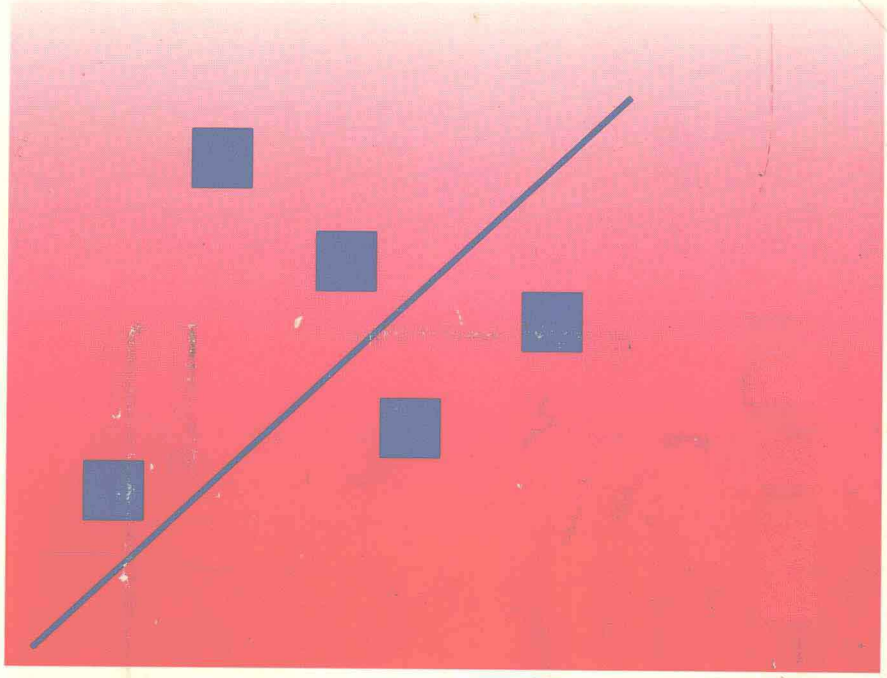

MYSTAT

STATISTICAL APPLICATIONS

MACINTOSH EDITION

Course
TECHNOLOGY

ROBERT L. HALE

INCLUDES MYSTAT SOFTWARE

MYSTAT

STATISTICAL APPLICATIONS

MACINTOSH EDITION

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Preface

When I first began learning statistics, the only substantial calculation tool available was the slide-rule. Because every slide-rule performed the same functions in the same manner and the simple mathematical operations could be taught in a few hours, statistics instructors consciously integrated this calculation instrument into class.

Next came the electronic calculator. Its operation was much easier than the slide-rule. Formerly tedious calculations were performed almost instantaneously. Calculators were swiftly adopted by statistics instructors and students and were integrated into both classroom lectures and textbooks.

The calculator and slide-rule only helped to solve the computation problems; they did little to help reveal the deeper meanings of statistical decision theory. Students had to understand the calculation formulas in order to be successful with the tool. Many students felt an overwhelming amount of time was devoted to the mathematics, and far too little time was spent on the assumptions and theoretical issues behind the statistical procedures. Often students could perform calculations on examinations, but they couldn't explain why one statistical procedure was used instead of another. Statistics class was often dreaded because of the math, and all excitement about the power that statistics provides to help make important research decisions for human welfare or business was lost.

With the proliferation of personal computers and statistical software programs, the learning scene has changed for the better. With current tools—a personal computer and a user-friendly statistics package—it is possible to answer statistical questions without spending inordinate amounts of time calculating the solution. To teach students how to do this successfully, however, it is necessary to integrate today's tools thoroughly into the classroom. With this integration, statistics instructors can concentrate on teaching the assumptions and theoretical issues of statistics, instead of teaching basic mathematical calculations. The tutorials and examples in this text enable the computer to become more than a simple computation tool; it can be a learning tool.

Content and Organization

MYSTAT: Statistical Applications is coordinated with the learning sequence presented in the typical introductory statistics text. With only a few exceptions, (for example, where there is a reference to data or an illustration presented in a previous chapter) the chapters are independent, and can be taught in any order.

Chapter 1 explains how to install MYSTAT, then briefly describes the MYSTAT Data Editor.

Chapter 2 introduces the students to data entry. Students learn how to enter and save data, how to create new variables, how to find specific cases using an *If...then* expression, and how read a text file with MYSTAT.

Chapters 3 and **4** give an introduction to descriptive statistics using MYSTAT to graph single variables and to calculate descriptive statistics.

Chapter 5 shows how to use MYSTAT to calculate one-sample *z*- and *t*-tests. Although MYSTAT can not directly calculate one-sample tests, the chapter shows how to use the software to do these calculations. MYSTAT's ZIF function, used to find the probability given the *z*-value, and ZCF function, used to find the *z*-value given the probability, are also described. Although the paired *t*-test is used in one-sample situations, initial discussion of this procedure is not presented until chapter 6 (*Two-Sample Statistical Tests*), because the procedure is more involved than the single sample examples presented in this chapter.

