the mantle to more complicated circulatory control and feeding, are treated in detail. In each case, the emphasis is on properties of nerve cells and circuits that account for special aspects of the behavior. For example, defensive inking has a high threshold and a very nearly all-or-none character, and these properties can be traced to electrical connections between the controlling neurons and to their special properties and pattern of synaptic connections.

The bulk of part 3 concerns the plasticity of the nervous system and its cellular mechanisms. After a survey of the classes of mechanisms that have been proposed to account for plasticity, Kandel describes the recent experiments from his laboratory on the cellular basis for habituation and dishabituation. The part concludes with a brief and brave discussion of possible implications of what has been learned from invertebrates for abnormal behavior in man.

This book is clearly written and provides a valuable introduction to cellular neurobiology (part 2) as well as a comprehensive treatment of the insights provided by *Aplysia* and other invertebrates into how the nervous system relates to behavior (part 3). Each chapter concludes with a "summary and perspective" that lets the reader get a clear idea, in only a couple of pages, of what happened in chapters he or she chose not to read. The equations in part 2 are developed lucidly, and the most important ones are given with examples, a great aid to understanding. It is a pity, however, that the action of magnesium at synapses is not more thoroughly explained in part 2, for magnesium block is used in a number of the experiments described in later sections. The book is attractively produced with many clear illustrations upon which thought and care have obviously been lavished.

Judged on their own terms, these are certainly successful books; they both do exactly what they set out to and do it well. What they present is accurate and authoritative, as well as lucid. The Kuffler and Nicholls book is already popular with students learning about neurobiology (Common conversation: Me to student, "And what do you know about neurobiology?" Student, "Well I read Kuffler and Nicholls"), and I suspect also with professionals who are not quite up to date on one or another aspect of nerve cellular mechanisms. Kandel's book will be an indispensable reference for anyone using *Aplysia*, and will be widely read by all who are interested in the relation between nervous system and behavior. Further, professionals will read part 2 in particular to catch up on the richness and diversity of the cellular properties described there. Both books would serve nicely as the basis for interesting courses.

The authors of these books know their business thoroughly. They are scholarly and good writers and could have produced exemplary standard texts. How then are we to view the decidedly nonstandard selection of material in both books?

Kuffler could well be called the father of modern neurobiology, and his many and classic contributions to various areas are well known. Nicholls, one of Kuffler's scientific sons, has also made important research contributions and has a comprehensive knowledge of neurobiology. Kandel is trained as a psychiatrist, has done first-rank work with both vertebrate and invertebrate nervous systems, and is the leading investigator of the cellular basis of functional plasticity. What such people choose to write, even the intentionally blatant malacomorphism of Kandel's final chapter, must be taken seriously. These texts can be read as historical documents that tell where leaders in the field think neurobiology stands and indicate where they think it is going.

The ultimate impact of such books is hard to predict, but I think these will play an important role in the evolution of the concepts of neurobiology and in the definition of the field itself. They document a trend toward explanations in terms of cellular and subcellular mechanisms, and they will, I think, help set the standard for the level of acceptable questions in neurobiology. Also, both books insist that one should strive to investigate cell properties that help to explain function, and they reject the sort of electrographic, morphologic, and biochemical taxonomy that was once usual and still occurs. It is more important to be systematic and to have observations make sense, they say, than it is to be exhaustive and collect information, without clear purpose, that fails to enhance understanding. The authors have not included all of neurobiology that makes sense—and would not claim to have done so—but by virtue of the meaningfulness and quality of the material presented their books will serve as models for future books and for research in the field.

CHARLES F. STEVENS
Department of Physiology, Yale University School of Medicine, New Haven, Connecticut 06510

Cognitive Psychology

Cognition and Reality. Principles and Implications of Cognitive Psychology. ULRIC NEISSER. Freeman, San Francisco, 1976. xvi, 230 pp. Cloth, $12.50; paper, $4.95.

In 1967 Neisser's seminal book *Cognitive Psychology* exploded on the psychological scene. The book was instrumental in establishing cognitive psychology as a respectable field of scientific research, and it moved Neisser to the front and center of a new and powerful movement in psychology. His name has been synonymous with cognitive psychology in the minds of students for nearly a decade. Thus it is not surprising that his new book has been avidly awaited by psychologists.

Alas, *Cognition and Reality* is pale by contrast to Neisser's earlier work. He has abandoned the scholarly, tightly reasoned, and information-packed format of his previous book and has opted instead for a conversational, redundant, often rambling style. As a result of this change, the book is more accessible to readers outside the psychological community, but it is substantially less convincing than his earlier work. The important arguments of the book, put forth in the first 78 pages, have to do with theories of perception, ordinary seeing, and cognitive structures (what Neisser calls "schemata").

Two themes recur throughout the book: (i) Too much work in modern cognitive psychology is grounded in artificial laboratory settings. Cognitive psychologists must move out of narrow laboratory situations and study people engaged in natural activity in the real world. (ii) The theories of J. J. Gibson have more merit than they have generally been given credit for by cognitive psychologists. (The book is dedicated to J. J. and E. J. Gibson, Neisser's colleagues at Cornell.)

The point concerning the relevance, or, as Neisser calls it, the "ecological validity," of psychological research is clearly worth attention. Cognitive psychologists as a whole do spend too much energy pursuing narrow, artificial problems, and pressure toward more generality is to be commended. Neisser's argument is vitiated, however, by the fact that the two pieces of his own research reported in the book are a study of a person trying to watch one or both of two video films played simultaneously over the same TV monitor and a study of people learning to read for full comprehension while writing down a list of ran-

dom words spoken to them by the experimenter—hardly natural tasks.

