

The Universe Within: A New Science Explores the Human Mind. Morton Hunt. New York: Simon and Schuster, 1982, 415 pages, \$18.75 hard.

Reviewed by S. Eoin St. John, Physical Therapy Systems

Whatever one's speciality today, it is virtually impossible to avoid contact with that relatively new field of study: cognitive science. The most innovative and startling linguistic investigations now focus as much upon how subjects think as upon language itself, and cognitive research is gradually assuming centrality in psychology. It is doubtless most evident in the realm of computers, with studies of artificial intelligence and its ramifications rolling out with amazing speed and regularity. This is hardly surprising, since computers themselves are proliferating at a spectacular pace. Indeed, it seems inevitable that "literacy" will very soon be measured not with the old yardstick of verbal competence, but instead with one's ability to program computers and to comprehend programs.

A very large portion of our population is bewildered by the new concepts proffered by cognitive science, just as they are bewildered by the sudden invasion of computers and computer language. This situation needs to be rectified, for if our society is to make maximal use of artificial intelligence, as well as the potential in human intelligence being revealed by cognitive studies, it must avoid this "new illiteracy." The learned cannot afford to ignore the inroads cognitive studies are making into all fields: music, anthropology, reading theory, education (via learning, and thus teaching, theory), mathematics, and even physical education. Certainly much of the present explosion in high quality long-distance runners, for example, has as much to do with new insights into the relationships between thought and running as it does with the running-shoe revolution.

The point is, whatever one's field may be, it would be helpful to make the acquaintance of this new scientific speciality—cognitive science. The research, however, has been suddenly multitudinous, spread across so very many fields, and often so apparently esoteric, that access has been difficult. Where could a non-specialist begin? At least one very good new book now fulfills that need. The book is Morton Hunt's *The Universe Within*, and it is learned enough to satisfy the academic, yet it is clear enough that the interested layperson could no doubt benefit from it as well.

Hunt covers a great deal of ground: from the speculations of the early Greeks to the development of cognitive science in psychology. Hunt notes that psychology very early turned away from attempts to account for the unseen events that constitute human thought to "observable events—actual stimuli and visible responses." Hunt explains how the revolution against behaviorists—because of their refusal to see thought processes as material for scientific study—correspond with shifting perspectives in neurology, child-development studies, formal logic, anthropology, linguistics and, of course, the mushrooming computer sciences. Better, he explains how researchers in each of these fields seek answers, and he succinctly summarizes an incredibly large amount of current research.

Early in the text Hunt concentrates upon psychobiology, and he elucidates current theories of *epineural* processes. He compares human brain structure to the brain structures of various animals, and as is the case throughout the book, the accompany-

ing illustrations make his explanation perfectly clear—in this case the notion that the human brain is superior because of the vast amount of uncommitted cortex. Not only do the illustrations help clarify exposition, so do Hunt's excellent examples. Explaining *redundancy* in the human brain, the fact that "many functions are duplicated in several regions of the cortex" and that there are a great many alternate pathways impulses can take, he writes:

This may explain how we can store so immense a quantity of facts, why we have so many different methods of locating things in memory, and why we can think about problems in such diverse ways—often with such unexpected results. And why most accidents, illnesses, and even supposed daily loss of 100,000 brain cells due to aging leave us fully capable of normal thinking until old age; it is the redundancy of our brains—their excess of parts and circuits—that keeps them running smoothly. In business terms, it would be a wasteful and unprofitable way to build a machine; in evolutionary terms, it is a triumph of good design.

After discussing the physical aspects of brain research, Hunt deals with a notion that recurs throughout the book: self-awareness. The ability of the human brain to be aware of its awareness, to think about itself in the act of thinking, Hunt sees as the essential difference between human cognition and that of other animals. In fact, he sees this as at once the basic tool of and the basic force behind cognitive science.

From this introductory chapter on the mechanics of the human brain, Hunt delves into a short history of psychology, with a special emphasis on the unfortunately overwhelming influence of Skinner which, with its uncompromising attention to environment and conditioning, closed a vast area of human psychology to research for decades. Hunt does not declare that behaviorism is wrong, only that it is a miniscule aspect of the psychology of the whole human being. Hunt presents a number of experiments which reveal the limitations of behaviorism, but he never blames its followers for their single-mindedness. Rather, he explains its appeal (e.g., to humanists, who wished to believe that environment was primarily responsible for anti-social behavior).

