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Book and Software Reviews

Books for review are to be sent to the Book Review Editor Jaki S. McCarthy, USDA/NASS, Research and Development Division, Room 305, 3251 Old Lee Highway, Fairfax, VA 22030, U.S.A.
Email: jaki_mccarthy@nass.usda.gov

Alan Agresti and Christine Franklin. *Statistics: The Art and Science of Learning from Data*. Upper Saddle River, NJ: Pearson Prentice Hall, Pearson Education, Inc., 2007. ISBN 0-13-045536-9, 693 pp, $124.67.

Statistics: The Art and Science of Learning from Data is the product of more than 50 years of introductory statistics instruction. In accordance with the American Statistical Association recommendations for the introductory statistics course, the authors aim to make statistics more accessible to the average American college student. Techniques that are used include the use of real data, stressed conceptual understanding, and fostering active learning in the classroom. The authors attempt to improve on previous introductory statistics books by promoting the asking and answering of interesting questions, to incorporate students' needs and eliminate lengthy convoluted prose, as well as to establish a connection with the real world.

The introduction of the text exposes the student to the importance and role of statistics. The best portion of Chapter 1 includes tutorial instruction on how to access large databases for statistical use in the General Social Survey. In Section 1.3, the authors provide a detailed description of statistical software. The use of large databases and complex statistical software has become pertinent in the field of statistics. The authors' emphasis on software from the beginning was both sensible and wise. Chapter 2 develops the concept of types of statistical data and descriptive statistics, such as measures of center and spread. Most notably, Section 2.2 illustrates graphical depictions of data and instructs on how to interpret them. The authors note the drawbacks to choosing particular types of graphical displays. Current emphases on graphical displays make this chapter particularly notable. To enlighten the Introductory Statistics student on the common pitfalls in interpreting data, Chapter 2 also highlights the potential misuses of statistical data.

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Following their introduction to statistical data, the authors delve into study design. Chapter 3 provides a detailed introduction to tests of association, including contingency, correlation, and regression procedures. A large portion of the chapter focuses on contingency tables, since the authors proclaim these as most often used in real-world examples. Students are also provided with warnings against making inferences from tests of association. Lurking variables and causation are also introduced. Chapter 4 focuses on study design, with a detailed outline of observational studies and in particular sample surveys.

Chapter 5 through Chapter 8 gives students an adequate background in the concepts that lie behind statistical testing. Chapter 5 introduces probability and its application to daily life. The authors' minimalist approach to probability theory offers students "just enough" to understand probability and to later grasp conditional probability. This de-emphasis on probability theory is consistent with suggestions to improve introductory statistics courses. Chapter 6 outlines the normal distribution for continuous random variables and the binomial distribution for discrete random variables. In Chapter 7, statistical inference is emphasized by introducing interval estimation. This is a shift from the standard significance testing which is later introduced in Chapter 8. The downfalls of significance testing are discussed here as well by defining Type I and Type II errors. An in-depth discussion of practical significance and statistical significance is also offered here as a warning against significance testing.

The remaining sections of the text cover more advanced statistical concepts. Chapter 9 describes statistics that compare two groups through bivariate analyses. Matched pairs procedures are outlined here as well. Chapter 10 examines the association between categorical variables. The authors attempt to draw emphasis away from Chi Square testing and place it on the difference and ratio of proportions (relative risk). Chapter 11 outlines linear regression procedures, including modeling, variation around the regression line, and inference and model assumptions. Chapters 12–14 focus on advanced topics including multiple regression, one-way and two-way ANOVA, and nonparametric statistics.

Since the 1992 Cobb report there has been a push in the statistical community to emphasize statistical thinking and data concepts while fostering active learning (Cobb, 1992). The present text is consistent with the modern reform of introductory statistics: more data and less probability, more active learning, and introduction of technology for data analysis (Moore, 1997). The frequent "Insight" sections provide students with the opportunity to develop inferences from statistics. By presenting introductory statistics as an art, rather than a science, I felt the authors captured students' attention and provided a fresh outlook on statistics. Particularly the recent shift in technology requires exposure to statistical software. The text is consistent with the AMA's definition of what it means to be "statistically educated," meaning statistical literacy is emphasized and statistical thinking is developed. Overall, Agresti and Franklin's text is an excellent teaching tool and an innovative source of information for Introductory Statistics courses.

