

## THE BRITISH SOCIETY FOR THE PHILOSOPHY OF SCIENCE

THE eighth annual conference of the British Society for the Philosophy of Science was held during September 20–22 at St. Hugh's College, Oxford. It comprised a colloquium of four symposia and was attended by some sixty members and guests. Mr. F. T. C. Harris (Middlesex Hospital Medical School) was conference secretary.

The four symposia were entitled "Models of Biological Growth Processes", "The *a priori* and the Empirical in Economics", "Value Judgements in Economics", and finally "Mathematical Logic in Relation to the Philosophy of Science".

With Prof. D. R. Newth (Middlesex Hospital Medical School) in the chair, Dr. H. Kaeser (University of Edinburgh) introduced the first session with a paper entitled "Causality, Complexity and Growth". Dr. Kaeser chose examples from his own field of embryology to support his argument that it is at least as important to achieve understanding as to make predictions. The mechanism of growth involves a system of chemical kinetics in which processes are dependent on many variables. The investigation of such growth mechanisms involves: (1) the identification of the elements of analysis, organs, molecules, etc.; (2) the establishment of a functional relationship between the elements; (3) the 'synthesis' of the organism in terms of this analysis. However, as it is not possible to apply the second of these procedures unambiguously to multi-variant systems, it is thus in principle impossible to make predictions. A causal explanation of growth in terms of chemical kinetics, *ceteris paribus*, is in practice trivial. The characteristics of the chemical kinetic growth system are just such that other variables never are equal. Dr. Kaeser held that the approach followed by his own unit, of simulating enzyme-controlled processes in terms of differential equations and of computing these sets of equations in a matrix computation, would lead to comprehension of the mechanisms influencing growth processes.

Mr. F. T. C. Harris gave an extempore account of a paper entitled "Description, Simplicity and Growth" which was available to the participants, and the subject of which fell into the first of Dr. Kaeser's three categories: the identification of the elements of analysis. Whatever the desirability of considering numerous contingent factors in causal explanation, Mr. Harris held that simplicity was essential at the level of description. In picturing morphogenesis embryologists have in mind a norm or ideal developmental pattern to which their material largely conforms and the part of which, in embryological theory, is analogous to that played in statistics by the concept of an infinite population. Simple descriptive concepts such as cell and number were shown to provide models of morphogenetic processes based on ideal developmental patterns. The models took the form of sequences of numbers which provided a classification of mosaic cleavage patterns that was more concise than that at present accepted. A specific example of the description of the cleavage of a sea urchin was used to illustrate the principles involved in formulating the models and in their empirical derivation. It was pointed out that the principles used provide a technique for seeking wider generalizations than are at present available. Further, these generalizations have the feature of being purely biological in that, at a descriptive level, they involve no reference to the conceptual apparatus of chemistry or of physics.

The chairman for the second symposium was Prof. G. H. L. Shackle (University of Liverpool). Prof. J. R. N. Stone (King's College, Cambridge) gave an extempore delivery of the essentials of an argument set out in

detail in his paper, "The *a priori* and the Empirical in Economics", which had previously been made available to participants. Prof. Stone held that it is not possible to discriminate between empirical and *a priori* statements in economics to the extent that such theories depend on both elements. For example, the *a priori* probability of obtaining a head in a single throw of a penny is a number  $p$  between 0 and 1. If  $p$  may have any value between these limits then if  $h$  is the probability of obtaining at least one head in  $n$  throws the expression for  $h$  is:

$$h = \int_0^1 [1 - (1 - p)^n] dp$$

Thus if  $n = 2$ , then  $h = 2/3$ , when  $n = 3$ ,  $h = 3/4$ , and so on. Betting on this would be uneconomic until experience showed that a more appropriate model was that based on an appreciation that the penny was unbiased when  $p = 0.5$ , and the function being of the form  $h = 1 - (1 - p)^n$  the corresponding  $h$ 's for  $n = 2$  and  $n = 3$  are  $3/4$  and  $7/8$ . Thus prior empirical knowledge may make a lot of difference to the theories we construct. Prof. Stone went on to elaborate this example by considering economic theories of consumers' behaviour, of statistical estimation of parameters concerning multiple relationships between economic variables and of a practical attack on the problem presented by the manner in which economic planning is affected by an infinite time horizon, in that what can be done to-morrow is influenced by what can be done to-day, *ad infinitum*. Dr. Ann Martin (University of Oxford) presented the second paper. Dr. Martin held that most economists are unclear as to whether their basic principles are testable or *a priori*. They treat analytic propositions as if they were synthetic, they re-state falsified synthetic propositions as if analytic, they fail to distinguish between rules that guide the construction of economic theory from those that guide economic policy and equally fail to distinguish between analytically and synthetically based types of hypothetical imperative (if you want one thing you must do another). The uncompromising *a priori* view of Von Mises is not truly Kantian because it appears to equate knowledge derived from introspection with *a priori* knowledge. But in fact knowledge of ourselves is not gained from introspection but from behaviouristic observation. Reliance on introspection tends to prevent empirical economic work being done and provides an apologetic *laissez-faire*. It provides the argument that if it is not possible to discover empirical regularities in economic affairs, such affairs are not suitable subjects for prediction and thus we should let them be.

Mr. J. W. N. Watkins (London School of Economics) was chairman at the third symposium, which was opened by Prof. R. L. Meek (University of Leicester), who explained that most early economic thinkers invoked political and theological criteria in judging economic policies. By the late-eighteenth century economists conceived their task as the analysis of the laws governing the operation of a kind of giant economic machine. Nevertheless, value judgements have since been imported into economic analysis. In the new economics developed since the Second World War, value judgements will undoubtedly enter into the formulation of the criteria of economic efficiency laid down for or by the economist, but once so defined the scope for their intrusion will be very small. Mr. K. Klappholz (London School of Economics) gave the second paper. He pointed out that there has recently again been much discussion of the question

whether economics can be 'wertfrei' or whether it is necessarily value 'impregnated'. After re-stating the usual meaning of 'wertfrei', Mr. Klappholz argued that the claims of "inevitable value impregnation" are quite irrelevant to it. The problem is 'Wertfreiheit'—in the logical sense—is a pseudo-problem. The paper briefly examined the problem of interpersonal comparisons of utility and its relation to value judgements, and the problem of value-free, that is, hypothetically-imperative, advice. In conclusion, Mr. Klappholz urged that the widespread desire to exclude normative questions from academic economic discussion is misguided and unnecessarily inhibiting.

Prof. W. C. Kneale (Corpus Christi College, Oxford) was chairman of the final symposium. Dr. G. T. Kneebone (Bedford College, University of London) argued the formalist's point of view of mathematical logic as a theory of the structure of logical relationships, adequate for the exhibition of the deductive form of traditional mathematics and for a formal analysis of mathematical concepts. While the deductive form of scientific theories is suitable for logical analysis, their empirical content ensures that such analysis cannot be exhaustive. Dr. M. H. Löb (University of Leeds) pointed out that mathematical logic is one of the most active areas of mathematical research and that fruitful pursuit of the philosophy of mathematics necessitates constant reference to tech-

nical work in logic because many concepts relevant to investigations in the foundations of mathematics have been explained in formal terms. Thus not only has mathematical analysis replaced the philosophy of mathematics but also is similarly applicable to the philosophy of science. Prof. Kneale succinctly summarized three points for discussion and then guided and stimulated the ensuing discussion.

There was general agreement that this was the most successful of the Society's conferences so far. There was considerable participation in the discussions by most members, with continuous subsequent development of themes initiated in earlier sessions. The unusual nature of these conferences, in which working scientists, philosophers, logicians and historians join in incisive and mostly good-natured mutual criticism, should perhaps not be allowed to pass unnoticed.

