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Book Reviews

Books for review are to be sent to the Book Review Editor Jaki Stanley, USDA/NASS, Research Division, Room 305, 3251 Old Lee Highway, Fairfax, VA 22030, U.S.A.

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Norbert Schwarz and Seymour Sudman (eds.), *Answering Questions: Methodology for Determining Cognitive and Communicative Processes in Survey Research.* New York: Jossey-Bass, Inc., 1996. ISBN 0-7879-0145-8. 469 pp., 40.95 USD (cloth).

This volume, the product of a 1993 conference on the question-answering process, is most remarkable for the variety of perspectives it incorporates. The topic of "cognitive and communicative processes in survey research" is illuminated through survey methodology, sociology, market research, linguistics, artificial intelligence, and of course, psychology (cognitive, social, and personality, from theoretical, experimental, and applied perspectives), among others. Approaches outside researchers' own familiar territory are often scattered across dozens of journals and books, and may have been largely obscure until now. This book forges a new meeting site, which should foster many exchanges of insights in this area.

The chapters raise interesting questions, and even provide a few answers, about cognitive aspects of surveys; virtually anyone who works with questionnaires will find at least some chapters to be of interest. The editors express the goal that each chapter should summarize and evaluate a specific technique for measuring cognitive and communicative processes. However, survey researchers will probably find that chapters fall naturally into three distinct categories. Some chapters are primarily conceptual, highlighting not so much specific techniques as insights into cognitive processes. Chapters in a second category review techniques primarily employed in questionnaire development, some of which will already be familiar to survey researchers. Last, some chapters describe cutting-edge techniques for studying cognitive and communicative processes.

Many survey researchers will find the first category of chapters to be the most illuminating – these chapters successfully apply psychological insights toward the understanding of survey problems. Wilson, LaFleur, and Anderson's chapter on verbal reports

about attitudes (as opposed to reports *of* attitudes) contains some complex and even counterintuitive ideas: for example, the authors suggest that asking respondents *why* they hold a certain attitude may only engage their most accessible thoughts, which could bias subsequent reports of attitudes. The authors present these ideas in a clear and intriguing manner. As a bonus, they offer a realistic assessment of the problems generalizing laboratory findings to survey settings, while ultimately making a case for the "potential for a profitable, symbiotic relationship between survey and experimental researchers."

Petty and Jarvis's chapter similarly focuses on psychological theories of response rather than specific questionnaire design techniques. They argue that two respondent characteristics, "need for cognition" and "need for evaluation," may explain how response effects differ across individuals. For example, low-cognition respondents may be most susceptible to peripheral question cues, while high-cognition respondents may be more susceptible to primacy effects. This chapter, like Wilson et al.'s, nicely illustrates the application of sophisticated psychological ideas to challenging survey problems.

The second category of chapters covers techniques such as cognitive interviewing, behavior coding, and expert questionnaire appraisal. Although these techniques will already be familiar to many survey researchers, the best of these chapters consolidate and expand upon a great deal of information, making them well worth reviewing. Fowler and Cannell's chapter on behavior coding is among these, nicely summing up the history, goals, and procedures involved. The authors are frank about the limitations of behavior coding (such as its inability to identify *sources* of problems), but also demonstrate its unique contribution to the arsenal of pretesting methods. Convincing examples show how behavior coding identifies questions that would be virtually impossible to administer in a standardized manner.

DeMaio and Rothgeb address cognitive interviewing, a broad rubric that can include thinking aloud and various types of probing (retrospective or concurrent, scripted or unscripted, general or specific). Of the techniques in the book, "cognitive interviewing" is probably the one most commonly used by survey researchers. Yet it is also one of the most difficult to explain. Cognitive interviewing approaches have evolved with some independence across organizations, reflecting the preferences and backgrounds of the practitioners. While the techniques ostensibly descend from cognitive psychological principles, virtually any request of a participant to elaborate upon the meaning of responses could qualify as a cognitive interview.

