
BOOK REVIEWS

Speaking My Mind: Just Another Hand-Me-Down?

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From Hand to Mouth: The Origins of Language, by Michael C. Corballis. 2002. Princeton, NJ: Princeton University Press. 272 pp., \$27.95.

Reviewed by JOSEPH B. HELLIGE, *Professor of Psychology, Vice Provost and Dean of the Graduate School, University of Southern California, Los Angeles, CA 90089.*

In *From Hand to Mouth: The Origins of Language* Michael Corballis provides an engaging, highly readable and provocative account of the evolution of human language. The primary thesis of his book is that language evolved from manual and facial gestures rather than from animal vocalizations, as is often assumed. While this point of view has been expressed by others during the last few centuries (for example, Condillac in 1747), it has never been argued more forcefully and with as much supporting scholarly evidence. (I suspect that it has also never been argued with greater use of hand/mouth adages, clichés and puns.) Among the more provocative ideas is the suggestion that human speech, like writing, was a cultural invention subsequent to gestural language rather than the evolutionary essence of language.

In developing his case, Corballis places a good deal of emphasis on the fact that neuroscientists have discovered individual neurons in the frontal lobe of monkey brains that respond to particular reaching and grasping movements made by the animal and that also respond when the monkey observes the same movements being made by other monkeys or humans. These *mirror neurons* provide a clear link between gesture production and gesture perception. It is interesting that the mirror neurons in monkeys have been found in an area that corresponds to an area of the human brain that is involved in the production of speech (Broca's area) and that there is evidence of a similar mirror-neuron system in present day humans as well. Because the mirror-neuron system is found in both present-day monkeys and present-day humans, Corballis argues that it is likely that such a system for linking action and perception for gesture was present in the last common ancestor before the split of monkeys and apes, perhaps as much as 30 million years ago. The early evolutionary appearance of the mirror-neuron system for gesture is likely to have been an important step in setting the stage for the eventual emergence of gestural communication.

Though it is impossible to do justice to Corballis' book in a brief review, his evolutionary scenario goes something like this. About 16 million years ago, the great apes (which eventually led to our species) split off from monkeys. Corballis argues that the evolution of larger brains in the line that eventually led to humans enabled an increase in the kind of "offline" thinking that could set the cognitive stage for the emergence of "protolanguage," the kind of gestural communication that can be acquired by present-day apes. About 5 or 6 million years ago, bipedalism emerged and distinguished hominins from the other great apes. Walking upright freed the arms and hands for even more effective gesturing and for actions that were voluntary and pre-planned rather than reflexive. Against this backdrop, the genus *Homo* emerged about 2 million years ago, accompanied by still larger brains, by the invention of stone tools, and by multiple migrations out of Africa. Corballis suggests that gestural language became more sophisticated during this time period, perhaps driven by emergence of the cognitive ability to imagine novel scenes and to think recursively (as, for example, in, "I know that you know that I know that you see me"). Emergence of recursive thought and of the ability to think of things that are novel or not present permits the emergence of grammar, generativity and other characteristics that distinguish language from protolanguage.

On Corballis' view, language during this period was primarily gestural, though it was likely punctuated by vocalizations consisting of grunts, groans, cries and the like. In fact, changes in the vocal tract that permitted the kind of enhanced cortical control of vocalization and breathing that we see in present-day humans may not have been complete until our species, *Homo sapiens*, emerged approximately 150,000 years ago. Moreover, such adaptations may have been favored specifically because they augmented an already existing gestural language.

If gestural language emerged first and was so powerful, then why did vocal language emerge at all? As Corballis argues, it is relatively easy to see the advantage of a language system that could be used in the dark or when individuals were out of sight from each other and that could permit communication even while the hands were being used for other things such as demonstrating how to make or use a particular tool. In fact, the transition from primarily gestural to primarily vocal language may have coincided with an explosion of art, culture, and technology that occurred in Europe approximately 40,000 years ago.

I suspect that most readers of this book will, like me, have an easier time accepting the premise that gestural communication was an important development on the way to vocal language than they will have accepting the more provocative suggestion that vocal language was a *cultural* invention. In Corballis' own words, "My guess is that our own species, *Homo sapiens*, discovered [emphasis added] that language could be conveyed more or less autonomously by speech alone. . . . The *invention* [emphasis added] of autonomous speech may have been as recent as 50,000 years ago." (p. 218) On this view, rather than being a biological imperative or being the initial or essential form of language, speech becomes very much like writing, mathematics and other cultural inventions that facilitate and enhance communication.