References

Cobb, G. (1992). Teaching Statistics. In Lynn A. Steen (ed.), Heeding the Call for Change: Suggestions for Curricular Action (MAA Notes No. 22), 3–43.

Cobb, G. (1993). Reconsidering Statistics Education: A National Science Foundation Conference. Journal of Statistics Education, 1, 1–26.
Moore, D. (1997). New Pedagogy and New Content: The Case of Statistics. International Statistics Review, 65, 123–165.

Annette K. McClave
Health Care Analyst II
Northrop Grumman IT Sector
4770 Buford Highway Mailstop K-50
Atlanta, GA 30341
U.S.A.
Phone: 770-488-5361
Fax: 770-488-5848
Email: AMcClave@cdc.gov

Valerie Sue and Lois Ritter. *Conducting Online Surveys*. Thousand Oaks, CA: Sage Publications, 2007. ISBN 978-1-4129-3754-2, 193 pp, $79.95USD.

The goal of *Conducting Online Surveys* is to describe the process of conducting a survey from the beginning planning stages through the end analysis stage; Sue and Ritter want to guide the practitioner through each step. The organization of this slim volume certainly supports this objective, as the outline of each chapter follows the general progression of the survey research process. Several chapters also provide handy checklists of things to bear in mind, such as a bulleted list of suggestions for writing survey invitation letters and a list of items to include in a codebook with a final dataset. As the title of the book suggests, the authors pay special attention to the advantages, disadvantages, and challenges that are particular to online surveys (both email and Internet/Web).

Guiding readers through each step, the authors cover topics such as the speed with which data can be collected, costs of developing and administering a survey instrument via e-mail or the Web, the types of questions that might be well-suited to online surveys, issues of anonymity and confidentiality, and the types of populations that can be reliably surveyed using online methods. Their discussion of each of these important topics is unfortunately very limited and rarely do the authors reference the rapidly growing literature on conducting online surveys. Granted, this book is intended to provide a single resource that covers the survey research process more generally while focusing on the particulars of online surveys. Given this objective, attention on any individual topic will be limited in scope.

Given how thin this volume is, the reader feels as though there is room for a fuller account of the important concepts in the book. One wishes for a more complete explanation of the implications for the researcher of each of the survey design decisions mentioned. Also, given the limited space available for each topic, the reader would be better served with more focused statements about decisions that have to do with survey design and fewer statements about decisions that may be somewhat obvious. The authors state that "With regard to socially desirable responses, online surveys are similar to self-administered postal mail questionnaires." One wishes that the authors had explained how they are similar (in the distribution of responses to questions? In the appropriateness of

these modes for collecting data on sensitive behaviors or attitudes?) and referenced literature on this point or presented evidence of their own.

Similarly, Chapter 2, on "Planning the Online Survey," mentions how the cost and ease of use of survey software packages should be taken into account and recommends finding a product that fulfills your needs for the lowest price. In this chapter, the authors also recommend against acquiring more expensive software packages with sophisticated capabilities if you are not going to use those features. Chapter 5 in the section on using color mentions that dark text on a dark background and light text on a light background are difficult to read. One wishes they had discussed more of what software capabilities are available and why one might consider using them as well as why one should consider using color or other graphical capabilities, instead of spending limited space on rather commonplace observations.