DeMaio and Rothgeb assemble some excellent examples of how cognitive interviewing can identify a wide range of problems, without oversimplifying the variety of potential cognitive interviewing practices. Still, all of their examples are from U.S. Census Bureau practices. This is somewhat unfortunate, since researchers in other laboratories might have approached the problems – or even defined basic terms – differently. A truly comprehensive overview would have to examine differences in actual practice across laboratories. (Jobe, Keller, and Smith's chapter discusses cognitive interviewing performed in another laboratory, but they emphasize a specific application that does not address this concern.) This is an omission from the book rather than a weakness of the chapter, however. One simply wishes the book presented another perspective for balance. This seems to be a critical piece of the story if we are to foster methodological development of these increasingly popular techniques.

Lessler and Forsyth describe a system for evaluating questionnaires without conducting interviews – potential difficulties with comprehension, retrieval, judgment, and response are identified through an analysis of question texts themselves. The authors claim that the system leads to conclusions similar to those of other methods, and that its speed and low resource requirements are advantageous. Still, it is undeniably complicated and a bit unwieldy, though the authors seem to be aware of the need for simplification. Expert questionnaire appraisal is often haphazard business, and attempts to systematize the process are clearly worth considering. A streamlined version of this system could be a useful complement to interview-based pretests.

The final category of chapters documents more experimental procedures for investigating the response process. Although survey researchers may find them less immediately applicable, most are well-written and thought-provoking. Like other chapters, they often gather, update, and extend material that has appeared in various sources. Bassilli's chapter on response latency is a good example. His discussion of measurement problems is refreshingly straightforward, which lends strength to his discussion of the how's and why's of his approach. Graesser, Bommareddy, Swamer, and Golding's work on a computational model of human question answering is probably unknown to many, but offers a novel and sometimes fascinating view of information processing.

Undisputably, the chapters in this third category give survey researchers a great deal to think about. Whether or not these techniques provide practical questionnaire design guidance is a different issue. Developing questionnaires and investigating the nature of survey response are complementary goals, but not all methods achieve both. Bickart and Felcher note the difference in their discussion of verbal protocols, but some other authors could have distinguished between these goals more clearly. Brewer and Lui's sorting techniques, and Ostrom and Gannon's exemplar generation, seem to reveal a lot about cognitive processes, but it is unclear whether they make a unique and practical contribution to questionnaire development. In contrast, DeMaio and Rothgeb's claim that the goal of cognitive interviews is to "produce information about cognitive processes" is debatable, although the fact that cognitive interviewing effectively identifies questionnaire problems is almost undeniable. Both science and questionnaire development are valuable, but it seems important to acknowledge that often there is a difference.

An alternative organization of the book might have helped clarify this point. The editors divide the chapters into sections labeled "Interactional Analysis," "Verbal Protocols," and "Other Methods." This distinction does not seem helpful for navigating through the considerable diversity of material here, especially since more than half of the book falls into the "Other" category. Separating questionnaire design, experimental research, and theoretical approaches might have been preferable. Alternately, a distinction could be made between techniques that use survey interviews, laboratory or "think-aloud" interviews, and no interviews at all. It might be useful to note, for example, that Bickart and Felcher, and Bolton and Bronkhurst, both present coding schemes for think-aloud interviews. Such a breakdown might have assisted readers considerably in finding the most relevant chapters.

The book might also have benefitted from more synthesis. Groves's wrap-up chapter offers some, and challenges researchers to demonstrate the benefits of techniques in terms of survey error reduction. This is a timely challenge and fitting conclusion. But in

the course of reading the book, I was intrigued by similarities and differences between Graesser et al.'s question-problem taxonomy and that of Lessler and Forsyth; reading Banaji, Blair, and Schwarz's discussion of implicit memory, I wondered if Wilson et al., and Petty and Jarvis, had uncovered part of the puzzle in their own chapters. More generally, I hoped for more discussion of the relative advantages and disadvantages of these approaches.

Admittedly, it is difficult to impose organization and synthesis on a book of this type. In the final analysis, it is hard to argue with the sheer quantity of information in this volume. Indeed, it is a credit to both authors and editors that so much is presented clearly and concisely. An intellectually and stylistically engaging book, it is also an important one, one that will surely foster new research, collaboration, and understanding in these cross-disciplinary endeavors.

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Seymour Sudman, Norman A. Bradburn, and Norbert Schwarz, *Thinking About Answers: The Application of Cognitive Processes to Survey Methodology*. San Francisco: Jossey-Bass, Inc., 1996. ISBN 0-7879-0120-2. 268 pp + refs., 33.95 USD.