Chapter 6 uses MYSTAT to calculate *t*-tests for both one- and two-sample situations.

Chapter 7 explains how to use MYSTAT to calculate ANOVA.

Chapter 8 gives an introduction to graphs. Proper graphic design is explained and students learn how to construct scatterplots.

Chapter 9 describes correlation and regression techniques.

Chapter 10 gives the students an introduction to ANCOVA and explains how to use MYSTAT's ANOVA function to calculate ANCOVA statistics.

Chapter 11 explains how to use MYSTAT to calculate non-parametric statistics.

Pedagogical Features

Six-Step Solution

The six-step solution appears in each chapter that discusses a statistical test. The six steps provide a consistent framework for students to use to find a solution to a given problem. The steps guide the student through constructing the null and alternative hypotheses, setting the probability, calculating the stastistic using MYSTAT, and interpreting and analyzing the results.

Decision Charts

Each chapter that introduces a statistical test includes decision charts. These charts are designed to help students decide which statistical test is required for the data and problem being studied.

Data Disk

In addition to the MYSTAT software, *MYSTAT: Statistical Applications* comes with a student data disk. All the data used in the text and in the exercises are provided on the disk. The students can spend their time studying the data instead of keying it in, and, because the data is already on disk, data entry errors are avoided.

End of Chapter Exercises

Exercises are provided at the end of each chapter. Some of the exercises use data that has been used in the chapter; other exercises use entirely new data. All are designed to give the students practice in using MYSTAT to describe and make decisions about data.

Acknowledgements

I would like to thank John Connolly, Kitty Pinard, and David Crocco from Course Technology for all their assistance. Without their vision of integrating technological advances into the college curriculum, this book would have been impossible. I would also like to thank Debbie Crane for her wonderful interior design and for implementing it so quickly. And finally, I would like to thank Melissa Heiger and Liz Chung for the many hours they spent working through chapter drafts making sure that the directions were clear, and the results both correct and understandable.

It is also a pleasure to articulate my appreciation to the following reviewers for their thoughtful comments: Tony Dubitsky, ASI Market Research, Inc.; Lawrence Gall, Yale University; Rebecca German, University of Cincinnati; and C. Lincoln Johnson, University of Notre Dame.

Thanks also go to Leland Wilkinson, Mary Ann Hill, and Eve Goldman of SYSTAT, Inc. for their suggestions as the text was being developed.

Finally, I would like to thank my wife, my son, and my mother for all their support through the years. Without their encouragement and my father's many days of working overtime to sustain my undergraduate studies, I would not have been able to obtain any of my goals. Thanks, Dad!

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Brief Contents

Contents

1

MYSTAT Overview

MYSTAT is an interactive statistics and graphics package. With MYSTAT, users can compute most of the descriptive and inferential statistics typically covered in a two-semester college course. MYSTAT graphs aid in visualizing both one- and two-dimensional data. MYSTAT can be used on IBM PC-compatible and Macintosh computers and VAX/VMS systems. This text describes MYSTAT features on a Macintosh. To run on a Macintosh, MYSTAT requires one megabyte of memory and either a hard disk drive or two 800K floppy disk drives. MYSTAT can handle up to fifty variables and 32,000 cases.

Objectives

At the end of this tutorial you should be able to

- Install MYSTAT
- Start MYSTAT
- Understand MYSTAT's seven menus
- Understand the different windows used by MYSTAT
- Obtain MYSTAT's on-screen help
- Quit MYSTAT

Installing MYSTAT

This tutorial describes how to install MYSTAT. The MYTAT program and the data files that will be used in the tutorials and the exercises are contained on the disk that comes with this text. You must complete one of the installation procedures before you can run MYSTAT. You cannot run MYSTAT using the disk that comes with this text because there is not enough space on the disk. If you have a hard disk and one floppy drive, continue with the following section "Hard Disk Installation." If you have two floppy drives, skip to the section "Floppy Disk Installation" on page 5.

Hard Disk Installation

To install MYSTAT on a hard disk, you'll create a MYSTAT folder on the hard drive and copy the MYSTAT program files from the MYSTAT Program and Data disk that comes with this text into this folder.

To install MYSTAT on a hard disk,

1. Turn on your Macintosh. Once the system is running, you should see an icon that represents the hard disk.
2. Double-click on the hard disk icon to display its contents.
3. Select **New Folder** from the **File** menu. A new folder appears in the window displaying the contents of your hard drive.
4. Drag the cursor across the title of the folder to highlight it, then type **MYSTAT Program**.
5. Make sure the original MYSTAT Program and Data disk that comes with this text is locked, then insert it into the floppy disk drive.
6. Double click on the MYSTAT Program and Data disk icon. You will see a window like the one shown in Figure 1.1.

