

BOOK REVIEW

Psychophysiology: The Mind–Body Perspective. By Kenneth Hugdahl.
Cambridge: Harvard University Press, 1995, 429 pp.

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This volume is a very welcome addition to the relatively limited set of texts for students of psychophysiology. Kenneth Hugdahl is an exceptionally broad psychophysiologicalist who has used all of the major response systems in his own research and has also made important contributions to experimental and clinical neuropsychology. He is therefore well-equipped to produce a particularly distinctive text in this area and he has delivered on the promise.

The text is intended as an introduction to the discipline. As such, the author does not assume any prerequisites on the part of the reader. This viewpoint will be a virtue in using this book with students. The text can serve as a useful overview for graduate students while still remaining sufficiently simple to serve as the primary source for the occasional undergraduate course in Psychophysiology. One of the very useful components of this book is the frequent referral of the reader interested in more depth to other primary sources. This information is provided for all of the major concepts and methods that are introduced. Each chapter also includes a brief summary that provides a helpful reminder to the reader of the major points that were covered.

The text is divided into three sections, along with an epilogue. The first section is an overview of the discipline. I thought this overview was a particularly useful component of the text for it introduces the student to the excitement of the subject matter. Hugdahl places psychophysiology squarely within the cognitive and affective neurosciences and, as such, offers a refreshing perspective on age-old questions about mind–brain–body relations. Hugdahl also has a very catholic view of psychophysiology and includes within its purview neuroendocrine and neuroimaging methods. Given the historical commitment of psychophysiology to the exploration of brain–behavior relations in intact humans using relatively noninvasive methods, this breadth is entirely appropriate.

In this first section, Hugdahl introduces the reader to the importance of individual differences, to laterality as an important organizing concept that extends throughout the neuraxis and is relevant to all response systems considered, and to some of the theoretical and applied issues that make psychophysiology so in-

teresting and diverse. These themes recur throughout the volume and provide continuity across chapters.

The second section is devoted to the brain and nervous system. This section will help the reader to appreciate the fact that all psychophysiological measures reflect brain function. Situating psychophysiological response systems within the context of brain function is essential in promoting the integration across autonomic and central measures that is still all too rare in this research tradition. The final chapter in this section is on the autonomic nervous system (ANS) and its location within this section helps make the important point that the brain controls autonomic events and vice versa. Hugdahl helps the reader appreciate the necessity of considering the ANS as an extension of the brain.

The third section is the longest. Although titled “Collecting and analyzing data,” this section presents the heart (no pun intended) of the material. In nine chapters, Hugdahl provides a selective but carefully chosen overview of the major response systems that occupy the attention of psychophysiologicalists, the various measures of these response systems, and the theoretical concepts that have been most successfully elucidated by these measures. He hits upon the classic and most important work in each of the systems covered and his explanations and the accompanying illustrations are consistently clear and straightforward. He is also careful to note, when appropriate, that answers to certain questions are not yet available and must await further research.

In light of the extensive use of the electrodermal system in research, it is perhaps appropriate that the electrodermal system gets three chapters by itself. Hugdahl does a terrific job in the first chapter of weaving together theoretically engaging material on the evolutionary significance of electrodermal activity with nuts-and-bolts practical information on recording methods. The second chapter on orienting and habituation illustrates how the electrodermal system has been creatively exploited to shed light on concepts that have long been part of the historically constituted subject matter of psychology. The third chapter on clinical applications of electrodermal activity will be particularly appealing to undergraduate students for it illustrates the many ways in which measures of this response system have been used in the study of altered states of consciousness, psychopathology, drug and alcohol abuse, and psychosomatic disorders.

There are two chapters on cardiovascular activity. The first presents enough of the details of cardiovascular anatomy and struc-

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ture for the introductory student. In addition, this chapter presents an excellent survey of the major methods now in use for the noninvasive assessment of cardiac function. Importantly, both impedance cardiography and spectral analysis methods are included. The second chapter on cardiovascular activity reviews an interesting mix of psychophysiological work that has featured cardiovascular measures. Stress, hypertension, coronary artery disease, Type A behavior, and visceral perception are all discussed. Also included are sections on cognitive and motivational processes and cardiac function. Hugdahl is judicious in his choices of content and presents the material in an interesting and readable way, successfully avoiding getting bogged down in details.

Three chapters are devoted to central measures: one on electroencephalography (EEG), one on event-related potentials (ERPs), and one on brain imaging techniques. In addition to a description of modern methods for acquisition and analysis of EEG data, the chapter on EEG includes examples of innovative new research using EEG techniques. This chapter also includes an informative short section on sleep and dreaming. The chapter on ERPs again includes a carefully balanced mix of methods and data. Hugdahl focuses on the use of ERPs in studies of complex information processing, including attention and language. Other less conventional applications of ERPs are also briefly discussed, such as the study of information processing in sleep and hypnosis. These latter sections help to distinguish this volume from its competitors and ensure that it will be of general interest to an introductory readership. The final chapter in this section is on brain imaging techniques. Although some psychophysiolgists may quibble that traditional EEG and ERP methods are themselves brain imaging techniques, this chapter is a very welcome addition to a text in psychophysiology. Most of the methods featured in this chapter (e.g., positron emission tomography [PET] and functional magnetic resonance imaging [fMRI]) have been developed outside the boundaries of traditional psychophysiology. Yet when these methods are used to probe brain-behavior relations, they should be viewed as psychophysiological techniques. And, the cumulative expertise of psychophysiology in the design and analysis of experiments that seek to relate simultaneous measures of behavior and brain function can be usefully brought to bear on the application of the new neuroimaging techniques on the study of cognition and emotion. Hugdahl provides clear and concise descriptions of the basic principles underlying PET, fMRI, SPECT (single photon

emission-computed tomography), and MEG (magnetoencephalography). Hopefully this chapter will presage the incorporation of neuroimaging methods into the standard armamentarium of the psychophysiolgist.

The final chapter is focused on other response systems and measures, including the skeletal muscular system, eye movements, and respiration. Basic methods of acquisition and analysis of these measures is described along with some highlights of research that use them. The use of the startle reflex in studies of attention and emotion is clearly described. This section even contains an interesting description of cross-cultural variations in startle. Also featured are eye-tracking studies of schizophrenia, although the citations in this section are only to the early studies in this area and do not reflect the current state of the field.

The Epilogue contains a series of important statements by the author. It is my hope that instructors who assign this book as a text include the Epilogue as part of their assigned reading. In it, Hugdahl argues for a broader and more inclusive psychophysiology than has been practiced typically. His point is one of integration and synthesis. He underscores the need for studies that include both central and peripheral measures to better characterize and understand how outflow from the brain affects the periphery and how activity in the periphery feeds back on and modulates brain function. Hugdahl also calls for increased interaction between psychophysiology and neuropsychology. The psychophysiological study of individuals with selective brain damage affords a unique and serendipitous opportunity to learn from nature. Too few studies probing the central and autonomic function of individuals with selective lesions have been performed. Such studies promise to shed important new light on the central mechanisms that regulate autonomic function and the specific neural substrates of various electrocortical measures.

At the end of this book, Hugdahl writes that it is his "hope that this book will contribute to a broader definition of psychophysiology . . ." Unquestionably, this volume succeeds in this effort. Hugdahl's perspective on the discipline is refreshingly integrative. The book is written well and will provide clear explanations of diverse and complex methods and phenomena for the beginning student. In conjunction with other original sources and edited volumes, this work has become my primary text for my graduate course in psychophysiology.