Only a decade ago, questionnaire design was viewed somewhat as an ''art'' requiring much experience and a ''feel'' for good design. Many researchers investigated the effects of question wordings, orderings, and formats on survey responses, but their findings were often inconsistent. The literature was rife with ''black box'' studies: research on response effects when Factor A is varied and Factors B through F remain fixed, but providing little insight regarding how the effect may change when Factors B through F are set at different levels. Lacking was a consistent theory or set of rules to predict when response effects are likely to appear. Consequently, this copious literature was quite limited in its implications for questionnaire design.

In Chapter 1 – Introduction, the authors provide a fascinating recounting of the history of survey research since the early days of the *Literary Digest* debacle to the present times. Only recently have significant advances in our understanding of the survey process been possible through applications of cognitive psychological research approaches. *Thinking About Answers* is the first *textbook* on the cognitive aspects of survey methodology. How fitting that it is authored by three world leaders in this area. As the authors note, previous books, such as their recent compendium *Answering Questions* (Schwarz and Sudman 1996) have been edited volumes and conference proceedings. *Thinking About Answers* is the first attempt in a textbook to integrate, summarize, and reflect upon the disparate body of literature that is cognitive survey methods.

The remaining ten chapters of the book cover all the key issues in the application of

cognitive processes to survey methodology. Chapter 2 – Methods for Determining Cognitive Processes and Questionnaire Problems is a summary of the methodological approaches researchers use to investigate cognitive processes and respondent difficulties in answering questions. Among the methods examined are think-aloud interviews, behavioral coding, expert appraisals, response latency methods, and focus groups. Each method is described in some detail and is discussed in terms of the stage(s) of the response process that it is designed to investigate. Four stages are considered: (1) comprehension/ interpretation, (2) information retrieval, (3) judgment formation, and (4) response editing and communication. Fifteen examples were used in this chapter to illustrate the concepts. The clear and uncluttered style in which they were presented made reading the chapter a genuine pleasure. It is unfortunate that neither this presentation format nor the frequent use of examples was copied for the remaining chapters.

Chapter 3 – Answering a Survey Question: Cognitive and Communicative Processes presents the basic cognitive theories which underlie the empirical work reviewed in the later chapters. Several ''models'' of the question asking and answering process are reviewed and their implications for survey data quality are explored. The authors present a lucid description and useful expansion of the compartment model of the response process originally proposed in Tourangeau (1984) and discuss its implications for survey work.

The next three chapters deal with the cognitive aspects of context effects in survey responses. Chapter 4 – Psychological Sources of Context Effects in Survey Measurement discusses various situations that can arise at each stage of the response process to generate a context effect. As an example, preceding questions may influence how respondents use the response scales for a question, resulting in context effects at the formatting stage. Chapter 5 – The Direction of Context Effects: What Determines Assimilation or Contrast in Attitude Measurement? examines why context effects sometimes move in the direction of previous information (assimilation effect) and sometimes away from previous information (contrast effect). They present an ''inclusion/ exclusion'' model to help predict when and where context effects will occur as well as the magnitude and direction of the effect. The last chapter in this trilogy is Chapter 6 – Order Effects Within a Question: Presenting Categorical Response Alternatives. In it, cognitive theory is used to explain why effects are sometimes based on the first items presented (primacy effects) and sometimes on the last few items presented (recency effects).

One of my favorite passages from the book is found in Chapter 6 (p. 141) where the authors present a theory for predicting a three-factor interaction effect between the serial position of an item, the mode of presentation, and the item's plausibility. They write,

> ''Assuming that an item is plausible, thus eliciting agreeing thoughts, primacy effects should emerge under a visual presentation mode and recency effects under an auditory presentation mode. On the other hand, if the item is implausible the opposite predictions hold. In the latter case, recency effects should emerge under a visual presentation mode and primacy effects under an auditory presentation mode.''

As complex as these predictions are, a four-way interaction is possible, say the authors. A response alternative may exhibit a ''confirmatory bias'' which inhibits disagreeing

thoughts in implausible items, thus attenuating the position effect. A former professor of mine once gave this advice: ''If ever you encounter a significant four-factor interaction, find another field of study.'' Quite tempting, isn't it!

