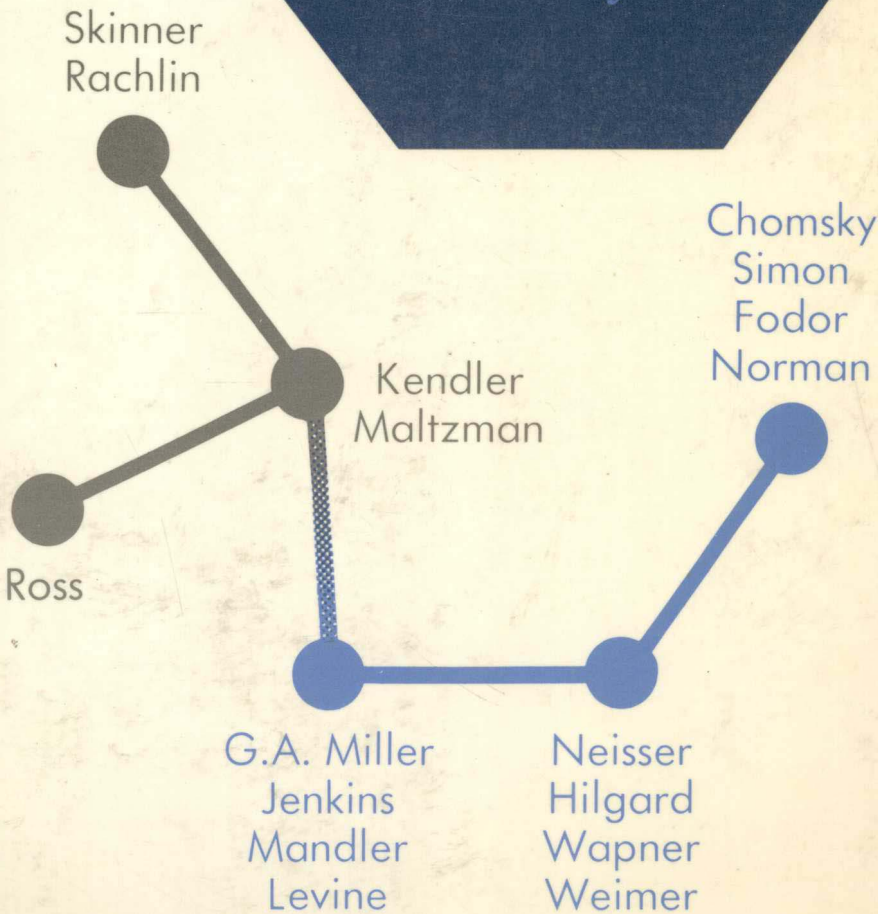
The Cognitive Revolution in Psychology

Bernard J. Baars



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Bernard J. Baars

University of California, San Francisco

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To my parents

—for their love and patience

Preface

In recent years the scientific approach to psychology has changed fundamentally, in ways that many consider revolutionary. This book aims to clarify the quiet revolution in thinking that has taken scientific psychology from a strong behaviorist viewpoint to a "cognitive" one. Toward this end, 17 psychologists on both sides of this revolutionary shift are interviewed, each explaining the issues from a personal perspective.

Behaviorism is defended by such major contributors to that approach as B. F. Skinner, Howard Rachlin, Howard H. Kendler, Irving R. Maltzman, and Alan O. Ross. The shift toward a cognitive point of view is discussed by George A. Miller, Noam Chomsky, Ulric Neisser, Donald A. Norman, George Mandler, Jerrold A. Fodor, James J. Jenkins, Walter Weimer, Marvin Levine, Michael A. Wapner, Ernest R. Hilgard, and Herbert A. Simon. Chapters 3, 5, 6, and 7 present the 17 interviews; Chapters 1, 2, and 4 attempt to place behaviorism and cognitive psychology in historical context. The final chapter raises some questions of interpretation: Has the century-long attempt to use the scientific method in psychology lived up to its promise? Have the means of application been appropriate? Does scientific psychology tend to denigrate human nature? If so, with what justification? Although there can be no final agreement on these interpretive issues, they are nonetheless worth raising.