General readers will doubtless be fascinated by Hunt's chapter on human memory, "What Do You Do With 100 Trillion Bits Of Information?" which explains *recall*, *recognition*, *hierarchical inference*, *chunks*, *IP theory*, *short-term memory*, and *long-term memory*. He explains how each of these items proved useful in human evolution—or at least human survival—and how they are useful for humans today. Students would doubtless be cheered by his account of research which disproves the exercise theory of memory—that is, by memorizing a great deal one can build up memory power in much the same way one builds muscles through exercise. So much for that time-honored learning theory. In fact, Hunt shows that most of what we have been told about memory is fallacious. His discussion of what happens to lost memories is fascinating: do forgotten memories gradually decay and disappear? Or are they always in our brains just waiting for the necessary stimulus to happen along? The jury is still out on this one, though evidence suggests that *some* forgotten memories remain for a lifetime.

Hunt then takes on the notion of language, and as his witty chapter subtitle indicates, the world's only logical animal earns a flunking grade in logic. Logic, and Aristotle's concepts of logic and rational thought, have impeded cognitive investiga-

tions, it seems. Contrary to assumptions of the educated, logic is not the ideal process for decision-making. Indeed, it is amazing that human beings still venerate logic, especially when one considers the atrocities it has supported. For example, if one grants Nazi Germany its initial assumptions, the extermination of six million people proceeds logically therefrom. Hunt points to the tremendous number of contradictory doctrines and sects within Christianity, all of which have been arrived at through the application of deductive reasoning applied to the same body of evidence—the same texts. Logic is not the best process for dealing with reality, as Hunt demonstrates. For one thing, it is inefficient. It takes too long. To survive the human animal had to react according to immediately perceived truths, and often react emotionally; then after the event, for example, an attack by an animal perceived to be a threat, the human being might account logically for his or her behavior. For humans, logic is very often an *ex post facto* matter. Most research supports the view that humans think *plausibly* rather than logically; after the fact we construct logical procedures to justify our answers, opinions, and actions. Formal logic is directly related to formal education, and in spite of Piaget's contention, the evidence indicates that without formal education very few human beings ever develop the ability to think in a formally logical manner—or need to, for that matter.

Hunt does not limit himself to a summary of research, the history of philosophy, the developments in cognitive science—all of which might prove unbearably dry after a few dozen pages. Rather, he accompanies his history and research with examples inviting reader participation. He presents problems that researchers often employ in their research, as well as traditional syllogisms for the reader to try his or her hand at. For example, in discussing analogical reasoning, among the many problems and puzzles he presents as examples—after working them out the reader can consult an answer key—Hunt includes this small example: "Washington is to 1 as Lincoln is to (a) 10, (b) 5." The answer is 5, and the analogy is the appearance of the faces of these two presidents on the one and five dollar bills respectively. But the more important aspect is *how* this problem is solved. And this is one of numerous instances in which the reader is invited to observe his or her own thought processes at work. Thus does Hunt drive home his notion that the basis of cognitive science is human awareness of human awareness. It is a participatory book, and though it will probably never be considered for such a role, this book would be excellent for an introductory college course in cognitive science—or as a supplementary psychology, philosophy, or computer science text.

Hunt deals extensively with the human tendency to classify information, and he shows that "pigeonholing our experience," while often disparaged by intellectuals, is probably an essential human process. Current research in concept formation indicates that, in fact, we pigeonhole naturally and inevitably. Indeed, it appears that humans are "hard-wired"—or somehow genetically predisposed—to conceptualize human experience in certain ways, of which this is one. Humans are "concept prone." We do not possess ready-made concepts, rather we possess neural structures which to a certain extent predetermine the kinds of concepts we make from our experience: we are "hard-wired" to create natural and realistic concepts, unlike computers which can be hard-wired to contain any concept, no matter how strange or useless (Hunt provides the example of "bachelors and returnable bottles" as one such useless concept-category). Hunt then presents recent research indicating how the human brain forms certain kinds of concepts "even without the benefit of feedback," and how we arrive at helpful categories lacking the logical boundaries Aristotle demanded. Indeed, our categories overlap and are rarely clearly bounded or logically defined.

