Handbook of
Behavioral Neurobiology

Volume 1
Sensory Integration

HANDBOOK OF BEHAVIORAL NEUROBIOLOGY

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Handbook of Behavioral Neurobiology

Volume 1 Sensory Integration

Edited by

R. Bruce Masterton

*The Florida State University
Tallahassee, Florida*

PLENUM PRESS · NEW YORK AND LONDON

Library of Congress Cataloging in Publication Data

Main entry under title:

Sensory integration.

(Handbook of behavioral neurobiology; v. 1)

Includes bibliographies and index.

1. Senses and sensation. 2. Sense-organs. 3. Physiology, Comparative. I. Masterton, R. Bruce. II. Series [DNLM: 1. Behavior. 2. Neurophysiology. 3. Psychophysics. WL102.3 H236]

QP431.S4515

596'.01'82

78-17238

ISBN 978-1-4684-2732-5

ISBN 978-1-4684-2730-1 (eBook)

DOI 10.1007/978-1-4684-2730-1

© 1978 Plenum Press, New York

Softcover reprint of the hardcover 1st edition 1978

A Division of Plenum Publishing Corporation

227 West 17th Street, New York, N.Y. 10011

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Preface

The principal goal of the *Handbook of Behavioral Neurobiology* is a systematic, critical, and timely exposition of those aspects of neuroscience that have direct and immediate bearing on overt behavior. In this first volume, subtitled “Sensory Integration,” the subject matter has been subdivided and the authors selected with this particular goal in mind. Although the early chapters (on the phylogeny and ontogeny of sensory systems, and on the common properties of sensory systems) are somewhat too abstract to permit many direct behavioral inferences, the focus on behavior has been maintained there too as closely as is now possible. A behavioral orientation is most obvious in the remaining chapters, which lay out for each sensory modality in turn what is now known about structure–behavior relationships.

The handbook is primarily intended to serve as a ready reference for two types of readers: first, practicing neuroscientists looking for a concise and authoritative treatment of developments outside of their particular specialties; and second, students of one or another branch of neuroscience who need an overview of the persistent questions and current problems surrounding the relation of the perceptual systems to behavior. The requirements imposed by the decision to address these particular audiences are reflected in the scope and style of the chapters as well as in their content.

To begin with, the difficult task of weighing and editing, which was needed to distill the myriad of facts into a single volume of reasonable length, has been accomplished by the contributing authors instead of the editors. Thus, the integrity of the individual chapters has been preserved in spite of the limitations of space required by the handbook format.

Another decision dictated by the intended audience was that the level and style of presentation of the subject matter should address the pedagogical aims of the handbook. This decision was made by the editors to help resolve the dilemma of authors who are asked to contribute a “concise overview” of developments in

their speciality areas. For, if authors decide to be both concise and comprehensive, the result can be an abbreviated, almost mathematical, style so cryptic and compact as to be comprehensible only to those already well versed in the subject. On the other hand, if authors decide to be both unequivocal and readable, the result can be a discursive style which places them in jeopardy among their scientific colleagues who recognize the exceptions to the truncated array of general principles, or who generate counter-examples or question the selection of subtopics, etc.

Therefore, the editors of this volume made the decision that pedagogical usefulness should supersede blind encyclopedic completeness, and this requirement was imposed on the individual authors. From the outset, the authors were asked to sacrifice comprehensiveness for illumination, in spite of any natural inclination to the contrary. Thus, the editors take the responsibility for the omission of some topics and the expansion of others.

The reader of several chapters of this volume will soon notice that the scope of treatment for the several modalities varies considerably. The reason for this variation is that inquiry into the behavioral roles of sensory structures has progressed at widely differing rates in the several modalities. For example, it has been necessary to allot three chapters to the visual system and two chapters each to the auditory and vestibular systems in order to provide reasonably complete coverage for these very active or highly sophisticated lines of inquiry. Each of these chapters could be easily expanded into an entire volume or even a set of volumes. At the other extreme, the olfactory and gustatory systems are technically more difficult areas in which to experiment, and have only recently gained the concentrated attention that they deserve. Thus, there are only single chapters on olfaction and gustation, and these deal more with receptor processes and their psychophysical counterparts rather than with the more subtle contributions of central sensory structures as seen in the chapters on vision or audition. Therefore, though the lack of uniformity among the chapters may be regretted, it cannot be seriously faulted. The current level of knowledge and, consequently, the focus of current research into the behavioral contributions of the several sensory modalities are simply too different to permit a single, fixed format of presentation.

Finally, it has been said that one of the less obvious but perhaps more lasting measures of any scientific book is whether or not the currency and clarity of its specific examples succeed in provoking its readers to make them obsolete. Using this yardstick, each of us who have played some part in the preparation of this volume join in wishing it an active but reasonably short life.

R. BRUCE MASTERTON

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