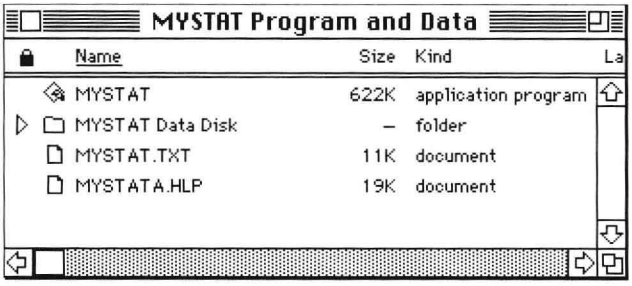

Figure 1.1
The contents of the MYSTAT Program and Data disk

7. Press and hold **[Shift]**. While holding [Shift] down, click on the files MYSTAT, MYSTAT.TXT, and MYSTATA.HLP. Let go of **[Shift]**. The three files should be highlighted in the window.

8. Drag the three files onto the MYSTAT Program folder icon. The files will be copied to the MYSTAT Program folder.
9. After the three files have been copied, double-click on the MYSTAT Program folder and make sure that all three files are in it. The MYSTAT Program folder window should look similar to Figure 1.2. Your screen may look different if an option other than **by Name** is checked in the **View** menu.

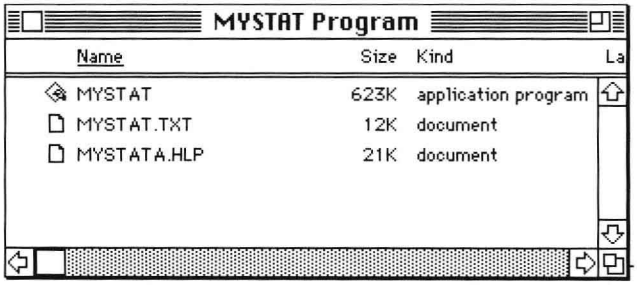

Figure 1.2
The contents of the MYSTAT Program folder

10. Click on the MYSTAT Program and Data disk window. If you are using System 6, select **Eject** from the **File** menu. If you are using System 7, select **Eject** from the **Special** menu. The disk will eject and its icon and the window will stay on the screen.

Now you need to copy the data files to a floppy disk.

1. Get an unitialized floppy disk and label it Data Disk.
2. Insert the Data Disk into the floppy disk drive. A dialog box like the one shown in Figure 1.3 will appear.

Figure 1.3
The disk initialization dialog box

3. Click **Two-Sided**. A message will appear warning you that this process will erase all information on the disk.
4. Click **Erase**.
5. The system now asks you to name this disk. Type **Data Disk**, and click **OK**. When the initialization is complete, the icon for this disk will appear on the screen.

6. Click on the Data Disk icon. If you are using System 6, select **Eject** from the **File** menu. If you are using System 7, select **Eject** from the **Special** menu. The disk will eject but the icon will stay on the screen.
7. Make sure the original MYSTAT Program and Data disk that comes with this book is locked, then insert it into the drive.
8. Double-click on the MYSTAT Data Disk folder icon in the MYSTAT Program and Data window.
9. Choose **Select All** from the **Edit** menu. All of the files in the MYSTAT Data folder will be highlighted.
10. Drag the files onto the Data Disk icon to copy them to the Data Disk.

    You may be prompted to switch disks while the files are being copied. Follow the instructions on the screen.
11. Double click on the Data Disk icon to make sure that the data files were copied. Your screen should look similar to Figure 1.4. Your screen may look different if an option other then **by Name** is checked in the **View** menu.

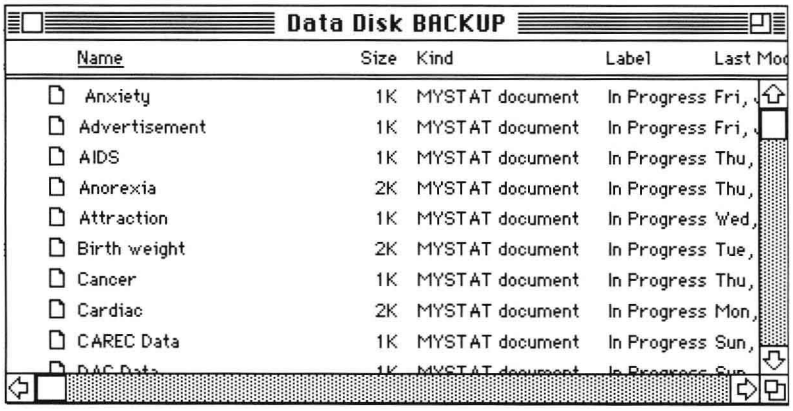

Figure 1.4
The contents of the Data Disk BACKUP

12. After all the files have been copied, drag the Data Disk and the MYSTAT Program and Data disk icons onto the Trash icon. The Trash icon will darken and the disks will be ejected when you release the mouse button. Put the original MYSTAT Program and Data disk in a safe place.

You will be using MYSTAT on the hard disk and the Data Disk (which will be called simply the *data disk* from now on) in the floppy disk drive.

Skip to the section "Starting MYSTAT" on page 9.