Indian Philosophical Quarterly Vol. XXII, No. 3
July, 1995

SOME APPROACHES TO THE PROBLEM OF INDUCTION

The problem of induction that arose for Hume in connection with his theory of causation leads to a devastating consequence. Hume's argument could be exploited by a skeptic to argue that our belief that bread is nourishing is as much irrational as would be the belief that bread is poisonous, for given that we have so far experienced that bread has been nourishing it does not logically follow either that bread will be nourishing in the furture or that it will be poisonous. Similarly, it could be argued that it is as much rational to believe that bread is poisonous as it is to believe that arsenic is poisonous. Hence, it is natural that philosophers, being embarrassed with this type of consequence, should come forward with different sorts of arguments to solve, dissolve, or to reject Hume's problem. In this paper we shall make a brief survey of some of the major attempts to deal with the problem.

Hume's argument which is often called the traditional problem of induction can be briefly formulated as follows. Any argument used rationally to justify induction must be either deductive or inductive. If a deductive argument with premises known on the basis of experience is used, the conclusion will be too weak. For the premises of such an argument are about past experiences only, and since the conclusion is a necessary consequence of the premises the content of the conclusion cannot extend beyond the past to cover any possible experience of the future. And if we use a strong inductive argument, we would be *begging the question* against Hume. Therefore, an argument used to justify induction must have a conclusion that will be too weak, or else the argument must be begging the question. Now this argument shares the form of the following argument known as constructive dilemma:

$(p \vee q)$

$(p \rightarrow r) \ \& \ (q \rightarrow s) \ / \ \therefore \ (r \vee s)$

Since this is a formally valid argument, any attempt to challenge the conclusion of this argument must be directed to questioning the truth of the premises.

There are three ways of defeating this dilemma. First, we can go between the horns by rejecting the disjunctive premise of the dilemma. But to reject a disjunction is to show that all the disjuncts are false.[2] We shall presently see that those who want to dissolve the problem of induction try to refute the dilemma by going between the horns. Secondly, we can grasp the dilemma by the horns by rejecting the conjunctive premise. But to show that a conjunction is false we need to show at least one of the conjuncts is false. We shall see that one approach, known as the pragmatic justification of induction, attacks the first horn, while another approach, known as the inductive justification of induction, grasps the second horn of the dilemma.

Finally, a third attempt to avoid the problem of induction consists in granting the skeptical conclusion, but showing that induction is not involved in scientific method.

Of the three approaches mentioned above I will begin with the last. This is the falsificationist approach taken by Karl Popper.[3] According to Popper, Induction has no role whatsoever in science. He maintains that what is called induction is a myth, for the so-called inductive arguments are always invalid and therefore not justifiable. Belief in the uniformity of nature, according to him, is a mere psychological fact. Thus Popper is a thoroughly Humean skeptic about induction.

Popper's basic point is that the distinctive mark of the statements of empirical science, unlike metaphysical statments and tautologies, is falsifiability.[4] The reason why he chooses falsifiability rather than verifiability as the logic of theory selection is simple. We would be committing what is called the fallacy of affirming the consequent if by affirming the consequent of a hypothetical statement, such as 'If Smith can correctly solve the problems of differential calculus, he knows the rules of differential calculus', we affirm its antecedent. However, we can logically deny the antecedent by denying the consequent of this hypothetical statement. Similarly, it

is widely known, explicitly or implicitly, that a universal generalization is falsifiable by a single counterexample to it, whereas it is impossible to verify a universal generalization by any finite number of positive instances of it.

Popper, therefore, holds that the aim of empirical science is to formulate theories to stand the test of very possible serious attempt at falsificaation. Scientific theories are not final truth, but conjuctures or hypotheses designed to explain the world. The job of the theoretician is to propose hypotheses, while the job of the experimenter is to devise ways and means for falsifying, not confirming, these hypotheses.

At this point it is convenient to explain the notion of the *hypothetico-deductive method* in order to properly grasp the further development of Popper's view. This method, unlike the method of enumerative induction where a hypothesis is arrived at by generalization from observed instances, begins by accepting a hypothesis whose truth is in question as well as a number of statements of initial conditions tentatively accepted as true. From the hypothesis and the initial conditions we deduce an observation statement. If the observation statement turns out to be false the hypothesis is disconfirmed, but if the observation statement fits with reality the hypothesis is said to be confirmed to some extent by the statement. If more and more such observation-statements are found to be true, the hypotesis becomes more and more confirmed, and at some stage we are justified in regarding it as well established. Thus the hypothetico-deductive method aims to make scientific method entirely deductive. In addition to the making of observations, the only nondeductive aspect is imagining some ingenious hypothesis; but this is a psychological matter of discovery and as such needs no justification.

