Successions in Psychology

The Cognitive Revolution in Psychology. BERNARD J. BAARS. Guilford, New York, 1986. xvi, 443 pp. $49.50; paper, $24.95.

Psychologists like to think that their science is a paradigmatic example of the paradigm shifts in science written about by Thomas Kuhn. The author of the present work is ambivalent about the applicability of Kuhn's theory to psychology, as he should be. Though it is certainly true that since the turn of the century there has been a succession of dominant points of view in psychology, these have been metatheories, injunctions about how to do psychology, rather than theories, such as Kuhn was concerned with in *The Structure of Scientific Revolutions*.

Baars's book describes behaviorism and cognitive psychology and tries to understand the reasons for the "revolution" in which the former was displaced by the latter. The author interviewed 17 scholars in these categories: current behaviorists; one-time behaviorists who have converted to cognitive psychology; cognitivists who have not been behaviorists; and scholars outside of psychology who have influenced cognitive psychology. The book includes verbatim transcripts of the interviews.

The early experimental psychologists, including William James, were introspectionists who believed that the task of psychology was to study consciousness. Functionalism was an American invention designed to emphasize the function of goal-directed behavior. Baars says too little about functionalism, which had a direct influence on behaviorism. In 1913 John B. Watson, then a professor at Johns Hopkins University, published a paper enjoining psychologists to abandon the methods of introspection. The subject matter should not be consciousness but behavior, observable motor behavior. Theories were verboten, including the posing of problems that implied internal, unobservable variables. "Mind" was part of a long lexicon including "perception," "thinking," "purpose," and "attention," never to be used. Introspection was a subject of particular ridicule from Watson. Behaviorism caught on among many psychologists, mainly, I believe, for sociological reasons. University departments of philosophy–psychology were being split, so it was important for the psychologists to differentiate their concerns from those of former department-mates. Metaphysics had no place in the new, scientific psychology, which was obviously creating a new metaphysics. The physical sciences were successful and prestigeful, so they should be emulated. Behaviorism, sometimes called stimulus-response (S-R) psychology, was congruent with the new logical positivism and operationalism. Most important, behaviorism fit the American spirit. It was practical (Watson wrote on advertising and child learning) and optimistic, as witness Watson's famous aphorism: "Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant chief and, yes, even beggarman and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors."

Except for Pavlovian conditioning in Russia, behaviorism made no headway in Europe, but most American psychologists were behaviorists, traditional and neo, until the end of the Second World War, when cognitive psychology replaced behaviorism as the main point of view of experimental psychology.

Cognitive psychology is prepared to theorize boldly in ways behaviorism was not. The concern is with information processing, the pick-up, transformation, storage, and retrieval of information, so that in traditional terms cognitive psychologists study such processes as perception, attention, memory, thinking, and problem-solving. A number of conditions made cognitive psychology an obvious next development: the advent of the computer, providing a metaphor for human information processing, and the emergence of the new Chomskian linguistics. Some said that cognitive psychology was a return to commonsense psychology. Still, the abandonment of behaviorism needs to be explained. Baars in order to make the transition fit Kuhn's terms argues that neo-behavioristic theory so failed that a new paradigm was essential. This interpretation ignores the fact that B. F. Skinner is the most famous psychologist today and a proud and unrepentant heir of Watson and that his students were and continue to be successful in their agenda of research and application, as in behavior modification.

Cognitive psychology arose shortly after the Second World War when there was an influx of new people into academic psychology and the old-timers had come through attempts to apply psychology to the military. It is not that behaviorism did not work, it was irrelevant to new concerns of psychologists.