There are also many places in the text where it is unclear whether the authors' recommended procedures are based on empirical evidence or on common sense and their own experience conducting surveys. Chapter 5, on "Designing and Developing the Survey Instrument," contains many recommended design principles for Web-based questionnaires, such as what a "welcome screen" in a Web survey should contain, how to control access to the survey, the format of the first few questions in a Web questionnaire, and the formatting and color to use. Though research on best practices for online surveys is still relatively new, there is nonetheless a body of work addressing all of these topics. It would have been nice if the authors had been clear about what work they were referencing, if any.[1] Also, since their space is limited for discussing any given topic, it would have been helpful if the authors had provided the references for further reading.

One important topic to which the book devotes an entire chapter is sampling. What the target population is, whether a sampling frame is available, and whether the target group has access to the Internet are all mentioned as key considerations for any researcher wanting to conduct an online survey. However, with only twelve pages in this chapter, the content must necessarily be brief and lack sufficient detail to be truly useful to any practitioner. The authors mention that "most statistical texts advise against using nonprobability techniques or suggest that they be reserved for exploratory research. While this advice is theoretically sound, in online survey research it is often impractical" (32). The reader gets the impression that using the Internet to conduct a survey is not a means to an end but an end in itself.

The vagueness on topics such as sampling and coverage, the very limited discussion of data quality, and the minimal number of concrete principles for designing surveys limits the value of this book for most readers. The book is most helpful when it gives practical guidance for implementing surveys. Given the book's objective to be a practical manual, one very useful contribution is that it provides a handy appendix of resources, namely a list of online statistics books and a list of over 100 online survey software packages and Web survey hosts, including data collection vendors with experience of using the Internet for data collection.

[1] For example, see Heerwegh and Loosveldt (2002a) for an evaluation of response formats on data quality; Heerwegh and Loosveldt (2002b) for the effect of controlling survey access using PIN numbers; and Couper, Tourangeau, Conrad, and Crawford (2004) for evaluating response options for Web surveys.

There are some really good books about designing and conducting surveys that are highly accessible to individuals who have never dealt with the issues involved in conducting a survey.[2] It is not clear what this book offers that these other volumes do not. The emphasis on online surveys may draw some survey professionals to this volume; however, without in-depth specifics on the possibilities, limitations, and data quality issues particular to online surveys, the usefulness of this book is very limited. Furthermore, there are some articles that discuss the research design issues of conducting online surveys more thoroughly than this volume.[3]

The authors note that the book will be valuable to individuals who intend to conduct online surveys. It is too basic for the survey professional and too simple for any researcher. Given how the book is organized, however, it may provide helpful material for teaching a course on (online) survey methods and is certainly appropriate for undergraduate level courses. It functions as a sort of checklist of basic things to keep in mind during any stage of the survey process, whether research design, survey administration, or analysis. Though the book does not provide many definite prescriptions, it may be helpful to someone wanting to collect data – or better yet wanting to hire someone to collect data – and who wants a basic introduction to some of the important concepts to keep in mind.

References

Bradbum, N., Sudman, S., and Wansink, B. (2004). Asking Questions: The Definitive. Guide to Questionnaire Design. San Francisco: Jossey-Bass.

Couper, M.P. (2000). Web Surveys: A Review of Issues and Approaches. Public Opinion Quarterly, 64, 464–494.

Dillman, D.A. (2007). Mail and Internet Surveys, 2nd ed. Hoboken, NJ: John Wiley.

Heerwegh, D. and Loosveldt, G. (2002a). An Evaluation of the Effect of Response Formats on Data Quality in Web Surveys. Social Science Computer Review, 20, 471–484.

Heerwegh, D. and Loosveldt, G. (2002b). Web Surveys – The Effect of Controlling Survey Access Using PIN Numbers. Social Science Computer Review, 20, 10–21.

Danna Basson
Mathematica Policy Research
600 Maryland Ave, SW Suite 550
Washington, DC 20024
U.S.A.
Phone: 202-264-3485
Email: dbasson@mathematica-mpr.com

Rudolf Taschner. *Numbers at Work: A Cultural Perspective*. Wellesley, MA: A.K. Peters, Ltd., 2007. ISBN 978-1-56881-290, 209 pp, $39USD.

