ly in order to provide some rational basis for looking in great detail (and at great cost) at specific low-level characteristics.

Stanislawski's article provides more detailed information than his previous publications on Hopi ceramic technology and traditions. Although his material is—as always—extremely thought-provoking, one constantly wonders how important specific randomizing factors (for example, transport of clay between villages, trading of pots between potters in different villages, the degree of randomization of clan residences) are in the overall ceramic makeup. Despite all the factors that generate "noise," Stanislawski mentions that individual potters can recognize pots made by particular people, which means that not all is chaos. While stylistic patterning may be randomized in some dimensions, it would be nice to know if that is the case for all ceramic types (ritual, commercial, domestic, and so on) and to what extent attributes such as line width and spacing cluster along teacher-apprentice dimensions. One wants to know to what degree the ceramic assemblages diverge from unanalyzable randomness, how to distinguish useful patterning from other variation, and when Stanislawski is going to bring out a monograph on his work.

Gifford's chapter presents some interesting data concerning vertical movement of small and large artifacts due to trampling, although in listing determinants of "archeological visibility" she neglects what is probably the most important variable, artifact density.

Kirch belabors the well-known concepts of adaptation and the extra-somatic. He goes on to present some rather vague and unevaluated hypotheses concerning seasonality and lack of diversity, population pressure, and political and socioeconomic forces as determinants of western Polynesian agriculture.

Schiffer presents a readable and enjoyable overview of ethnoarcheological techniques, together with examples of down-to-earth laws derived from contemporary American discard behavior. His exhortations to broaden the theoretical scope of ethnoarcheology are well placed.

Gould's concluding chapter has some good and some bad. The good is the concrete exploration of ethnoarcheology and a materials approach (as more or less advocated by Tringham) to explaining the distribution of raw material types in sites according to tool type, although there is precious little referencing in this section. The bad is largely in the theoretical introduction, in which Gould shows a misunderstanding of the fashion in which laws operate and goes on to arrive at the remarkable conclusion that "the less the archaeologist must depend upon uniformitarian assumptions to infer past human behavior, the more valid his explanations will be" (pp. 254–255). I cannot see any archeologist dispensing with uniformitarianism used as it was meant to be used. The discussion of flake scrapers is marred by numerous inaccuracies and distortions, the statement on locations of woodworking tasks (p. 282) is misleading, and it is not clear whether statements regarding flake scrapers' being derived from adze debitage are based on conjecture or observation (I suspect the former). Nevertheless, there are illuminated moments, and the description of raw material selection and transport to base camps is very good, as are the main conclusions.

Overall, while many of the specific case studies may not be telling us a great deal that is new (but then traditional archeological reports rarely do either), there are enough thought-provoking articles of general interest to make the book well worth buying. It is, moreover, well written—a laudable recent trend in archeology.

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Language Comprehension

Cognitive Processes in Comprehension. Papers from a symposium, Pittsburgh, May 1976. MARCEL ADAM JUST and PATRICIA A. CARPENTER, Eds. Erlbaum, Hillsdale, N.J., 1977 (distributor, Halsted [Wiley], New York). xiv, 330 pp., illus. $19.95.

This is a stimulating and timely collection of papers by a number of psychologists who are active in the study of cognition. In fact, their work represents a new field that is coming to be known as cognitive science, an area of research that merges viewpoints from cognitive psychology, linguistics, and artificial intelligence. Some of the most interesting ideas in psychology are being distilled from this new mixture, ideas that are shaking many of our traditional ways of thinking about thinking. All of the chapters in this volume struggle with the complexities of understanding complex discourse—how people extract the gist or overall meaning from long passages of text, how they infer much that is not explicitly stated, and how they decide what details to ignore.

