

HOW TO USE SPSS®

BRIAN C. CRONK

*A Step-by-Step Guide to
Analysis and Interpretation*

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A Step-by-Step Guide to Analysis and Interpretation

From the library of:

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How to Use SPSS®

A Step-by-Step Guide to Analysis and Interpretation

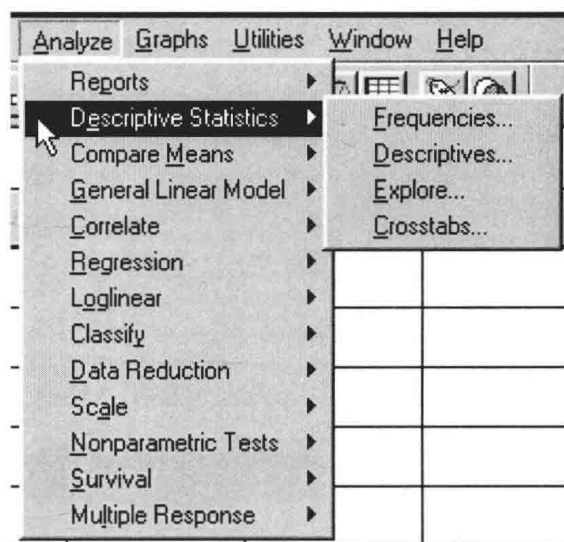
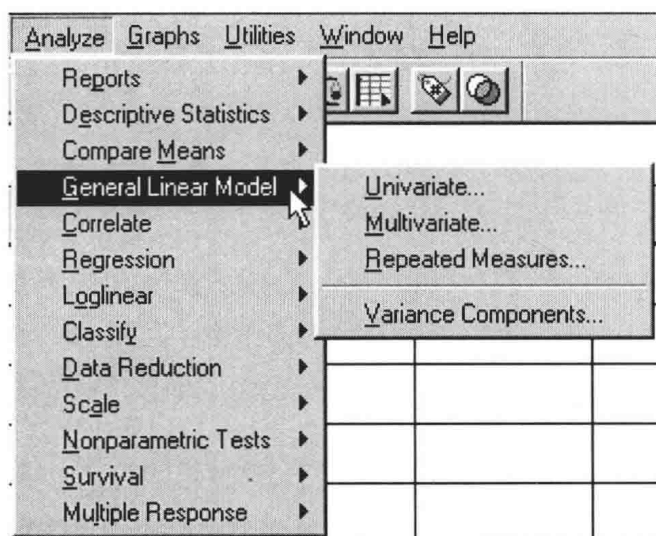
Addendum for Versions 9.0 and 10.0

How to Use SPSS: A Step-by-Step Guide to Analysis and Interpretation was designed for use with SPSS Version 8.0. Since then, Versions 9.0 and 10.0 have been released. Although Version 9.0 differs in a number of ways from Version 8.0, only three cosmetic changes will affect users of the book. These changes from Version 8.0 to 9.0 are described below.

CHANGE #1. The Statistics menu has been renamed Analyze.

CHANGE #2. The Summarize menu (that was under Statistics) has been renamed Descriptive Statistics.

CHANGE #3. The submenus under the General Linear Model command have been renamed. GLM - General Factorial has been renamed Univariate. GLM - Multivariate has been renamed simply Multivariate. Finally, GLM - Repeated Measures has been renamed simply Repeated Measures.



Note: If you are using Version 10.0, first read the material for Version 9.0 on this page. Then read the material for Version 10.0 on the inside back cover of this book.

Introduction

The SPSS statistical package is designed to perform a wide range of statistical procedures. Like any other powerful computer program, there are certain conventions and techniques that must be mastered in order to use the program efficiently and to obtain correct answers consistently. By providing detailed step-by-step guidance illustrated with worked-out examples, this book will help you achieve such mastery.

In addition to showing you how to enter data and obtain results, this book shows you how to select appropriate statistics and state the results in a form that is suitable for use in a research report in the social or behavioral sciences. For example, the section on the independent t test shows how to state (i.e., phrase) the results of both a significant and an insignificant test.

Audience

This book assumes only a basic understanding of statistics. Thus, it is ideal as a supplement to a traditional introductory statistics textbook. It can also be used as a statistics refresher manual in a research methods course. Finally, students can use it as a desk reference guide in a variety of workplace settings after they graduate from college.

