have worked on the theory of pulsar emission in a very even-handed way. The magnetospheric plasma around a spinning neutron star is forced approximately to corotate with the star by the huge stellar magnetic field—an approximation that clearly must break down where rotation velocities approach the speed of light. There theoretical descriptions are particularly uncertain and varied. But the uncertain flow of plasma in that outer region affects current flow everywhere in the pulsar magnetosphere, even near the stellar surface. This uncertainty supports a host of conjectures about relativistic current flows and consequent radiation mechanisms. None of these pulsar radiation models is likely to be deduced confidently from the properties of a rotating neutron star until the theory of the entire magnetosphere is finally achieved. Until then all flowers bloom, and Manchester and Taylor have wisely avoided trampling on any of them (although their own opinions can, I think, be inferred).

In a recently published sister volume of almost identical size and price, similar structure and the same title, Graham Smith has also summarized the present state of pulsar observations and theories (reviewed in PHYSICS TODAY, December 1977, page 55). Both "Pulsar" volumes are comparably excellent and the field is honored by each of them; they are distinguished by differences in style and arrangement and in their emphasis on various theoretical models. For anyone interested in working seriously on pulsars, and this appears of necessity to mean looking at details of many special pulsars, the book of Manchester and Taylor is probably now an almost indispensable reference.

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Acoustical Oceanography: Principles and Applications

C. S. Clay, H. Medwin
544 pp. Wiley-Interscience, New York, 1977. $27.50

This is the first book to combine oceanography and underwater sound. It does this by touching upon a wide variety of topics ranging from sea-floor spreading to filter theory. Clarence S. Clay and Herman Medwin are eminently qualified in their field, being professors of long standing at the University of Wisconsin and the Naval Postgraduate School. Their treatment is in large part academic; indeed, the book is intended as a text at the undergraduate level for students having had, according to the preface, only a year of college physics and calculus. Each chapter is concluded by a number of

problems, although, regrettably, no problem answers are supplied.

While the book has value as an undergraduate text, the engineer interested in a particular application of acoustical oceanography will find only portions of the text to have practical interest. Only a few descriptions of acousto-oceanographic equipments such as beacons and transponders are given; the engineer can find little numerical data to assist him in a design problem. The book concentrates on basic physics rather than on engineering applications.

The range of topics discussed is enormous. Chapter headings include "Sound waves and Huygens' principle", "Scattering and absorption by bodies and bubbles", "Seismic and acoustical measurements of the sea floor" and "Signals, filters and random functions." With such diversity, little in-depth discussion can be given, and references to specific literature papers, where particular topics can be dug into further by the reader, are scanty. The treatment is in large part often theoretical, starting from basic principles—perhaps as benefits an undergraduate text.

Like most books, this one deals heavily with topics on which the authors have made research contributions. It contains useful summary material, for example, on the scattering of sound by rough surfaces and the acoustic theory of bubbles. In a series of ten appendices, there is a relatively in-depth discussion of specific topics such as fish echoes, marine sediments and the Fourier transformation. Particularly valuable is an appendix summarizing sound transmission in an underwater waveguide, where some realistic theoretical problems are worked out.

It must be said, however, that some aspects of underwater sound are slighted or ignored altogether. The ambient noise of the sea is hardly more than mentioned, and nothing is said about the characteristics and properties of reverberation as observed in sonar systems. Other kinds of noise that may be encountered by the underwater engineer, such as flow-noise and cable strumming, are absent.

Indeed, the book is devoid of descriptions of oceanographic equipment employing acoustics that are available on the open market. Perhaps the "innards" of such systems are commercial secrets, but still, with the title *Acoustical Oceanography: Principles and Applications*, the applications discussed are meager compared to the principles. The only hardware items described at all are a side-scan sonar to illustrate a beamed transducer and a multi-beam echo sounder to illustrate depth sounding. But there are a great many other acoustic devices that can be bought commercially, such as fish finders, control systems, transponders, telemetering devices, diver's aids, and underwater locators, whose

description would be valuable to the student having a need, plus some money to spend to fill it.

Still and all, this contribution by Clay and Medwin will help dispel some of the mystique concerning underwater acoustics among oceanographers. It will be a valuable text in a course designed to introduce underwater sound to oceanographers, as well as a handy introductory reference to the many diverse aspects of acoustical oceanography.

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Perception, Theory and Commitment: The New Philosophy of Science

H. I. Brown
203 pp. Precedent, Chicago, 1977. $15.95

This book presents a survey, at a fairly introductory level, of the decline of logical positivism and the rise of newer philosophical accounts of science. Rather than give a simple historical account of the rise of logical positivism and its gradual demise through the death of a thousand qualifications, H. I. Brown adapts the theory of research projects, which Imre Lakatos formulated to explain scientific development, into a tool for explaining philosophical change. Logical positivism is presented as an ongoing research project based on the presuppositions that mathematical logic supplies the paradigm for scientific explanation and that the goal of science is the expression of propositions that are true, general and capable of serving as axioms in deductive explanations.

Not surprisingly, his treatment focusses more on the defects of logical positivism than on any positive achievements. In his summary and evaluation of the paradoxes of confirmation, the attempts to eliminate theoretical terms in favor of observational terms, and the deductive–nomological model of scientific explanation, Brown summarizes the familiar difficulties brought out by such advocates of logical positivism as Carl G. Hempel and Israel Scheffler as well as the criticisms developed by Paul Feyerabend, Michael Scriven and others. The criticisms offered are neither new nor very searching. Brown, however, does present them in a style that would make their significance clear to beginning philosophy students.

After a brief treatment of Karl Popper's falsificationism as a transitional and ultimately unsatisfactory bridge between the old and new philosophies of science, Brown outlines what he takes to be the most important new developments. These are: an account of perception as theory-laden, stemming from N. R.