This book is aimed at three possible audiences. First, professional psychologists may be curious to know how the cognitive shift was understood by some of its major protagonists. Those readers interested in the history, philosophy, and sociology of the human sciences will find the interviews a source of insight on a revolutionary change in our scientific conception of human beings. Third, and most important, this book is addressed to students who are within a few years of becoming professional psychologists—graduate students and advanced undergraduates. They are the ones most likely to feel torn between the competing perspectives of their teachers, and they may benefit most from a clear

presentation of the circumstances that led to the present state of psychology.

Inevitably, the telling of history is shaped by one's point of view. The psychologists interviewed in this book take a number of different perspectives, and in the historical chapters I attempt a coherent sketch of the major events that have led to contemporary psychology. Because the standard history of psychology, E. G. Boring's *History of Experimental Psychology* (1950), was written from a very specific and strongly held point of view (see Blumenthal, 1975, 1977b), my own attempt to sketch out the events that have shaped contemporary thinking may strike some readers as "revisionist history." Undoubtedly, the narrative of my historical chapters reflects the views of a contemporary cognitive psychologist; however, I have attempted to be sensitive to other points of view, and I am not uncritical of cognitive psychology itself. Still, there is no historiography without perspective, and any perspective both reveals and conceals the actual stream of events. Thus, although the historical chapters represent many years of thinking about the issues, I do not claim them to be the last word on the cognitive shift in psychology.

A cognitive metatheory now dominates most scientific work in psychology, yet there are still a number of viable behavioristic research programs. Does the predominance of the cognitive approach invalidate contemporary behavioristic research? The claim made here is not that "behaviorism is false," but that, in point of historical fact, it has fallen from favor among the majority of active workers in the field. Behaviorists may deplore this development as a deviation from the right way to do scientific psychology, but they do not dispute that the cognitive shift *is* a fact. Indeed, insofar as it represents the philosophical position of "physicalistic monism"—one of the perennial positions on the mind–body problem—behaviorism can probably never be *proven* false. Nor does it make much sense to say that behaviorism "lost" in the cognitive revolution, any more than it would to say that Newtonian physics "lost" to relativity theory in the early decades of this century. Einstein's contribution is inconceivable without the background of Newtonian physics, and the cognitive metatheory can be understood only against the background of behaviorism.

Some of the central tenets of behaviorism are at this point so taken for granted that they have simply become part of standard experimental psychology. All modern psychologists restrict their *evidence* to observable behavior, attempt to specify stimuli and responses with the greatest possible precision, are skeptical of theories that resist empirical testing,

and refuse to consider unsupported subjective reports as scientific evidence. In these ways, we are all behaviorists.

At the core of the disagreement between cognitive and behavioristic psychology is the role of theory. This book defines "cognitive psychology" in the first instance as a metatheory—an approach to scientific psychology—that encourages psychologists to infer unobservable constructs on the basis of observable phenomena. Classical behaviorism historically resisted this kind of theoretical inference (see Chapters 1 and 2); but more recent work by behaviorists suggests a greater reliance on theoretical constructs. Thus, in this critical respect, the differences between behaviorists and their cognitive colleagues may well disappear in a few decades.

On the other hand, most of the natural sciences are characterized by the perennial debate between experimenters and theoreticians—between those who are comfortable with theoretical entities such as "genes" and "electrons" and those who must see and touch the phenomena to be sure they are real. In this sense, the dynamic tension between the behavioral and cognitive points of view may well continue in the future, though it may be *called* something else. It may begin to resemble the perennial debate between experimental and theoretical scientists in the natural sciences.