The interviews in this book are not all useful. Baars is an acute, well-prepared interviewer, but the responses are redundant without being enlightening. Still, it is fun to imagine the voices of friends recounting their choice of psychology as their life's work. I did find four interviews particularly interesting. George Miller (now at Princeton) came to cognitive psychology from psychophysics and mathematical psychology. He introduced psychologists to information theory. In the 1950s and '60s he was co-director of the Harvard Center for Cognitive Studies, where the early agenda for cognitive psychology was formed. Miller worked with Chomsky to test linguistic theory as a psychological theory. It did not work but showed what a cognitive theory should look like and demonstrated that behaviorism could not come to grips with language behavior. Incidentally, during this period Chomsky published an important review of Skinner's *Verbal Behavior*, questioning the fundamental assumptions of behaviorism. In his interview in this book Chomsky repeats his ridicule of behaviorism, though I doubt there is a psychologist, linguist, or philosopher who has not heard it.

The interview with Ulric Neisser (Emory University) is useful. Neisser in 1967 published the first book to be called *Cognitive Psychology* and so named the field and outlined an agenda. Neisser never paid much attention to behaviorism; he was influenced by Gestalt psychology. He plays the role of burr in present-day cognitive psychology. The field, he believes, has degenerated to minor laboratory studies that have little connection with reality. He raises an important question about how different behaviorism and cognitive psychology are.

Baars could profitably have paid more attention to this question, though he is devoted to demonstrating differences between the two approaches. All psychologists today are behaviorists in that they study observable, measurable behavior. Even modern studies based on introspection are controlled so that the introspective steps are obvious. For example, a subject is shown a tumbling cube and the display is removed for some fixed time, after which the subject reports the current position of the cube. Most behaviorists would find this experiment quite acceptable.

George Mandler (University of California at San Diego) talks about the influence of Gestalt psychology on cognitive psychology, an important influence that Baars himself neglects. Gestalt psychology was an

import from Germany in the 1920s and '30s. It was a strong critique of behaviorism and introspectionism, though Gestalters used introspection as a method.

Finally, the interview with Herbert Simon (Carnegie-Mellon) is enlightening. Simon, trained as an economist and management specialist, has profoundly influenced psychology without any formal training in the field. His comments are wise and judicious as befits a Nobel laureate. Simon is responsible for the interest in artificial intelligence, now an important aspect of cognitive psychology. He has developed computer programs for problem-solving and for playing chess and has been a leader in the emergence of a new academic field called "cognitive sciences," which may absorb cognitive psychology as it combines psychology, linguistics, philosophy, and computer science.

Baars has written an interesting and useful book on selected aspects of experimental psychology over the past 80 years. I would not again teach a course in the history of psychology without referring to this book. He writes well. He paints the demarcation between behaviorism and cognitive psychology too sharply. It has been said that cognitive psychology is a disguised S-R formulation with some fancy talk between the S and R. And should the author believe that the history of psychology is linear I would point out that there is discussion again of connectionism among cognitive psychologists, reminiscent of the associationism of behaviorism.

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Carbonate Complexes

Reef Diagenesis. J. H. SCHROEDER and B. H. PURSER, Eds. Springer-Verlag, New York, 1986. x, 455 pp., illus. $59. Based on a symposium, Papeete, Tahiti, 1985.

In compiling this collection of 19 papers Schroeder and Purser have done carbonate geology a truly valuable service. Most of the papers are case studies describing ordered diagenetic sequences in specific reef complexes; thus taken together they offer a comprehensive view of reef alteration. They include diagenetic studies of many of the best-known depositional reef facies models in various parts of the world and adequately encompass the span of geologic time.

Two papers are special studies: one on details of fabric control of coral diagenesis (B. R. Constantz) and another on the hydrology of Eniwetok and Davies Reef in the Australian Great Barrier Reef (R. W. Buddemeier and J. A. Oberdorfer). The latter is particularly important because so few hydrodynamic studies are available. It reports that fabric variation in reefs makes for high but variable permeability. Sea water penetrates well into these two modern reef masses. The Ghyben-Herzberg freshwater lens is thin and irregular despite the exposed reef mass at Eniwetok. The study also reports that microbial activity affects internal water chemistry throughout reef masses, a diagenetic control often not considered.