[2] See Dillman 2007 and Bradburn, Sudman, and Wansink 2004.
[3] E.g., Couper 2000.

When I was asked to review Rudolf Taschner's *Numbers at Work: A Cultural Perspective* I was excited and had high expectations. Those expectations were definitely met. When I opened the book I was immediately impressed with the interesting chapter names and beautiful illustrations printed on nearly every page. I had to begin reading straight away and I did not want to put this book down.

Taschner, a professor at the Technical University of Vienna, was named "Scientist of the Year" in 2004 by the Austrian Association of Science Journalists. His work with "math. space," part of the Museums Quartier in Vienna, is aimed at sharing mathematics and its cultural achievements with visitors to the center and is part of the reason for his award. The books Taschner has written further indicate that he enjoys sharing his passion for mathematics with not just academics, but also the number-weary, and through his work he hopes to change the readers' perceptions of numbers. *Numbers at Work* explores how numbers have shaped our world and culture and provides interesting examples that are easy to read and understand.

The chapters of this book are based on Taschner's lectures and workshops presented at math. space, and each chapter reveals how numbers are everywhere and in everything we do. In each chapter I learned something new and fascinating. Taschner covers a wide variety of themes, mostly drawing from historical examples, and the book is organized into eight chapters that include such titles as "Pythagoras: Numbers and Symbols," "Bohr: Numbers and Matters," and "Laplace: Numbers and Politics." Each chapter discusses how central figures have integrated and used numbers in the field. For example, in "Bach: Numbers and Music," Taschner reveals how Bach incorporated his own name into his compositions as a musical signature. While each chapter only provides an overview of each topic, there are many references to follow up on the themes that pique your interest. The translators of this book from German into English note that "Reading *Numbers at Work* is like walking down a great corridor lined with books" and they suggest you do not give in to follow one of the many leads. This piece of advice may be more difficult to follow than it sounds, as there are so many interesting examples that could have a whole book written about them.

In the first chapter, "Pythagoras: Numbers and Symbols," it was intriguing to learn how numbers and script are intertwined through biblical examples. Also interesting was learning how the artist Albrecht Dürer created a clever 4×4 magic square; this magic square met all the numerical requirements while incorporating other ingenious elements. One of these elements involved the last row of the square where the two middle numbers combine to make the year the etching was created (1514). And the first and fourth numbers of the same row are 4 and 1 and correspond to the letters A and D, representing Dürer's initials.

In the chapter "Hofmannsthal: Numbers and Time," Taschner explains how days in ancient civilization were just the time from either sunrise to sunrise or sunset to sunset, depending on the particular culture. A need arose, however, for a more accurate depiction of time, and the Egyptians developed the first 365-day calendar. They did so because they needed to know when the Nile would flood and allow them to irrigate their crops. Despite being aware of the calendar falling behind every year, the problem was not addressed until 63 BC by Julius Caesar. Also described is a recent attempt to change the way we organize the months and days of the calendar year. The proposed change involved having 364 traditionally named days and an extra day in December and another in June every leap

year. The name given to the extra days would be up to individual countries. The purpose of this reform was to have dates and days that remained the same regardless of the year and keep the calendar easily calibrated. This attempt, however, failed, as has any other attempt to move away from the traditional seven-day week.

Statistics are first mentioned with politics in the chapter "Laplace: Numbers and Politics." An example of Simpson's Paradox is provided in relation to the pharmaceutical industry and the testing of two hypothetical drugs with gender-biased results. Taschner says that "frequently [sic] statistically correct data are hijacked and used for partisan purposes." He goes on to suggest that supporters of the gender-biased drug will argue for their results while advocates of the other drug will use the conflicting results. Taschner points out other examples of how numbers and statistics can be manipulated and recommends that those who are interested in reading more on how to lie with statistics read one of the many books now available. These titles are referenced in the back of the book. Other statistical topics touched upon in this chapter include data correlation and probability, which are discussed in light of how numbers can be manipulated by politicians to make their point.

