Hume’s Challenge to Inductive Logic

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Inductive logic is used to shape our expectations of that which is as yet unknown on the basis of those facts that are already known; for instance, to shape our expectations of the future on the basis of our knowledge of the past and present. Our problem is the rational justification of the use of a system of scientific inductive logic, rather than some other system of inductive logic, for this task.

The Scottish philosopher David Hume first raised this problem, which we shall call the traditional problem of induction, in full force. Hume gave the problem a cutting edge, for he advanced arguments designed to show that no such rational justification of inductive logic is possible, no matter what the details of a system of scientific inductive logic turn out to be. The history of philosophical discussion of inductive logic since Hume has been in large measure occupied with attempts to circumvent the difficulties he raised.

Before we can meaningfully discuss arguments which purport to show that it is impossible to rationally justify scientific induction, we must be clear on what would be required to rationally justify a system of inductive Logic. Presumably we could rationally justify such a system if we could show that it is well suited for the uses to which it is put. One of the most important uses of inductive logic is in setting up our predictions of the future. Inductive logic figures in these predictions by way of epistemic probabilities. If a claim about the future has high epistemic probability, we predict that it will prove true. And, more generally, we expect something more or less strongly as its epistemic probability is higher or lower. The epistemic probability of a statement is just the inductive probability of the argument which embodies all available information in its premises. Thus the epistemic probability of a statement depends on two things: (i) the stock of knowledge and (ii) the inductive logic used to grade the strength of the argument from that stock of knowledge to the conclusion.

Now obviously what we want is for our predictions to be correct. If we could get by with deductively valid arguments we could be assured of true predictions all the time. Deductively valid arguments lead from true premises always to true conclusions and the statements comprising our stock of knowledge are known to be true. But deductively valid arguments are too conservative to leap from the past and present to the future. For this sort of daring behavior we will have to rely on inductively strong arguments—and we will have to give up the comfortable assurance that we will be right all the time.

How about most of the time? Let us call the sort of argument used to set up an epistemic probability an e-argument. That is, an e-argument is an argument which has, as its premises, some stock of knowledge. We might hope, then, that inductively strong e-arguments will give us true conclusions most of the time. Remember that there are degrees of inductive strength and that, on the basis of our present knowledge, we do not always simply predict or not-predict that an event will occur, but anticipate it with various degrees of confidence. We might hope further that inductively stronger e-arguments have true conclusions more often than inductively weaker ones. Finally, since we think that it is useful to gather evidence to enlarge our stock of knowledge, we might hope that inductively strong e-arguments give us true conclusions more often when the stock of knowledge embodied in the premises is great than when it is small.

The last consideration really has to do with justifying epistemic probabilities as tools for prediction. The epistemic probability is the inductive probability of an argument embodying all our stock of knowledge in its premises. The requirement that it embody all our knowledge, and not just some part of it, is known as the Total Evidence Condition. If we could show that basing our predictions on more

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1 I have taken some liberties with Hume and have given the traditional problem of induction a new twist for reasons that will become apparent.

2 Its other uses do not differ in ways essential to the argument.

3 Sometimes the Total Evidence Condition is stated as the requirement that an e-argument embody only our relevant knowledge. This comes to the same thing, however, since by definition, the remainder of our stock of knowledge is irrelevant just in case its addition or deletion from the premises makes no difference to the probability.
knowledge gives us better success ratios, we would have justified the
total evidence condition.

The other considerations have to do with justifying the other
determinant of epistemic probability—the inductive logic which assigns
inductive probabilities to arguments.

We are now ready to suggest what is required to rationally justify a
system of inductive logic:

**Rational Justification**

A system of inductive logic is rationally justified if and only if it is
shown that the arguments to which it assigns high inductive
probability yield true conclusions from true premises most of the time,
and the e-arguments to which it assigns higher inductive probability
yield true conclusions from true premises more often than the
arguments to which it assigns lower inductive probability.

It is this sense of rational justification, or something quite close to it, that
Hume has in mind when he advances his arguments to prove that a
rational justification of scientific induction is impossible.

If scientific induction is to be rationally justified in . . . [this] sense,
we must establish that the arguments to which it assigns high inductive
probability yield true conclusions from true premises most of the time.
By what sort of reasoning, asks Hume, could we establish such a
conclusion? It the argument that we must use is to have any force
whatsoever, it must be either deductively valid or inductively strong.

Hume proceeds to show that neither sort of argument could do the job.

Suppose we try to rationally justify scientific inductive logic by
means of a deductively valid argument. The only premises we are
entitled to use in this argument are those that state things we know. Since
we do not know what the future will be like (if we did, we would have no
need of an inductive logic on which to base our predictions), the
premises can contain knowledge of only the past and present. But if the
argument is deductively valid, then the conclusion can make no factual
claims that are not already made by the premises. Thus the conclusion of
the argument can only refer to the past and present, not to the future, for
the premises made no factual claims about the future. Such a conclusion
cannot, however, be adequate to rationally justify scientific induction.

To rationally justify scientific induction we must show that e-
arguments to which it assigns high inductive probability yield true
conclusions from true premises most of the time. And “most of the time”
does not mean most of the time in only the past and present; it means
most of the time, *past, present, and future*. It is conceivable that a certain
type of argument might have given us true conclusions from true
premises in the past and might cease to do so in the future. Since our
conclusion cannot tell us how successful arguments will be in the future,
it cannot establish that the e-arguments to which scientific induction
assigns high probability will give us true conclusions from true premises
*most of the time*. Thus we cannot use a deductively valid argument to
rationally justify induction.