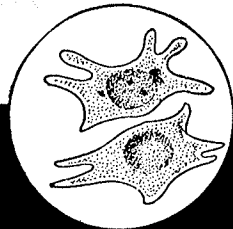
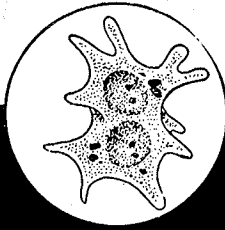
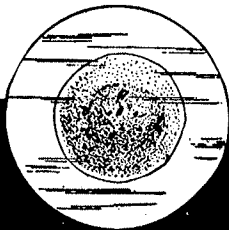
One very interesting experiment was initiated by the linguist William Labov, who asked subjects to name objects—classifying these objects as either cup, bowl, or vase. As one would expect, definitions shifted: some objects could function as all three and resembled all three to a certain extent. Classification depended upon physical variables such as depth and width, and also depended upon the experimenter's comments. A cup could become a bowl if Labov had asked subjects to imagine the objects as filled with mashed potatoes; borderline objects could become vases if he had asked them to imagine the objects filled with flowers. Clearly, some objects were definitely cups. As Labov showed, this is how human beings categorize. We have a number of impressions of cups, and those closest to our "ideal" cup serve as its core definition, but the concept and category of cup get fuzzier near the edges until they can fade into the concepts and categories "vase" and "bowl." Reading this book one is struck by this, and so many other seemingly obvious conclusions about the nature of the human cognitive process that have been arrived at only recently. Once we escape the Aristotle that has been drummed into us, we see that only rarely are categories clearly bounded and logically defined, and that more often than not boundaries are both artificial and absurd—and often useless. Even small children, who are apt to call a sheep a dog, will when asked to choose the dog, after being shown a sheep and a dog, rarely make a mistake. They will choose the dog. Clearly humans categorize from an ideal center then define the edges of the category as it becomes necessary to do so.

Hunt recounts some fascinating experiments: for example, those which demonstrate that children 2 and 3 years old firmly grasp the notion of causality and clearly demonstrate pattern-recognition abilities. In fact, evidence indicates that humans are pre-wired for pattern recognition, that this is one basic aspect of cognition. Also fascinating are the accounts of errors that those trained in "logic" are apt to make. One famous, and discouraging, experiment with *confirmation bias* involved psychotherapists in training who made preliminary diagnoses of patients based upon behavior tests, and who were subsequently presented files to consult which were full of information contradicting their diagnoses. Unfortunately most were so firmly entrenched in their original hypotheses that they rejected the contradictory evidence, explaining it away—logically in most cases. This is human enough: smokers reject negative evidence associated with smoking, bikers reject or rationalize the dangers of motorcycles, those who believe in ESP are many times more receptive to information which seems to support their position than that which seems to reject it.

But Hunt assures us that even our apparent weaknesses as thinkers often serve positive ends. If humans abandoned hypotheses at the first sign of error or contradiction, we would abandon a great number of positive hypotheses. So even our apparently illogical biases in favor of what we have come to believe often serve to make certain we do not abandon a valid hypothesis because of faulty observation. This process is fundamentally human, and is certainly apparent in the scientific community. As Hunt points out, new theories are only very slowly accepted, no matter how heavily weighted the evidence is in their favor. Hunt quotes Max Planck in this regard, that scientific theorists triumph by outliving their opponents, not by convincing them.

Hunt is uncompromising throughout. In "The Origins of the Mind" he is gently merciless with the supposed discovery of syntactical abilities in apes—from the famous Washoe on—that so many humans wanted to believe and which even now many believers, scientists among them, are slow to question. It was, he notes, a pleasant theory, one that we liked, perhaps. Hunt covers a great deal in this book; one wonders at the tremendous number of hours he must have spent reading the research and interviewing the researchers. He quotes such a large number of researchers that it

is clear he must have invested a great many hours in the preliminaries alone—deciding who he should be talking with. Hunt's attempt most certainly can be admired. To some extent, he tries to do what, for some time at least, many cognitive scientists will also attempt: synthesize theories of cognition. Indeed, as Hunt notes, many cognitive scientists doubt that a sophisticated synthesis will emerge because the human mind displays such a diverse number of processes and phenomena that no single set of principles will account for the totality. Other cognitive scientists foresee a synthesizing set of principles, and still others predict that the theories pertaining to cognitive phenomena will correspond to the theories governing biological processes: "The biology of the cell, the biology of the lover, the biology of the whole person are different enterprises. They are not discrepant, but they are not encompassed by a single overall theory." One thing is certain, and Hunt clearly evidences this in his book: the research in cognitive studies is as continually fascinating and revolutionary as any going on in any field today.



Psychology & Social Theory

No. 3/CHANGE: SOCIAL MOVEMENTS, EDUCATION, THERAPY

Seven Ways of Selling Out/*Daniel Foss and Ralph Larkin*

Identity Formation and Social Movements/*Richard Weiner*

In Defense of Revisionism/*Gene Grabiner*

Hegemony and Education/*Philip Wexler and Tony Whitson*

Social-Clinical Case Discussion/*Bill Glover, Bruce Smith, Eli Zaretsky*

Sexism and the Hidden Society/*Edward Jones*

Notes/*Russell Jacoby, Ilene Philipson, Ed Silver*

Back issues No. 1/Breaking the Neopositivist Stranglehold and No. 2/

Critical Directions: Psychoanalysis and Social Psychology are available.

Subscription rates: Individual, \$12.50/yr.; Student, \$10/yr.; Foreign

postage, \$3 additional, US dollar check. Address: Psychology and

Social Theory, East Hill Branch, Box 2740, Ithaca, New York 14850.