PREFACE

This book is about graphing data in science and technology. It contains graphical methods and principles that are powerful tools for showing the structure of data. The material is relevant for data *analysis*, when the analyst wants to study data, and for data *communication*, when the analyst wants to communicate data to others.

Many of the methods and principles in the book are new; many others are old, but not widely known. The first few decades of the 20th century were an exceptionally fertile time for the invention of *numerical* statistical procedures. Statistical scientists invented methods and approaches to data analysis that eventually permeated all of science and technology. The period since about 1960 has been an exceptionally fertile time in statistical science for the invention of *graphical* procedures for data analysis. An infusion of this graphical methodology into science and technology will raise the effectiveness of data analysis just as confidence intervals and hypothesis tests did decades ago.

The prerequisites for understanding the book are minimal. A few topics require a knowledge of the elementary concepts of probability and statistical science, but these topics can be skipped without affecting comprehension of the remainder of the book.

The book was meant to be read from the beginning and to be enjoyed. However, it is possible to read here and there. Winding its way through the book is a summary of the material: the figures and their legends. Reading this summary can help readers direct themselves to specific items.

Except for one small section, there is nothing in this book about computer graphics. The basic ideas, the methods, and the principles of the book transcend the medium used to implement them, but the reality is that the computer looms behind the book content because it is the medium of the present for many and of the future for almost all. The graphs of the book that are not copies of other people's graphs were computer generated. The software used was the S system for data analysis and graphics [9] developed by Richard Becker and John Chambers of AT&T Bell Laboratories, and GRAP [13], a very recent system developed by Jon Bentley and Brian Kernighan, also of Bell Labs.

Many graphical methods are missing from this book. I included only those that had promise for application to the most commonly occurring types of data and that would be relevant for all areas of science and technology. Many specialized methods, important as they are, are omitted.

The graphs in this book are communicating information about fascinating subjects, and I have not hesitated to describe the subjects in some detail when needed. In many cases some knowledge of the subject is required to understand the purpose of a graphical analysis or why a graph is not doing what was intended or what a new graphical method can show us about data. I hope the reader will share with me the excitement of experiencing the increased insight that graphical data display brings us about these subjects.