Because of the ferment in this field, the newly developing ideas (to call them theories would be premature) are rapidly changing and a variety of approaches to the same problems are competing with one another. Readers of this volume can gain a good overview of a number of prominent approaches to discourse comprehension, but they should be aware of several arguments that are carried on sotto voce (and occasionally viva voce) throughout the book. Because terminology changes meaning from chapter to chapter, it may help to point up what these arguments are about. Some chapters lay primary emphasis on inductive inferences operating over relatively small segments of text. This approach has been called a data-driven, or "bottom-up," processing approach. Other chapters stress the application of sets of previously acquired expectations (schemata or frames) to what is being read or heard. In this view, processing is more "top-down," or conceptually driven. In addition, some workers emphasize people's familiarity with and expectations about the structure of various kinds of discourse and others emphasize familiarity with the content of what is being discussed.

The authors tend to concentrate on one or the other aspect of these approaches, although they all recognize the other points of view. For example, Carpenter and Just examine eye movement data to study how we infer semantic relations between groups of sentences; on the whole this approach emphasizes bottom-up processing. Both van Dijk and Kintsch spend more time discussing the global structures of texts. Nevertheless, their theory of how people gradually build up a "macrostructure" on the basis of various kinds of textual cues places most emphasis on inductive inferences from the propositional level to an intermediate level of structure, with relatively little emphasis on the role played by the overall syntax or "superstructure" of a text. Hinsley, Hayes, and Simon, on the other hand, stress that, in solving algebra word problems, people often make decisions about the category to which a problem belongs quite early in reading. Thus, they place greater emphasis on the top-down application of previously acquired schemata in the comprehension process.

A question that arises from work that stresses either text-based or schema-based analyses is expressed by Fred-

eriksen in his final, summarizing chapter. How can we tell if a particular piece of macrostructure generated by a listener or reader is due primarily to schema-based knowledge or is constructed from text-based inferences? Clearly the approaches exemplified here need to be put together, and the integration of research directed toward different levels of content and structure must be one of the major tasks facing this important field of study. It may be difficult, because, as Winograd points out, linguists, psychologists, and workers in artificial intelligence have traditionally had different ways of dealing with these problems. Only recently have they begun to talk to each other in an informed fashion.

The book also contains a section discussing computer simulation of processes involved in comprehension, but the reader should be warned that without a solid background in artificial intelligence or a good deal of familiarity with the particular systems discussed the models will be difficult to follow. Reading this section, in fact, provides a good example of the importance of top-down processes in comprehension.

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The Dynamics of Estuaries

Estuarine Transport Processes. Papers from a symposium, Georgetown, S.C., May 1976. BJÖRN KJERFVE, Ed. Published for the Belle W. Baruch Institute for Marine Biology and Coastal Research by the University of South Carolina Press, Columbia, 1978. xx, 332 pp., illus. $27.50. Belle W. Baruch Library in Marine Science, No. 7.

Studies of physical processes in estuaries, which are emphasized in this book of symposium proceedings, have begun only recently, and are regarded by many as belonging to the field of oceanography. The 18 papers in the book are concerned with the present state of our knowledge of such processes and with identifying problems and needs that researchers must address. The underlying questions have to do with the estuarine system's dispersal of pollutants, transport of dredged spoils, and ability to sustain biological and chemical balance, all of which depend strongly on the movement of water parcels. The book's emphasis on kinematics and dynamics is appropriate, for a better understanding of the physical processes in an estuary is indispensable in any quantification of biological and chemical activities to assist effective management and protection of estuarine environments.

Much of the progress made in coastal oceanography and coastal management stems from the monumental contributions of Donald W. Pritchard, in whose honor the symposium was convened. Here, Pritchard reviews the fundamental estuarine processes and concludes that they are much more complicated than researchers originally believed. Bowden and Carter and Okubo summarize mixing and turbulent diffusion. Officer and Hamilton and Rattray discuss some theoretical aspects of estuarine circulation. These papers combined give an excellent overview of mixing and circulation in estuaries. All of the authors mention the use of numerical models as an alternative approach for research, but no paper is devoted to a review of the state of the art for numerical modeling of estuaries.

Several papers concentrate on transport processes of suspended particles, but, perhaps because our knowledge of sediment transport processes is still quite rudimentary, no author attempts to give an overall evaluation of the subject. Instead, Krone focuses on the aggregation of fine suspended particles; Schubel, Wilson, and Okubo discuss the transport mechanism in the vertical direction; and Boon and Gardner and Kitchens address the transport of sediment into and out of salt marshes.

