ing programming languages with inherent verification and precise semantics. While some advance this science with ad hoc methods tailored to specific problems, others are concerned with providing a rigorous general mathematical foundation. At this writing, no one mathematical model enjoys consensus. At the week-long seminar which gave birth to this volume, some 30 mathematicians and computer scientists of many nationalities presented and debated the merits of high-level mathematical approaches to program design, semantics, and verification.

The editors are to be congratulated for producing a book that reads more like a coherent monograph than a conference proceedings. The style of the articles tends to be leisurely, and relevant background is usually included. A brief comprehensive introduction is followed by 17 contributions of which 3 or 4 are purely tutorial.

A wide spectrum of mathematical structures is variously emphasized, and existing theory from the pure-mathematical community must often be augmented by new ideas arising from computation-inspired problems. Suprema in partially ordered sets and convergent sequences in metric spaces provide the limit, as time increases, of a running program. Recursive program schemes are unfolded into infinite trees to study classes of interpretations using methods from universal algebra and first-order logic generalized to deal with limits. Categories and functors were employed by many to model both control structures and data types.—*Ernest G. Manes, Mathematics and Statistics, University of Massachusetts*

Statistical Methods for Meta-Analysis. Larry V. Hedges and Ingram Olkin. 369 pp. Academic Press, 1985. $49.50.

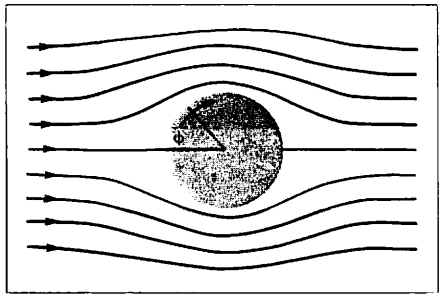
In the social sciences one often finds a large number of empirical studies all trying to answer the same question. How can the evidence provided by these studies be combined? This problem, the problem of meta-analysis, has been the topic of a growing literature in recent years. Some portions of this literature concentrate on the organization of qualitative judgments, but other portions are concerned with the combination of quantitative measures, usually significance levels, correlation coefficients, or effect sizes. (An effect size is an average treatment effect, measured as a proportion of the standard deviation for an untreated population.)

This book brings a new level of statistical sophistication to the problem of combining quantitative measures from different studies. The authors review the existing literature astutely, and they suggest a large number of new ways in which ideas from mathematical statistics can be brought to bear on the problem. Topics from statistics on which they draw include nonparametric estimation, simultaneous testing, empirical Bayes estimation, detection of outliers, clustering, and missing data.

As this list suggests, the book is an almost exhaustive treatment of meta-analysis using the resources of classical, or fequentist, mathematical statistics. It is limited to frequentist methods. It does not discuss Bayesian or other methods for quantifying subjective judgments about the validity of different studies.

The authors have high standards for both exposition and precision. They use their expertise as mathematical statisticians fully, but they present their methods in a way that will be accessible to most social scientists. The book will be widely used and admired.—*Glenn Shafer, Business, University of Kansas*

Engineering and Applied Sciences



Basic Toxicology: Fundamentals, Target Organs, and Risk Assessment. Frank C. Lu. 276 pp. Hemisphere, 1985. $49.95 cloth, $29.95 paper.

This short book is directed at beginning students in toxicology and for those in allied sciences seeking some background in this fast-moving field. The book is clearly and simply written, with extensive subheadings which make it easy to find specific items. A considerable amount of illustrative material is included, and the bibliography has been pared down to the most generally useful entries.

The book's greatest value is as a reference rather than a teaching text. The author's goals are admirable, but the basis for inclusion or rejection of topics is unclear. Risk assessment is given prominence in the subtitle but is not listed in the index, and, apart from a few pages on low-dose extrapolation, there is no real discussion on the subject. Similarly, the organization of the text into sections on general principles, testing procedures, and target organs is somewhat misleading, as the overall emphasis in each section seems to be on how to do certain tests and how to evaluate the data. The section on target organs includes the eye, a rather specialized topic for an introductory text, yet it omits the digestive, circulatory, and hematopoietic systems. Consequently, benzene, an important chemical whose toxicity should be known to all students, is given essentially no treatment. Also missing, as an example of environmentally and scientifically important agents, is any substantial mention of dioxins or polynuclear aromatic hydrocarbons.

Finally, there were a number of opportunities to provide generalizations and overviews of toxic responses and mechanisms through structure-activity analysis, but none were evident. Methanol and ethanol are discussed briefly in terms of metabolism and, in a different section, end-organs affected. There is no mention of structure-activity relations for this class of compounds. Other examples abound—hydrocarbons (aliphatic, aromatic, and polycyclic), ethers, and barbiturates among them. Overall the book is good, but could have been better.—*Robert A. Scala, Exxon Corporation, East Millstone, NJ*

Precision Frequency Control, Vols. 1 and 2. Eduard A. Gerber and Arthur Ballato, eds. Vol. 1: **Acoustic Resonators and Filters.** 434 pp. Vol. 2: **Oscillators and Standards.** 460 pp. Academic Press, 1985. $69.50 each.

This set must be the single most useful reference available to any group working in this field. It brings together the theoretical, experimental, and engineering techniques used in this diverse area.

The two volumes comprise 16 independently contributed chapters. Chapter 1 treats, in 45 pages, the stress-strain laws, the electric-field equations, the coupled-constitutive equations, the 20 possible classes of piezoelectric crystals, techniques for growing crystals, thermal properties, techniques for measuring Q, and more. The chapter even includes useful tables of the elastic and piezoelectric constants for alpha-quartz, lithium niobate, lithium tantalate, and others. Obviously, this is not intended to be a textbook. Yet the next chapter discusses bulk and surface waves, including nonlinear theories, in 100 pages. This article is an excellent small textbook and includes a list of 27 materials whose piezoelectric properties have been measured, along with a specific bibliography for each material. Other articles discuss the experimental and engineering aspects of the field. They deal with growing quartz, fabricating resonators, filters, long-term stability and aging, microwave-frequency standards, laser-frequency standards, time measurement, and so on. In toto, the articles show the unevenness that