It is this method of theory-selection-by-accumulation-of-positive-instances that Popper rejects, i.e., the idea of confirmation by positive result. According to Popper, if the test result is negative we can reject the hypothesis, but if the result of testing the hypothesis is positive, we can only say that we have failed to falsify the hypothesis.

For example, when the statement 'All ravens are black' survives

every attempt at falsification, we can only say that the statement has not been falsified. This is equivalent to saying that we have not observed a non-black raven. But the content of this statement is less than the content of the observation statement that some black revens have been observed. Again, when we say that the statement 'All swans are white' has not been falsified, all we mean is that a nonwhite swan has not been observed. Here too the information of this statement is less than the simple statement of the observation of white swans. Popper, however, believes that when a hypothesis continually survives severe attempts at falsification it is 'corroborated'.

When one hypothesis is falsified, we discard it and accept another hypothesis that has not been falsified. Popper maintains that hypotheses differ from one another in respect of falsifiability, and that we should select these hypotheses that are as highly falsifiable as possible. Moreover, our search for facts should be guided by the effort to find facts that will falsify the hypothesis in question.

According to Popper, the content of a hypothesis varies directly with the degree of falsifiability of the hypothesis. Tautologies lack empirical content, becuase they are compatible with every possible state of affairs. The greater the number of facts excluded by a hypothesis the greater the risk of its being falsified by possible states of affair. Therefore, the greater the content of a hypothesis the gretear the number of its potential falsifiers. We know that the probability of a hypothesis is defined in terms of the number of states of affairs with which the hypothesis is compatible. Thus the greater the probability of a hypothesis the lower the number of its possible falsifiers, and hence the lower its falsifiability.

Popper maintains that a highly falsifiable hypothesis which survives severe tests becomes corroborated, and the greater the degree of severity of the tests the greater the degree of corroboration. It is clear that *modus tollens* without corroboration is empty, but *modus tollens* with corroboration is good, non-deductive, scientific method. It we now accept as legitimate the question, why should we *accept* from among all the unfalsified hypotheses the one that is highly corroborated, we have, if effect, raised the issue of induction. So Popper has not really succeeded in showing that scientific method operates without reliance on induction.

Let us now consider the attempt to justify induction by an inductive argument without committing the fallacy of begging the question. This approach, as already pointed out, attacks one horn of Hume's dilemma in order to avoid the conclusion. The use of a *self-supporting inductive argument* to justify induction is intuitively the most appealing. If we are asked why we believe that the inductive method will work in the future, the most natural answer would be that it worked well in in the past. Among the philosophers the most well-known advocate of this approach is Max Black.[5] He rightly points out that the inductive support of induction does not commit the simple fallacy of *petitio principii* involved in assuming as a premise the very conclusion to be proved. Thus if we argue from the fact that a certain rule of induction, such as the elementary rule of general induction, has been successful in the past to the conclusion that this rule will also be successful in the future, we are not in fact assuming the conclusion as a premise.[6] Although an inference is a always according to a certain rule, the inference, being distinct from the rule, need not assume the rule as a premise.

But Salmon has made a distinction between "premise-circularity" and "rule-circularity", and in terms of this distinction has shown that an argumet may involve rule-circularity without involving any premise-circularity.[7] To see this point let us consider the following argument:

If affirming the consequent is valid, snow is white.

Snow is white.

Therefore, affirming the consequent is valid.

This argument conforms to a certain rule whose validity is asserted by the conclusion of the argument. However, this argument cannot convince us that affirming the consequent is a valid rule, for we know on other grounds that this rule is invalid. The above argument, however, is circular, for, although it does not assume the conclusion as one of its premises, its conclusion asserts the validity of the very rule to which the argument conforms. As such the argument cannot establish the truth of the conclusion, or rather the validity of the rule to which the argument conforms. This point becomes clearer when we remember that a decuctive argument can establish the truth of its conclusion only if the pormises are true

and the argument is valid. If any one of these two conditions remain unsatisfied, the truth of the premises cannot establish the truth of the conclusion. Judged by these criteria the premises of the argument stated above cannot establish the conclusion as true, for the argument conforms to a rule that cannot be regarded as valid. Similarlly, the use of self-supporting inductive argument, according to Salmon, involves rule-circularity. Thus just as a person cannot act as a judge in his or her own case, so also the inductive method cannot pass a verdict on the question of its own legitimcy.