SPSS is an incredibly powerful program, and this text does not attempt to be a comprehensive user's manual. Instead, it targets the procedures normally covered in introductory courses in statistics and research methods.

Organization

The book is organized into eight chapters. The first two chapters deal with the basic mechanics of using the SPSS program. Each of the remaining chapters focuses on a particular class of statistics.

Each chapter contains several short sections. For the most part, these sections are self-contained. However, it is expected that students will master the SPSS basics in Chapters 1 and 2 before attempting to learn the skills in the rest of the book. Except for the skills in the first two chapters, the book can be used in a nonlinear manner. Thus, an instructor can assign the first two chapters early in a course, and then assign other sections in whatever order is appropriate.

Appendix A contains a "decision tree" that helps in the selection of appropriate inferential statistics for various research designs. Appendix B contains data sets that are needed for the Practice Exercises that are interspersed throughout this book. The glossary in Appendix C provides definitions of most of the statistical terms used in this book. Because it is assumed that it is being used in conjunction with a main statistics textbook, the glossary definitions are brief and designed to serve only as reminders. Finally, Appendix D provides the sample data files that are used throughout this book.

SPSS Versions

There are numerous variations and versions of the SPSS statistical package. This guide was written for use with the 8.0 version of SPSS for Windows. It can work easily with earlier versions, especially Versions 7.0 and 7.5. However, there are substantial

differences in how the output appears between Version 6.1 and later versions. These differences are noted in this book.

The menu bars shown in the illustrations are ones that appear when the Base, Professional, and Advanced modules (the most common modules) of the program have been installed. If your menu bars look different or if you cannot locate a menu item for a command presented in this book, it may be that your institution supports different modules. For instance, some colleges use only the Base module, but the Reliability procedure is available only with the Professional module and the repeated measures ANOVA procedure is available only with the Advanced module. Check with your instructor for additional guidance.

Some institutions purchase site licenses from SPSS to make the software available free of charge to their faculty and, sometimes, their students. If your institution has not purchased a site license, you should still be able to purchase the student version of the software in your campus bookstore at a discounted price for the educational community. Either of these will be a fully functional version of the software intended for your personal use.

Conventions

The following conventions have been used throughout this book.

- Items presented in **bold** are defined or explained in the Glossary in Appendix C.
- Items in *italics* are either buttons or menus from the SPSS program or statistical symbols.
- Items in ALL CAPITAL LETTERS are either acronyms or the names of variables in the SPSS data file.

Practice Exercises

Practice exercises are included for each skill presented. In addition, the skills acquired in this text can be used in doing the practice exercises in other statistics texts or workbooks. One text that would work well in this capacity is *Real Data: A Statistics Workbook*.¹

Acknowledgments

This book is dedicated to the students in my Behavioral Statistics and Measurements, Research Methods, and Intermediate Statistics courses. While teaching those courses, I became aware of the need for an SPSS manual that did more than simply tell students how to start the program and enter data. I am deeply indebted to Wendy Schweigert at Bradley University, who first showed me the power, simplicity, and usefulness of statistics. This book was field tested in Sally Radmacher's Behavioral Statistics and Measurements course at Missouri Western State College and Wendy Schweigert's course at Bradley University. Jose L. Galvan of California State University, Los Angeles, provided support and helpful suggestions throughout the process. Of course, this text would not have been possible without the support of my wife and family.

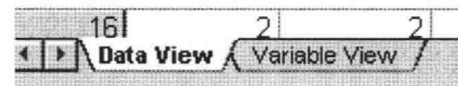
¹ Holcomb, Z. (1997). *Real Data: A Statistics Workbook*. Los Angeles: Pyrczak Publishing.

Addendum for Version 10.0

This book was originally written for use with Version 8.0 of SPSS. Since then, Versions 9.0 and 10.0 have been released. If you are using Version 10.0, first read the addendum on the inside front cover of this book, which applies to Versions 9.0 and 10.0.

Version 10.0 has a number of new features. However, most of the changes do not affect the accuracy of this textbook. The purpose of this addendum material is to describe those changes that are relevant to this textbook so that users of Version 10.0 can use the *How to Use SPSS* text. **Note:** All the changes listed for Version 9.0 (on the inside front cover of this book) continue to apply to Version 10.0.

