

understood, any arguments against their own position; finally, nothing of any scientific or ethical consequence follows from the contrasting stances taken up by each author.

Thorpe's book is perhaps the less bad, if only because, unlike Skinner, he gives some interesting examples of the results of his own science. He culls from recent work in ethology instances of fixed action patterns, animal communication systems, and social organisation in mammals. Such phenomena have an inherent fascination: like most ethologists Thorpe is at his best when describing such behaviour and speculating on its survival value. He is less good at specifying the mechanisms that mediate it. On many issues, such as nature against nurture, he takes a sensible position—he rightly castigates Hebb for his declaration that it is absurd to ask how far a given piece of behaviour is innate, how far it is learned. Thorpe's chapter on perception is weak: he still thinks of perception in terms of pattern recognition and fails to get across the idea that perception must involve forming representations of the outside world which can be manipulated in ways that serve to guide the organism around. In this chapter, his accounts of much experimental work are somewhat cursory and inaccurate.

In arguing for an antireductionist, emergent view of mind he fields the standard team of obscurantists: Koestler, Polyani, McKay, Eccles, Dobzhansky, Weiss, Hardy and Teilhard de Chardin. His eleven is made up by enrolling two new players, Chomsky and Popper, and by using a theologian (Hick) as long-stop. With the exception of the two beginners, these players proceed to throw around terms like 'emergent', 'consciousness', 'determined', 'free-will', 'wholes-greater-than-the-sum-of-their-parts', and so on. We are treated to such sentences as "the ego's view of the physical world will thus be mediated by a mechanism working just like television". On page 341 there is even a diagram showing (with a dotted line) how "mental space" intersects three-dimensional physical space. The players have such an enjoyable time tossing the ball to one another and cheering each other on, that they seem quite to have forgotten to notice the opposition. Nevertheless, they make their opponents' task very difficult, since the game is played with no rules or definitions; but it may be worth examining a few of the many *non sequiturs*.

Thorpe accepts McKay's proof that behaviour is indeterminate: in attempting to predict our own behaviour, we change our internal state and, short of an infinite regress, we cannot take such changes into account in making our

predictions. The premise is correct but the conclusion does not follow: do we regard computers as being indeterminate because no program could completely predict what it will do? Again, it is correctly stated, following Popper, that at each level of explanation it is necessary to evolve concepts appropriate to that level. To explain and predict the behaviour of a gas we need concepts like pressure, appropriate to collections of molecules not to individual molecules, and to explain the workings of a computer program we need concepts such as 'conditional jump', 'recursion', and 'iterative loop' that cannot be applied to transistors. If this is all Thorpe means by "emergent qualities", then we can readily concede that a system with the highly unusual organisation of the brain is likely to have emergent qualities, without committing ourselves to the belief that there is some special sense in which human behaviour is 'undetermined' and without supposing that there is a two-way interaction between consciousness and matter. Thorpe also uses the "gawping at Nature" argument: we do not understand why some bird songs and displays should be as elaborate as they are, but present ignorance is no reason for assuming that no scientific explanation will in future be found. It is particularly curious that Thorpe should use this argument since else-

where he points out that some highly complex behaviour once thought to indicate the presence of a life-force or creator can nowadays be explained in mechanistic terms.

The assertion that "Sir Karl Popper comes down with all the weight of his great learning and experience heavily on the side of dualism" surely does not exempt Thorpe from considering the difficulties inherent in this position. The polemical parts of the book are written in the vaguest of terms. Thorpe dismisses computers as models of the mind without discussing any work in artificial intelligence, yet telepathy and clairvoyance are uncritically accepted on the strength of the questionable work of such experimenters as Soal and of Koestler's collection of unlikely coincidences. The distinguishing characteristic of the human race is said to be religion.

The book is based on a series of Gifford lectures delivered at St Andrews: such lecturers are instructed, under Lord Gifford's will, to deal with natural religion "as a strictly natural science, the greatest of all sciences"; but this instruction is usually interpreted by the lecturers themselves to mean they should treat of their own subject matter in religious terms. The present book is a fine example of the Gifford Lectureship Syndrome.

N. S. Sutherland

Factors leading to schizophrenia

Genetics, Environment and Psychopathology. (North Holland Research Series on Early Detection and Prevention of Behaviour Disorders, vol. 1.) Edited by S. A. Mednick, F. Schulsinger, J. Higgins and B. Bell. Pp. xiv+346. (North Holland: Amsterdam and Oxford; American Elsevier: New York, 1974.) £9.25.

In 1962 the Psykologisk Institut in Copenhagen began a research project aimed at the early detection and prevention of mental illness. This book brings together a number of studies conducted at the Institute over the last 10 years. Many have contributed to the research, and 20 authors from the USA, Denmark, Iran and the UK, write in this volume.

The authors were dissatisfied with research on people already schizophrenic and so they conducted prospective studies of people at risk. They used children of schizophrenic parents and selected control groups. Unexpectedly, they found that perinatal factors influenced later outcome and so they established a new study in greater detail, using babies born in Copenhagen between 1959 and 1961. They linked that with Professor Preben Plum's detailed peri-

natal study of 9,006 deliveries during that period.

The methods that were used are described fully. They were of a high standard and good contact was maintained with family doctors and hospitals. There is a full list of references which will be valuable to others studying in this field, and there is an index.

The book represents a considerable advance towards the unravelling of genetic and environmental factors in the origins of schizophrenia. Electrodermal responses were used in several of the studies, and some of the authors characterise schizophrenia as a learned pattern of avoidance responses. As treatment seems to offer little, attention has been concentrated on methods of prevention of the development of schizophrenia in 'high risk' children. The authors have made excellent use of the Danish Register of Adopted Children. Schizophrenia is only one of the mental illnesses studied, and the effect on being reared by a schizophrenic mother is tentatively separated from inherited factors.

This volume is good value for money for all research workers in this field and will be of great interest to all field workers.

R. Mac Keith