Book and Software Reviews

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H.A. David and A.W.F. Edwards. *Annotated Readings in the History of Statistics*. New York: Springer, 2001. ISBN 0-387-98844-0. 252 pp. 69.95USD.

I confess that when I was first asked to review this book, I agreed to do so in a weak moment. When the book arrived and began to stare me in the face, I again regretted having said yes. Somewhere along the way, though, as I started to thumb through the pages and take stock of my task, the latent bibliophile in me took over and drew me in. The more I read, the more interested, intrigued, and fascinated I became.

David and Edwards' new text, *Annotated Readings in the History of Statistics,* is the latest in a series of volumes compiled by respected members of the statistical community about the discipline itself. Dedicated to Anders Hald – a statistical historian of some renown – the book appears as one of the most recent works in the Springer-Verlag series titled ''Perspectives in Statistics.''

David and Edwards continue the noteworthy themes of previous authors (e.g., Stigler 1986; Hald 1990, 1998) who engage in a retrospective and introspective look at the origin and evolution of statistics. As in the case of the earlier works, and as the title suggests, the material is principally historical in nature. Depending on one's own personal bent, historical matter may not hold great appeal. Yet, in an unmistakable sort of way, the contents of this book seem really important. What David and Edwards present might be described as meta-information about statistical science – information that informs the very essence of who statisticians are, how they think, and what they practice.

By today's standards this is a relatively short text – about 250 pages – that can be completely read in a few focused sittings. It consists of a number of early writings,

some of which are newly translated by the authors, as well as literary commentary and discussion about others. The earliest writing is part of a 1654 letter from Blaise Pascal to Pierre de Fermat. There are fourteen different sections covering the work of seventeen different individuals. The list of topics includes significance testing, asymptotic relative efficiency, goodness of fit, extreme value theory, the distribution of the sample variance, logistic growth curves, and more. Some sections consist of entire papers or letters, while others only contain dialog by David and Edwards as to the importance of a particular item and its relationships to similar investigations. No single section/article is very long, so the reading is easily broken into manageable segments. Yes, there is some mathematics to wade through, but most readers should be able to successfully navigate the notation without missing the essential points being made.

To many statisticians, some of the authors represented here will be completely unknown. The names Arbuthnott, Montmort, Bortkiewicz, Verhulst, Abbe, and Zermelo are not commonplace in statistical literature, and even the most advanced graduate students will likely not have come across them. Even names like Pascal, de Moivre, Laplace, Helmert, Gauss, and Venn, whose works David and Edwards have included, would more likely show up in mathematics texts than in books about statistics. That is what makes the contents of this volume so remarkable – it brings together a collection of ideas, both from within and beyond the usual bounds of the statistical community, that represent some of the earliest statistical thinking – ideas that might otherwise have been lost to the collective memory of contemporary statisticians.

Quite remarkably, and by design, names like Neyman, Pearson, Bayes, and Student, all of whom would be readily recognized, are conspicuously absent. David and Edwards contend, and appropriately so, that the writings of such individuals have already received extensive coverage. Their stated intent is to ''fill in the gaps,'' and that goal appears to have been adequately achieved. This is not to say that all the well-known statistical patriarchs have been ignored. A single paper each by von Mises, Yule, and Fisher is included, these having been selected by David and Edwards because of their belief that the importance of these documents has been overlooked (e.g., the 1930 paper by Fisher titled ''Inverse Probability'' from which the ideas of confidence intervals have evolved). In fact, all the works represented in this book have been selected for inclusion because of the authors' belief that they have been neglected in the historical development of statistical thinking or that they have simply been inaccessible, having been written in languages other than English. The translated versions provided by David and Edwards are particularly important contributions to the statistical literature.

In addition to the major body of the book, there are two informative appendices, as well as an index of subjects and an index of names. The first appendix is a listing of other English translations of papers and book extracts compiled by David and Edwards that they believe to be of historical interest/importance to the discipline of statistics. This list, alone, is a noteworthy contribution for those interested in the development of statistics. The second appendix contains David's updated list of first literary occurrences of common statistical terms, which should prove to be a highly useful resource, as well, to future researchers.

This is certainly not a book that everyone will want to rush out and purchase; but for

those interested in the evolution of statistical thinking, it would be an excellent source of information with which to start. Most readers would be able to glean considerable knowledge from this book without thorough scrutiny of the more extensive volumes that precede it. For instructors planning a formal graduate course in the history of statistics, it would be an excellent choice as a primary or supporting text.