The biggest difference between Version 10.0 and previous versions is the new data editor. There are two primary ways that this change affects users of this text:



CHANGE #1. The data window has been changed so that there is a *Data View* and a *Variable View* available. The *Data View* is the same as previous versions. However, the *Variable View* provides an easier way to examine how your variables are defined.

CHANGE #2. Variables must now be defined using the *Variable View* screen. Instead of a dialog box for each variable, a single matrix represents all variables in the file. To make a change, click in the appropriate area. In addition, *Define Variable* is no longer available on the *Data* menu, and the *Variable View* window must be used to define new variables.

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	id	Numeric	8	0		None	None	8	Right	Ordinal
2	day	Numeric	8	2	Day of Class	{1.00, Mon/We	None	8	Right	Ordinal
3	time	Numeric	8	2	Time of Class	{1.00, Morning}	None	8	Right	Ordinal
4	morning	Numeric	8	2	Are you a mor	{00, No}...	None	8	Right	Ordinal
5	grade	Numeric	8	2		None	None	8	Right	Scale
6	work	Numeric	8	2	Do You Work	{00, No}...	None	8	Right	Ordinal
7	training	Numeric	8	2	receive special	{00, No}...	None	8	Right	Ordinal

To define the variable type, labels, value labels, etc., the user now enters the value directly in the matrix.

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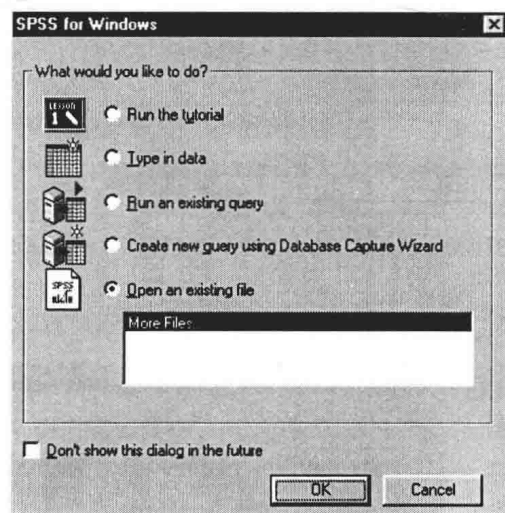
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Chapter 1

Getting Started

Section 1.1 Starting SPSS

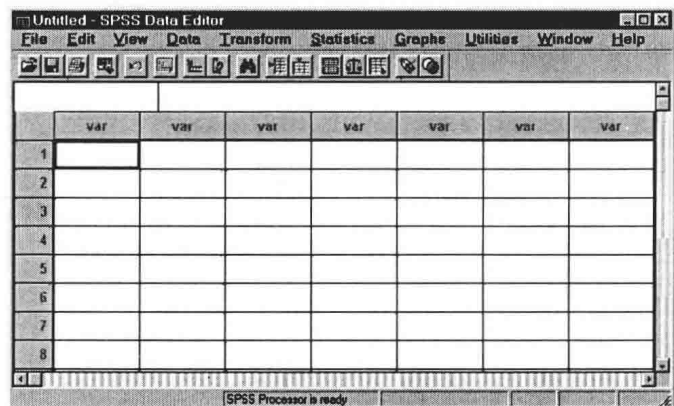
Starting SPSS will differ slightly depending on the exact configuration of the machine on which it is installed. On most Windows 95 and Windows 98 computers, you can start SPSS by first clicking on *Start*, then clicking on *Programs*, then on *SPSS*. On many installations, there will be an *SPSS* icon on the desktop that you can double-click to start the program.



When SPSS is started, you may be presented with the dialog box to the left, depending on the options your system administrator selected for your version of the program. If you have the box, click *Type in data* and *OK*, which will present a blank **data window**.¹

If you were not presented with the dialog box to the left, SPSS should open automatically with a blank data window.

The data window and the **output window** provide the basic interface for SPSS. A blank data window is shown below.



Section 1.2 Entering Data

One of the keys to success with SPSS is knowing how it stores and uses your data. To illustrate the basics of data entry with SPSS, we will use example 1.2.1.

Example 1.2.1

A survey was given to several students in four different classes (Tues/Thurs mornings, Tues/Thurs afternoons, Mon/Wed/Fri mornings, Mon/Wed/Fri afternoons). The students were asked whether or not they were “morning people” and whether or not they worked. This survey also asked their final grade in the class (out of 100). The response sheets from two students are presented as follows:

¹ Items that can be looked up in the glossary are presented in **bold**.

