

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 in-

dispensable 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 prop-

er 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. Kaeppler. 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. Macmillan, New York, and Collier Macmillan, London, ed. 2, 1978. x, 820 pp., illus. \$16.95.

**Life-Span Development and Behavior.** Vol. 1. Paul B. Bailes, 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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