



## Book Reviews

**Subcortical Structures and Cognition: Implications for Neuropsychological Assessment (Hardcover), Leonard F. Koziol and Deborah Ely Budding. Springer Science, New York (2008). ISBN: 978-0-387-84866-2. 381 pp, \$105.**

This is a fine summary of a great deal of literature on the basal ganglia and cerebellum and of their intimate relationships with the cortical forebrain. It is organized around 12 chapters. The first chapter offers a basic perspective on vertical organization of the brain. The next chapter reviews basic thinking about the basal ganglia and its relationship to prefrontal systems, whereas the third outlines basic looping corticostriatal thalamocortical networks. The fourth chapter looks at basic learning theory as it relates to the basal ganglia. The fifth chapter summarizes what is known about the anatomy and basic function of the cerebellum. Chapter 6 examines the differences between automatic versus more deliberative modes of executive control. Chapter 7 deals with psychiatric disorders (schizophrenia, OCD, ADHD, mood disorders and Alzheimer's disease), in terms of what we know about the disruption of these multitiered executive systems. Chapter 8 examines clinical evaluation of the frontostriatal systems and how various classic neuropsychological tasks illuminate function and dysfunction in the frontostriatal systems. Chapter 9 examines the notion of "speed of processing" as an executive variable and its relationship to automaticity. Chapters 10 and 11 examine individual clinical cases and neuropsychological test findings. Chapter 12 offers a theoretical integration and overview.

What was most interesting for me was to read reviews of the book on Amazon.com (all quite favorable) from neuropsychologists and other clinical professionals, suggesting (at least for most of the reviewers) that the book's emphasis on central roles played by the basal ganglia and cerebellar systems in cognition was "news." It might be news to neuropsychologists trained in a corticocentric model of brain function, but frankly, it is not news to anybody else in neuroscience! Indeed, much of the fundamental work on which this fine review was based actually took place in the 1980s and 1990s. If anything, this underlines that the theoretical neuroscience foundations in clinical neuropsychology, at least in terms what is typically presented in many graduate school curriculums, are *badly* out of date.

Parenthetically, I realized roughly 20 years ago that virtually all of my early training in neuropsychology about the brainstem and subcortex was so badly incomplete as to be virtually wrong. We were taught that the brainstem (a staggeringly complex concatenation of 40+ nuclei with an enormous range of functions) was a "dumb arousal center" and that virtually all of the important aspects of consciousness were contributed by the cortex, perhaps even the creation of consciousness itself. But the real story, of an enormous hierarchy of vertically integrated systems, ended up being much more interesting and theoretically compelling than our traditional oversimplification and virtual condescension toward the subcortical brain. Unfortunately, the saddest corollary (I believe) to the over-emphasis on the cortex appears to be a kind of "species-ism," in which our uniqueness in the animal kingdom is overemphasized, and correspondingly, the common ground we share with all vertebrates (including probably the experience of pain), and particularly all mammals, is tragically minimized. This is particularly true in relationship to findings from affective neuroscience, where the evidence is that we share a fundamental group of subcortical architectures related to the generation of all prototype emotions such as fear, rage, lust, play, separation distress, and so forth (see Panksepp, 1998, for a detailed and now classic explication). Although the massive explosion of cognition and language processing clearly transforms prototype emotion in humans, our cognized emotions retain a fundamental connection to a prototype state. For example, separation distress might be the original prototype state out of which loneliness, sadness, and feelings of abandonment, rejection, desertion, and so forth, as well as shame and guilt all emerge. All of these are, in a sense, flavors of separation distress.

The brainstem and particularly the mesodiencephalon may supply much of the original anatomical foundation for integrative mechanisms underpinning a conscious state, ancient neuroanatomy which allows the cortex to make its critical contributions (the explosion of long-term memory capacity, and "high-resolution" processing at both the sensory and motor ends), but without neurodynamic connection to these more ancient mesodiencephalic systems, the cortex is completely non-functional. The best evidence for this of course comes from the tragic cases of persistent vegetative state associated with severe upper brainstem/mesodiencephalic injuries. The cortex is completely intact anatomically, but the person (including any version of cognitive processing) is completely gone, and this suggests of course that cortical systems must be bootstrapped by the upper

brainstem. (For a brilliant theoretical exposition and literature review of the upper brainstem and its critical role in the creation of conscious states, see Merker [2007].)

One could offer an even more radical message than the central concept in the book that the cerebellum and basal ganglia are critically involved in all cognition—this of course is absolutely true as the authors skillfully outline. One might offer an even more radical conceptualization, namely that *cognition itself rests on the foundations provided by homeostasis and emotion*, with consciousness erected on ancient affective/homeostatic mechanisms which vastly predated the cortical forebrain in mammalian and then hominid evolutionary lines.

As a test of the hypothesis that cognition is grounded to and energized by fundamental emotional and homeostatic mechanisms, just try to conceptualize a cognitive activity that is not motivated by fundamental emotional or homeostatic needs. This “thought experiment” will quickly underline that our predominant image of the cognitive/cortical brain as an “information processing” engine, untethered to the body and the body’s needs (and particularly the fundamental and enduring need for social connection), is fundamentally illusory. Instead, evolution appears to have provided additional complex toolkits in cortical evolution for the solution of what are still fundamentally emotional and homeostatic problems.

Of course, no volume, however finely written, is perfect. One of my major concerns is the authors’ apparent assumption that most if not all readers will be intimately familiar with virtually all of the neuropsychological tests and related abbreviations for tests, subtests, and so forth. Because of this assumption, oftentimes data and test score summaries will be difficult to decipher if not meaningless for some readers.

These few nitpicks and other small missteps from time to time, however, do not detract from the overall excellence of the volume. This book applies a long overdue corrective to a discipline that in some sense has been blinded by the simplistic corticocentric view of brain function. If the book prompts neuropsychologists to read outside their traditionally rather constricted domains (the neuropsychological testing literature) and to more fully explore other domains of neuroscience, it will have performed a double service. I recommend it highly.

## References

- Panksepp, J. (1998). *Affective neuroscience: The foundations of human and animal emotions*. Oxford, UK: Oxford University Press.  
 Merker, B. (2007). Consciousness without a cerebral cortex: A challenge for neuroscience and medicine. *Brain and Behavioral Sciences*, 30 (1), 63–81.

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**Adult Learning Disabilities and ADHD: Research-Informed Assessment, Robert L. Mapou. Oxford University Press, New York (2009). 282 pp. + index**

This book provides the reader with a foundation, based in research, on the assessment of learning disabilities and attention deficit hyperactivity disorder (ADHD) in adults that is consistent with the information provided in workshops conducted by the author. As part of the Oxford Workshop Series: American Academy of Clinical Neuropsychology, any licensed psychologist who reads this volume can obtain up to three continuing education credits by completing an online quiz; directions for doing this are included in the text.

Notably, unlike most texts that address learning disabilities and ADHD within the context of the DSM and, for children, within the context of special education law, Mapou also considers and defines disability from the perspective of the Americans with Disabilities Act. The book summarizes the existing research base with regard to learning disabilities and