The final chapter, "Pascal: Numbers and Spirit," touches on many topics including the creation of the universe, the death penalty and the discovery of the ratio between the circumference and diameter of a circle. While this seems odd, the chapter is tied together by the enigmatic π and its pragmatic and philosophical underpinnings. This ties in with the concept of infinity, counting, and the reality which we live in, which are topics discussed in some sense in earlier chapters. However, I did not feel that the last chapter closed any topics, but rather left me with a humbling sense of how small we really are in this universe.

This is just an overview of four of the eight chapters; there are many more wonderful examples but including them would give too much away. Taschner has presented the information with attention to detail, with interesting literary quotes and some beautiful figures that augment the text well. The notes at the back are as interesting as the text in the book itself. I felt, however, that the index could have been more comprehensive as there were times I wanted to find a subject but was limited by the index, which was frustrating.

From reading *Numbers at Work: A Cultural Perspective* I feel I gained a greater appreciation of the value of going beyond your discipline to broaden your understanding of other fields. I believe this book would be an excellent recommendation to anyone who questions why they have to learn mathematics. Too often such questioning meets with a less than enthusiastic or rational response. Taschner's book offers numerous examples of how mathematics can be fun to learn, and I could see myself using examples from this book to teach students. I also gained a greater appreciation of numbers themselves – since I am a statistician this speaks volumes.

Bellinda King-Kallimanis
University of South Florida
Louis de la Parte Florida Mental Health Institute
Department of Aging and Mental Health
Tampa, FL 33620
U.S.A.
Email: bkallimanis@fmhi.usf.edu

Don Dillman. *Mail and Internet Surveys: The Tailored Design Method 2007 Update with New Internet, Visual, and Mixed-Mode Guide (2nd Edition)*. Hoboken, NJ: John Wiley and Sons, 2007. ISBN 978-0-470-03856-7, 544 pp, $75.

Don Dillman's pioneering works on self-administered questionnaires have influenced survey practice for decades. *Mail and Telephone Surveys: The Total Design Method* (1978) articulated principles that have become standard in the field. His 2000 follow-up reworked these principles into *The Tailored Design Method,* updating his guidance on mail surveys and extending it to the emerging practice of conducting surveys via Internet.

Of course, since the initial publication of *Mail and Internet Surveys: The Tailored Design Method*, the viability of Internet surveys for many purposes has been clearly established, and their prevalence has exploded. Questions regarding how to do them well have taken on new urgency and spawned considerable research on visual design principles and mode effects. The downside of such innovation is that it makes comprehensive treatments of the subject out of date almost as soon as they hit the shelves.

The 2007 update of *The Tailored Design Method* addresses what has happened in the last seven years. The original text of the book is presented unchanged, but is augmented by a 50-page appendix covering new developments. It is an ambitious addition, not only reporting new research findings, but also locating them within larger theories of communication and visual processing. The appendix also puts the methodological changes into cultural context – for example, noting how broad changes in people's ability and willingness to screen calls has necessitated flexibility in mode and contact strategies. Mixed-mode surveys are often the result: while the telephone remains an efficient way to contact many respondents, problems with coverage and access increasingly limit its viability as a sole mode.

One major theme of the appendix is the comparability of data collected in multiple modes. Making questions comparable across modes is not always straightforward. Differences in visual and aural processing of information mean that literal duplication of words does not always create equivalent items (consider, for example, a long list of response options that might be clearly understandable on a Web page, but awkward if read over the phone). Furthermore, even questions that seem comparable may produce different results in different modes, especially those using rating scales.

Dillman points out that deciding whether to mix modes requires an assessment of tradeoffs: doing so may be useful for improving coverage and cooperation, but may also introduce measurement error under some circumstances. Similarly, Internet surveys open up the possibility of adding sounds, pictures, animation, and other features that are not feasible in some other modes. These features have the potential to improve comprehension and recall, but using them on only a subset of the sample reduces comparability of measurement. At a minimum, it seems advisable to think carefully before mixing scalar data across modes, and to exercise caution when utilizing features that cannot be applied across the whole sample.