Chapter 7 – Autobiographical Memory deals with the storage and retrieval of behavioral reports in surveys. The authors discuss several theories for the way memory is organized. As the authors state, understanding how memory is organized is key to understanding the process of remembering. As an example, they present evidence that events are not stored as discrete, isolated bits of information but rather are ''clustered'' in event sequences. Thus, remembering one event in a cluster of events can trigger the remembrance of the entire cluster.

The next three chapters also relate to autobiographical memory. Chapter 8 – Event Dating deals with the mental processes involved in recalling and dating events occurring within a specified time period and examines the reasons for systematic biases in reports about the date the events occurred. Chapter 9 – Counting and Estimation – discusses how and when estimation occurs as well as some strategies commonly used by respondents to count and/or estimate the number of times a particular type of behavior occurred. The authors conclude that neither counting nor estimating is always better. Counting has the advantage for events that occur infrequently and estimating is usually better for more frequent events. Further, when estimation is used, shorter time reference periods provide as much information (with less respondent burden) as do longer reference periods. In either case respondents simply multiply the average frequency per unit of time by the number of time units in the time period to arrive at an estimate of the total for the time period.

When the target respondents are not available or otherwise cannot answer for themselves, others who live in the same household may provide reports for them. Chapter 10 – Proxy Reporting discusses the cognitive complexities inherent in the task of reporting about others. The findings reviewed in this chapter encourage the use of proxy reports since for many behaviors proxy reports can be as accurate as self-reports. However, much depends upon the amount of communication between the target respondent and the proxy.

The content of *Thinking About Answers* is of a theoretical nature rather than a practical one. Conversion of the theories and abstract ideas into practical guidelines for questionnaire design is, perhaps, left for another textbook. Several of the chapters end with a section titled ''Practical Implications for Questionnaire Designers'' which provides more of an applied perspective to the theoretical findings; however, the sections are short and quite general. The last chapter of the book, Chapter 11 – Implications for Questionnaire Design and the Conceptualization of the Survey Interview – is also quite useful in this regard. Here the authors summarize their key conclusions, provide an integrative perspective for future research, and present some basic practical implications for questionnaire design.

Notwithstanding its emphasis on cognitive theory, *Thinking About Answers* is a landmark text and a major contribution to the survey methods research literature. As a summary of the recent advances in the field of cognitive psychology as applied to survey research, it is unique, well-organized, and superbly written. Survey methods researchers will find this an indispensable resource and will cite it often.

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Schwarz, N. and Sudman, S. (eds.) (1996). Answering Questions: Methodology for Determining Cognitive and Communicative Processes in Survey Research. Jossey-Bass Publishers, San Francisco.

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Reeves, B. and Nass, C., The Media Equation: How People Treat Computers, Television, and New Media like Real People and Places. CSLI and Cambridge University Press. ISBN 1–57586–052–X, pp. xiv + 305, 27.95 USD.

The key focus of this book is summed up in its subtitle, ''How people treat computers, television, and new media like real people and places.'' Essentially, the media equation asserts that computers, televisions and other media are not viewed as objects or tools, but are imbued with a ''social presence.'' The potential relevance of this book to survey research is mainly in the area of computer assisted interviewing (CAI). With the proliferation of CAI, and particularly computer assisted self interviewing (CASI and audio-CASI), a key question is how interviewers and respondents interact with computers and what the implications may be for data quality.

The central thesis of this book is that people treat computers like they treat people – in other words their interaction with computers (and other media) is fundamentally ''social and natural'' (p. 5). The authors cover a wide range of issues in the 23 chapters of this book, with each chapter based on one or more laboratory experiments whose results all bolster the ''media equation.''

So, for example, in a chapter on politeness to computers, Reeves and Nass posit that ''when a computer asks a user about itself, the user will give more positive responses than when a different computer asks the same questions'' (p. 21). Not surprisingly, the results of a small experiment the authors conducted using simple text interfaces support this assertion. Somewhat more surprising to this reader, in a follow-up experiment they added voices to the computer(s), and found that the addition did not make the interaction any more social than the text-based systems. They conclude (p. 28) that ''the nerdiest of media, a computer that looks like it comes from NASA control, is close enough to being human to trigger rich scripts for social interaction.''

On the basis of this and other experiments, the authors make design recommendations to the computer and media industry. For example, after finding that people react positively to flattery from a computer (Chapter 4) they suggest that people would want a spell-checker that would praise the user (e.g., ''Your spelling was significantly above average. You should be commended for your work.'' (p. 61)).