As Corballis develops this evolutionary scenario over the ten chapters of his book, he provides insightful analysis of several related topics. This includes a very useful discussion of the nature of language and of the characteristics that distinguish a "true" language from protolanguage and other forms of communication. It also includes consideration of factors leading to the emergence of such evolutionary landmarks as bipedalism and of the emergence of handedness and hemispheric asymmetry. With respect to the topic of functional hemispheric asymmetry, Corballis builds on the account provided in his earlier books, especially *The Lopsided Ape* (1992).

Of particular importance to his discussion of hemispheric asymmetry are Corballis' speculations regarding the emergence of left-hemisphere dominance for language in general and for speech in particular. As he notes, there is

evidence of left-hemisphere superiority for vocalization in several present-day species, including some species of frogs, with which we shared the last common ancestor approximately 170 million years ago. Though vocalizations in other species do not constitute language, the ubiquity of left-hemisphere dominance suggests that cerebral asymmetry for vocalization may be quite old in evolutionary terms. If this is the case, then it should come as no surprise that when vocal language did eventually develop in humans it would be associated with the already existing left-hemisphere superiority for vocalization. And, it is certainly plausible to suppose that any left-hemisphere dominance for fine motor movements or for gestural language would have been reinforced as language was extended from gesture to vocalization.

Testing evolutionary scenarios is always tricky because it is not possible to simply go into a laboratory and conduct the relevant set of experiments. In building his case, Corballis reviews circumstantial evidence from an extraordinarily wide range of fields and he does so with both scholarship and wit—not an easy combination to pull off. The technique of looking for similarities among contemporary species and then supposing that those similar characteristics were present in their last common ancestor has been used very effectively. Corballis also provides a very effective analysis of gestural communication in present-day humans. To the extent that language emerged first in the form of gesture, we should be able to find evidence for true gestural language in present-day members of our species. In building his case, Corballis makes very good use of contemporary research on signed language systems in humans, though it must be noted that there is far from unanimous agreement about whether these systems constitute formal language.

In short, this is an important book on an important topic. Though not every reader may agree with every conclusion, Corballis lays out his evidence and his logic with sufficient clarity that critics will know exactly what they have to deal with. *From Hand to Mouth* should be studied by everyone with a serious interest in the origins of language and read by others who want an evolutionary account that is as entertaining as it is informative.

Tasty, but Not a Well-Balanced Meal

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Traumatic Brain Injury in Children and Adolescents: Assessment and Intervention, by M. Semrud-Clikeman. 2001. New York: Guilford. 211 pp., \$30.00.

Reviewed by C.H. SILVER, Ph.D., *Departments of Rehabilitation Counseling and Psychiatry (Div. of Psychology), University of Texas Southwestern Medical Center, Dallas, TX.*

The author states that this book was written for a target audience of school psychologists, child psychologists, and educators. The intent of the book is to provide this audience

with a knowledge base for traumatic brain injury, including basic neuroanatomy, sequelae of TBI, assessment practices, family issues, and interventions. One may presume from

various hints that the author's primary purpose, in fact, is to provide school psychologists with the know-how to provide much-needed services to the students in their schools who do not have access to pediatric neuropsychologists. With this goal in mind, the menu includes an appetizer of neuroanatomy, a first course of assessment tools, and a second course of school reintegration and intervention strategies.

The most valuable chapters are those on school reentry for the child who has experienced TBI, and on classroom interventions. These chapters clearly reflect the author's real-world expertise and her extensive knowledge of what pitfalls can occur and what needs to happen. These chapters contain a compilation of observations and recommendations that would be quite beneficial not only for the school or child psychologist, but also for the novice pediatric neuropsychologist who has extensive "book knowledge" of neurological conditions and experience in testing but has not yet obtained the experience of translating findings from a neuropsychological evaluation to useful recommendations. This part of training in neuropsychology is the least formalized aspect of interpretation and report-writing. Faculty in neuropsychology may find these two chapters a nicely organized reference to train their students in how to think about the needs of children with learning disabilities and other neurological conditions, as well as children with TBI.

Prior to these chapters, important concepts float to the surface as hearty morsels in a soup. If the less experienced clinician (presumably the target audience) is not aware of their value, they may be missed. It is truly unfortunate that these valuable morsels are not emphasized, or perhaps presented in a more systematic manner. For example, the author mentions the potential for cognitive difficulties even when hospital staff predict a child will have a "good recovery." This fact is important for clinicians to recognize, but the concept appears in an isolated sentence in an introductory section on demographics of TBI. This "by the way" phenomenon occurs throughout the first four chapters.

