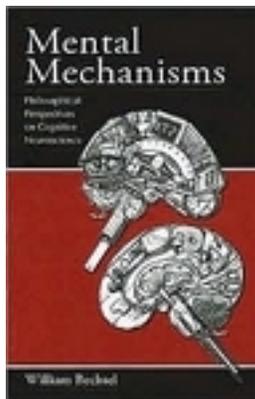


Mental Mechanisms: A Reductionist and Emergentist Rapprochement

A review of



Mental Mechanisms: Philosophical Perspectives on Cognitive Neuroscience

by William Bechtel

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Philosophical reflections upon cognitive neuroscience are concerned with bringing conceptual clarification to the scientific study of the neural substrates of mental processes and their behavioral manifestations. Attempts to find correlates between experimental results gleaned from various approaches to neuropsychological investigation (social, cognitive, and affective neurosciences) have resulted in two competing philosophical explanations of biological and psychological aspects of cognition: reductionism and emergentism. While those favoring reductionist approaches prefer that one extend the theory and praxes of brain

science to psychology, proponents of emergentism counter that the complexity of brain functions allows a nonlinear outcome of psychological phenomena.

Although much of science emphasizes reductionism and the discovery of fundamental laws, this model was developed from physics and does not easily apply to the biological and social sciences relevant to the praxes of clinical and experimental psychology. Likewise, emergentism has difficulties with issues of incommensurability of secondary qualities with materialist ontologies. A possible solution is to move away from the rather unproductive debates of reductionists and emergentists to a focus upon mechanisms. A move from laws to mechanisms may increase the integration of biological, psychological, and social approaches to the philosophy of neuroscience.

William Bechtel, in his recent book *Mental Mechanisms: Philosophical Perspectives on Cognitive Neuroscience*, offers a mechanistic philosophy of science that takes the view that phenomena are often explained by specifying mechanisms. According to Bechtel, “The decomposition required by mechanistic explanation is reductionist, but the recognition that parts and operations must be organized into an appropriate whole provides for a robust sense of a higher level of organization” (p. 130). Reductionistic research that focuses on the contributions of the parts and operations of a mechanism typically needs to be complemented by approaches geared to appreciating systemic properties, such as how the parts and operations are organized and the difference that organization makes to the behavior of the components. Furthermore, the need to consider organization does not top out at the boundaries of the mechanism. A mechanism is always contextually situated.

Within *Mental Mechanisms*, Bechtel provides extended discussions of mechanistic accounts delineating and decomposing memory and vision to reveal different ways in which researchers have developed accounts of mental mechanisms. Bechtel builds upon the traditional scientific approaches' idea of decomposition. First, Bechtel describes the disassembly of the system and breaks it down into its constituent parts. Next, he describes each part—starting with the simplest and moving forward with ever-increasing complexity. Finally, Bechtel describes the reintegration of our understanding of the ways in which all of the parts work together to produce the complex mechanism.

For example, recent research on neural processes involved in memory activities is discussed to provide guidance in decomposing memory operations. Likewise, visual processing research is discussed to reveal the ways in which vision research has prompted the differentiation of areas and operations and has enabled researchers to begin identifying the ways in which components are organized. These discussions reflect the emergence of cognitive neuroscience, which was greatly aided by the development of neuroimaging techniques (e.g., positron emission tomography and functional magnetic resonance imaging) as well as new modeling techniques (artificial neural networks). These advances made it possible to develop neurally grounded mechanistic models of cognition. Hence, much of the book discusses the development of mechanistic models of mental processes through an emphasis upon recent developments in cognitive neuroscience.

This book offers an up-to-date and accessible overview of recent developments in cognitive neuroscience that can be used for the development of mechanistic models of mental processes. This work is accessible to readers regardless of experience and is indispensable for those interested in the teaching of courses that provide an introduction to philosophical perspectives in cognitive neuroscience.

Bechtel's mental mechanisms appear to hold promise for the development of explanatory models for clinical and experimental psychology. Given the fact that understanding the impact of causal factors upon neurocognitive processes (for both normal and clinical populations) requires that we tap into biological, psychological, and social perspectives, reductionist and law-based approaches appear to be less than adequate for clinical and experimental psychology. Bechtel's explanation of mental mechanisms may proffer a more appropriate scientific model for clinical and experimental psychology in that it emphasizes mechanisms within a multicausal framework.

Although Bechtel's account of mechanistic explanations provides constructive descriptions of phenomena found in both biology and the cognitive neurosciences, he does not do an adequate job of dealing with critics' complaints that mechanistic descriptions are inadequate accounts of persons' experiences of the world. Bechtel's text might have been improved by increased discussion of the important role emotions and social context play in neurocognitive processing.

While he does discuss these issues briefly, his discussion of mental mechanisms would have been aided by an expanded discussion of the mechanisms underlying affective processing in normal individuals and persons with affective disorders. While it appears that Bechtel's mechanistic account takes seriously the impact of affect and mood upon representation and computation, the text would have been aided by more discussion of the ways in which affect may help philosophers of cognitive neuroscience develop a more focused understanding of the role of mental mechanisms within normal and pathological functioning.

Further, mental mechanisms are inherently social in ways that Bechtel's text seems to ignore. Unfortunately, the author fails to include a good deal of current work in social affective neuroscience. A more developed understanding of mental mechanisms would more fully address such complexities as affect, motivation, and psychopathology. In addition to attempts to understand and explain mental mechanisms, it would have been beneficial to see more discussion of the ways in which mental mechanisms are influenced by the actual, imagined, or implied presence of others. A number of researchers have begun to move beyond analyses limited to information processing mechanisms and are now including investigation of socioemotional cues, contexts, experiences, and behaviors.

Mental Mechanisms: Philosophical Perspectives on Cognitive Neuroscience offers a well-developed summary of the ways in which scientists investigating the mind-brain system develop mechanistic accounts of mental activities. Bechtel has written a clear and comprehensive text that will be an invaluable guide for both students and cognitive

neuroscience teachers. This work offers an engaging, informative, and up-to-date discussion of both the historical development and current practice of cognitive neuroscience.

However, a more fully developed discussion of the mechanisms involved in affective and social aspects of cognition would have aided the text. Although Bechtel's emphasis upon mental mechanisms is useful for elucidating various features of cognition, his text could have been improved by increased discussion of the important role emotions and social contexts play in cognition.