The recommendations they make on the basis of these results appear to fly in the face of evidence that people reject social interfaces in computer media. Microsoft BOB and Postal Buddy are two of the best-known examples of failures in this area, suggesting that people do not want a friendly, chatty computer, but rather one that is usable and efficient

(i.e., a tool, not a friend). In the words of Alan Cooper (1995), for example, "The ideal interaction is not a dialog – it's more like using a tool." (See also Shneiderman 1992, pp. 545–549).

In another set of experiments Reeves and Nass manipulated words on computers to represent different personalities, and used simple line drawings to represent different character types. They summarize these results as follows: "Sophisticated representations are not necessary to get participants to change evaluations that influence everything from feelings of self-worth to evaluations of a machine. A couple of well-chosen words reliably communicated can do the trick." (p. 97). They go on to say, "Virtually *all* interfaces have a personality. This literally applies to anything that presents words to a user, from toaster ovens and televisions to word processors and workstations." (p. 97).

Some of the findings appear contradictory. For example, the authors report that adding voices to an interface does not appear to make it any more social (p. 25). Yet later in a chapter on voice, they report that users will respond to different voices on the same computer as if they were different social actors (p. 173) and that if the same voice is on two different machines, it is still viewed as the same social actor. Other results appear counter-intuitive. For example, Reeves and Nass report in Chapter 18 that degrading video quality has little effect on evaluation, attention, and memory for video segments, but degrading audio quality does have an effect. They conclude that "unlike video, poor audio fidelity is psychologically unfamiliar, even weird" (p. 208). Some of the arguments are not well-developed and there is often little theoretical support for their assertions. At times, the authors even appear to ignore the existing literature. For example, the one area where they confess to inductive discovery and being surprised by a finding is that of motion affecting mental engagement. They find that movement on video gets our attention. Intuition suggests there must be empirical literature on this topic. Similarly, they cite a number of popular books on subliminal messages, concluding that the books "discuss fantastic theories but they lack good evidence to bolster the claims" (p. 243). The authors imply that there is no empirical research in the psychology or communication literature on subliminal messages. They then offer one experiment of their own to fill this gap.

Despite the lack of theoretical grounding or empirical evidence (beyond their own experiments) for their conclusions, every experiment they conducted provides support for their assertion that people treat media as social actors. The skeptical reader would seek details on the studies they conducted, but these are not to be found in this book. In fact, there is not one table, not a single statistic, in the book. (We do learn in some chapters that most of the experiments are based on about eleven subjects per cell.) The dearth of numbers is somewhat disquieting to a quantitative person.

If the results reported in this book are to be believed, they have important implications for survey research, and particularly computer assisted interviewing. In fact, there is mounting evidence that CASI reduces social desirability effects over interviewer-administered surveys. This book suggests that CASI and ACASI should still produce these effects because people treat computers as they would other people. These findings thus appear contradictory.

This book was clearly written for the popular press. As such, it may leave many serious researchers unfulfilled. If one is interested in an entertaining book that offers provocative examples of how we may treat computers and other media, this book makes an interesting read. However, if one is interested in learning more about the empirical procedures the authors

use to test their theoretical assertions, I suggest starting with one of their journal articles (see, for example, Fogg and Nass 1997; Nass, Moon, and Green 1997). While provocative and challenging, their findings clearly still await empirical replication. This skeptical reviewer would prescribe more than the proverbial pinch of salt when reading this book.

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Zaman, Asad, *Statistical Foundations for Econometric Techniques.* Academic Press, Inc., San Diego, CA, 1996. ISBN 0–12–775415–6, xxvi + 570 pp., 45 USD (pb.).

This book appears to have been designed primarily as a main text for an advanced, graduate-level course in econometrics. As such, it does not skimp on mathematics, requiring a familiarity with linear algebra, differentiation of vector functions, probability theory, and statistical theory. It would also not hurt to have the equivalent of a bachelor's degree in mathematics, plus a solid year or more of graduate-level statistics or econometrics. Economics other than econometrics is not addressed, and, in fact, most of the practical examples in the book do not even involve economic variables. Thus, the book can be read as easily by mathematical statisticians as by econometricians. Besides its function as a textbook, it could serve as a supplemental text for students, faculty, or practitioners of econometrics or statistics who are looking for detailed discussions on selected topics. As advanced econometric textbooks go, it is relatively difficult, and many students would need additional texts to guide them through some of the book's mathematical hurdles and explanatory shortcuts.