The intent of the lengthy chapter on assessment is somewhat confusing. The author states several times that her purpose is to help clinicians who are not trained in neuro-

psychology (mentioning school psychologists, occupational therapists, physical therapists, and speech pathologists as consumers) to employ useful assessment instruments available to them. In this chapter, the author cautions the reader that the use of most neuropsychological batteries is "generally beyond the level of the specialist in school psychology" (p. 59). Nevertheless, lists of tests, test descriptions, and information on how they can be interpreted as isolated elements of a neuropsychological evaluation are offered. An appendix provides publisher information, presumably for purchasing the tests. It appears that the author is cautioning traditional school psychologists against practicing beyond their training and simultaneously advocating that they do so, using the information that this book provides.

Furthermore, the fundamental information on neuroanatomy and the neurocognitive effects of TBI contained in this book is worrisome. For example, the solitary figure depicting a midsagittal view of the brain does not label several of the diencephalic structures that are presented in the text, so the reader would be required to find another book if seriously interested in their locations. Contradictory facts exist in several places, so the reader may not be certain, for example, if complete recovery in adults with TBI occurs in the first 6 to 9 months (p. 9) or in the first 18 months (p. 32), or if it is receptive language (p. 6) or expressive language (p. 12) that should be understood as the most vulnerable language function. Additionally, some facts could be misinterpreted out of context, such as the author's statement implying that advanced executive functioning is a type of intellectual function (p. 31). It would not be seriously troubling to know that a neuropsychologist in training will read this book along with many others, but to think that this book might be the only training mechanism for school personnel is disconcerting. Because of its focus on school reentry, this book could be a valuable addition to an existing library on understanding the interface between neuropsychological findings and the school setting. It would not suffice as the primary reference in the office of a school psychologist.

Olfaction and the Brain

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Olfaction, Taste, and Cognition. C. Rouby, B. Schaal, D. Doubois, R. Gervais, and A. Holley (Eds.). 2002. Cambridge, UK: Cambridge University Press. 462 pp., \$95.00.

Reviewed by RICHARD L. DOTY, Ph.D., *Professor and Director, Smell and Taste Center, University of Pennsylvania, Philadelphia, PA.*

This 27-chapter volume arose from a symposium held in Lyon, France, in June of 1999, that sought to integrate information from academic scientific studies of olfaction, largely psychological in nature, with knowledge derived from the perfume industry. It is dedicated to the French

perfumer Edmond Roudnitska, known for creating such classic fragrances as "Femme" (1944, Rochas), "Diorama" (1948, Dior), L'Eau" (1951, Hermès), "Diorissimo" (1956, Dior), "Eau Sauvage" (1966, Dior), and "Diorella" (1972, Dior), and addresses such topics as odor classifica-

tion, odor memory, odor conditioning, and the plasticity of chemosensation.

This book is long overdue, as in recent years results from molecular biology have dominated the thinking of chemosensory scientists to the point of obscuring the fact that the brain is involved in establishing the identity, meaning, and affective nature of chemosensory stimuli, and that the significance of most odors is learned, not inherited. The quality of the chapters is higher than that traditionally associated with a symposium-based book; indeed, one would not have known of the book's association with a symposium had it not been mentioned in the introduction. With rare exception, the chapters are very good to outstanding, albeit often brief, and provide fresh insight from several quarters into important issues related to the processing, retention, and retrieval of chemosensory information.

The volume begins with a review by Annick Le Guèrer of the historical negativism directed towards odors and the sense of smell, beginning with the early Greeks and culminating with 20th century psychoanalysis. The negativism is further documented in a subsequent chapter by Catherine Rouby and Moustafa Bensafi, who point out ethnographic evidence that numerous languages have more negative than positive terms to describe odors. Chapters by André Holley and E.P. Köster address issues related to perfume creation and the functional nature of chemosensation, indicating, among other things, how odors come to signify objects (thereby reflecting a "nominal sense"), setting the stage for later discussions of odor memory, emotion, and odor classification. Fascinating anthropological studies are reviewed by David Howes, including those of the Ongee, a hunting and gathering society of Little Andaman Island in the Bay of Bengal, who reportedly use smell as the primary sensory medium for expressing such concepts as time, space, and person.

