BOOK REVIEWS


To say that Mackintosh has produced the most comprehensive and scholarly analysis of the process of learning is not a sufficient complement to the achievement represented by his recent book The Psychology of Animal Learning. Other books on the topic provide neither the depth nor the breadth of coverage that this fundamental area of experimental psychology demands. Mackintosh has remedied this serious deficiency by providing a thoughtful and provocative analysis of the major issues in learning.

The book consists of a brief introduction followed by nine lengthy chapters. The methods and theories of classical and instrumental conditioning are dealt with in the first four chapters. One chapter is devoted to the analysis of aversively motivated behaviour, one to contrast effects and one to extinction. The final two chapters deal with generalization and discrimination. Although Mackintosh's writing style is precise and readable, the organization of the material within chapters tends to disrupt the logical progression of the narrative. Each chapter is divided into between three and eight sections many of which have a number of subsections. Some of the subsections also have subsections and the numbering and lettering of the many components of each chapter can be a source of some confusion.

The categories into which Mackintosh fits the findings of the (over 1800) articles that comprise his reference list will be familiar to students of psychology who have been nurtured on the writings of Tolman, Hull, Guthrie and Pavlov. He reduces the phenomena of learning to terms of the R-T-R thing language. In so doing he has succeeded admirably in imposing a potentially comprehensible order upon experimental data gathered by researchers using a variety of methods and working from very diverse sets of assumptions. The organization of the published work on learning is in itself a substantial contribution to psychology.

Mackintosh does a masterful job in examining the experimental phenomena of learning in relation to the theories that have evolved to explain them. His method is first of all to provide an operational analysis of a particular learning phenomenon in which the empirical dimensions of the process are fully described. Thus, for example, in describing the determinants of the partial reinforcement effect the influences of the following variables are fully analysed: percentage of reinforcement, N-length, and N-R transitions, patterning of N and R trials; effects of reinforced and non-reinforced placements in the goal box; partial delay of reinforcement; effects of size of reward; intertrial interval; number of acquisition trials; generalization between non-reinforcement and punishment; effect of drugs. The list of topics submitted to this type of exhaustive operational analysis is impressively long.

Following analysis of the experimental findings related to a particular learning process, Mackintosh then goes on to examine the theoretical implications of these findings. Although in the introduction he denies commitment to any particular theory, a strong inclination towards a Tolmanian interpretation of learning is evident throughout the book. Often the resolution of a theoretical dilemma in favour of an S-S, expectancy interpretation appears to arise spontaneously although at other times 'expectancy' emerges as a victor by default: by the inadequacy of alternative (often S-R) formulations in accounting for the intricacies of the experimental data.

The process of expectancy is an intuitively appealing and parsimonious explanatory device that may be employed to interpret many behavioural phenomena. But it is not shown to be experimentally falsifiable. Perhaps this is why Mackintosh's theoretical conclusions frequently appear to be rather weak. Thus in commenting upon the observation of Shapiro et al. (1966) that salivation often accompanies panel pushing in dogs reinforced with food, he suggests 'that a more natural interpretation...is...that the presentation of the CS led subjects to expect that the time for the delivery of food, and therefore the time for responding, had arrived' (p. 228). The central problem of how reinforcement in instrumental learning establishes response-controlling properties in discriminative stimuli is treated in similar terms. Thus discriminative stimuli 'do not instigate responding: as a consequence of past learning they act as goals for responding'.
Animals learn that 'their behaviour has certain consequences' (p. 211) and their response rate increases because of 'increased anticipation of reinforcement' (p. 232). Expectancy notions are also central to his interpretations of avoidance learning, conditioned inhibition and frustration (p. 346).

Biologically-based approaches to the analysis of behaviour such as ethology have provided some compelling criticisms of the artificial and intuitive behavioural categories employed by experimental psychologists. These criticisms tend to be supported by an evaluation of the theoretical analyses presented in this book. The analytical framework provided by traditional learning theory is only marginally successful. It lacks internal consistency, reducing the phenomena of learning to terms ranging from operationally defined processes to concepts still firmly rooted in mentalistic philosophy. In view of this, the reader may regret Mackintosh's reluctance to specify the assumptions underlying his theoretical preferences and to provide explicit definitions of fundamental terms such as stimulus, response, motivation, etc. Perhaps greater use of a biological frame of reference and of relevant data from the areas of physiological and comparative psychology may enable learning theory to progress beyond the formulations proposed 40 years ago by Tolman and Hull.

However, Mackintosh does not purport to generate a new approach to the explanation of learning processes and it is patently unfair to burden him with the sins of earlier generations. As a compendious reference source, a distillation of conclusions from much effort in animal laboratories, and as an example of methodology and the weighing of evidence, the book is a striking and welcome achievement.

JASPER BRENER AND STEPHEN WALKER


Venables and Christie have invited 17 contributions with which to interest the general or experimental psychologist, as well as the committed psychophysiologicalist, in the approaches of contemporary psychophysiology. Therefore this is not a specialist book, such as the substantive handbook edited by Greenfield and Sternbach, but rather aims to whet the reader's appetite with issues that may be pursued in depth elsewhere.

It is divided into three parts. The first concerns methodology. Lykken in a short chapter stresses the necessity of controlling for individual variability in group designs, and admonishes researchers for failing to look at score distributions in order to consider what may underlie variation from the mean. Mefford describes problems associated with statistical evaluation of longitudinal measures, and advantages in multivariate approaches. Christie and Todt point to ways in which psychophysiological measures may underline the influence upon the subject of the experimenter and test situation.

The second part is loosely called 'states'. It includes an excellent description by Frankenhaeuser of the behavioural correlates of sympathetic-adrenomedullary activity. Sayers introduces novel statistical analyses of sustained tonic changes in cardiovascular variables in laboratory and work situations. There are discussions by Johnson on the psychophysiology of sleep and by Naitoh on sleep deprivation. Other chapters include Bell's investigation of the menstrual cycle, and Christie's experiments relating skin potential levels to electrolyte balance and their variation with stress. Stern, Farr and Ray review studies of pleasure. The section ends with three chapters on psychiatric conditions: affective disorders by Lader and Noble, schizophrenia by Venables, and psychopathy by Hare.

In the final section physiological variables are shown to shed light on information processing. Sutton and Tueting tantalize with their studies showing the sensitivity of the cortical evoked potential in reflecting subtle attentional and motivational changes. Martin outlines the contribution made by autonomic conditioning to learning theory, drawing on her own meticulous work. Craik and Blankstein review the controversial literature concerning aspects of the psychophysiology of human memory. Finally, Venables, in pointing to the possible psychological and psychopathological implications of the recovery time of the skin conductance response, illustrates the advantage in interdisciplinary collaboration.

The editors' enthusiasm for psychophysiology is shared by this reviewer, who hopes that the collection awakens many experimental psychologists to the advantages in concurrent measurement of biological variables, and to methodological advances that psychophysiology has fos-