Whereas the inductive justification of induction attacks the left horn, the pragmatic justification of induction grasps the right horn of the dilemma by producing a valid deductive argument in order to justify induction. Hans Reichenbach is an outstanding advocate of this approach.[8] Of course, he argees with Hume that it is impossible to establish by argument that any inductive argument will ever necessarily lead from true promises to a true conclusion. Reichenbach believes that although the sucess of induction as a method of prediction cannot be determined *a priori*, it can be shown to be superior to any other method available. His argument can be put simply as follows :

Either nature is uniform or she is not.

If nature is uniform, induction will be successful.

If nature is not uniform, then no method will be successful.

Therefore, if any method will be successful, then induction will be successful.

This is obviously a deductively valid argument. And the first and the second premise of this argument appear to be true. But the third premise cannot be readily seen to be true. So we can ask a question: Could not there be some alternative method of prediction, such as the method of crystal ball gazing, that would work even if nature is not uniform?

Reichenbach has an ingenious answer to this question. If nature is not uniform but chaotic and still some strange method, say the method of crystal ball gazing, does really work, then there will be at least one uniformity, viz., the continued success of the crystal

ball gazing method. Thus the following will eventually be considered a strong inductive argument :

Crystal ball gazing has been reliable in the past.

Therefore, crystal ball gazing will be reliable in the future.

Thus if crystal ball gazing is reliable, then induction also will be reliable in so far as it will ultimately discover the reliability of crystal ball gazing.

Since induction works, if any mothod works, we have nothing to lose and everything to gain by adopting the inductive method. This is the essence of Reichenbach's argument to justify induction.

If is interesting to note that Reichenbach does not claim to be showing that nature is uniform or that induction will work. He just tries to show that induction is the best method of prediction, whether it happens to work or not.

It may further be noted that Reichenbach's first premise is a tautology. And his conclusion follows even only from the second premise and the contraposition of the third premise by the rule of hypothetical syllogism, Hence, the first premise is actually redundant. This, however, is not a serious defect of the argument.

From the empirical point of view the first premise is an oversimplification of facts, for it is not plausible to say either that nature is uniform in all respects or that there is no uniformity in nature. However, this premise being unnecessary for the conclusion, and the second premise being unquestionably true, the third premise must be entirely responsible for any defect in the conclusion of Reichenbach's valid argument. The third premise seems to be faulty in so far as it is based on an inductive justification of a method used to justify induction. Therefore, the pragmatic approach does not succeed in meeting Hume's challenge. In fact this approach is an attempt not to *validate* but to vindicate the inductive procedure. To *vaindicate* an inductive rule is to show the practical reason for the adoption of a rule.

Finally, we shall consider the *linguistic* (or, *conventionlist*)

approach which attempts to go between the horns of Hume's dilemma by trying to show that no argument whatsoever is neccessary to justify induction. Thus this approach consists in showing that the disjunctive premise is false in so far as we do not need to justify induction either by a deductive argument or by an inductive argument. According to this approach, the problem of justification is a pseudo-problem. Paul Edwards[9] and Peter Strawson[10] are two important proponents of this wiew. We shall briefly present below some of the important points of the linguistic approach.

According to this view, the problem of the rational justification of induction arises from a misunderstanding of the meanings of such words as 'induction' and 'rational'. Deduction is not the only type of reasoning that can be legitimately used. Induction is also an independent mode of argument that cannot be judged by the standard of decuctive argument. Similarly, the question why it is rational to accept inductive arguments is a silly question, for part of what we mean by being rational is understanding and accepting inductive arguments as a linguistic convention. If a skeptic asks why it is rational to accept any argument at all, his question cannot be answered without begging the question, for he has called into question the very instrument for rational discussion. Similarly, it does not make sense to demand justification for induction by calling into doubt the machinery that is used for justification. Thus the dilemma of induction seems to be a 'paper tiger'.

The main difficulty with this view is that if the members of a given society understand that rationlity consists in the use of counterinductive arguments and we understand by rationality the use of inductive arguments, then there is no way to show that our standard of rationality is superior to theirs. For if we ask them to justify the use of counterinductive arguments in preference to inductive arguments, they might, by the same type of reasoning as we have used, reply that is exactly part of what they mean by being rational. Thus rationality in this sense becomes merely a matter of convention.

