sion of control of eye-head movement. Bizzz reiterates an important issue raised by Hoyle at the beginning of the volume (i.e., the extent to which a given behavior is under the control of sensory feedback as opposed to being run off as a "motor tape" which is completely specified by central processes). He shows that eye-head coordination is controlled differently according to different behavioral situations. Land's chapter on visuomotor behavior in the fly and man might better have been placed with this one.

The final section, "Integration and Regulation in the Brain," covers diverse topics, all anchored in psychology. Berlucchi and Buchtel review the neural bases of learning from a highly narrow and uncritical point of view. Changes in visual neuron receptive fields due to sensory deprivation are taken to indicate that "a decrease in synaptic efficiency" is a "basis for learning." Current research in learning does involve a great deal of effort in electrophysiology, including attempts to relate the activity of single neurons or groups of neurons to acquired behavior; regretfully this approach is not discussed. References to reviews that do cover this and other approaches to learning simply do not serve as adequate substitutes.

Schacter considers one facet of motivation and emotion, the James-Cannon controversy between peripheral (visceral) and central (brain) explanations of emotion, respectively. Schacter points out that neither view accounts for experimental findings; even behavioral patterns evoked by central (e.g., hypothalamic) stimulation through the same electrode will vary according to the context (situational stimuli) in which an animal finds itself. While this chapter comes close to realizing the editors' hopes for fundamental consideration of central issues (no pun intended), it seems a bit dated; the most recent paper cited was published in 1966.

Gazzaniga deals with perhaps the most far-reaching issue in psychobiology, localization of function, and asks what is supposed to be localized? He finds that "... systems in the brain which are involved in conducting primary input (and output) messages are susceptible to dramatic breakdowns in function and these can be easily localized and detected." But, he adds, when behavior involves concept formation, logical capability, etc., the information channels involved are not easily, if at all, identified. Gazzaniga implies that despite the acquisition of data from the "split-brain" human, and the like, apparently we still require a "far more sophisticated set of concepts and ideas ... to penetrate ... the problem of brain and behavior."

While this volume does provide a good view of much contemporary psychobiology, it may not be regarded as a "handbook" in the sense of the term as generally used in that it ignores large segments of the discipline (e.g., behavioral genetics and the use of genetics as an analytic tool to understand behavior, species-specific behavior including territoriality, aggression, sexual behavior, eating, drinking, and relevant aspects of neuroendocrinology). A specific consideration of organismic adaptation and the evolution of behavior would certainly be obligatory in a handbook of psychobiology. The present volume is useful in depicting much of current research in the discipline, and because several of the chapters deal broadly with fundamental conceptual problems as well as contemporary data, it may have a certain timelessness.

What Makes the Rabbit Run

Frank A. Geldard


Reviewed by James C. Smith

Frank A. Geldard is Stuart Professor of Psychology, Emeritus, and Senior Research Psychologist at Princeton University, where he established the Cutaneous Communication Laboratory. A PhD of Clark University, he was previously Dean of the Graduate School of Arts and Sciences and Director of the Psychological Laboratory at the University of Virginia. Geldard is former President of APA Division of Experimental Psychology and Military Psychology, and received the American Psychological Foundation’s 1974 Distinguished Teaching Award. He is author of Fundamentals of Psychology and of The Human Senses.

James C. Smith is Professor of Psychology at Florida State University, where he earned his PhD. He has been a visiting staff member at Pennsylvania State and Colgate Universities, and at the U.S. Naval Radiological Defense Laboratory. Smith received the 1974 Amoco Foundation Award for Excellence in Undergraduate Teaching. He contributed chapters to W. C. Stebbins’s Animal Psychophysics: The Design and Conduct of Sensory Experiments and to E. Stellar and J. Sprague’s Progress in Physiological Psychology IV.