Statistical Foundations for Econometric Techniques is written for the reader who enjoys, or at least does not mind, plowing through mathematical proofs of statistical theorems. The book weighs in at nearly 600 pages, but its coverage of econometrics is almost entirely restricted to the single-equation case – it provides only cursory discussion of simultaneous equations, the identification problem, etc. Its focus is heavily on

foundations, rather than techniques, and as a result, specific techniques like limited dependent variables, or distributed lag models with lag operators, are not covered. Thus, the book is quite different from econometric texts that provide encyclopedic overviews of common techniques. Instead, as its title implies, the book looks *underneath* most of the single-equation methods that those other books prescribe.

In the areas of empirical Bayes estimation, robust regression, stringency of tests, asymptotic theory, and bootstrapping techniques, the book's coverage is *cutting-edge*, containing discussions of advanced econometric theory that have not yet entered into standard textbooks, but have recently appeared in technical journals and working papers. In this sense, the book could be ideal for graduate students of econometrics who are looking for a dissertation topic in one of the above-mentioned areas. Given the difficulty of its subject matter, the book is relatively readable, and it organizes the advanced material quite well, providing an extremely useful guide to the technical literature.

The book does not get a perfect score in all categories, however. It contains more than an average amount of oversights and errors, even relative to other econometric books that are also in their first edition. Examples include missing text (p. 234), errors in variable notation (p. 346), wrong equation numbers (p. 330), and incorrect theorem numbers throughout Chapters 13 and 14. Chapter 13, in particular, appears to have been extracted from some other source and then hastily attached to the rest of the book at the last minute. For instance, the chapter defines the Fisher Score Function and the Information Matrix (pp. 339–340) as though it were the reader's first exposure to them, while both concepts had already been defined and discussed as early as page 27. Other oversights sometimes ruin important points the author is trying to make, as in the statement, ''consider a simple minimax rule for the unequal variances case, ... coordinates with small variances are shrunk less and coordinates with high variances are shrunk more. In contrast, Bayes and empirical Bayes rules shrink in the opposite fashion: high variance coordinates are shrunk more and low variance coordinates less'' (pp. 88–89).

The book is too fast and loose with acronyms, even for readers who are bureaucrats (myself included). For instance, on page 131, the acronym ''LMP'' is used when the author probably means ''LM'' for the Lagrange multiplier test. LMP, for ''locally most powerful'' test, is only first spelled out on page 133. Similarly, on pages 268–269, Zaman discusses ''ARMA process errors'' without mentioning what the acronym stands for (autoregressive moving averages), or what it means. Future editions of the book would benefit from a listing of abbreviations and acronyms.

The book contains some sections for which sufficient background is not developed for the reader to understand the material unless he or she is already familiar with it, in which case these sections more closely resemble outlines of ideas than full explanations. On the one hand, some readers, especially those who are most familiar with the background material, may actually be pleased that Zaman bothered to cut a few corners to make their reading go faster. On the other hand, others, especially students, might be disturbed by it. On page 173, for example, crucial points are made involving the term ''amenable,'' an attribute of invariant transformations, where Zaman remarks ''For the definition of amenability ... the reader is referred to Bondar and Milnes (1981).''

Other problems also relate, in some ways, to incomplete explanations or background. In Chapter 5 Zaman examines a database, originally from another source, that lists the

body weight and brain weight of 28 species of animals. He uses the database to illustrate limitations in OLS and other methods when brain weight is regressed onto body weight. However, Zaman never identifies the correct approach toward analyzing the data, neglecting three fundamental problems with any of the regressions he describes: heteroscedasticity, limited dependent variables (brain weight must be greater than 0 and less than body weight), and missing variables (type of organism). In an actual analysis of the causality of brain weight, a better approach would be to define the dependent variable as the proportion of an organism's weight accounted for by its brain, thereby reducing heteroscedasticity. Furthermore, a limited dependent variables test, using type of organism as an explanatory dummy, would have probably explained a great deal more of the variance. Similarly, in what would otherwise have been an excellent discussion of structural changes and "splines" (pp. 215–217), Zaman graphs time-series data and regression lines where autocorrelation is evident from casual observation. Zaman had covered the topic of autocorrelation only 33 pages earlier, and though it was no longer the topic of discussion, he should have acknowledged the presence of autocorrelation in the data he was analyzing. In fairness to the author, however, oversights in the proper analysis of real data are not unusual in econometric discourse. That is, while it is often easy to find real data to illustrate a technique, it is extremely difficult to find any real data that relate to a technique perfectly, i.e., without any problems in definition, measurement, or interpretation.