This book owes a great deal to a number of people. The interview participants graciously gave of their time and effort. Others helped with the very large clerical effort involved, especially Ms. Connie Fremont, whose epic battles with computer terminals and text editors were awesome to behold, and certainly indispensable. Magdalena Palmer volunteered her time and energy to organize a sizeable bibliography. Mark Mattson, Michael T. Motley, and Kenneth Giroux gave helpful comments on several chapters, and Professors Aaron Carton, Marvin Levine, and Leonard Krasner provided important historical insights. Professor Lyn Abramson (now of the University of Wisconsin) joined me in interviewing Alan O. Ross (Chapter 3). Comments and reviews by Arthur Blumenthal, Arthur Reber, Howard Gardner, and Donald G. MacKay were most helpful. I also wish to thank my editor, Seymour Weingarten, for his patience and confidence, and for incisive editorial comments. My father, Louis J. Baars, helped design the book jacket. The finishing touches were put on this book while I was Visiting Scientist at the Program for the Study of Conscious and Unconscious Processes, Langley Porter Psychiatric Institute, supported by the John D. and Catherine T. MacArthur Foundation and directed by Mardi J. Horowitz. They are hereby gratefully acknowledged.

The Cognitive Revolution in Psychology

Contents

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Introduction: Scientific Psychology in Search of a Framework

For at least 50 years, until very recently, scientific psychology was dominated by a philosophy of science known as behaviorism. Behaviorism is, in many ways, a radical position. Many behaviorists denied the legitimacy of ideas such as consciousness, thinking, feelings, motives, plans, purposes, images, knowledge, or the self. Much of the everyday vocabulary we take for granted in describing human behavior and experience was rejected as unscientific. Thus the most prestigious form of psychology, taught in all major colleges and universities, utterly rejected the major psychological concepts of Western thought. The reasons for this radical rejection of everyday ideas are complex; they involve not only the historical circumstances under which experimental psychology came about and was maintained, especially in the United States, but also the philosophical issue of the mind-body problem, and the nature of science. All of these reasons will be touched on in the course of this book. Over the past several decades, however, a significant shift has taken place in the research community, away from behaviorism and toward a "cognitive" or "information-processing" position. Fewer scholars at major universities now call themselves behaviorists in the traditional sense. In fact, "behaviorism" is often referred to in the past tense, and many commonsense notions of human experience and action are again gaining wide currency in the scientific literature. This shift has been referred to as "the cognitive revolution in psychology" (*e.g.*, Dember, 1974; Joynson, 1970; Weimer & Palermo, 1973; Palermo, 1971), and this book presents the thoughts of some of the most prominent psychologists who figured on both sides of this conceptual revolution.

The changes that have occurred in the last 20 years or so can be interpreted from different vantage points, and will undoubtedly be the source of many disagreements. But no one doubts that something has happened, and that it is fundamental. Sociologists and philosophers of science may differ on how best to characterize the "cognitive revolution," but for working scientists in psychology, the effects of the shift have been concrete and practical: Topics and phenomena that were rejected as "unscientific" are again the subject of lively thinking and experimentation, and much of the 19th-century psychology of Wilhelm Wundt, William James, and others has become relevant again. And conversely, research topics that constituted the very core of the scientific approach to psychology a few decades ago are now dormant, and often considered to be contrived or irrelevant. Along with this, the "reference experiments" that seemed to provide analogues for all other problems have changed. Experiments in animal associationism, such as the work of Pavlov, Watson, and Skinner, seem less relevant now to many psychologists. Reputations have fallen, and reputations have been made. A number of workers who were trained under the older viewpoint are sympathetic to the cognitive revolution, yet seem unable to disengage from the older point of view. The editorial control of journals has shifted, and new journals have sprung up. Along with this have come the new buzz-words—"cognitive," "information processing," "structure," "organization," "psycholinguistics," and so on. The human cost has sometimes been considerable.

Human experimental psychology has been the major focus of the cognitive revolution, but other areas of psychology are beginning to feel the impact. Animal psychology has long been the stronghold of a behaviorism, but recent work indicates the beginnings of a shift there, too (*e.g.*, Hulse, Fowler, & Honig, 1978). Developmental psychology has been similarly affected. And even clinical work with emotionally disturbed people, which has gained the most practical benefits from behavioral ideas and findings, may be shifting in a more cognitive direction (*e.g.*, Mahoney & Arnkoff, 1978; Beck, Rush, Shaw, & Emery, 1979).

