

Book Reviews

The Bases of Behavior

Comparative Psychology at Issue. Papers from conferences, Tokyo and Honolulu, Aug. and Sept. 1972. ETHEL TOBACH, HELMUT E. ADLER, and LEONORE LOEB ADLER, Eds. New York Academy of Sciences, New York, 1973. 198 pp., illus. Paper, \$18. *Annals of the New York Academy of Sciences*, vol. 223.

This timely little volume consists of papers presented by 15 contributors at a series of meetings held in 1972. At these meetings leading investigators and theorists discussed the issues that had been raised in an article by R. B. Lockard a year earlier ("Reflections on the fall of comparative psychology," *Am. Psychol.* **26**, 168 [1971]). In the end no clear statements are made either in support of or refuting Lockard's main arguments, but this may be a reflection of the "committee" approach.

Two main themes emerge. One is the growing evidence that evolution has produced behavioral adaptations highly tuned to ecological conditions in closely related as well as in distantly related animal species, giving rise to behavioral diversity among animals. On the other hand, common descent and, on a smaller scale, speciation imply underlying communalities of behavioral mechanisms. As Hidaka expresses it, "The theme is always hidden in the variations and is never stated beforehand; and the variations are really the existing species, which are all we can observe" (p. 75).

Lockard's argument has serious flaws that are only touched upon by several writers. He asserts that natural selection acts only on heritable behavioral traits, resulting in the transmission of genetically based behavioral adaptations to specific ecological niches. If this means anything more than that surviving animals (therefore adapted ones) produce like young, which cannot be disputed, it ignores the fact that natural selection acts only upon the outcomes of behavior and is indifferent to the

mechanism by which these outcomes are achieved. Moreover, "genetically based behavior" refers to all behavior, including those behaviors which depend upon genetically based mechanisms for acquiring behavior through experience. Genetic material is indifferent to the mechanisms by which it is transmitted to offspring: like natural selection, it is concerned only with outcomes. Innate behavior may be defined, as it is by Lockard, as genetically based, but this definition is not equivalent to "developing without experience" as Lockard is prone to believe. In this volume only Klopfer challenges the concept of innate behavior as proposed by Lockard.

Nevertheless, the various authors discuss issues of concern to comparative psychologists. The value of the comparative method is discussed by J. P. Scott, D. A. Dewsbury, W. Wickler, T. Hidaka, and H. Moltz as applied to the study of behavioral development, the nature of imprinting, mating behavior in mammals and in Lepidoptera, and convergent adaptation. Behavior patterns having similar adaptive functions in different species can be the starting point for the analysis of species differences in behavioral organization. Behavioral homology is discussed by several writers, and the difficulty of deriving lineages to account for existing behavioral homologies is acknowledged to a greater extent than in Lockard's article.

W. H. Thorpe and C. Pfaffman, from different viewpoints, discuss the significance of the evolution of behavioral capacities as adaptations to specific habitats. Thorpe proposes that mechanisms of both innate and learned behavior are specialized adaptations and gives examples from several species to support this view. Pfaffman discusses how the use in neurophysiology of natural stimuli derived from analysis of species-specific behavior patterns has led to the discovery of specialized neurophysiological capacities, particularly in sensory perception (that is, sensory

coding). To this reviewer there remains a question whether the ethological "lock and key" conception of the releasing stimulus is compatible with the properties of neural functioning revealed through sensory neurophysiology.

The subject of higher mental functions, often neglected in comparative psychology, is represented by the articles of L. V. Krushinskii and K. H. Pribram. The former discusses complex spatial perception as it appears in different species, and the latter addresses himself to the problem of language use and the processes that underlie it.

The most comprehensive theoretical article is that of H. P. Ziegler, who attempts to deal with the central issues raised by Lockard and by the problem of dealing simultaneously with the similarities and differences that are presented to us by the diversity of animals and their specialized behavioral adaptations. It is a complex article, difficult to summarize, but highly recommended.

The editors were wise not to try to impose too much form on the individual contributions or to attempt in their epilogue to integrate or resolve the issues raised during the meetings. I doubt that the latter can be done at the present time, and that perhaps is the message of this volume.

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Artificial Intelligence

Computer Models of Thought and Language. ROGER C. SCHANK and KENNETH MARK COLBY, Eds. Freeman, San Francisco, 1973. x, 454 pp., illus. \$13.50. A Series of Books in Psychology.

The "computer models" in this anthology's title are of two sorts: computer programs which are meant to act as models of human thought processes, and accounts of mental activity which compare the mind to a computing system but which have no particular computer program associated with them. The models of the second kind might more properly be called theories, but there is a tendency throughout the book to use the words interchangeably and to obscure the fact that one of the principal difficulties both in constructing and in appreciating model programs is in sorting out the part that is of theoretical interest from the part that is not.