A SURVEY OF SOME FUNDAMENTAL PROBLEMS

CHAPTER 1

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FUNDAMENTAL PROBLEMS

The question whether inductive inferences are justified, or under what conditions, is known as the problem of induction.

The problem of induction may also be formulated as the question of how to establish the truth of universal statements which are based on experience, such as the hypotheses and theoretical systems of the empirical sciences. For many people believe that the truth of these universal statements is 'known by experience', yet it is clear that an account of an experience —of an observation or the result of an experiment—can in the first place be only a singular statement and not a universal one. Accordingly, people who say of a universal statement that we know its truth from experience usually mean that the truth of this universal statement can somehow be reduced to the truth of singular ones, and that these singular ones are known by experience to be true; which amounts to saying that the universal statement is based on inductive inference. Thus to ask whether there are natural laws known to be true appears to be only another way of asking whether inductive inferences are logically justified.

Yet if we want to find a way of justifying inductive inferences, we must first of all try to establish a principle of induction. A principle of induction would be a statement with the help of which we could put inductive inferences into a logically acceptable form. In the eyes of the upholders of inductive logic, a principle of induction is of supreme importance for scientific method: '... this principle', says Reichenbach, 'determines the truth of scientific theories. To eliminate it from science would mean nothing less than to deprive science of the power to decide the truth or falsity of its theories. Without it, clearly, science would no longer have the right to distinguish its theories from the fanciful and arbitrary creations of the poet's mind.'

Now this principle of induction cannot be a purely logical truth like a tautology or an analytic statement. Indeed, if there were such a thing as a purely logical principle of induction, there would be no problem of induction; for in this case, all inductive inferences would have to be regarded as purely logical or tautological transformations, just like inferences in deductive logic. Thus the principle of induction must be a synthetic statement; that is, a statement whose negation is not self-contradictory but logically possible. So the question arises why such a principle should be accepted at all, and how we can justify its acceptance on rational grounds.

1 H. Reichenbach, Erkenntnis 1, 1910, p. 185 (cf. also p. 64 f.).

I. THE PROBLEM OF INDUCTION

Some who believe in inductive logic are anxious to point out, with Reichenbach, that 'the principle of induction is unreservedly accepted by the whole of science and that no man can seriously doubt this principle in everyday life either'. Yet even supposing this were the case —for after all, 'the whole of science' might err—I should still contend that a principle of induction is superfluous, and that it must lead to logical inconsistencies.

That inconsistencies may easily arise in connection with the principle of induction should have been clear from the work of Hume; also, that they can be avoided, if at all, only with difficulty. For the principle of induction must be a universal statement in its turn. Thus if we try to regard its truth as known from experience, then the very same problems which occasioned its introduction will arise all over again. To justify it, we should have to employ inductive inferences; and to justify these we should have to assume an inductive principle of a higher order; and so on. Thus the attempt to base the principle of induction on experience breaks down, since it must lead to an infinite regress.

Kant tried to force his way out of this difficulty by taking the principle of induction (which he formulated as the 'principle of universal causation') to be 'a priori valid'. But I do not think that his ingenious attempt to provide an a priori justification for synthetic statements was successful.

My own view is that the various difficulties of inductive logic here sketched are insurmountable. So also, I fear, are those inherent in the doctrine, so widely current today, that inductive inference, although not 'strictly valid', can attain some degree of 'reliability' or of 'probability'. According to this doctrine, inductive inferences are 'probable inferences'. We have described, says Reichenbach, 'the principle of induction as the means whereby science decides upon truth. To be more exact, we should say that it serves to decide upon probability. For it is not given to science to reach either truth or falsity . . . but scientific statements can only attain continuous degrees of

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3 Reichenbach ibid., p. 67.
4 The decisive passages from Hume are quoted in appendix vii, text to footnotes 4, 5, and 6; see also note 2 to section 41, below.
5 Cf. J. M. Keynes, A Treatise on Probability (1921); O. Kampe, Vorlesungen über Logic (ed. by Seiz, 1923); Reichenbach (who uses the term 'probability implications'), Axiomat der Wahrscheinlichkeitslehre, Kautzen, Ztschr. f. 34 (1934), and in many other places.
2. Elimination of Psychology

Fundamental Problems

The process of recognizing the role of the scientific approach in psychology is not a straightforward one. It requires the integration of the cognitive and unconscious mind, and the development of a refined methodology. The process involves the identification of the information that is relevant to the subject of study. The information may be obscured by irrelevant factors, such as biases or preconceptions, which must be carefully analyzed and corrected. The process also involves the development of a refined methodology, which is essential for the advancement of knowledge in the field of psychology.

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with that are usually called 'epistemological'. Those problems, more especially, to which inductive logic gives rise, can be eliminated without creating new ones in their place.
KARL R. POPPER

DISCOVERY

THE LOGIC OF SCIENTIFIC