Why should anyone outside the field really care about these specialized debates between scholars? Are they not, in fact, very far removed from our everyday concerns? The cognitive revolution warrants general interest for several reasons:

1. *The experimental psychology community has made a profound effort to apply scientific methods to the study of human beings.* At times the operative conception of "scientific method" may have been naïve or based on excessive borrowing from the physical sciences. Nevertheless, both behaviorism

and cognitive psychology represents efforts to be as objective as mere humans can be about ourselves, and neither can be understood apart from this devotion to an idealistic conception of science. Both the behavioristic and cognitive paradigms represent cases of "scientism" in modern life, certainly one of the dominant themes of this century. If the turning away from the behavioristic approach represents a case of "scientism gone wrong," it should concern all of us as a demonstrated limit of what is perhaps the deepest faith of the 20th century.

2. *The cognitive revolution may represent a living example of a "scientific revolution."* Historians and sociologists of science are currently much concerned with the nature of scientific revolutions—radical shifts in the viewpoints of whole research communities (Kuhn, 1962). The best-known examples of such shifts are associated with the great names in the history of science: the Copernican revolution, the Einsteinian revolution, the Darwinian, and so on. It has been argued that the cognitive shift is not at all like these classical revolutions; yet the basic phenomenon—a relatively sudden turnabout in the perspective of a community of scientists—is very similar. Most important, it is happening today, and the majority of the participants in this remarkable event in the life of a scientific community are still alive to give us their impressions.

3. *Because their work carries the status of science, experimental psychologists are highly influential.* Experimentalists have tremendous long-term influence not only over the lives of college students, but also over practicing psychologists, educators, social workers, and others in the "helping professions." Today's research ideas are likely to show up elsewhere—not tomorrow, for there is a considerable time lag before ideas become widely known—but within the next 5 or 10 years. On most college campuses psychology is the most popular subject. But because of the time lag between research and teaching, many undergraduate students even today are taught the behavioristic perspective on human psychology as if it were still dominant in the thinking of researchers.

4. *The scientific approach may yet succeed in understanding human nature.* Probably most scientific psychologists would agree that our understanding is quite limited. But nothing is more fascinating to most of us than the study of humanity itself, and this book may, in a sense, be treated as a progress report on the historic *quest for scientific certainty* in our understanding of human beings and the human puzzle. Even those who view science with suspicion have reason to care about the course of experimental psychology: We have enough experience today with the benefits and drawbacks of successful science to know that the more widely

a scientific approach is understood, the less likely it is to be misused. If war is too important to be left to the generals, then certainly scientific psychology is too important to be left to the psychologists.

In spite of what some popular figures have said about scientific psychology, we in the field are not about to manipulate masses of people against their will. Indeed, current research findings might be held to suggest the impressive capability of people to *resist* manipulation. This book tends, if anything, to emphasize the limits of our current understanding of human beings, and the researchers whose words are recorded herein are very frank about those limits.

In yet a different way, I hope that these interviews reveal the human dimension of psychologists as they devote their professional lives to extending our knowledge about ourselves. Certainly there are failures, and doubts, and some of the less praiseworthy aspects of humanity have their role here as elsewhere. Overall, experimental psychologists are dedicated to a compulsion that all of us share to some degree: the pursuit of knowledge, the attempted satisfaction of a fathomless curiosity about mankind. They have tried to pursue this ideal in a highly disciplined way, refusing to claim anything unless they could prove their claim in the most rigorous way. Sometimes this great cautiousness makes psychologists appear silly, as when they seem to explain laboriously, or even to deny, some utterly commonplace fact. But it must be understood that scientific standards of evidence are much more demanding than those we use in everyday life—in fact, it may be this self-disciplined approach that has ultimately led to the power of the scientific approach in so many areas of life.

The Cognitive Revolution as a Change in the Metatheory of Psychology

Roughly in the decade from 1955 to 1965 a quiet revolution in thought took place among many research psychologists. The dominant metatheory of the previous 50 years was discarded or changed fundamentally, and a new point of view began to take shape. A "metatheory" in science is a viewpoint about how one goes about doing the science, and because psychology is a young and, in many ways, uncertain discipline, its metatheories are even more important than its theories. The theories that psychologists propose to explain their observations are usually quite limited and prone to change, but the metatheory defines the field itself, often for many decades. Psychologists may disagree about any particular

topic, but if they share the same metatheory, they will be able to agree on what constitutes evidence for or against their claims. On the other hand, if they cannot define their standards of evidence or their views about the proper domain for psychology, scientific work and communication become nearly impossible.