A scholarly account—perhaps the best to date—of schemes for classifying odors is presented by Maurice Chastrette, followed by an important chapter by Dirk Hermans and Frank Baeyens on how odor meaning, particularly that related to hedonics, is largely acquired through conditioning. Rachel Herz eloquently reviews the influences of learning, including cultural factors, on the perception of the pleasantness of odors, noting, among other things, that (1) the hedonic responses of most children to odors mimic those of adults by the age of eight, (2) it is unlikely that odors exist that are "automatically liked without prior experience," and (3) pleasant odors—indeed even the suggestion of their presence—tends to make people feel good, in contrast to unpleasant odors or their suggestion, which have the opposite effect and can even lead to reports of adverse health symptoms. Extensive discussions of odor memory paradigms are provided by Maria Larsson and by Sylvie Issanchou and associates, with the latter authors putting forth the argument that, because of the nature of odor memory in real life (e.g., typically unintentional), as well as problems associated with verbal encoding of representations of odorant stimuli, the most appropriate tests of odor

memory should not direct a subject's attention to the stimuli during the encoding phase. Mats Olsson and his associates critically review the literature on odor priming, concluding that most "odor priming" effects in the literature likely reflect "name priming." Johannes Lehrner and Peter Walla address developmental aspects of odor naming, whereas Benoist Schaal and his associates examine the influences of early pre- and post-natal learning on later odor preferences and other odor-related behaviors. In a provocative chapter, Robyn Hudson and Hans Distal describe an interesting, albeit preliminary, study suggesting that an individual's familiarity (and, thus, presumably exposure) with an odor may idiosyncratically influence its perceived intensity and pleasantness, leading to the hypothesis that individual and cultural factors significantly alter perceptual measures previously assumed to be rather invariant.

The influences of Alzheimer's disease, as well as aging, on odor memory and other functional measures are addressed in chapters by Steven Nordin and Claire Murphy, and by Thomas Hummel and his associates. Electrophysiological data regarding peripheral odor coding, odor-induced event-related potentials, and experience-related changes in neural activity in bulbar and higher-order olfactory structures are addressed in a series of chapters by Gilles Sicard, Bettina Pause, and Nadine Ravel et al., respectively. Edmund Rolls reviews the central anatomy of the olfactory and taste systems in primates, as well as the influences of motivational state on their function, whereas Robert Zatorre provides a brief chapter on functional imaging and the coding of odor-related affect in humans. Katharine Fast and colleagues provide a circumscribed review of taste psychophysics and the perception of taste bitterness, and Annick Faurion and her collaborators address issues of gustatory system plasticity at psychophysical and physiological levels, including studies of functional imaging. Chapters on linguistic expressions for odors in French and on "human pheromones" are contributed by Sophie David and Suma Jacob and associates, respectively.

Overall, this is an excellent treatise that provides a background for understanding conceptual issues related to higher-order olfactory processing in humans. Admittedly its focus is limited and few animal data are presented in support of many of the concepts that are presented, even though such data are available. Like most volumes based upon multiple authors, the integration of information between chapters could be better orchestrated, although surprisingly little overlap occurs among the chapters. In light of the theme of the overall volume and the symposium upon which it is based, the work probably would have been better served by leaving out the two chapters solely related to taste and the one chapter on "human pheromones," and by including at least one chapter from a perfumer who has first-hand knowledge of the art of perfume creation.

I would recommend this book to all chemosensory scientists, as well as to psychologists and physiologists interested in higher-order cognitive processes associated with

human olfaction. While this is not a book that provides information of much value to the practicing physician or clinical psychologist, it does provide a framework for fu-

ture studies seeking to explain some olfactory deficits in patients with brain lesions or diseases involving central nervous system structures.

Fundamentally Sound

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Principles of Human Neuropsychology, by G. Dennis Rains. 2002. Boston: McGraw Hill. 569 pp., \$80.00.

Reviewed by MICHAEL DANIEL, Ph.D., *School of Professional Psychology, Pacific University, Portland, OR.*

The goal of this textbook, stated in the preface, is for students to “have access to an account of neuropsychology that was at once clear and in-depth,” and in most respects it achieves this purpose. The book has a total of 15 chapters divided into three parts. Each chapter begins with an outline and ends with a summary. Major terms are printed in bold and defined in a glossary. There is a website for the book. Apparently a test bank is available that includes multiple-choice, fill-in, true–false and essay questions for all chapters.

Part I, Foundations, consists of five chapters. Chapter 1 integrates historical milestones in neuropsychology with clear explanations of the associations between seminal findings and the implications of each for the development of conceptual underpinnings in neuropsychology. Single-case studies and psychometric approaches to neuropsychological research are nicely contrasted with pros and cons of each identified. Chapter 2 presents a thorough yet concise review of nerve impulse conduction that incorporates updated information not included in books published just a few years ago.

