

BOOK REVIEWS

An Integrated View of Motor Behavior

The Frontal Lobes and Voluntary Action, by Richard Passingham. 1995. New York: Oxford University Press. 328 pp., \$35.00.

Reviewed by RICHARD CAMICIOLI, M.D., *Department of Neurology, Oregon Health Sciences University, Portland, Oregon.*

As a neurologist interested in motor behavior, I had been planning to read this book, so I welcomed the opportunity to review it. I was not disappointed in this unique synthesis of disparate areas of research important for understanding motor behavior. Although much recent work on the frontal lobes has focused on higher-order frontally mediated behaviors, such as planning, it is clear that more basic aspects of movement are the foundation for these. Dr. Passingham does an admirable job of bridging basic aspects of movement to higher order behavior in the real world and laboratory. This book will be of interest to neuropsychologists, neurologists, cognitive psychologists, physiologists, senior undergraduates, and graduate students. Although it is primarily a book for those interested in understanding research in motor behavior, I think that clinicians will also find this text of interest. Those already in the field of motor behavior would probably be aware of most of the work discussed, but still might enjoy this book. The literature is not covered exhaustively, by design, allowing the text to be of manageable length.

A major strength is parallel discussion of animal research (mostly on nonhuman primates), human lesion studies, functional neuroimaging, and physiological studies. The book begins with an attempt to present an overview of motor behavior. Chapters 2 through 7 discuss this research with reference to different anatomic subdivisions of the frontal lobes, based on Brodmann's scheme. Chapter 8 covers the basal ganglia. Chapter 9 attempts to integrate the anatomic discussions. Chapters 10 and 11 discuss higher order aspects of frontal lobe function and language, respectively.

Although the illustrations are helpful and well integrated with the text, a working knowledge of neuroanatomy facilitates optimal use of this volume. While the author does present anatomic information clearly, it is necessary to jump between the various numbering schemes designating architectonic regions in different species. This is only a minor problem, outweighed by the importance of integrating interspecies data. A section summarizing the analogous cor-

tical areas in different species might have been helpful early on in the book.

Human lesion studies are not covered extensively. The cases discussed generally illustrate important points, though I felt myself wishing for a broader treatment of lesion work. A review of investigations coupling electrophysiologic and lesion studies would have been welcome. Disease models such as Parkinson's disease, and animal models of parkinsonism, were discussed selectively. Major advances that have been made in recent years regarding the organization of the basal ganglia and their connections with the frontal lobes were touched on in the chapter on the basal ganglia and in the summary chapter. It would have been of interest to see a more extensive coverage of pharmacologic studies (which have mostly been done in animals). Neurochemistry is not discussed to any great extent.

The highlight of the book is the excellent discussion of physiological investigations, and lesion studies, in nonhuman primates. Cellular recording studies, as well as cognitive-behavioral experiments are presented to illustrate the roles of various areas in the frontal lobes. Even though this is obviously the author's major area of research, he doesn't dwell on his own work, but gives a balanced treatment quoting contrasting view points. He very clearly highlights areas of controversy and future research.

Human physiologic studies, especially metabolic studies using positron emission tomography, are presented. Although this area of research has evolved in the last few years, this book remains a good starting point for workers and students entering this area. The rapidly evolving field of functional magnetic resonance imaging, which has become an important tool in understanding the brain and behavior, was not widely available at the time of publishing.

The final three chapters were not as well integrated with the whole of the book as one would have hoped. In part, this simply reflects the state of the art. A table referring to the appropriate sections might have made the summary chapter more useful. The chapter on higher-order function was

too brief, from my biased point of view. The final chapter on language provided interesting insights, but did not incorporate recent developments involving human lesion and functional imaging studies, and work on degenerative language disorders such as primary progressive aphasia.

This book is well produced. I found few typographical errors. The tables and figures were helpful and well designed. Some of the figures showing raw data (e.g., cellular recordings) might not have been necessary given the premium on space. The index was not exhaustive; however, given the length of the book and its excellent organization, it was easy to answer questions that came to mind.

Chemicals and Neurobehavioral Function

Neuropsychological Toxicology: Identification and Assessment of Human Neurotoxic Syndromes (2nd ed.), by David E. Hartman. 1995. New York: Plenum Press. 525 pp., \$59.50.