Thus, it is of major importance that the behavioristic metatheory, which defined the scientific approach to psychology from about 1913 to about 1960, has undergone a fundamental change, a change so profound that most active researchers began to refer to the new point of view with a new name: usually, "cognitive psychology" or "information-processing psychology."

This new metatheory has not yet spread to all areas of psychological research, but everywhere, there is a strong trend in a cognitive direction. Behavioristic influence does remain strong, however, in those areas where it has apparently been very fruitful, especially in animal research and clinical psychology. And because history seldom fits our categories very neatly, it may be that the behavioral influence in these areas will continue to be strong for some time.

Some Ambiguities

Practically all of the words used to describe the events I am outlining have several meanings. "Behaviorism" is a fairly good label for the scientific metatheory that dominated psychology between 1913 and 1960, but a closer look shows that there are many varieties of behaviorism: operant conditioners (Skinnerian), S-R behaviorists, Hullian behaviorists, functionalists, reflex behaviorists, and even "cognitive behaviorists" (*e.g.*, Tolman, 1932). Furthermore, the word "cognitive" is ambiguous: Although it may denote "conscious, intellectual functions," this is *not* the primary sense in which modern cognitive psychologists use it (see Chapter 2). The term "cognitive psychology" is also used to specify a field within human experimental psychology that applies an information-processing metaphor to human functioning. This book uses the term in an even broader sense: It treats cognitive psychology as a new metatheory for psychology—a new approach to the subject matter of scientific psychology—and, thus, as an alternative to behaviorism. This book attempts to use all such labels as consistently as possible, but the reader should be sensitive to possible ambiguities.

Even the word "science" is ambiguous. In one sense, it refers to an established body of fact, integrated by an elegant and powerful theory, but it is also used to characterize a specific *approach* to the establishment

of fact, an approach using precise measurement and observation, rigorous reasoning about the observations, and a preference for experimental manipulation of phenomena. Psychology is *not* a science in the first sense, because it lacks an overarching theory. But the psychological research community has worked very hard, at times brilliantly, to develop a *scientific approach* to human conduct and experience. In this second sense, psychology has been scientific for at least 100 years. It has been remarkably difficult to understand human beings in a scientific way, and what progress has been made has been hard won. Yet we have progressed, despite the problems.

Three Metatheories for Psychology

Some fundamental themes will be found throughout this book. One is that three metatheoretical viewpoints have dominated experimental psychology so far, usually called *introspectionism, behaviorism*, and *cognitive* psychology. Each specifies a domain for psychology, a set of techniques for investigating that domain, and a research program to integrate the findings into the body of human knowledge and practice.

Introspectionism claims that the special domain of psychology is conscious human experience. No other science deals directly with human experience as such, and it is the job of psychologists to discover ways to investigate the contents of consciousness. Introspectionism in this sense is usually attributed to Wilhelm Wundt (1832–1920), the major experimental psychologist of the 19th century. But recently it has become clear that Wundt's view is very much broader than introspectionism proper, though he did use "systematic self-observation" to analyze "simple" mental contents. This basic misinterpretation of Wundt's psychology is apparently due to Edward B. Titchener (1867–1927), who was considered the foremost exponent of Wundtian psychology in America (Blumenthal, 1980). It is actually Titchener who best represents the kind of introspectionism against which the behaviorists revolted near the beginning of this century.

Thus, the word "introspectionism" is problematic. Strictly speaking, it is best suited to the work of Titchener, who used the term to describe his own technique of analytic self-observation. Other 19th-century psychologists did not use the term to describe their own work, nor did Wundt. On the other hand, there was general agreement among academic psychologists in the 19th century that the primary *mission* of psychology was to investigate conscious experience.

We could therefore refer to 19th-century academic psychology as