One of the best features of the book is the fact that it expresses opinions, and argues in favor of them, about the preferability of some econometric procedures over others. Most econometric books tend to avoid such comparisons, but passively devote more attention to some methods over others, as an indirect and subtle form of advocacy. This passive approach, however, does little to alleviate uncertainty in readers' minds as to which methods are best. In contrast, by actually taking a stand, Zaman not only helps the practitioner, but sets a good example of how future statisticians and econometricians should carry out useful discourse. Furthermore, in arguing his positions on alternative methods, Zaman is usually quite convincing.

Although the text often delves into high-powered mathematics, Zaman makes a strong effort to highlight, and "bring home," the points that he wants every reader to understand, regardless of their level of mathematical prowess. For example, in discussing the inappropriateness of empirical Bayes techniques when the observed data conflict with the Bayesian prior, he argues (p. 55), "If one trusts the prior, one should discard the data, or alternatively, if the prior is deemed less trustworthy one should discard the prior information. To put it more graphically, if we have information about a person suggesting that either he is from California or he is from New York, it does not make sense to average and say that he is probably from Kansas."

Many of the topics covered in the book would be of general interest to all econometricians, but they are topics that are not easily found in traditional econometric texts. Examples of these include:

a demonstration of how regression analysis can be interpreted geometrically as the projection of a vector onto a smaller subspace,
a useful discussion of the "breakdown point" of estimators (the extent to which estimators could be influenced by outliers),

continued emphasis on the importance of estimators being independent of units of measure, and what this property implies about one's choice of estimators,
a candid examination of the "use and abuse of the F test," explaining "data mining" and what should be done about it, and
convincing examples of how empirical Bayes estimation should be the method of choice in certain instances.

For obvious reasons, much of this material could be quite helpful to econometricians who work with official statistics, even if they may not be interested in the mathematical proofs underlying the author's arguments. In addition, Zaman reviews research in two areas that had been carried out for the development of official statistics, in which empirical Bayes estimation was employed: (1) estimates of per-capita income in sparsely-populated regions (pp. 458–461), and (2) efforts to eliminate undercounting of population while summarizing the data acquired from a census (pp. 462–469). Two other studies that he reviews, which also employ Bayesian techniques, have close ties to official statistics: (1) estimation of the "wages of displaced workers," where "the dependent variable ... measures the ratio of the initial wage received by an unemployed worker to the last wage he/she received while on his/her last job (pp. 469–473)," and (2) statistics on the reading levels of school children "explained by test scores on ... the WISC-R battery of tests (pp. 479–483)."

Given the subject matter, most readers will find that the book is not exactly fun to read. On the other hand, Zaman does try to express ideas in an interesting way. Philosophical ideas occasionally surface, as in the remark, "Now the Bayesian rationality arguments do not exhaust the limits of reason, and it may be possible to prefer some of the Bayesian procedures over others on rational grounds." Humor can also be found, e.g., when observations about dinosaurs (in the database on animals) are not identified as outliers by ordinary least squares, Zaman asks, "Could it be that the failure of OLS to identify dinosaurs as exceptional dooms the technique to share their fate?" While the author would obviously be well-advised to "keep his day job," he does make the text less mundane than it would otherwise be.

As already suggested, the book is particularly valuable as a research tool. It contains numerous references throughout, many of which are quite recent, amounting, in the end, to a 21-page bibliography. It also contains problems at the back of each chapter, which are appropriate for advanced graduate-level classes in econometrics. The book's current price of $45 for a paperback copy is hard to beat for any modern econometrics text with the same amount of useful material. In conclusion, Zaman's *Statistical Foundations for Econometric Techniques* is a reference that every mathematically-oriented statistician or econometrician should consider purchasing.

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