Very useful general descriptive accounts of Neogene diagenesis are given in papers on submarine cements in the Great Barrier Reef (J. F. Marshall); peripheral cementation and dolomitization by mixing of marine and fresh water in reefs of Mururoa Atoll, French Polynesia (D. M. Aissaoui, D. Buigues, and B. H. Purser); and diagenesis in Pleistocene coral reefs in the Red Sea (W. C. Dullo) and in Miocene reefs in the Gulf of Suez (D. M. Aissaoui *et al.*). Older reefs — Paleocene coral knobs of southern Egypt— are also discussed (J. H. Schroeder). The Cretaceous is well represented by papers on northern Spain's Albian reefs in the tectonically active Cantabrian basin (J. Reitner) and rudist reefs in Tunisia (A. M. Rabet *et al.*).

A major paper by P. Enos reviews work on the Cretaceous of the Valles Platform in central Mexico and is followed by studies of the southern German Jurassic sponge-algal reefs in Schwabia and Franconia (R. Koch and M. Schorr) and the Triassic Wetterstein limestone of Bavaria (R. Henrich and H. Zankl). For the Paleozoic, two Upper Permian examples are included: the Zechstein-Magnesian limestone of northeastern England (M. E. Tucker and N. T. J. Hollingworth) and aragonitic sponges from the Djebel Tebaga of southern Tunisia (M. Scherer). A paper on micrite diagenesis in the Carboniferous Waulsortian (J. Miller) is followed by two on Upper Devonian reefs: the subsurface Nisku of Alberta, Canada (H.-G. Machel) and the Canning Basin of western Australia (C. Kerans, N. F. Hurley, and P. E. Playford). Two Silurian reef studies complete the case histories: a subsurface study of northern Michigan basin pinnacle reefs (K. R. Cercone and K. C. Lohmann) and a study of the Klinteberg formation in the Baltic Gotlandian (P. Frykman).

The reviews are admirably summarized by the editors, both of whom contributed to some of the case histories. They list seven reasons why diagenesis is so prominent in reefs, most important that reefs are high-standing barrier-forming masses with great internal porosity and metastable mineralogy consisting of aragonite and are organic-rich. The summary points out that hydrodynamic models of reefs (indeed of all carbonate masses) need intensive additional study and calls attention to tidal movements, thermal convection, and wave surge as reasons for surficial cementation on windward sides of reefs and for the strong internal penetration of marine waters, the latter offering an additional explanation of dolomitization. The majority of the studies show that the depth of the Ghyben-Herzberg lens is controlled by surface outcrop exposures and internal inhomogeneity and that its general thinness diminishes the influence of mixing-zone dolomitization. Incidentally, 14 out of 19 of the reported examples include dolomitization, much of which is associated with solution and therefore may originate in mixing zones. Evaporites are involved in the stratigraphic sequences in only two of the 19 examples.

The studies show that early marine cementation is pervasive but that meteoric cementation is also present in all the reefs studied. These cements are volumetrically important and serve to stabilize the reef mass. Later burial diagenesis (compaction, pressure solution, and cementation) is generally porosity-destructive. The editors have included several useful cartoons of suggested water masses and their flow paths in reefs. In their conclusions, they urge more careful plotting of the geographic variations in diagenetic effects within individual reef bodies. I strongly recommend this book to both specialists and students interested in carbonate rocks.

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Invertebrate Immunology

Hemocytic and Humoral Immunity in Arthropods. AYODHYA P. GUPTA, Ed. Wiley-Interscience, New York, 1986. xiv, 535 pp., illus. $59.95.

Within the field of comparative immunology much of the growing body of research has dealt with arthropods. This volume on the subject consists of 20 chapters by 32 authors. The first seven chapters pertain to cell-mediated immunity and the next ten are concerned with humoral factors. The final three chapters deal with techniques.

The chapters vary in quality and scope. The lead chapter, by A. P. Gupta, is a comprehensive and thought-provoking analysis of the structure and functions of arthropod immunocytes and their similarities to vertebrate B and T cells. Similarly, the contribution by A. Vey and P. Götz is an in-depth review of the antifungal defense