Robert Johnson

Elementary Statistics

ELEMENTARY STATISTICS

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Robert R. Johnson

Duxbury Press, North Scituate, Massachusetts

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TO THE MEMORY OF MY FATHER

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PREFACE

This book was written for use in an introductory-level course for the nonmathematics major who needs a working knowledge of statistics but does not have a strong mathematical background. However, because statistics requires the use of many formulas, any student who has not had intermediate algebra should complete at least one semester of college mathematics before beginning this course: such a background will cover the necessary manipulation skills. In addition, many of the mathematical topics that the student will be expected to understand prior to the course are presented in a concise fashion in the appendixes. Students are encouraged to refer to these appendixes.

On the other hand, the acquisition of the ability to think abstractly and logically—so necessary to the student of statistics—is one of the intended results of using this book. In that regard, it is hoped that the level of plain talk and the common-sense approach used here will allow any student with the necessary basic skills to work his way through the course with relative ease.

The illustrations and exercises have been chosen from a multitude of fields to show the versatility and usefulness of the basic techniques being studied. To encourage the student to become more involved in the course, *each chapter has a problem set in addition to the exercises*. For these, the student obtains his own data and is asked to master a variety of objectives in ways that will cause him to re-live the entire chapter. The problem sets will enable the student to interrelate his courses and will motivate him to learn. (It is beneficial to share a few of the problem sets with the whole class. Each set represents its own special statistical problems.)

I should like to point out the two primary aims of this book: to motivate the student, by showing statistics in a context of the student's personal experience, and to organize his learning process as he progresses through the book. The first goal—motivating the student—is achieved by means of two devices. One is the use of common language in examples based on common experience and of explanations founded on common sense. The second motivating device is the use of actual news stories in the opening of every chapter. These stories, aside from showing statistics in an everyday-life context, illustrate some aspects of the statistics presented in the respective chapters.

The second goal of the book—to organize the student's learning process—is achieved by means of the following techniques. Chapter openings feature a schematic flow diagram indicating the information covered by the chapter, and pointing out the essential information contained in the chapter. They are followed by a section entitled "Chapter Objectives," in which the student is told what, specifically, he is expected to learn from this chapter. This technique is reinforced by a section called "In Retrospect," at the end of each chapter, in which the student has occasion to review the entire chapter and come full circle to the objectives outlined at the beginning of that chapter. "Chapter Quizzes" and "Vocabulary Lists" at chapter ends further focus the student's attention on the essentials of the chapter.

Use of the first ten chapters is very appropriate for the typical one-semester course (approximately 42 hours of instruction). The level of mathematical maturity of the students will, of course, determine the amount of material that one covers in a single course, however the instructor does have several options in the selection of topics to be studied. I consider Chapters 1 through 9 to be the basic core of a course (although Chapter 3 can be omitted without affecting the continuity of other topics). Following the completion of Chapter 9, the instructor could select any combination of the topics presented in Chapters 10 through 15 (with the proviso that Chapter 3 be studied before Chapter 14).

A debt is owed the texts listed in the references lists at the end of each chapter. Many of the ideas, principles, examples, and developments that appear in the text stemmed from thoughts provoked by these sources.

It is a particular pleasure to acknowledge the aid and encouragement I have received throughout the development of this text from David H. McNitt and Calvin A. Lathan and the students and colleagues who used the original drafts of the manuscript for several semesters. Special thanks are due to those who read and criticized various chapters and aspects of the text: Robert O. Maier, El Camino College; Janet M. Rich, Miami-Dade Junior College; Bryan A. Haworth, California State College at Bakersfield; Joyce Curry; Frank C. Denny, Chabot College; Kenneth D. Wantling, Montgomery College; Edward A. Sylvestre, Eastman Kodak Co.; and John C. Holahan, Xerox Corp. I am also indebted to my wife, Mary Lou, and to the secretaries for their many hours of typing. Special appreciation to my children, who saw less of me than usual while I was writing.

Thanks also to the many authors and publishers who so generously extended reproduction permissions for the news articles and tables used in the text. These acknowledgments are specified individually throughout the text.

ROBERT R. JOHNSON

NOTE TO THE STUDENT

Each chapter is introduced by a *Chapter Outline*. Use this list to fix in your mind the sequence of chapter topics. Next, read the *News Articles*. They are included to give you some feeling for the practical, everyday application of the chapter topics. Finally, read through the section entitled *Chapter Objectives*. It will outline what you should expect to learn to do as the result of studying any particular chapter.

The sections at the end of the text are intended as learning aids and self-testing devices. The *Exercises* should be done as each topic is presented. This will allow you to learn and practice each new idea separately. The *Answers to Selected Exercises*, which begin on page 458, will allow you to check your solution to various chapter problems and may also serve as illustrations. After you complete the exercises, use the *Problem Set* to set up test situations to further explore applications of the chapter lesson. The *Vocabulary List* will help you identify specific terms and phrases, and can also serve as a self-test. The *Quiz* will provide a short review of basic concepts. Answers to each quiz may be found beginning on page 475.

R.R.J.

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