Reviewed by LISA A. MORROW, Ph.D., *Associate Professor of Psychiatry, Western Psychiatric Institute and Clinic, 3811 O'Hara St., Pittsburgh, PA 15213.*

Neuropsychologists interested in the effects of chemicals on human behavior and cognition are typically required to research a wide literature; from neuropsychology to toxicology, to psychiatry, to neurology, to epidemiology. This book provides researchers and clinicians with a much needed integration of this diverse field. Particularly impressive is both the breadth and depth of information that has been collated by Dr. Hartman. The current text, which is greatly expanded from the first edition that appeared in 1988 (525 pp. vs. 323 pp.), provides a detailed description of the clinical syndromes associated with exposure to a wide variety of toxic chemicals.

The format of the book begins with the historical antecedents of neuropsychology, including behavioral neurology, mental testing, and experimental psychology. From there, descriptions of general neurotoxicity are given, as well as the direct and indirect effects of toxins on the nervous system (e.g., cellular damage, neurochemical damage). Areas that are specific to this field, such as legislative acts governing toxic substances and the standards for permissible exposure limits, are also included. Particularly noteworthy is this latter section which presents background information on the regulation of toxic materials, and reviews questions regarding the development of safety thresholds. The second chapter provides an extensive discussion of the complex issues of evaluating patients who present with possible toxic exposures. A description of various neuropsychological test batteries that have been specifically developed for this population is provided, and individual tests (e.g., color vision, evoked potentials) that may be particularly sensitive to toxic exposures are identified.

I would recommend this book to anyone interested in an affordable introduction to the role of the frontal lobes in motor behavior. It could be used as a textbook for organizing a senior undergraduate or graduate level course. In addition, workers who are not themselves physiologists or cognitive psychologists working in the field of motor behavior would find this book of interest. Researchers in the field might recommend it to their graduate students as a well written starting point. Even though the field has advanced, this book will remain valuable because of its unique integration of disparate areas of research.

The next five chapters provide a detailed account of the major neurotoxic agents—heavy metals, solvents, alcohol, drugs, and pesticides. Concise information such as recommended exposure limits (e.g., short-term exposure limit; STEL), generic names, and odor thresholds, is listed at the beginning of each chemical subheading. Within each of these chapters, the neuropsychological effects of exposure to individual toxins are outlined, and where appropriate, relevant adult and childhood effects are discussed, as well as psychiatric findings and peripheral and central neurological effects. Several case studies of heavy metal exposure (lead and arsenic) are also provided to illustrate the range of cognitive and behavioral changes that can occur following both short-term and chronic exposure.

The final three chapters deal with a variety of miscellaneous toxins (e.g., formaldehyde, ionizing radiation), psychosomatic disorders, and forensic issues. In the chapter on psychosomatic disorders, controversial diagnoses are discussed, such as multiple chemical sensitivity (MCS) and mass psychogenic illness. Factors such as work-related stress and posttraumatic stress disorder are also outlined. Finally, the bibliography at the end of the book is very extensive; reference dates range from the mid-1800s through 1994.

This book is well suited not only for clinicians and researchers in neuropsychology, but will be very useful for health professionals outside the field who want to understand how chemical exposures can affect cognitive and psychiatric status. The only drawback—especially for clinicians—is treatment issues. This is not because Dr. Hartman has neglected to include this in the book. Rather, there is almost no research that has addressed behavioral treat-

ment for persons with neurotoxic exposures. As a researcher, I am particularly appreciative of the extensive number of articles that have been summarized into a very coherent overview. This is one of the few books that has been published in this area, and it stands alone as the definitive treatise on

neuropsychological toxicology. It is well organized, well written, and well thought out. As more and more neuropsychologists are likely to be asked to see patients with toxic exposures, this book will be a very useful reference.

OTHER BOOKS OF INTEREST

Cytowic, R.E. (1996). *The neurological side of neuropsychology*. Cambridge, MA: MIT Press. 529 pp., \$55.

Yassa, R., Nair, N.P.V., & Jeste, D.V. (Eds.). (1997). *Neuroleptic-induced movement disorders*. Cambridge, U.K.: Cambridge University Press. 494 pp., \$100.