We have discussed serveral approaches to Hume's dilemma designed to show that there is no logical justification for inductive arguments. Popper tried to reject induction as a method of sceince. But the he failed to reject induction, for his concept of corroboration

of a hypothesis by its survival of the severest possible tests for falsifying it, is only a disguised form of the concept of confirmation. The inductive justification of induction involved a rule-circularity, although it did not commit the fallacy of *petitie principii.* The pragmatic justification also fails to answer Hume's problem, for this approach only takes account of the adoption of inductive policies. The linguistic approach, as we have seen, ultimately reduces the concept of rationality to social conventions. Thus none of the arguments that we have discussed have been able to meet Hume's challenge.

The failure of all these arguments might quite naturally lead one to suspect that there is something seriously wrong with Hume's argument. Hume's problem of induction was the problem of justifying induction by justifying something more fundamental, i.e. the principle of uniformity of nature that would serve as a guiding principle in inductive reasoning. But discovering the uniformities of nature is perhaps the most difficult, if not an impossible, thing to do. All the different arguments to justify induction as well as Hume's argument for the impossibility of justifying induction have one thing in common. They are all based on the presupposition that the justification of someting is a matter of presenting a valid or correct argument in favour of that thing. This is one sense of reason. But it is not necessary that this should be the only sense of reason that is appropriate for all purposes.

As Pollock points out, there are two different sorts of justification corresponding to two different sorts of reasoning, viz., "primitive reasons" and "reasons". Primitive reason is the stronger of the two concepts, and P is a primitive reason for Q if this is a basic epistemic fact that cannot be derived from anything else. In this sense the "reason for" relation is not a transitive relation. Thus, for example, that house's looking red gives me a reason for thinking that it is red. But reasoning in the second sense consists in deriving one proposition from another. Pollock, however, does not think that the relation between the premises and the conclusion of an inductive argument is a primitive reason relation.[11] This distinction might lead us to look for some sense of reason or justifiction that would not be the result of some valid argument.

Although the linguistic approach to the problem of induction

is not quite satisfactory, we can learn an important lesson from it: It does not make sense to demand justification for a certain mode of argument which is itself an essential instrument for the justification of other things. In fact the root of the problem of induction lies in trying to give an empiricist account of the guiding principle of induction. For an empiricist there are two possible ways of solving the problem of induction. One approach would be to try to deduce the statement of the principle of inductive reasoning from a purely formal principle. But in fact we cannot deduce the principle of inductive argument from a tautology. Another approach would be to try to deduce the statement from an empirical principle. In this case we would be begging the question, for this approach assumes that past experience is a reliable guide to the future and this is exactly what we are trying to prove.

Since the problem of induction cannot be theoretically solved in either of the two ways, a thorough going empiricist, such as Ayer,[12] has to conclude that it is not a genuine but a fictitious problem. But Russell, in spite of being a philosopher in the empiricist tradition, frankly admits the truth of a non-empirical principle which he calls the principle of induction on the ground of its being the simplest self-evident principle.[13] Thus, although Russell.[14] like Hume, believes that if the principle of induction were false there would be no reason for accepting our empirical generalizations and the predictions based on them, he, unlike Hume, takes a rationlist's position with regard to this principle as well as the pirnciples of deductive arguments. As Russell says :

> Logical principles are known to us, and cannot be themselves proved by experience, since all proof presupposes them. In this, therefore, which was the most improtant point of the controversy, the rationalists were in the right.[15]

Thus it is clear that any reasonable attmept to justify the principle of induction must proceed along rationalistic lines.

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NOTES AND REFERENCES

1. See Copi (1982), pp. 269-272. Refuting a dilemma is not a way to prove that it is formally invalid. Rather, it is a way to evade the conclusion without questioning the validity of the argument.
2. This is possible only when the alternatives in the disjunctive statement are not exhaustive. If, however, the disjunctive premise is a statement about mutually exclusive and exhaustive alternatives, it is impossible to escape between the horns.
3. See Popper (1959) for the most comprehensive account of Popper's position.
4. Popper applies the falsifiability to distinguish between science aand non-science. but not between meaningful and meaningless statements.
5. See Black (1954). ch. 11.
6. To say that an argument with a true premise is successful is just to say that it has a true conclusion.
7. See Salmon (1967), pp. 14-15.
8. See Reichenbach (1949) ch. 11.
9. See Edwards (1949), pp. 141-163 for Edwards' view on the dissolution of the problem of induction.
10. See Strawson (1952), pp. 248-263 for Strawson's view on the dissolution of the problem of induction.
11. See Pollock (1984), ppl. 423-426.
12. See Ayer (1946), p. 50.
13. See Russel (1912), ch. VI.
14. See Russell (1912), p. 38. and Russell (1961), p. 647.
15. Russell (1912), p. 41.

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