Book reviews

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Elements of Psychophysical Theory
By Jean-Claude Falmagne. New York: Oxford University Press, 1985. 385 pp., $59.00.

Few of us consider measurement central to psychological inquiry, but many controversies and questions extant in the literature are really simply problems of measurement. Thus, a book on measurement and its role in psychological inquiry has the potential for advancing the state of the art. This book makes some progress in this direction. Falmagne intends it to be a graduate text for a two-semester course on measurement in psychophysics. Some background in mathematics and much motivation and hard work will be necessary. Although the book is highly mathematical, psychological issues are the groundwork for this theoretical treatise. One of Falmagne's goals is to illustrate how the questions asked by classical psychophysics are still fundamental questions facing the field today, even though the traditional question of how psychological sensation relates to physical properties might be replaced by the question of how some physical property is coded by a particular sensory system.

Falmagne makes a distinction between laws and models. A psychological law might describe some relationship between two variables. A model or mechanism is generated to explain observable laws. Most psychologists would consider a focus on laws a rather dull enterprise, whereas inquiry into mechanisms requires much more creativity. On the other hand, as Falmagne points out, laws will tend to have a better life expectancy than models. A law may continue to be useful even though it is falsified under certain conditions. Thus, we know that Weber's Law holds at medium intensities, even though it fails dramatically at the extremes of a stimulus continuum. However, this law summarizes important observations that must be captured by any serious model. Another reason to appreciate laws over models is that a particular model found to provide a good description of some observations is rarely unique. That is, other models could fit the data equally well, so that there is no reason that the data justify preference for one model over another. Although not addressed by the author, this touches upon confirmation bias in psychological inquiry. Too often investigators feel that it is simply necessary to demonstrate that the data are consistent with their favorite model rather than to show that the data are inconsistent with other reasonable models.

The book is organized into 3 chapters on background and 11 chapters

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on theory. The first chapter deals with ordinal measurement or the question addressing the ordinal relationship between two stimuli, such as "Is A heavier than B?" Extensive measurement or the measurement of fundamental physical quantities such as mass or length using qualitative devices is the topic of the second chapter. Falmagne comments that algorithms for constructing fundamental scales are quite similar in physics and psychophysics. Functional equations serve as the topic for the third chapter. Fechner's extension of Weber's Law is the most well-known example. The book contains a nice awareness of historical contributions, as in the discussion of Plateau's classic experiment in which artists were asked to paint a gray disk midway between one white and one black disk. The eight artists gave essentially identical results, even though each of their studios had very different illumination conditions. Falmagne's contribution is that this observation does not necessarily imply that equal stimulus ratios produce equal sensory ratios, as would be assumed by the Stevens Power Function. Plateau may have even been aware of another possibility that there is a constancy of the ratios, not of the differences of the sensations. Therefore, Plateau's data and other data of the same form cannot be taken as support for the choice of a power function over a logarithmic function describing the relationship between stimulus and sensation.

I appreciated the author's insights into the value of a psychophysical scale. Subjects show a surprising degree of reliability in using numbers to quantify their experience of sensory intensities. These observations can have important practical applications, as in describing our environment in such matters as noise pollution and illumination.

The theory section of the book begins, as it should, with Fechner's study of psychophysics. The author does so because he believes that Fechner's psychophysics is essential to a good understanding of theory underlying current methods. The chapters that follow are devoted to models of discrimination, psychometric functions, sensitivity functions (Weber's Law), signal detection theory, and psychophysics with several variables or channels. In all of these situations, the author illuminates for us the implicit assumptions in various approaches to these topics. Two issues that I found of particular relevance to cognitive psychology involved how rating data can be used to test various threshold models, and the analysis of how a subject integrates information flowing from several sensory inputs. The book reveals how far cognitive psychology has yet to travel to approach the theoretical sophistication of basic work in psychophysics. The author also discusses scaling in the measurement of sensation and gives an overview of the two approaches involved in conjoint measurement and functional measurement. He ends the book with a confrontation of the meaningfulness of psychophysical laws. Consistent with current viewpoints in cognitive psychology, the author concludes that a model is a convincing explanation only if it is physically realizable. This is analogous to the idea of computational realization in cognitive psychology and artificial intelligence.

A book of this form could have proven to be highly valuable not only for

specialists in the field, which it is, but for all students of experimental psychology and information processing. However, the technical involvement and the mathematical sophistication that is required, not to mention the effort needed even when readers do possess such mathematical skills, will preclude most workers in the field from reading it. Unfortunately, the author did not make enough effort to justify or rationalize the value of such an analytic approach. I am sure he feels that most of us must already be aware of the pertinent arguments. However, I believe that the rationale would be worth stating once again. As it stands, the work is to be applauded, even though it will probably fall outside the mainstream of cognitive psychology. Perhaps scientists should search the book for a topic that relates to a research question of current interest. I am sure that they will find something beneficial from the author's conceptualization of the question, and they may be enticed to search for even more gold. But remember, mining is a hard business.

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How Conversation Works

By Ronald Wardhaugh. Oxford, U.K.: Basil Blackwell, 1985. 230 pp. Cloth, $34.95.

Discourse Semantics

By Pieter A. M. Seuren. Oxford, U.K.: Basil Blackwell, 1985. 544 pp. Cloth, $39.95.

Children's Conversation

By Michael McTear. Oxford, U.K.: Basil Blackwell, 1985. 293 pp. Cloth, $34.95.

Conversation is such a commonplace activity that we often fail to recognize its tremendous complexity. When people talk with one another, there is the assumption that what is said is not random but that we speak and understand according to certain norms and rules. The search for the regularities underlying conversational behavior has been an interdisciplinary enterprise involving philosophers, sociologists, linguists, and psychologists. Analytic philosophers have tried to discover the principles underlying the assignment of meanings to discrete utterances. Their belief is that these principles are accessible through introspective, rational analysis of conversational utterances most of which are made up rather than taken from real discourse. Sociologists have been concerned only with real conversation occurring in naturalistic settings. Their aim is to discover invariant properties of conversations, such as rules for turn-taking and repairs, and to show how institutional settings, such as classrooms and doctor-patient exchanges, affect the way people speak and listen. Some linguists have performed microanalyses of specific pieces of talk to highlight particular linguistic phenomena like intonation or topic and have done multileveled analyses of what is going on in particular discourse situations, like therapeutic conversations. Other