, will do nothing to eliminate the "crazy" explanation that it is a law that all emeralds are grue.

Bonjour, then, is going to have to eliminate *a priori* these crazy hypotheses. Can he do so? This is really the old question, for which the probability calculus and Bayes's theorem in themselves give us no help, of how we should assign the initial, or prior, probabilities to possible hypotheses. Traditional suggestions for assigning prior probabilities include appeals to background common-sense or scientific beliefs, to considerations of simplicity, to the principle of indifference, or to various combinations of these. There has been and still is much controversy over how to formulate clearly such suggestions, e.g. how to formulate a criterion of simplicity which squares with our intuitions. Further, there is additional scepticism over the status of the connection between the suggested conditions and probability. It may well be that simpler hypotheses are more likely to be true, but is this *a priori*?[4]

A careful examination of Bonjour's attempt at an *a priori* justification of induction leads us back to these old controversial questions. Well and good. But at this point Bonjour leaves us hanging. The most he gives us in the way of an *a priori* rejection of crazy hypotheses are a footnote dismissal of "grue"-like predicates as having "any major bearing on the classical problem of induction" (189) and a short dismissal of hypotheses that postulate a change in the laws of nature (such as our million-year hypothesis above) by claiming, but not defending, the view that objective regularities are in some sense non-Humean (214-15).

3. Do Possible Worlds Help?

Bonjour at one point tries to couch his argument for the some-explanation principle in terms of possible worlds. "The relevant claim," he says, "would be that it is true in all possible worlds that there is likely to be a non-chance explanation for the truth of a standard inductive premise." In other words, it is a *necessary truth* that the number of possible worlds that satisfy the inductive premise and have some explanation is greater than the number of worlds that satisfy the inductive premise and do not. In fact, he goes on to claim that these latter worlds "are quite rare and unlikely within the total class of possible worlds" (209).

Why should we believe this? First, it seems clear that the number of possible worlds is infinite. How are we to understand Bonjour's claim about the relative rarity of some types of world *vis-à-vis* others? He concedes that he is assuming that it is possible to make sense of the relative sizes of classes of possible worlds even when the classes are themselves infinite, and cites as an intuitive example, Cantor notwithstanding, that there are twice as many positive integers as even integers. Despite his faith in the "intuitive credentials" of such a claim, we remain unpersuaded.

Furthermore, it seems easy to show that among worlds in which the inductive premise is satisfied, there are at least as many worlds in which there are *no* "sane" objective regularities as there are worlds in which there are. Consider a world W in which such regularities hold.

[4] Howson, in 2000 (which has greatly influenced our views on induction), pp. 42-43 considers and nicely rebuts the view that we should reject many of the crazy hypotheses because "these concocted alternatives did not predict the data *independently* …"

For each such world there is some other world W* which is exactly like W except that in some remote unobserved region of W* conditions obtain so as to render false the conclusions of all "sane" standard inductions.[5] So much for the rarity of such "non-explanation" worlds.

Second, even if Bonjour could show that there are more possible worlds in which some explanation holds, it would follow that a given world is *more likely* to be such a world only if we assume that each possible world is equally probable. But this is impossible, since any finite number times infinity will be larger than one.[6] We cannot assign all possible worlds equal prior probability, and any attempt to make an alternative assignment (e.g., lower probabilities to the "crazy" worlds mentioned earlier) will necessarily require additional assumptions, which may well turn out to be empirical.

But the situation is even worse than this. The number of possible worlds is clearly *non-denumerable*. Howson (2000: 75) has shown that in a non-denumerable possibility space, a non-denumerable number of the possibilities must be assigned a prior probability of zero. Which possible worlds are to receive that honor? Bonjour gives us no clue about this.

Bonjour's fresh attempt at an *a priori* solution to the problem of induction, then, is well worth exploring. Sadly, it cannot be counted a success: there are too many issues left unresolved.

[5] We are indebted to Chase Wren (2000) for this suggestion, which we are paraphrasing almost verbatim.

[6] This principle, despite being obvious, follows from Archimedes's Axiom, which claims that any for any non-zero real number x, there is a *finite* number of times x can be added to itself such that the resulting sum will exceed any finite number specified.

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