On a more personal note, a conversation that I sometimes have with my colleagues has to do with a concern that contemporary statistical research can be a bit shallow. I worry most about young researchers, particularly those in tangentially related fields that have little or no real connection to early solutions and discoveries and seem content to reinvent the wheel without even realizing it. It is truly unfortunate that degree programs in many statistics departments today do not have room for courses of a historical nature so that our bright young statisticians can be anchored in the wisdom, reasoning, and logic of their intellectual forefathers. Over the years, there have been attempts by some authors (e.g., Folks 1981) to weave historical matter into presentations of elementary and intermediate statistics to raise the interest level of students, but these occurrences have been rare and their success somewhat limited.

Consequently, I am particularly thankful that David and Edwards have brought us back to the beginnings of statistical time and have reminded us, in perhaps a not-so-subtle way, that new ideas are inevitably linked to those of the past. I appreciate the scholarship with which they have approached this task. Because I personally enjoy telling my own students about the women and men whose names are attached to the theorems, lemmas, and methodologies I ask them to learn, I am even more grateful to David and Edwards for enhancing my own personal awareness and providing me with many new insights with which to expand my students' educational experiences.

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Douglas W. Maynard, Hanneke Houtkoop-Steenstra, Nora Cate Schaeffer, and Johannes van der Zouwen (eds). *Standardization and Tacit Knowledge: Interaction and Practice in the Survey Interview.* Wiley Series in Probability and Statistics, John Wiley & Sons, Inc. New York, 2002, 94.95USD.

A well carried-out structured survey interview has complete response, no item-nonresponse, no response set or misunderstood questions, and is conducted in a controlled manner. These are basic assumptions of any survey interview. This means that there is a well defined process of interaction in which interviewer behaviour is controlled by using standardization of contact strategy, instrument design and data collection, and in which respondents behaviour is assumed to follow the rules of a straight forward stimulus response model. Above all the interviews are assumed to take place in a constant or, if possible, a more or less controlled environment.

The survey interview as we know it today has developed from a ''conversation with a purpose'' to an ''interaction with a target.'' The landmarks of survey methodology illustrate a profound body of knowledge and expertise from which different issues emerged such as the roles of both the interviewer and the respondent, and the questionnaire itself, including guidelines and instructions. Less attention was given to characteristics of the interaction process itself, although the idea that the interaction itself plays a decisive role in realizing adequate response was generally acknowledged. The publication *Standardization and Tacit Knowledge* addresses the question of how everyday rules of conversation and interaction (the ''Tacit Knowledge'' of the title) interfere with the rules of standardization in the process of obtaining adequate responses. Conversation analysis, ethno methodology and cognitive psychology provide insights into the apparent paradox of standardization and tacit knowledge.

The volume is based on contributions presented at the international workshop on ''Interviewer-Respondent Interaction in the Standardized Survey Interview,'' held in Amsterdam in November 1995. The goal of this workshop was to bring together ideas from the domains of conversation analysis, ethno methodology and survey methodology with respect to the standardization of the survey interview. Every chapter in the volume is edited and reviewed by at least two editors, representing the different domains.

In Part 1 of the volume theoretical orientations are addressed. In the first two chapters arguments are given for taking into account tacit knowledge and commonsense knowledge as important factors in the analysis and research of the interview process. Also the underlying communication model of the interview process is addressed in this part (Chapters 3, 4, and 6). In the basic communication model of the standardized survey interview the interviewer reads the questions and instructions as worded, and the respondent answers following the instructions of the interviewer and according to the presented answer categories. However, interviewing is not just mechanically following instructions, as an interviewer you have to bring the scripts to life (Chapter 5). As a consequence some words can have different meanings depending on what the interviewer intends them to mean on particular occasions. It is precisely this phenomenon that undermines the standard survey interview. Therefore a model which takes into account the ''meaning-in-words assumption'' is necessary to understand the effect of tacit knowledge, i.e., everyday rules of conversation, on the outcome of the survey interview.

The interviewer has two main tasks. The first task is to convince the respondent to

participate in the survey. This task relies heavily on the talents of improvisation and tailoring. The second task is to conduct the interview by asking questions and recording the answers. The interviewer is expected to act according to the set standards. These two tasks are discussed in parts two and three, respectively, of the volume. The studies discussed in these chapters provide insights into important elements of the interaction between interviewer and respondent. It appears that in the process of convincing potential respondents to participate in a survey, everyday rules of conversation are decisive in getting best results. This implies that tailoring (Chapter 7), optimism (Chapter 8), conversational introduction (Chapter 9), and combining these issues, for example in refusal conversion (Chapter 10), are important aspects of interviewer training. The conversational character of this part of the survey process is in contrast with the prescribed interaction of the interview itself. When it comes down to the interview process itself, standardized interviewer behaviour is required. The questionnaire and its instructions have to make this possible. So it is important to take into account elementary aspects of speech such as turn-taking (Chapter 11), tacit knowledge brought in by both interviewer and respondent (Chapters 12 and 14) and techniques for achieving mutual understanding, or inter-subjectivity, regarding the survey (Chapters 13 and 15). This will enhance validity of survey research: it will promote a common understanding not only of the meaning of survey questions but also of the (standardized) procedure of asking and answering questions.

