in fact, insoluble save by the softening influence of more contact, and by the wider recognition of our common humanity and of the white man's weaknesses as well as of his power to help. Consciousness of supposed superiority on one side and of impressed inferiority on the other are the bane of all relations between peoples of diverse traditions.

H. J. FLEURE.

IS THE MIND A CALCULATING MACHINE?

The Nature of Explanation

By Dr. K. J. W. Craik. Pp. viii+124. (Cambridge: At the University Press, 1943.) 6*s*. net.

AT a time when professional philosophers are trying to persuade us that philosophy is an attempt to answer questions which should never have been asked, and professional scientists are taking over the task of answering the questions, it is refreshing to come upon a writer on philosophy who, after a few preliminary skirmishes with the modern sceptics, unhesitatingly attacks a philosophical problem by the plain scientific method. Dr. Craik makes his philosophical point of view crystal clear. He believes in the methods of the observational scientists as the only methods of explanation. He is intolerant only of those who will not experiment and who consider that the virtue of thought is analytic precision rather than fruitfulness in the experimental field. He confesses that he has no gift for analytic precision and is particularly addicted to confusing similar concepts. He is, quite clearly, not deeply versed in traditional philosophy. This gives his book a certain freshness of outlook, although it makes his criticisms of the great philosophers, particularly Kant, appear rather naïve.

The first three chapters discuss five attitudes in which one might approach the question, "What is explanation?": (1) The *a priori* method consists in the logical deduction of conclusions from premises accepted as indubitable because the terms involved have been clearly and precisely defined. When coupled with empiricism, as sooner or later it must be, apriorism is transformed into (2) scepticism. (3) There is the view that explanation is merely description, which says nothing about causes. (4) There is the relational theory, which also insists that explanation has no interest in causes, its task being to find relations between observable entities. (5) There is finally the causal theory, which holds that explanation consists in discovering the actual interaction of things within the universe.

Although Dr. Craik is not clear on this point, he seems to consider it necessary to disprove the first four theories and to establish the causal theory before he formulates his theory of the nature of explanation. Apriorism is rejected because analytic certainty is an illusion. In attacking scepticism he insists that the assurance of an outer world is to be found not in any proof but in the fact that our symbolism works. The point could have been more convincingly established by showing that all usages of the word 'outer' in English have no relevance to the question "Is there an outer world?", and that in this context 'outer' is meaningless. Dr. Craik, however, in his justifiable hostility to the metaphysics of logical positivism, fails to grasp the importance of its linguistic analysis. Relational and descriptive theories such as those held by modern physicists, which associate definite probabilities with events and eschew any attempt to find an underlying causality, are rejected on the grounds that probability is meaningless without causality. Like symbolism, causality is accepted because it works.

This preliminary discussion paves the way for the main thesis, which can be stated as follows. The nature of thought is essentially prediction. Prediction consists in devising symbols to represent an external process, performing a mental operation upon those symbols, and then translating the result back again into an external situation. Calculating machines, A.A. predictors, do just this sort of thing, because in certain essential respects they parallel the external reality.

This is the hypothesis. The first question that presents itself is, "What corresponds in the mind to the mechanical parts and movements in the predictor or the calculating machine?" One answer, which the author does not consider, is that it is the symbols and the transformations which they undergo in accordance with logical principles. This is a perfectly intelligible view. It was put forward very clearly by the great American philosopher, C. S. Peirce, who states that reasoning consists in performing mental experiments upon symbols, the grouping of the symbols representing the arrangement of the facts so far as is necessary for the reasoning involved. In this connexion Peirce developed a system of logical graphs which in an abstractly pictorial way enable the premises of an argument to be represented and the conclusion read off. Dr. Craik, however, seeks his analogue for the calculating machine in the brain, and suggests that it is to be found in "neural patterns". Implication would then be the power of these neural patterns to act on each other as the real events act causally upon one another. He even suggests that a physiologist, if he could see these patterns in the living brain, might be able to interpret the ideas they represent and, presumably, though this is not stated, to follow the argument. This is difficult doctrine.

In a chapter entitled "Methods of Testing this Hypothesis", experiment with the view of establishing the meaning of words pragmatically is strongly urged; but it is difficult to see what relevance such experiment could have to a hypothesis about the brain. In the last few pages the truth emerges that it is the physiology and biochemistry of the brain that must be used to test the theory, and no experiments are suggested in these spheres.

The book, considered as a reasoned exposition of a single hypothesis, is not wholly successful, because the author has not presented the hypothesis in such a way as to make clear just how it can be confirmed or refuted by experiment. He seems quite unaware, for example, of the enormous leap he makes in the transition from symbols to neural patterns. There is compensation in the number of illuminating suggestions which are struck off like sparks in the course of the argument. There are two or three pages on the ethics of selfishness which are worth a volume of professional moralizing, and a valuable suggestion about the part played by feeling in the formation of hypotheses. Finally, to have an idea is, for Dr. Craik, to think of ways of testing it; and, for many incidental ideas on the fringe of the main argument, he makes ingenious suggestions about establishing or refuting their validity.

WINSTON H. F. BARNES.