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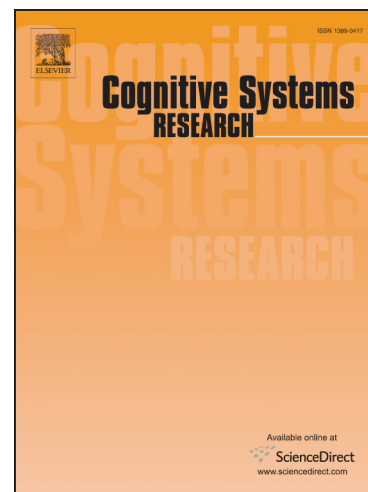
From Cybernetics to Brain Theory, and More: A Memoir

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# From Cybernetics to Brain Theory, and More: A Memoir

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### Abstract

While structured as an autobiography, this memoir exemplifies ways in which classic contributions to cybernetics (e.g., by Wiener, McCulloch & Pitts, and von Neumann) have fed into a diversity of current research areas, including the mathematical theory of systems and computation, artificial intelligence and robotics, computational neuroscience, linguistics, and cognitive science. The challenges of brain theory receive special emphasis. Action-oriented perception and schema theory complement neural network modeling in analyzing cerebral cortex, cerebellum, hippocampus, and basal ganglia. Comparative studies of frog, rat, monkey, ape and human not only deepen insights into the human brain but also ground an EvoDevoSocio view of “how the brain got language.” The rapprochement between neuroscience and architecture provides a recent challenge. The essay also assesses some of the social and theological implications of this broad perspective.

**Key words:** action-oriented perception; ape; architecture; artificial intelligence; automata theory; basal ganglia; brain theory; cerebellum; cerebral cortex; cognitive science; computational neuroscience; cybernetics; frog; hippocampus; human; language evolution; linguistics; monkey; rat; robotics; schema theory; social implications; systems theory; theological implications

### Chapter 1. Preamble

In the early 21<sup>st</sup> century, the wide use of the prefix *cyber-* has become the marker of the penetration of computer and information science, broadly conceived, into myriad facets of our lives. This use of the term can be traced back to a single book, Norbert Wiener’s *Cybernetics* (Wiener, 1948, 1961). I first read that book in early 1959, and my subsequent research and teaching career may be seen as the working out of key ideas not only of that book but of the related intellectual ferment that ushered in “the information age.” This article outlines that career as the basis for a history of some key ideas in artificial intelligence, brain research and cognitive science, together with some other areas with stronger or weaker ties to cybernetics.

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