The Mind's New Science: A History of the Cognitive Revolution

Howard Gardner
Basic Books
New York
1985
423 pp., $22.50

Cognitivism is clearly an idea whose time has arrived, again. This time the challenge of the Meno has been accepted by men and women armed with far more than footnotes to Plato. In this book, Gardner does an excellent job of chronicling the truly exciting ideas and advances that have emerged in the last half century toward development of a new science of the mind. The subtitle of *The Mind's New Science* is incomplete. Gardner's history of the cognitive revolution is also a strident call for a scientific reorganization akin in magnitude to that which emerged from the 17th century.

In the first three chapters of *The Mind's New Science,* Gardner seeks to establish the scope and definition of cognitive science, its birth and geneology, and the dragons it must slay. Cognitive science is seen as:

> *a contemporary, empirically based effort concerned with the nature of knowledge, its components, its sources, its development, and its deployment. . . . I apply the term chiefly to efforts to explain human knowledge [and] am interested in whether questions that intrigued our philosophical ancestors can be precisely answered, instructively reformulated, or permanently scuttled. Today cognitive science holds the key to whether they can be. (p. 6)*

After defining the science, Gardner proceeds to describe a Cognitivist's Credo. Gardner sees five fundamental beliefs or faiths for the cognitive scientist. First, in talking about human cognition it is necessary to posit a level of analysis separate from neurological or cultural analyses. Second, computers are central to the understanding of the human mind. Third, the influence of emotions, culture, and context on human cognition must be deemphasized. Fourth, much is gained from interdisciplinary studies until a unified cognitive science is attained. Fifth, the roots of cognitive science lie in the Greek philosophical tradition.

Next, behaviorism and its corollaries in other disciplines are identified as the dragons that have been slain. To the cognitivist, behavioristic psychology, functionalism, and logical empiricism have led the study of the mind down dark dead-end alleys and relegated cognitive scientists to the status of voices crying in the wilderness. Shortly after World War II, cognitivists from various disciplines began coming together to voice their objections to behaviorism and rally behind the belief that mathematics and computers could be used to definitively answer philosophical quesitons about the nature of thought and psychobiological questions about the workings of the brain. In the remainder of Part I, Gardner does a masterful job of tracing the nascent works in cognitive science and creating an exciting climate of impending scientific revolution.

Gardner asserts that there are three conditions that had to be met before cognitive science could emerge as a new science. "First of all, it was necessary to demonstrate the inadequacies of the behaviourist approach. Second, the particular limitations of each social science had to be acknowledged. Finally, the advent of the computer was needed to provide the final impetus for a new cognitive science." Part II of *The Mind's New Science* focuses on the roots of cognitive science from within the disciplines of philosophy, psychology, artificial intelligence, linguistics, anthropology, and neuroscience.

Gardner's purpose in this part of the book is to show how in each of these disciplines his three conditions have been met. He is only partially successful. Artificial intelligence as a discipline did not exist prior to the computer and it can hardly be said that the investigators of a silicon-based mind were ever enthralled by the canons of behaviorism. Neuroscientists have retreated steadily from the cognitive and holistic view of Karl Lashley. In philosophy, psychology, linguistics, and anthropology (after a fashion) Gardner builds a more persuasive argument. However, it is not readily apparent why the new scholars of the mind cannot find homes in the very disciplines which were founded to investigate mental life.

But this is nitpicking from a psychologist who has always been enthralled by the cognitive behaviorism of Tolman and secretly believed that rg-sg was a mental representation. Part II of *The Mind's New Science* was fascinating reading. Any reader is likely to be very knowledgeable about the history of one or more of the disciplines covered. Unfortunately, the nature of our education is likely to have obscured the fact that all of the social and behavioral sciences are hounded by the same epistemological issues addressed in philosophy. Gardner's relentless comparisons of one discipline's models with another and frequent examples of transdisciplinary efforts do more to illustrate the promise of cognitive science than any of the cognitivist rhetoric that characterizes the early part of the book.

In chapters 10-13, Gardner presents state-of-the-art synopses of four research topics: perception, visual imagery, classification, and human rationality. Each of these topics has been at the crux of any debate about the nature of mental life. Gardner offers this survey as examples of the best work within cognitive science.

In the final chapter, Gardner offers his vision for a new science of cognition:

> *whose crucial divisions . . . are not the traditional disciplinary perspectives but rather the specific cognitive contents. Therefore, scientists should be characterized by the central cognitive domain on which they work: broad domains like language, music, social knowledge, logical thought; and more focused subdomains like syntactic processing, the early phases of visual processing or the perception of rhythm. Scientific training and research enterprises should come increasingly to be organized around these problems. When working on these problems, scientists should*

> *fuse their necessarily different perspectives in order to arrive at a full account of the particular cognitive domain at issue. And so the ultimate cognitive-scientific picture of syntactic processing, or of language as a whole, should be a coordinated representational account which covers the full gamut of the traditional disciplines without any need to even mention them. (p. 39)*

Gardner also recognizes the long-term limits of cognitive science if it ultimately fails to address affective and cultural influences on cognition or incorporate neurobiological principles.

The Mind's New Science is a well-researched and well-written account of an exciting period of scientific history. It is an important book that does a superb job of tracing the events in several disciplines that has led to the reemergence of thought as a legitimate scientific topic.

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