Part 4 of the volume describes some practical aspects of the relation between the interview interaction and survey data quality: coding of question-answer sequences (Chapter 17), identifying paradigmatic, problematic and inadequate sequences (Chapter 18), detecting deviations from the standard or paradigmatic question-answer sequence (Chapter 19), and the effect of CAI on interviewer behaviour (Chapter 20). These are basically elements which are related to the interviewer's role in the interview process. The chapters underline why understanding the principles of conversation with respect to proper question-answer sequences will help improve questionnaires and interviewer performance.

A general conclusion is that standardization in theory is not standardization in practice. Even in a standardized interview, it is hard to escape the compelling tacit rules of everyday conversation. This volume puts forward strong arguments to the effect that taking into account this tacit knowledge will improve the quality of the survey interview. However, the proof of the pudding is in the eating: what type of control variables for conducting an efficient survey (costs and benefits) and an effective interview (tailoring) can we derive from the studies presented here? Furthermore, what is the effect on reducing measurement error? On both issues, the control variables and the measurement error, the volume lacks some abstraction. That would require further research, for example controlled field experiments, which could reveal if benefits of altering the interview practice (intensive interviewer training!) outweigh the costs. Nevertheless, with this volume a hardly discovered area is systematically ''scouted'' and by doing this the authors take a big step from the ''art of asking questions'' to a ''science of asking questions.''

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Gerald van Belle. *Statistical Rules of Thumb*. John Wiley & Sons, Inc., New York, NY, USA, 2002. ISBN 0-471-40227-3 (pbk). Xviii 221 pp. 54.95USD.

The concept behind this book is very attractive. Statisticians working in an applied environment will encounter a range of problems and need to develop appropriate solutions and quickly provide useful advice, often with limited time available. Experienced working statisticians will, over time, develop favoured approaches to the problems that they encounter, which can be termed ''rules of thumb.'' They may hear and adopt such rules from others without perhaps checking on the basis of the rules and also forget the basis of the rules they have developed and adopted themselves. A book that provides a description of such approaches and the reasoning behind them is potentially very valuable. It can provide a check of those approaches and also be a source to check when a new problem is encountered. For each rule in this book an introduction is provided, followed by a statement of the rule, an illustration, basis of the rule, and discussion. A strength of the book is the attempt to provide a justification for each rule. Another good feature is that the author invites input from readers on new or better rules and has provided a web site, http://www.vanbelle.org, to which new rules will be added.

There are eight chapters. Chapter 1 is entitled ''Basics'' and covers the general issues of variability, statistical models, estimation, and hypothesis testing. A distinction is made between experimental and observational studies, but the place and role of sample surveys selected using probability-sampling methods is unclear. Chapter 2 considers determining sample sizes, essentially for studies that involve comparing two groups using independent samples. There is good advice provided but for only this common but none-the-less restricted design. More complex designs involving several groups, repeated measures or several factors are not mentioned in this chapter, although some rules related to such designs are given elsewhere. Chapter 3 considers covariation and rightly distinguishes between the role of experimental and observational studies and the type of variables involved and the type of association of interest. Epidemiology is considered in Chapter 4, and Chapter 5 considers environmental studies. These two chapters reflect the strength and the interests of the author.

Chapter 6 considers the design, conduct, and analysis of studies, but explicitly restricts this to clinical trials and experiments. Blocking and factorial designs are considered and the importance of understanding the design for analysis, nested and crossed designs, plotting data, and multiple comparisons are also considered. Chapter 7 is concerned

with construction and presentation of words, tables, and graphs. The last chapter offers advice on consulting. These last two chapters are useful and include advice that is not readily covered in introductory statistical texts.

I am not convinced that the book is suitable for people with only an introductory statistics course behind them. The discussion often seems more aimed at practising statistical consultants. An issue for the statistical profession is whether to encourage the view that statistical methods can be effectively understood as rules of thumb. In any field such rules are useful when adopted by experts, but can be dangerous when used by the naive person or novice. On the other hand, provided that it is understood that such rules are one way and a starting point for determining the statistical approach to use, then they can serve a purpose. But the need to read relevant texts and seek advice needs to also be emphasized. In this book references are provided so that the reader can read further on the topic. However, the statement ''Statistics-in one handy reference'' on the back cover is somewhat of an overstatement.

The book reflects the author's background and tends to concentrate on investigating differences between groups and relationships between variables. The coverage is more limited than the title suggests focusing, to some extent on epidemiological and environmental situations. Readers of the Journal of Official Statistics working in sample surveys or time series will find very little coverage of these areas. Quite rightly the importance of randomization is emphasized, but the distinction between random selection of units from a population and randomization of subjects to treatments is not made. Also the distinction between descriptive and analytical statistics is not made. It is understandable that in such a book the concepts of statistics are glossed over, but that is a danger inherent is such a book. A pointer to some basic statistical texts that would give a person a firm basis in important statistical concepts would be useful to emphasize that the book does not stand-alone.