Sensory Salivation is a fascinating book that can be easily read in an evening. I would recommend it not only to researchers working with the senses, but to a much broader audience including advanced undergraduates. The book says as much about the man, Frank Geldard, as it does about the research in sensory salivation. It is as fine a lesson in a systematic approach to the solution to a problem as I have read. Ideas for research emerge as one reads, and in many instances they are proposed and reported in the ensuing pages. Quite explicitly in the last few pages, Geldard suggests dozens of theses and dissertations ripe for picking by students in the sensory area.
This book will be important in the history of psychology, for Geldard is unique in his academic family as one of the last sensory generalists. As a student of the late John Paul Nafe, who was a student of Titchener (who was a student of Wundt), Geldard's ancestry quickly renews back to the beginnings of scientific psychology. The book was the result of talks given for the MacEachran Memorial Lecture Series at the University of Alberta. The research reported in the book is less than five years old. As Thomas M. Nelson said in the foreword to the book, "Much of the work reported came to fruition during the last year. The lesson is that it is vigor and firm direction, not circumstance or age, that are the important markings of a scientist."

Saltation is derived from the Latin saltare, which means to dance, leap, or jump. Saltation in the book is about a sensory phenomenon that Geldard and his colleagues happened on by accident in 1971.

What is the effect in question? Let us consider a simple cutaneous stimulation situation. There are identical contactors placed about 4 inches apart on the forearm. Each is capable of delivering a sequence of sharp taps, being energized by square waves of only a few milliseconds duration. Now let the three contactors be put into operation sequentially, each in turn receiving five rapid pulses and with no pause in passing from one vibrator to the next. In the right range of repetition rates—and this can be anything from 3 to 50 pulses per second, optimally about 20—instead of feeling three well-spaced bursts located under the contactors, the 15 taps appear to distribute themselves uniformly from the region of the first contactor to that of the third. There is a slow, sweeping movement punctuated by taps. The impression is that of a tiny rabbit hopping up the arm. (pp. 28-30)

The second chapter describes a long series of investigations where the parameters of the rabbit were altered over a wide range in an attempt to understand what made the rabbit run. Much of this was done with the "reduced rabbit," a situation where the number of contactors was reduced to two. When the conditions were right, the tap would leap out of position somewhere between the two loci of stimulation. Geldard reports that the rabbit can span considerable distances either with or against the flow of afferent impulses. It can go in several directions simultaneously and is dependent on both time and intensity of the taps. Geldard subsequently found that topographic variations with the contactors was an important parameter. The rabbit could make large leaps in a longitudinal orientation, but made weak, uncertain, or no leaps with transverse placement of the contactors. Geldard concluded:

We are coming to the belief that we are dealing with a fundamental property of the nervous system and it may have far-reaching implications. Is it a dermatomal boundary that prohibits the saltatory leap? If so, we are in possession of a powerful neurological probe, one that may have practical and clinical value for testing the integrity of the nervous system. (p. 79)

Because there was no evidence of travelling waves in the skin, the conclusion was reached that the rabbit was a centrally controlled phenomenon, and therefore it should be possible to demonstrate saltation in other senses.

The third and last chapter of the book describes saltation in audition and vision. With the placing of seven speakers, clicks were presented in 1, 4, and 7 in a specified manner and 14 observers could "hear the rabbit" as he jumped through all seven speakers. Several other auditory experiments are described, but Geldard confesses that they have given far less attention to the auditory rabbit than to the cutaneous or visual version.

With the visual rabbit, Geldard manipulated retinal position, adaptation state, color, and many other parameters in demonstrating this "perceptual leap" across the visual field. The implications for color theory are quite profound in the study of the locus for color-mixing.

Marie Curie once said, "A great discovery does not leap completely achieved from the brain of the scientist, as Minerva sprang, all panoplied, from the head of Jupiter; it is the fruit of accumulated preliminary work. Between the days of fecund productivity are interspersed days of uncertainty when nothing seems to succeed, and when even matter itself seems hostile; and it is then that one must hold out against discouragement."

As a result of many fruits from his long accumulated previous work, Geldard was able to recognize this great discovery as it leaped not from the brain but from the arm of his observer. This book is the story of many days of fecund productivity and along with Vincent Dethier's To Know a Fly and Kenneth Roeder's Nerve Cells and Insect Behavior, it will become recommended reading for my students.

Can Impoverished First Graders Earmarked for Failure Be Taught to Read?

Michael A. Wallach and Lise Wallach


Reviewed by Martin Kling

The authors, husband and wife, are both at Duke University, where Michael A. Wallach is Professor of Psychology. Michael Wallach previously taught at Massachusetts Institute of Technology, the University of Chicago, and Harvard University (where he earned his PhD). He is author of The Intelligence/Creativity Distinction and coauthor with C. W. Wing, Jr., of College Admissions and