Response Sheet 1

ID: 4593
 Day of class: MWF X TR
 Class time: Morning X Afternoon
 Are you a morning person? Yes X No
 Final grade in class: 85%
 Do you work outside of school? Full-time Part-time
 X No

Response Sheet 2

ID: 1901
 Day of class: X MWF TR
 Class time: X Morning Afternoon
 Are you a morning person? X Yes No
 Final grade in class: 83%
 Do you work outside of school? Full-time X Part-time
 No

Our goal is to enter the data from the two students into SPSS for use in future analyses. The first step is to determine the variables that need to be entered. Any information that can vary among participants is a variable that needs to be considered. Example 1.2.2 lists the variables we will use.

Example 1.2.2

ID#
 Day of class
 Time of class
 Morning person
 Final grade
 Whether or not the student works outside of school

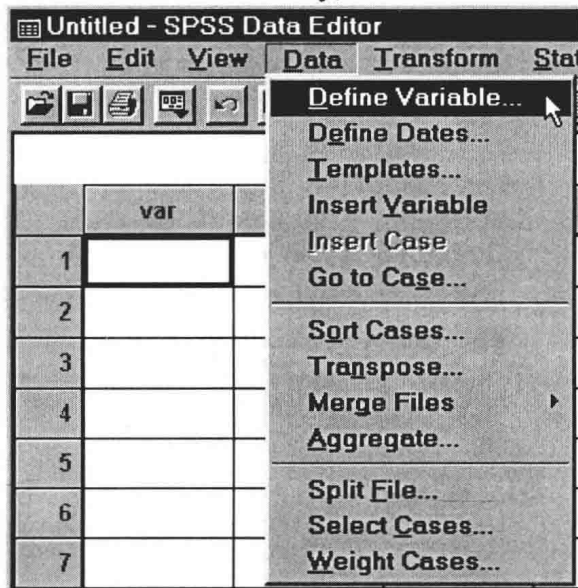
In the SPSS data window, columns represent variables and rows represent subjects. Therefore, we will be creating a data file with six columns (variables) and two rows (students/participants).

Section 1.3 Defining Variables

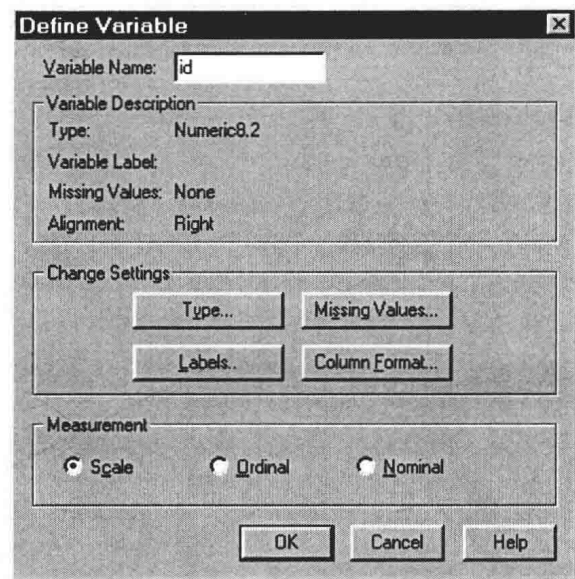
Before we can enter any data, we must first enter into SPSS some basic information about each variable. For instance, each variable must first be given a name that:

- begins with a letter;
- does not contain a space; and
- is eight characters or fewer in length.

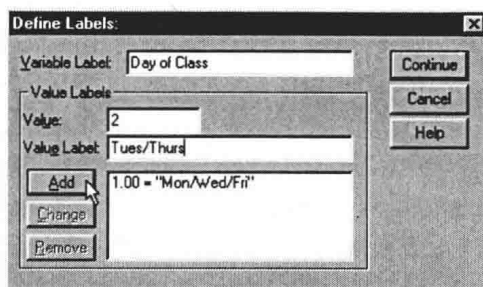
Thus, the variable name “Q7” would be acceptable, while the variable name “7Q” would not be. Similarly, the variable name “PRE_TEST” is acceptable, but the variable name “PRE TEST” is not. Capitalization does not matter, but variable names are capitalized in this text to make it clear when we are referring to a variable name.



To define a variable, click on *Data* then click on *Define Variable*. This will bring up the Define Variable dialog box shown below. