

The goal of Explaining Abnormal Behavior: A Cognitive Neuroscience Perspective, by Bruce Pennington, Ph.D., is to examine how research in cognitive neuroscience can be used to understand the etiology of psychiatric, neurodevelopmental, and neurological disorders. This is a very laudable goal, but depending on one’s perspective and background, this volume may or may not meet that goal. The first section of the book is designed to provide the reader with an understanding of the history of conceptual models of brain function, including those drawn from philosophy, neuroscience, psychology, and computational sciences. For someone with a background in cognitive neuroscience or psychology, much of what is contained in this section will be quite familiar. However, for those younger cognitive neuroscientists or for readers with a background in other disciplines such as medicine, this section provides an excellent and succinct summary.

The goal of this first section appears to be to convince the reader that we must abandon trying to understand brain organization as it has been typically conceptualized in behavioral neurology, that is as localized brain regions performing specific functions, with the classic example being Broca’s area thought of as being responsible for controlling speech output. Rather, citing evidence from a variety of perspectives, Pennington argues that the brain is really an interactive system with behavior representing an emergent function of interrelated parts. This conclusion is not all that novel and represents a strong and growing trend in the field over the last decade. However, the degree to which such ideas have been used to explain abnormal behavior is much less prominent or commonplace.

Having dispensed with a localizationist approach to understanding brain-behavior relationships, which was based mainly on observations in adults with acquired damage, Pennington argues that one must consider the development of the brain to truly understand how the brain performs mental functions. Based on his analysis of the literature, Pennington argues that rather than having a preprogrammed innately defined module for particular mental functions, the best model for explaining brain function is an interactive specialization model in which the environment influences, in an ongoing manner, how the brain becomes specialized during development. Hence, his argument is that disorders are best understood from this perspective.

The next and largest section of the book is organized to bring home this idea by examining different types of functions, one to a chapter. The functions examined are perception, attention, language, memory, action selection, and disorders of state regulation (i.e., emotion). Each chapter is formatted in a similar manner. The first section discusses basic brain mechanisms for a given function, the second is a brief review of how that function typically develops, and the third section covers disorders of that function. While the information contained in these sections can be found in more detail in other larger books (e.g., textbooks of cognitive neuroscience and developmental psychology and behavioral neurology), the Pennington book is unique in its organization of juxtaposing these three distinct sections and the promise that a developmental perspective can play a central role in expanding our understanding of such functions and how they are disordered.

Unfortunately, these sections can feel more like standalone parts rather than integrated pieces. For example, in the chapter on attentional disorders, it is not clear how the discussion of the development of attentional abilities can help inform models of hemineglect, nor how the development of memory in children informs our understanding of the memory deficits associated with Alzheimer’s disease. I found myself wanting more synthesis between these sections to more fully bring home the promise and uniqueness of Pennington’s approach. (As an aside, since the information in this book regarding brain systems is presented without many diagrams, it helps if the reader is well acquainted with the neuroanatomy of the brain.)

The last section of the book addresses one of the most vexing questions in psychiatry and cognitive neuroscience, which is, “What is the neural basis of the self?” Pennington sides with those who think that the sense of self is something constructed by the brain and that the self has different aspects, each of which is influenced differentially by distinct sets of brain systems. For example, the bodily self is a construction of somatosensory cortex in interaction with regions providing information about the world. The autobiographical self relies differentially on medial temporal lobe regions involved in autobiographical and episodic memory. What is most notable about the book is its breadth—drawing from philosophy, neuroscience, psychology, and developmental sciences—and the questions it asks, attempting to understand who we are and how the “selves” constructed by the brain are affected in neurodevelopmental and psychiatric disorders.

MARIE T. BANICH, Ph.D.

Dr. Banich is Director of the Institute of Cognitive Science, University of Colorado, Boulder, Colo.

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Although the release of the first draft of the human genome sequence came in 2001 (bringing subsequent genome-wide association studies and a boost for genetics and genomics studies in identifying genetic causalties), the actual foundations for the field of psychiatric genetics were laid in the late 19th century. Despite the depth and duration of this field’s history, identification of genetic components of psychiatric disorders has been lagging.

Disease heritability for specific psychiatric disorders, such as schizophrenia and bipolar disorder, has been estimated at 80% or even higher. Identifying the underlying genetic etiology is complicated by phenotypic heterogeneity, complex genetic architecture, such as the involvement of multiple genes (polygeny), common genes of small effect, rare, disruptive