Perhaps the dominant feature of the book is Neisser's attempt to revise his earlier views to bring them in line with Gibson's position. This is a difficult task. Neisser's earlier work took a constructionist view of perception. He endorsed the analogy of the perceiver to the paleontologist who extracts a few fragments from a mass of otherwise irrelevant rubble and reconstructs the dinosaur that eventually appears in the museum. In contrast, Gibson rejects the constructionist position outright. He argues that all of the information necessary for perception is in the optic array, that there are temporal invariances produced in the optic array by the objects in the world, and that the observer perceives simply by picking up these invariances. No construction is involved.

Neisser's attempted reconciliation is somewhat strained. It is better characterized as a statement of ambivalence about the two positions than as a positive synthesis. It is perhaps not unfair to say that he maintains the constructionist position while emphasizing the informativeness of the optic array—especially as it occurs in natural situations. The paleontologist must still put the dinosaur together, but normally there is only one way to do it.

In a sense, *Cognition and Reality* is a microcosm of the debate in cognitive psychology over the constructionist and Gibsonian views of perception. Neisser makes arguments for each and I suspect satisfies proponents of neither.

DAVID E. RUMELHART
Department of Psychology, University of California, La Jolla 92093

North American Archeology

Prehistory of the Far West. Homes of Vanished Peoples. L. S. CRESSMAN. University of Utah Press, Salt Lake City, 1977. xx, 248 pp., illus. $15.

Luther Cressman, drawing on his over 40 years of experience in the Far West of North America, has attempted to fill the need for a synthesis of the complex and still relatively unknown prehistory of that portion of the continent. His contribution is to be welcomed into the archeological literature in the hope that it will stimulate further attempts in this direction to take into account the ever-increasing amount of information that is becoming available through both academic archeological research and conservation archeology.

This handsome yet reasonably priced volume is essentially a narrative representing the culmination of Cressman's experience in the archeology of western North America. Written in what has been described as a humanistic style suitable for general readers as well as professional archeologists, the book consists of seven major chapters with an introduction and concluding summary.

The first two chapters deal with the general physiography and geomorphology of the region and with the dating of the various glaciations, pluvial lakes, sea level and temperature fluctuations, volcanic ash falls, and so on in relation to possible environmental changes. Both chapters are brief but informative. Various subareas are discussed in some detail, with the emphasis being on the Pacific Northwest, an area with which the author is intimately familiar. The figures and maps are adequate throughout, although perhaps there is an overabundance of glaciation photographs at the expense of other, possibly more useful illustrations.

The chapter entitled "The wanderers" is a reasonably detailed discussion of man's probable entry into the New World via the Bering land corridor and associated topics. Cressman's discussion of sites thought to have been occupied by early man (for example, Santa Rosa Island, Texas Street, Valsequillo, and Tlapacoya) is enlightening not only because of his opinions about their validity but also for the reminiscences he provides about investigations of them. Personal views of this type are often lacking from the writings of archeologists, and it is interesting to have a glimpse or two behind the scenes. A lack of adequate maps detailing site locations and possible migration routes impedes the understanding of this chapter.

The following chapter, "The people," discusses various anthropometric studies of both the living and the nonliving peoples in the region, with the emphasis on California and the Pacific Northwest. As Cressman himself notes, "While the prospect for gaining a detailed knowledge of the physical anthropology of ancient far westerners is not bright, the prospect for understanding the *cultural* achievements of these people does not depend on such knowledge" (p. 77). This brief chapter could well have been reduced or eliminated, for it adds little to the value of the work.

The chapter "Linguistic prehistory" is well done. Cressman adequately discusses the reconstruction of the linguistic prehistory of the region as well as the migrations and dispersals of various peoples of the Far West as inferred from the present linguistic evidence.

"Subsistence and adaptation" presents information on both the technological and the social aspects of subsistence activities in the various subareas. Adaptation as related to environmental change, primarily that associated with the Altithermal, and the relation between ecological adaptation and social organization are also briefly dealt with. On the whole, the chapter is well organized and informative, but it emphasizes fishing, especially in the Pacific Northwest, at the expense of the other activities. Gathering is treated only summarily, with almost no information given on the plants utilized or their relation to seasonal migration and dispersion. While Cressman draws on the ethnographic literature for his discussion of fishing, he appears almost to ignore it in the subsection on gathering, especially with respect to the Great Basin, for which a substantial body of both ethnographic and ethnohistorical literature is available. I believe he underestimates the importance of gathering relative to hunting.

The heart of the monograph is contained in "Monuments to the dead," a chapter discussing the development and status of archeological research (up to 1969) in the various subareas of the Far West (Pacific Northwest, Great Basin, California, western Oregon). Cressman covers the history of archeological work in each subarea, the people and institutions involved, and the objectives of the research. His own views are, of course, clearly presented, along with a tremendous quantity of data. On the whole the chapter is a good review of the archeology, although various area specialists will doubtless disagree with the author on some points.

This monograph was apparently completed in 1969 (that is the cutoff date the author gives for the bibliography). Since then there have been major additions, both of data and of theory, to far western archeological research that put many of the matters Cressman discusses in a new perspective.

Another comment I have is that Cressman has attempted to do too much in writing a book for both the professional archeologist and the lay person. His humanistic style of writing is refreshing compared to the archeological writing to which we are accustomed, but sometimes, as in the case of the discussion of radiocarbon dating (pp. 26–27), the infor-