



# NEW BOOKS IN REVIEW

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**PRINCIPLES OF FORECASTING: A HANDBOOK FOR RESEARCHERS AND PRACTITIONERS**, J. Scott Armstrong, ed., Boston: Kluwer Academic Publishers, 2001, 849 pages, \$190.00 (hardback), \$95.00 (paperback).

In the late 1970s, Professor Armstrong wrote a treatise on long-range forecasting that many readers considered irreverent and humorous, albeit very insightful and highly readable (Armstrong 1978). On the basis of a detailed review of the extant empirical research, Armstrong identified, described, and provided an evaluation of the various subjective and objective methods used in forecasting. Without mincing words, he clinically dissected the relative effectiveness and usefulness of each technique. Although readers can disagree with Armstrong's strong opinions and conclusions, there can be no disagreement on the overall impact the book had on the science of forecasting. In his new magnum opus, Armstrong continues his tradition of extending the frontiers of knowledge on forecasting by incorporating 39 other experts as coauthors and contributors.

In his inimitable style, Armstrong explains the need for "principles in forecasting" by narrating a personal experience. He writes (pp. 4–5):

A blood test showed that my cholesterol was too high; it was 260, with a ratio of 4.3. To determine the best course of action, my doctor had to forecast the effect that recommended changes would have on my cholesterol level. Next, he needed to forecast how closely I would follow his advice. Finally, he had to forecast how reducing my cholesterol level would affect my health and quality of life. He made these forecasts in his head, all very quickly, and prescribed a low-fat and low-cholesterol diet.... The issue then [became] whether to follow advice based on the judgmental forecasts of my doctor, or whether to rely on the more objective evidence from my experiment [on varying my diet] and on findings in the published literature. I chose the latter.

Although Armstrong's example has a happy ending and communicates nicely the relevance of forecasting principles in day-to-day life, his approach toward controlling cholesterol is not to be tried by the fainthearted.

*Principles of Forecasting: A Handbook for Researchers and Practitioners* is an ambitious, well-executed undertaking that is certain to make a lasting contribution to the field of forecasting. As Armstrong describes (p. 3) in the intro-

ductory chapter, "the purpose of this book is to summarize knowledge of forecasting as a set of principles. These 'principles' represent advice, guidelines, prescriptions, condition-action statements, and rules." Armstrong and his 39 contributors admirably achieve this goal, fascinating the reader by their ability to succinctly translate complex issues into simple, easy-to-understand principles.

Armstrong identifies several target audiences for the handbook, including (1) forecasting practitioners and government agencies, (2) forecasting researchers, (3) educators, and (4) lawyers and expert witnesses. Potential purchasers should recognize that the handbook assumes that readers will have a basic level of knowledge of forecasting techniques and experience with applications. Therefore, despite the clarity of the writing, this book is not necessarily intended for the novice forecaster or as an introduction to the forecasting field.

Armstrong and his expert contributors represent multiple disciplines, including marketing, economics (population and agricultural), information systems, psychology (cognitive and experimental), statistics, decision sciences, public policy, operations management, strategic management, and logistics. They also represent a variety of countries, including the United States, the United Kingdom, Australia, New Zealand, Canada, and The Netherlands. By bringing together such a powerful brain trust, Armstrong not only ensures a top-quality production but also bridges the gap that normally exists because of interdisciplinary differences in the use of forecasting terminology. Furthermore, all of the 31 essays have undergone a rigorous review process by both the contributors and 123 outside reviewers. On average there were more than 8 reviews per paper, and some received more than 20 reviews—much more than a typical research manuscript undergoes before being published in the best academic journals.