There is some need for better editing. For example the reference to Copas and Li (1997) does not indicate in which series of the Journal of the Royal Statistical Society the paper appears, and Nelder becomes Nelson on page 22. In Equation (1.5) the sample standard deviation (s) is used when it appears the population standard deviation (s) should be used. The web site provides a list of errors found so far.

In general I agreed with the advice given. This book provides another source to check. But for people working in experimental or epidemiological statistics this book could be useful to have on their shelves as a supplement to other texts.

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P. Doyle, J.I. Lane, J.J.M., Theeuwes and L.V. Zayatz (eds.). *Confidentiality, Disclosure and Data Access. Theory and Practical Applications for Statistical Agencies*. Amsterdam: Elsevier Science, 2002. ISBN 0-444-50761-2, 462 pp, 113.50 USD.

Statistical agencies and other agencies that in some respect produce or manage databases have always been confronted with a trade-off dilemma between protecting the confidentiality of the data and maximizing data quality and data access. The authors state this trade-off dilemma in the introductory chapter of the book: ''While statistical agencies go to great lengths to collect high quality data, the necessity of protecting confidentiality results in some data quality compromises.'' The Information Age has made this task even more complex, due not only to the massive generation of data but also to changes in public perceptions of confidentiality. It is the purpose of this book to describe, but also to present solutions to the new problems that statistical agencies face nowadays.

The introductory chapter describes the trade-off dilemma and defines some of the fundamental concepts that are addressed in the subsequent chapters. The remaining fifteen chapters of the book, written by different contributors, can be grouped into four parts. The first part, consisting of two chapters, gives an overview of the techniques that statistical agencies all over the world have been employing in order to optimise the trade-off between confidentiality and data access. This part also documents the explosion of private data collection that has occurred during the last decade(s) by some examples (birth certificate information, loyalty card applications for supermarkets). The second part of the book consists of seven chapters on methods of disclosure control or disclosure limitation. These methods try to manipulate the original data in such a way that the available amount of information is maximized while at the same time the risk of disclosure of individual records is minimized. The manipulated data are then made publicly available. The first chapter of Part 2 is on disclosure risk assessment. The perspective of the intruder is taken to assess the risk of an attack and the risk of disclosure when attacked. The next two chapters describe and compare disclosure limitation methods and information loss assessment methods for continuous as well as categorical micro data (i.e., data on individual observations). Such methods are also discussed for tabular data. Three chapters are devoted to this topic, each taking a somewhat different point of view to address the subject. The final chapter of the second part deals with methods for disclosure limitation for longitudinal data.

Part 3 (three chapters) deals with so-called remote access to non-public data. Statistical agencies sometimes resort to this approach to avoid having to manipulate the data before they are made public. In the remote access approach the data can only be used under the supervision of the agency that is responsible for the data and it is subject to the same legal and ethical protections that are imposed on the agency. Two chapters discuss in more detail two types of remote access, namely licensing and restricted access. The third chapter deals with possible problems associated with remote access, especially due to the rapid development of information technologies.

The fourth and final part of the book discusses the perceptions of the public with respect to the confidentiality of the information that they provide about themselves and how statistical agencies handle this information. These perceptions are equally important with respect to data quality: people, who believe that the information they provide cannot

be protected adequately will not be eager to share this information. The first chapter examines the views of the public about the confidentiality of the data collected by statistical agencies, how these views have changed over time and how these beliefs may affect survey participation. The next chapter examines how and why people decide to provide information about themselves. The final chapter of the book discusses the perceptions of businesses and organizations about confidentiality.

The four parts of the book cover a wide range of topics related to the trade-off dilemma between confidentiality and data access. The introductory chapter and the first part of the book provide the reader with a good introductory overview of the most important aspects of the trade-off dilemma, current practices and upcoming and/or existing difficulties. The other parts of the book give more detailed information on the different aspects of the confidentiality/data access trade-off dilemma. This makes the book suitable and interesting for novice as well as more advanced readers on the topic of data disclosure. It must be mentioned, however, that the accessibility of the book differs somewhat across the four parts. The chapters of the second part of the book are necessarily somewhat more mathematically oriented and therefore require some mathematical background on the part of the reader. The fact that nearly all the chapters of the book have been written by different authors also leads to some degree of repetition in the arguments and chapter introductions throughout the book. Nevertheless, this book provides a unique and comprehensive introduction to the disclosure limitation issue, which makes it an invaluable resource for everyone who is confronted with the trade-off dilemma.

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