In a closing address, Prof. S. Korner (University of Bristol) thanked the conference secretary and Dr. H. R. Post for their efforts on behalf of the conference, the bursar of St. Hugh's College, Miss E. A. M. Major, for the care taken by her staff and herself for the comfort of participants, and the Department of Biology as Applied to Medicine, Middlesex Hospital Medical School, for secretarial assistance.

F. T. C. HARRIS  
D. G. HARRIS

## BRITISH TECHNICAL ASSISTANCE OVERSEAS

THE extent and character of technical assistance from the United Kingdom came under some criticism in two recent debates in the House of Commons, when it was again urged that the Department of Technical Co-operation should not be excluded from responsibility for financial assistance. On February 3, in moving the second reading of the International Development Association Bill, the Chief Secretary to the Treasury, Mr. J. Boyd-Carpenter, said that the purpose of the Bill was to approve Britain's commitment of £34.5 million over the three years covered by the Association's second plan, since in the autumn of 1963 it was agreed that the provisional pledges then given would become binding when 12 countries, contributing in all 600 million dollars, had formally notified their intention to contribute. Mr. Boyd-Carpenter said that when the Association was started in 1960, 750 million dollars was made available over a 5-year period, but expenditure had been much slower than commitments and only 130 million dollars had been expended although 600 million dollars had been committed. The new proposals agreed in autumn 1963 would provide a further 750 million dollars over a three-year period and Britain's contribution would be 13 per cent of the total, comparing with 8 per cent from France and 9.5 per cent from Germany.

Of the 550 million dollars committed up to September 30, 1953, 70 per cent went to Asia and the Middle East, 12 per cent to Latin America, 6 per cent to Africa and the remainder to the Far East and Europe. India had so far taken the largest proportion—54 per cent, followed by Pakistan. About 30 per cent of the projects were concerned with roads, about 20 per cent with other forms of transport, 20 per cent with irrigation and the remainder was divided between electric power, communications, industry, water and education.

While the Bill was generally welcomed, there was some criticism that the Association was conceived on too small a scale that it required a world authority and a more satisfactory if not compulsory basis for finance. Mr. R. E. Prentice stressed the importance of multilateral rather than bilateral aid and urged that the work should be ex-

panded and related to the United Nations Development Decade. In replying on the debate the Economic Secretary to the Treasury, Mr. M. Macmillan, maintained that the rate of interest was not the reason for aid not being taken up fast enough; but neither he nor other speakers referred to the factors emphasized by Dr. Dedijer in a recent paper on science in underdeveloped countries (*Nature*, 201, 1153; 1964).

In the debate on Commonwealth trade, technical assistance and Commonwealth links which was opened by the Prime Minister on February 6, Sir Alec Douglas-Home said that private investment in Commonwealth countries was running at about £150 million a year, and under the Montreal Conference system of Commonwealth loans since 1957 Britain had committed £300 million to 14 Commonwealth countries. British aid to Commonwealth countries was running at £120 million a year and £50 million of international funds had been put at their disposal by Britain in 5 years. Under the various technical assistance schemes Britain had 18,000 officers in 39 Commonwealth countries, and of the 1,637 new appointments made in 1962, 542 went into education, 254 into engineering, 219 into health and 97 into agriculture. Of the 42,000 students from Commonwealth countries in Britain's universities and colleges, some 5,000 were assisted by British Government funds. Since the Commonwealth Scholarships Plan was started in 1957, 1,000 scholars had held awards in Britain alone, and Britain was training 400 teachers each year from developing Commonwealth countries and in 1963 sent 600 teachers to Commonwealth countries to train teachers there. Sir Alex also referred to the work of the voluntary associations and to the expansion of British information services in Commonwealth countries.

Mr. H. Wilson, who followed the Prime Minister, referred to the importance of scientific research for the developing countries. His several questions on research contracts with universities and colleges of technology for developing new products to meet the needs of these countries met with no response, nor did his reference to the potentialities of agricultural research for agricultural productivity. Mr.