Most of the remainder is devoted to principles of visual design. Clearly, these principles are important for self-administered questionnaires: whereas in some modes interviewers navigate through complicated or unclear instruments, self-administration puts respondents completely on their own. This raises the bar in terms of required quality of design and

clarity of instructions. At best, poor design leads to confusion and frustration; at worst, it leads to response error and refusal to participate.

The 2000 edition of the book already addressed the importance of both verbal and graphical language in self-administered questionnaires. In the 2007 appendix, Dillman expands the paradigm to include numerical and symbolic language as well, and provides a systematic treatment of how respondents use all four languages to make sense of the response task. One might quibble whether symbols (mostly navigational arrows) warrant designation as a full language, but it is clear that nonverbal attributes of questionnaires play a critical role in communicating meaning. Certainly numbers are a part of this communication as well, whether they are used to indicate position within a questionnaire or the meaning of scale points. The appendix presents a more comprehensive theoretical framework than was previously available, for example outlining the stages of visual processing and suggesting how various elements of visual design help or hinder those processes.

The theories and concepts presented are always interesting, although they do not always feed into unambiguous design recommendations. Sometimes a fair amount of judgment is needed to bridge the principles with actual questionnaire decisions. This seems especially true when considering the overall visual design of a page, in which dozens of elements could be altered or organized in a number of ways, each of which might be true to the principles to some degree. Nevertheless, the specification of these languages provides a basis for understanding problems with particular questions, and also imposes a useful framework for organizing various research findings into a coherent big picture. It is also clear that more specific guidelines (for example, Martin et al. 2007) have built directly upon the concepts and principles laid out here.

Dillman concludes with some thoughts on emerging developments. One example is the potential for electronic surveys to collect paradata, such as time spent responding to questions. This provides quick, quantitative feedback about instrument performance. Another section considers the contributions of usability testing to visual design, a topic that could be mined in greater depth in the future. Finally, he ponders whether mail surveys have a future in the electronic age, ultimately arguing that they still offer unique advantages – for example, reaching people that would probably not be included otherwise. Fair enough, although as the book conclusively demonstrates, data collection methods change as quickly as our everyday modes of communication.

On the whole, the appendix complements the original text nicely, expanding upon the earlier material rather than contradicting it. Occasionally, elements of the original show signs of aging (for example, suggestions for embedding surveys within the text of an email conjure a late-90s flashback). But most of the original text stands fine as it was written, largely offering advice on writing and organizing questionnaires that transcends technological development. Most suggestions on survey implementation similarly hold up well. In the 2000 Edition, material on new technological developments concluded the book, and the appendix essentially carries the story forward in a logical manner.

In terms of style, the appendix also blends seamlessly with the original, offering the same conversational tone that makes the whole work quite readable. Still, this is not a book that is easy to boil down to a few takeaway reference points. Some are offered, but the Tailored Design Method really should be considered in its entirety. The book is not a

compendium of all applicable research findings; rather, through a consideration of available research, it offers a general way of thinking about important design decisions. It is a fairly hefty volume, but it is worth taking the time to absorb it as a whole.

Like the 2000 version, this edition will probably not stay up-to-date for long – one gets the sense that this is an interim measure, and one update of many. But this is as good a time as any to consider the good counsel within, and the volume shows that this pioneer of self-administered methodology still has much to offer.

Reference

Martin, E., Hunter Childs, J., DeMaio, T., Hill, J., Reiser, C., Gerber, E., Styles, K., and Dillman, D. (2007). Guidelines for Designing Questionnaires for Administration in Different Modes. Washington, DC: U.S. Census Bureau.

Paul Beatty
National Center for Health Statistics
3311 Toledo Road, Room 3218
Hyattsville, MD 20782
U.S.A.
Voice: 301-458-4090
Fax: 301-458-4031
Email: pbeatty@cdc.gov