However, the order and organization of the material may make it somewhat difficult to follow if the reader does not already have a pretty good basic grasp of neuronal conduction. Chapter 3 has a good overview of neuroanatomy and associated basic function. Chapter 4, also a good overview, presents current experimental methods with a particularly good description of PET technology and its methodological limitations. The rationale of the dissociation paradigm is thoroughly discussed. Chapter 5 reviews “the visual system as a model of nervous system function.” Approximately one-third of the chapter is devoted to in-depth physiology of the retina that seems too detailed for a book on neuropsychology. While the description of the magnocellular and parvocellular pathways are the clearest I have read, some less clear and less well-organized explanations of receptive fields and modular columnar cortical organization will be somewhat difficult for students lacking a fairly solid understanding of it. Little attention is paid to other sensory systems. For example, the auditory system is not described in detail nor are parietal lobe areas PG and PE mentioned here.

Part II, Neuropsychology of Major Functional Systems, is composed of seven chapters. A good overview of language in chapter 6 omits some functional findings such as frontal lobe mediation of verb word retrieval and temporal mediation of noun word retrieval. Chapter 7, on spatial processing and the more commonly occurring impairments, has an informative discussion of neuronal responses in V3 that may contribute to constancy in visual localization. Visual recognition, chapter 8’s topic, has a good presentation of cortical blindness, and an excellent overview of classical apperceptive and associative agnosias including discussion of the dimensions and limitations of classical formulations of these syndromes, although the right hemisphere’s special role in facial recognition is not mentioned. The last one-third of the chapter is devoted to theories of visual recognition.

Chapter 9 reviews motor functioning and mediating brain systems with an extended consideration of apraxia and omits the neuroanatomic specifics of the lateral and ventral-medial motor systems. A good cognitive overview of working memory and memory is offered in chapter 10. Among its excellent features are reviews of medial temporal lobe amnesia, explicit and implicit memory and the neural networks likely underlying each, and frontal lobe involvement in working memory and learning. In dealing with emotions, chapter 11 presents a good overview of the amygdala’s connections and its likely role in fear conditioning, as well as the role of cortical involvement in discrimination and inhibition of fear responses. It provides a useful model of subcortical and cortical integration of emotional regulation with underlying neural systems.

Chapter 12 provides clear discussion of prefrontal lesion effects including the specificity of prefrontal neural circuits for mediating various types of working memory. Reference is made to posterior parietal and superior temporal multimodal cortex with respect to their connections with prefrontal cortex along with distinct connections and functional differences of prefrontal areas. It would have been helpful to see these connections indicated on a brain model rather than or in addition to a flow chart diagram. The text contains a clearly explained model of prefrontal lobe functioning that integrates data from human and animal research

and provides a framework to begin conceptualizing prefrontal functioning.

Part III, Application of Neuropsychology to Broad Behavioral Domains, consists of three chapters. Psychiatric and degenerative disorders are discussed in chapter 13, including schizophrenia, the dopamine hypothesis and the possible role brain damage plays in schizophrenia; possible hypo and hyper-frontal lobe activity in major depression; brief reviews of bipolar disorder, anxiety disorders, obsessive-compulsive disorder, sociopathy; and Alzheimer's, Huntington's and Parkinson's diseases.

Chapter 14 presents a brief overview of brain development, causes of neurodevelopmental disorders, learning disability, attention deficit disorder and autism. Chapter 15 covers recovery of function with some discussion of rehabilitation. The research cited for children is 25 to 55 years old. The text states "children that lose language after a cerebral lesion that occurs before puberty almost all experience full recovery" (pp. 427 and 445). References were omitted that suggest the possibility of some impairment in language skills after childhood left-hemisphere injury. The text also states "the most important factor affecting recovery of function following a brain lesion is the age of the individual at the time of the lesion" (p. 445). Al-

though subsequent sections mention that extent and location of brain injury also is important, this qualifier is not included with the quote above. These passages may give misimpressions about certain aspects of recovery from brain injury.

In general, this is a well-written textbook appropriate for the undergraduate level. With a few exceptions, it provides informative, and in many cases enhanced, information about neuropsychology. In many chapters, a review of classic theories of disorders and models of neuropsychological functioning demonstrates how they do not adequately account for all the data; new models and theories are then proposed that better account for research findings. In this way, tracing the history of theory regarding brain-behavior relationships explains the development of current formulations and sets the context for their understanding.

Students are likely to do best with the book if they already have a good grasp of basic neuroscience. This text, like many others, does not always identify cortical areas referenced; for example, fusiform and lingual gyri, area V6 and the presubiculum are not identified on a brain graphic. There are a few areas where the text will need to be augmented for a clear or complete understanding, but these are certainly surmountable.