cine." Despite the efforts of a few dynamic young recruits, the average age of homeopathic practitioners has steadily increased. Kaufman predicts the sect's demise within two or three decades.

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Afferent Processes

Animal Psychophysics. The Design and Conduct of Sensory Experiments. WILLIAM C. STEBBINS, Ed. Appleton-Century-Crofts, New York, 1970. xiv, 434 pp., illus. $18.75.

The editor of this unique compendium cites Claude Bernard (1865) on the impossibility of studying psychophysics in the dumb brutes: "Experimental studies of sense organs must be made on man because animals cannot directly account to us for the sensations they experience." The limits of Bernard's imagination have been exposed by a century of fruitful investigations capitalizing on the behavior—both unlearned and learned—of animals.

Recent advances in the experimental control of behavior, stemming in large part from Skinner's operant conditioning methods, have notably enhanced the power and accuracy of studies of afferent processes and mechanisms in animals. The present volume assembles 18 reports from 27 authors who share a devotion to operant conditioning in some form as a basic element in their diverse inquiries, all gathered under the heading of psychophysics. This heading, as usual, comprises processes as different as stimulus transduction by sensory end-organs and the categorization, interpretation, or ranking of stimuli by the intact organism.

The book is intended to be methodological—meaning it deals with training procedures, with rules for the presentation of stimuli, and with instrumentation—but happily it is more besides. Compositely the papers afford a view not elsewhere available of the state of the art, together with some of the best products of the art, and offer an intimation of how far the art might be extended. The detailed information supplied concerning the measurement of thresholds and similar parameters is what one would ordinarily have to obtain from the investigators in person—the particulars left out of journal articles, pieces of useful lablore, mention of alternatives and of false possibilities tried and discarded.

The merit of the whole book is of a different genus from the virtues of its parts. Some contributions are long on methods, others on findings, and a couple on neither. James Smith's chapter summarizes a long program of work at Florida State University on many species and on the ordinary sense modalities plus some exotic ones. The conditioned-suppression method used by Smith is described in its application to mutant mice by Barbara Ray. Reviews of programs of research on audition are presented by Stebbins and by Gourevitch, and Dalland writes about ultrasound and bats. Weiss and Laties bring an overview of their extensive studies of pain and analgesia, of course with a pharmacologic side. This work has a motivational aspect, but even more so does the other contribution on somatic sensitivity, Harry Carlisle's chapter about rats pressing bars to douse themselves with radiant heat. These experiments deal not with cues so much as with reinforcements on their sensory side and with regulation; more precisely said, the behavior studied is jointly controlled by brain interoceptors and by exteroceptors sensitive to the same conditions, and thus we have the larger phenomenon of homeostasis, in which sensation is just an element.

Vision comes in for four chapters: Berkley's on training visual discriminations in the cat; a brief one by Glickstein and colleagues on striate cortex lesions; Yager and Thorpe's on color vision in the goldfish, which lends support to the Hering-Hurvich-Jameson theory of opponent processes; and one in which Scott and Milligan take up the difficult and delicate problem of measuring visual motion aftereffects in the monkey and report impressive results.

Three chapters, by Moody, Miller *et al.*, and Reynolds, are given over to reaction-time methods. The most positive results are shown by Moody, who has used equal reaction time as a null method for measuring light and sound intensities. Titration and tracking methods, like those of von Békésy which were first applied to animals by Ratliff and Blough, are here discussed by Rosenberger. The general principles of psychophysics and a bit of the classical methods are sketched at the outset by Stebbins, but that whole new way of thinking about sensory experiments in general called the theory of signal detection is brought in by John Nevin in the last chapter. Nevin's studies are guided by the theory, but his data are not compatible with the simple notion that the signal distribution remains fixed on the decision-axis under varied reinforcement conditions, or with the idea of a single criterion maintained by the animal for all signals.

One original theoretical effort is made—an attempt by the Mallotts to bring sensation and perception rather generally into the framework of stimulus control and cognate concepts from the language of conditioning. The effort is not successful; the claim that sensation and perception experiments can be distinguished by whether or not the experimenter knows exactly when to reinforce seems to this reviewer plainly false. The attempt to put under the heading of multidimensional generalization the diverse topics of illusions, sensory scaling, and stimulus matching emerges as a confusion. These difficult questions will have to be settled at a future date, as both psychophysics and the study of behavior advance, helped along by this book.

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Pharmacology

Molecular Properties of Drug Receptors. A Ciba Foundation Symposium, London, Jan. 1970. RUTH PORTER and MAEVE O'CONNOR, Eds. Churchill, London, 1970 (U.S. distributor, Williams and Wilkins, Baltimore). x, 298 pp. + plates. $14.

The purpose of this symposium was to bring pharmacologists and protein chemists together and let them discuss the "state of the art" as far as pharmacologic receptors are concerned. Thus the proceedings begin with a historic review of pharmacologic receptors; several well-known receptor systems are described; recent information about active sites of several enzymes and methods that can be used to study conformational changes are discussed; and finally, the participants share their thoughts about how to characterize and isolate the "elusive" pharmacologic receptor.