In all, the 849-page handbook comprises 31 essays, organized in 20 sections. Armstrong sets the stage for the book in the introductory chapter by presenting a "methodology tree" that depicts the various methods and techniques available to the forecaster divided along the lines of judgmental and statistical sources. In the last section of the handbook, Armstrong provides a summary of 139 key principles, most of which are derived from the individual essays, organized along the lines of the major tasks confronting a forecaster: problem formulation, obtaining information, implementing forecasting methods, evaluating forecasting

methods, and the use of forecasts. Armstrong ends this section with a comprehensive forecasting standards checklist that can serve as a useful tool for forecasters and decision makers. The remaining 18 sections comprise essays that address topics that include role playing; intentions; expert opinions; conjoint analysis; judgmental bootstrapping; analogies; extrapolation; rule-based forecasting; expert systems; econometric methods; selecting methods; integrating, adjusting, and combining forecasts; evaluating methods; assessing uncertainty; gaining acceptance; monitoring forecasts; applications of forecasting principles (population forecasts, diffusion of innovations, market share, and trial sales for new products); and diffusion of the principles through textbooks and forecasting software.

Armstrong has in the past expressed a strong preference for objective and empirical research-based forecasting approaches; for example, in his 1978 book he concludes that the primary advantage of the popular but subjective Delphi method is that it is a gimmick that is acceptable to organizations. Nevertheless, he devotes a substantial portion of the handbook to judgmental methods. Indeed, judgment-based methods garner eight chapters compared with six for statistical-based methods. I enjoyed reading the chapters on role playing and judgmental bootstrapping (by Armstrong), intentions (by Vicki Morwitz), and improving judgment in forecasting (by Nigel Harvey). Given my personal bias for marketing topics, I also found Wittink and Bergstuen's treatment of forecasting with conjoint analysis interesting.

Among the chapters dealing with the statistical methods for forecasting, I found Armstrong, Adya, and Collopy's treatment of rule-based forecasting and Allen and Fildes's discussion on econometric forecasting fascinating and personally satisfying. Also, Remus and O'Connor and Collopy, Adya, and Armstrong have done a terrific job in simplifying two relatively complex subjects: neural networks and expert systems, respectively. In general, though, given that the statistical-based methods for forecasting are relatively more complex to discuss without involving the technical nuts and bolts and to summarize as set principles, I would have preferred to see a more elaborate treatment of these sections. Parts of this section lack the lucidity and depth prevalent in the rest of the book. Readers who are relatively new to the field will find it particularly difficult to traverse through some of these chapters.

Although the core positioning and objective of the handbook—to discuss, analyze, and summarize knowledge as a set of principles—is prevalent across the 30 essays, the style and approach differ. For the most part, Armstrong begins his essays with a global problem or a scenario from everyday life that serves as a useful tool to introduce the concept or issue addressed by that particular paper. For example, in his chapter on role playing he describes the Falkland situation in the mid-1970s and U.S. military strategies during the Vietnam War, to highlight the importance of role-play and the negative consequences of poor forecasts. His chapter on judgmental bootstrapping begins with a narration of an interesting personal experience during a flight from Denver to Philadelphia, and his “Whodunit murder mystery” scenario nicely sets the stage for the discussion on combining forecasts. This style is also present in essays by several of his contributors. For example, Gregory and Duran introduce the concept of scenarios and acceptance of forecasts in their

introductory narration of “The Plumber and the Case of the Missing Ring.” Such an approach helps the authors communicate complex concepts in an effective and often entertaining manner. However, several of the other essays adopt very different styles. For example, Morwitz's chapter on intentions starts with a listing of the nine key principles to be discussed and then proceeds to provide evidence in support of those principles. Although this could be a bit disconcerting for some readers who would like to see a consistent style of treatment across chapters, I found the differences refreshing.

Certain interesting and useful approaches in some of the chapters should perhaps have been adopted throughout the book. One such useful tool is the conclusion section of some of the essays that had specific subsections discussing the implications to researchers and practitioners. Such explicit implication sections provide completion to the method or issue addressed in the essay and put a proper perspective on its usefulness. Likewise, I found Brodie and colleagues' exhibit on evidence to support principles for market-share forecasting useful, and I would have liked similar exhibits in other chapters.

Cox and Loomis's examination of the diffusion of forecasting principles through books and Tashman and Hoover's discussion of diffusion through forecasting computer programs show that not all principles are created equal in terms of their emphasis by authors and software creators. It would be interesting to do a survey of forecasting researchers and practitioners to identify the relative importance they place on the 139 principles and to compare their evaluations with the results reported in these two chapters.

A useful online supplement to this handbook is the Forecasting Principles Web site (<http://fourps.wharton.upenn.edu/forecast/>). It includes such features as a comprehensive list of future research needs pertaining to the 139 principles identified in the handbook, which would have been a useful addition to the book itself. It also contains Armstrong's summary of which principles are used in available forecasting software and how other principles could be incorporated. This table would have fit well in Tashman and Hoover's software discussion. The handbook's dictionary of forecasting terms is also available at this site.

In conclusion, Armstrong's book goes beyond its stated goal of presenting the state of the art of forecasting research in the form of concrete principles; it sets the tone and direction for all future work in this area. The book has earned its place as the bible for forecasters and is a “must have” in every forecaster's library.

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OPTIMAL DATABASE MARKETING: STRATEGY, DEVELOPMENT, AND DATA MINING, Ronald G. Drozdenko and Perry D. Drake, Thousand Oaks, CA: Sage Publications, Inc., 2002, 398 pages, \$54.95.

This book evolved out of the authors' collaboration with the Direct Marketing Educational Foundation to develop a

database marketing course and teaching materials. Ronald Drozdenko is Professor of Marketing at Western Connecticut State University, and he brings more than 25 years of teaching experience along with extensive industry experience to this project. Perry Drake has been in the direct marketing industry for 15 years, and he is currently Vice President of Drake Direct, a database marketing consulting firm. In addition, Perry teaches courses for the Direct Marketing Master's Degree program at New York University.

This text is appropriate for advanced undergraduate and graduate students in a direct marketing or database marketing course. The authors focus on database marketing and take readers through the process of database strategy, development, and analysis. Starting with "What Is a Marketing Database?" the first two chapters deal with establishing a database marketing plan, including setting marketing objectives. The next three chapters address database considerations, such as defining customer data requirements, database maintenance and coding, and basic database design. The treatment of database topics is not very technical from an information technology perspective, but rather is intended to give an overview of key terms and issues. Chapter 6 discusses how to select a representative sample for conducting a test and emphasizes the importance of creating a "frozen file," which shows what the customer looked like at the time the sample was selected, for use in later analysis.

The next eight chapters focus on analytical tools, beginning with variable transformations and simple techniques such as univariate analyses, cross-tabulations, and correlations. Chapter 8 covers segmentation schemes, with brief overviews of the more advanced techniques of factor analysis, cluster analysis, and CHAID (chi-squared automatic interaction detection). Chapter 9 is a clear and straightforward presentation of simple linear regression. Chapter 10 covers multiple regression modeling and briefly describes logistic regression, neural networks, and several popular data mining packages. Although "data mining" is in the book's subtitle, the discussion is quite limited, and readers looking for depth on this topic will be disappointed. Chapter 11 explains gains charts and expected profit calculations. Calculating lifetime value and other customercentric metrics are covered in Chapter 12. Chapters 13 and 14 focus on test design and analysis, including detailed discussions of and formulas for hypothesis testing, confidence interval calculations, and sample size considerations.

Chapters 15 and 16 focus on database concepts, both strategic and analytical, as they are applied to the Internet and online customers. The book concludes with a chapter that explores future issues and trends.

The book is clearly written and gives many examples to illustrate both the concepts and the analytical techniques. A glossary provides a handy reference for key terms, and each chapter concludes with a set of review questions. For instructors adopting the text, a complete set of supplemental materials is available, including sample syllabi, chapter-by-chapter PowerPoint slides, exercises with solutions, sample exams and quizzes, and sample marketing databases in various formats including SAS, Excel, and SPSS. A supporting Web site can be found at [www.DrakeDirect.com/OptimalDM](http://www.DrakeDirect.com/OptimalDM). This comprehensive Web site contains chapter summaries, downloadable data sets for several regression-based case studies with 150 to 57,000 customer names, and

links to related Web sites. Also included on this Web site are many software downloads that either are free or have a free evaluation period. The free Plan-alyzer downloadable software performs sample size estimation, confidence interval calculations, and hypothesis testing using a simple point-and-click interface. Other downloads include statistical tools for Excel, desktop statistical calculators, and a financial calculator for handhelds using PalmOS.

As the overview of chapters suggests, this book delves deeper into statistical analysis than many other database marketing texts, such as those by Hughes (1996, 2000), Jackson and Wang (1994), and Schmid and Weber (1998), which focus more on strategic considerations. The closest book in terms of breadth of coverage of topics is perhaps *The New Direct Marketing* by David Shepard Associates (1999), though at more than twice the length of Drozdenko and Drake's book, *The New Direct Marketing* may be better suited as a reference than a text.

Despite the book's analytical emphasis, readers with a more statistical orientation may take issue with some of the discussions and examples in the text. The chapter on multiple regression starts with an example that uses a binary response variable to indicate whether a customer ordered or did not order a service. There is no mention that the assumptions of multiple regression are not consistent with a binary dependent variable. The book advises readers to ignore the low  $R^2$ s that such models inevitably yield and to think of the predicted values for the dependent variable as probabilities. However, the book then cautions the reader not to mistake the multiple regression score for an exact probability and notes that this problem can be alleviated by using a logistic regression model. A brief section on logistic regression models later in the chapter states that logit models, though specifically designed to deal with binary response variables—thus resulting in a better model and yielding a predicted value that is a true probability—are quite computer intensive and not available in Excel. A preferable approach would be to illustrate multiple regression with an example using a metric dependent variable such as the dollar amount of the customer's order. Then, logistic regression could be introduced as the appropriate technique for binary response variables.

The chapter on "Segmenting the Customer Database" may also raise some eyebrows. In the discussion of factor analysis, the authors inappropriately recommend converting metric variables such as age, income, and household size to binary variables before performing the factor analysis. In addition, their approach for computing factor scores diverges from the approach in statistical treatments of factor analysis. Finally, the example chosen to illustrate factor analysis blurs the distinction between factor and cluster analysis. Although the authors perform the factor analysis on variables (rather than customers), the results are interpreted in terms of the "distinct groups of customers" that the factors identify (e.g., "2-person household with high income and expensive taste," "young struggling family"). I would have preferred a factor analysis example that more clearly identifies dimensions rather than groups.

Readers familiar with the RFM (recency, frequency, and monetary) segmentation popularized by Hughes (1996, 2000) and discussed by other authors (e.g., Berry and Linoff 2000; David Shepard Associates 1999; Schmid and Weber

1998) should note that Drozdenko and Drake do not cover it. Instead, they use RFM variables in cross-tabulation analyses and also to create a weighted RFM score. Given the popularity of formal RFM analysis, including routines in data mining packages such as SPSS's Clementine, I would like to have seen this included.

Several positive features deserve special mention. The authors do an excellent job of emphasizing key issues in designing, conducting, and validating market tests. On the design end, they stress the importance of up-front planning to ensure that the test will yield the precision needed to make the marketing decisions at the end. They discuss traps that can occur when the test is not conducted in such a way that the results can be generalized, and they repeatedly stress the need to both validate test results and assess their accuracy. In addition, there is an extended discussion of how to select the appropriate confidence level and use or interpret confidence intervals in making business decisions. Given the growth of the Internet and its suitability for direct marketing, it is nice to see several chapters that exclusively address database marketing and the Internet.

The strengths of this book are its breadth of coverage of both the managerial issues and the analytical topics associated with database marketing. Potential adopters with a strong interest in analytical topics should consider that whereas this book discusses the basic statistical tools in detail, data mining and advanced analytical tools are covered only briefly. In addition, some of the empirical examples of the more advanced techniques do not necessarily reflect current best practices from a statistical perspective. However, I believe many instructors will appreciate the book's balance between the conceptual and the quantitative. It is well written, contains interesting examples, and has sufficient detail for students to follow and then apply most of the techniques presented. The package of supplemental materials, including exercises, quizzes, and data sets, makes this a good text around which a course can be built. The depth of the authors' experience in the direct marketing industry and academia is well reflected in this book.

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