Suppose we try to rationally justify scientific induction by means of
an inductively strong argument. We construct our argument, whatever it
may be, and present it as an inductively strong argument. “Why do you
think that this is an inductively strong argument?” Hume might ask.
“Because it has a high inductive probability,” we would reply. “And
what system of inductive logic assigns it a high probability?” “Scientific
induction, of course.” What Hume has pointed out is that if we attempt to
rationally justify scientific induction by use of an inductively strong
argument, we are in the position of having to assume that scientific
induction is reliable in order to prove that scientific induction is reliable;
we are reduced to begging the question. Thus we cannot use an
inductively strong argument to rationally justify scientific induction.

A common argument is that scientific induction is justified because it
has been quite successful in the past. On reflection, however, we see that
this argument is really an attempt to justify induction by means of an
inductively strong argument, and thus begs the question. More explicitly,
the argument reads something like this:

Arguments that are judged by scientific inductive logic to have
high inductive probability have given us true conclusions from
true premises most of the time in the past.

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\therefore \text{Such arguments will give us true conclusions from true premises most of the time, past, present, and future.}
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It should be obvious that this argument is not deductively valid. At best it
is assigned high inductive probability by a system of scientific inductive
logic. But the point at issue is whether we should put our faith in such a
system.
We can view the traditional problem of induction from a different perspective by discussing it in terms of the principle of the uniformity of nature. Although we do not have the details of a system of scientific induction in hand, we do know that it must accord well with common sense and scientific practice, and we are reasonably familiar with both. A few examples will illustrate a general principle which appears to underlie both scientific and common-sense judgments of inductive strength.

If you were to order filet mignon in a restaurant, and a friend were to object that filet mignon would corrode your vitals and lead to quick and violent death, it would seem quite sufficient to respond that you had often eaten filet mignon without any of the dire consequences he predicted. That is, you would intuitively judge the following argument to be inductively strong:

I have eaten filet mignon many times and it has never corroded my vitals.

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∴ Filet mignon will not now corrode my vitals.

Suppose a scientist is asked whether a rocket would work in reaches of space beyond the range of our telescopes. He replies that it would, and to back up his answer appeals to certain principles of theoretical physics. When asked what evidence he has for these principles, he can refer to a great mass of observed phenomena that corroborate them. The scientist is then judging the following argument to be inductively strong:

Principles A, B, and C correctly describe the behavior of material bodies in all of the many situations we have observed.

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∴ Principles A, B, and C correctly describe the behavior of material bodies in those reaches of space that we have not as yet observed.

There appears to be a common assumption underlying the judgments that these arguments are inductively strong. As a steak eater you assume that the future will be like the past, that types of food that proved healthful in the past will continue to prove so in the future. The scientist assumes that the distant reaches of space are like the nearer ones, that material bodies obey the same general laws in all areas of space. Thus it seems that underlying our judgments of inductive strength in both common sense and science is the presupposition that nature is uniform or, as it is sometimes put, that like causes produce like effects throughout all regions of space and time. Thus we can say that a system of scientific induction will base its judgments of inductive strength on the presupposition that nature is uniform (and in particular that the future will resemble the past).

We ought to realize at this point that we have only a vague, intuitive understanding of the principle of the uniformity of nature, gleaned from examples rather than specified by precise definitions. This rough understanding is sufficient for the purposes at hand. But we should bear in mind that the task of giving an exact definition of the principle, a definition of the sort that would be presupposed by a system of scientific inductive logic, is as difficult as the construction of such a system itself. One of the problems is that nature is simply not uniform in all respects, the future does not resemble the past in all respects. Bertrand Russell once speculated that the chicken on slaughter-day might reason that whenever the humans came it had been fed, so when the humans would come today it would also be fed. The chicken thought that the future would resemble the past, but it was dead wrong. The future may resemble the past, but it does not do so in all respects. And we do not know beforehand what those respects are nor to what degree the future resembles the past. Our ignorance of what these respects we is a deep reason behind the total evidence condition. Looking at more and more evidence helps us reject spurious patterns which we might otherwise project into the future. Trying to say exactly what about nature we believe is uniform thus turns out to be a surprisingly delicate task.

But suppose that a subtle and sophisticated version of the principle of the uniformity of nature can be formulated which adequately explains the judgments of inductive strength rendered by scientific inductive logic. Then if nature is indeed uniform in the required sense (past, present, and future), arguments judged strong by scientific induction will indeed give us true conclusions most of the time. Therefore the problem of rationally justifying scientific induction could be reduced to the problem of establishing that nature is uniform.

But by what reasoning could we establish such a conclusion? If an argument is to have any force whatsoever it must be either deductively
valid or inductively strong. A deductively valid argument could not be adequate. for if the information in the premises consists solely of our knowledge of the past and present, then the conclusion cannot tell us that nature will be uniform in the future. The conclusion of a deductively valid argument can make no factual claims that are not already made by the premises, and factual claims about the future are not factual claims about the past and present. But if we claim to have established the principle of the uniformity of nature by an argument that is rated inductively strong by scientific inductive logic, we are open to a challenge as to why we should place our faith in such arguments. But we cannot reply “Because nature is uniform.” For that is precisely what we are trying to establish.

Let us summarize the traditional problem of induction. It appears that to rationally justify a system of scientific inductive logic we would have to establish that the e-arguments it judges to be inductively strong give us true conclusions most of the time. If we try to prove that this is the case by means of a deductively valid argument whose premises state things we already know, then the conclusion must fall short of the desired goal. But to try to rationally justify scientific induction by means of an argument that scientific induction judges to be inductively strong is to beg the question. The same difficulties arise if we attempt to justify scientific inductive logic by establishing that nature is uniform.