

## Behaviourist history

*Behaviourism and the Limits of Scientific Method.* By Brian D. Mackenzie. Pp. 193 (Routledge and Kegan Paul: London and Henley, 1977.) £4.95.

In *Behaviourism and the Limits of Scientific Method* Dr Mackenzie traces the history of behaviourism from Watson to Skinner and examines its philosophical assumptions. He notes that there have been several different kinds of behaviourist. Watson's insistence that in order to be a science, psychology should be concerned only with observable behaviour and not with the furniture of the mind was followed by a more general concern with scientific method, and many behaviourists went on to embrace the then fashionable reductionist doctrines of the logical positivists and operationists. The most extreme version of behaviourism is that still being promulgated in increasing isolation by B. F. Skinner, who abjures all theoretical concepts.

Dr Mackenzie makes some interesting points. He claims for example that the learning theorists of the thirties—Hull, Tolman and Guthrie—were led astray by their adherence to logical positivism. Because they believed that their theories were merely ways of systematising the data and that their explanatory concepts had no ontological status, they failed to make explicit many of the assumptions behind their theories: the mutual misunderstandings thus engendered led to many pointless wrangles. It is certainly true that, as they later came to realise, their theories lacked rigour, but the theoretical looseness surely arose less from their philosophical assumptions than from the fact that at that time no formal language existed in which to couch rigorous explanations of behaviour.

Dr Mackenzie fails to note the difference between postulating intervening variables and putting forward a mechanism to explain behaviour. It is ironic that psychologists should have been reluctant to reify their explanatory concepts. It is clear that real processes intervene between the stimulus and the response and these processes are instantiated in a corporeal body known as the brain. To understand the logic of the brain's connectivity, psychologists needed to evolve new concepts, but the reality of the brain cannot be doubted in the same way as it is possible to doubt the reality of quarks.

Although Dr Mackenzie has provided an interesting and original account of the philosophy and history of behav-

ourism, the book has one curious fault: he has kept his eye so firmly on his quarry that he seems unaware that there have always been psychologists of many different colours. He even refers to behaviourism as "the most important single influence in the continuing development of modern psychology". This is a startling assertion to make at a time when many psychologists explicitly take account of introspection, and when almost all are concerned with building process models. Behaviourism has in fact never had much effect on the study of perception, language or cognition;

even those studying memory have shaken off its influence over the past two decades. Moreover, at the time when Hull, Tolman and Guthrie were at their most influential, Lashley, Kohler, Wertheimer and Bartlett were putting forward ideas and theories of a very different kind. Dr Mackenzie clearly did not come to praise behaviourism: it is a pity he has not appreciated that he is too late to bury it.

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## Photoconductive techniques

*Photoconductivity and Related Phenomena.* Edited by J. Mort and D. M. Pai. Pp. 502. (Elsevier: Amsterdam and New York, 1976.) Dfl. 155; \$61.95.

PHOTOCONDUCTIVITY is probably the most sensitive of all the electrical phenomena, to the defect properties of insulators and semi-insulators. Furthermore, the photoconductive technique can be studied under a wide range of experimental variables such as wavelength, intensity, temperature, applied electric field, and in steady-state and non-steady conditions. Consequently, photoconductive data are often very distinctive and rich in structure, providing a powerful probe for investigating the trap parameters and structure of solids, as well as an insight into physical processes involved such as absorption photogeneration recombination, transport, intramolecular relaxation, electro-photon interaction, and so on.

It is not surprising, therefore, that in recent years photoconductivity techniques have been increasingly utilised in the study of the disordered and amorphous state. This book describes the applications of photoconductive techniques to these materials, a collection of review articles by leading workers in the field.

The first nine chapters are devoted to basic concepts and experimental techniques. The book opens appropriately with a review of contact effects, often neglected and ignored (conveniently?), yet absolutely fundamental to a proper understanding of photoconductivity. Chapter 2 deals with experimental techniques, with particular attention on transient and time-varying Hall and photo-electromagnetic

techniques. Chapter 3 is concerned with the time-dependent photoconductivity, an area which I believe offers the greatest scope for future study, but which poses formidable problems. Chapters 4-9 deal with photoconductivity in a variety of materials: covalent semiconductors, molecular crystals, amorphous tetrahedrally bonded solids, amorphous chalcogenides, and polymeric photoconductors. The most comprehensive of these, and a very readable account, is the one on amorphous chalcogenide and non-polar liquids. There is surprisingly little duplication considering the closely-related nature of the work, and that the works are by different sets of authors, thus reflecting the wide-ranging versatility of photoconductive techniques.

The final two chapters are concerned with applications of photoconductivity. Chapter 10 deals with photoelectronic semiconductor devices. I would have liked to have seen more space devoted to this chapter, and more emphasis on devices using disordered photoconductors, because this is what the book is really all about; even if this were at the expense of those based on crystalline materials. The last chapter, a fitting close to the book, is concerned with electrophotography, and provides a good account of the basic principles of electrophotography, image formation and development, and requirements for photoreceptor materials.

On the whole, most of the articles are concerned with underlying physical processes stressed rather than the theory, and most are very readable. The book is prepared to a high standard, and should appeal to experts (and others) in the field, although I doubt very much if the price (\$62) will.

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