The remaining papers include a discussion of coastal meteorological inputs to estuaries (Hsu) and case studies made at the Gironde and Thames estuaries (Dyer), at Puget Sound (Barnes and Ebbesmeyer and Cannon and Ebbesmeyer), at subarctic fjords (Muench and Heggie), and at Mediterranean basins (Hopkins).

All of the authors point out the lack of suitable data to verify (or to test) hypotheses and to calibrate models. The excellent epilogue by Kjerfve, Dyer, and Schubel summarizes the meeting and assesses existing research problems of high priority. Included in the epilogue is a resolution that was drafted and unanimously endorsed by the participants at the symposium. It states appropriately and concisely:

> While millions of dollars are being spent each year on monitoring of the estuarine environment, these data are generally of little use to oceanographers interested in processes, or in formulating, constructing, and verifying analytical, numerical or physical models. They are also unfortunately frequently of little value to regulatory agencies in attaining their long-term pervasive goal—effective management of coastal environments. Through proper coordination and planning, experimental programs can be designed that will not only satisfy the short-term needs of regulatory agencies, but also provide the oceanographers and managers with the data they require to develop predictive models.

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Books Received

"Artificial Curiosities." An Exposition of Native Manufactures Collected on the Three Pacific Voyages of Captain James Cook, R.N. Adrienne L. Kaeppier. xvi, 24 pp., illus. Paper, $27.50. Bernice P. Bishop Museum Special Publication 65.

Biofeedback. A Survey of the Literature. Francine Butler. IFI/Plenum, New York, 1978. xii, 340 pp. $45.

Biology Teachers' Handbook. William V. Mayer, Ed. Wiley, New York, ed. 3, 1978. xviii, 586 pp. $16.95. Biological Sciences Curriculum Study.

A Century of Doctorates. Data Analyses of Growth and Change. U.S. PhD's—Their Numbers, Origins, Characteristics, and the Institutions from Which They Come. National Academy of Sciences, Washington, D.C., 1978. xii, 174 pp., illus. Paper, $10.50.

Characterization and Treatment of Human Tumours. Proceedings of a symposium, Budapest, Apr. 1977. W. Davis and K. R. Harrap, Eds. Excerpta Medica, Amsterdam, 1978 (U.S. distributor, Elsevier, New York). xii, 332 pp., illus. $50. Advances in Tumour Prevention, Detection and Characterization, vol. 4.

Developments in Opiate Research. Albert Herz, Ed. Dekker, New York, 1978. xii, 432 pp. $35. Modern Pharmacology-Toxicology, vol. 14.

External Neuroanatomy of Old World Monkeys (Cercopithecoidea). Dean Falk. Karger, Basel, 1978. viii, 96 pp., illus. Paper, $32.25. Contributions to Primatology, vol. 15.

The Human Body. Its Structure and Physiology. Sigmund Grollman. Macmillan, New York, and Collier Macmillan, London, ed. 4, 1978. x, 662 pp., illus. $15.95.

Human Skeletal Remains. Excavation, Analysis, Interpretation. Douglas H. Ubelaker. Aldine, Chicago, 1978. xii, 116 pp., illus. $12.50. Aldine Manuals on Archeology.

International Directory of Marine Scientists. A Product of the Aquatic Sciences and Fisheries Information System. Food and Agriculture Organization of the United Nations, Rome, 1977 (U.S. distributor, Unipub, New York). xiv, 334 pp. Paper, $13.75.

Life Science. Gerard J. Tortora and Joseph F. Becker. Macmillian, New York, and Collier Macmillan, London, ed. 2, 1978. x, 820 pp., illus. $16.95.

Life-Span Development and Behavior. Vol. 1. Paul B. Baites, Ed. Academic Press, New York, 1978. xiv, 352 pp. $21.50.

Limiting Oil Imports. An Economic History and Analysis. Douglas R. Bohi and Milton Russell. Published for Resources for the Future by Johns Hopkins University Press, Baltimore, 1978. xviii, 356 pp. $22.50.

Methods in Mammalian Reproduction. Jo-

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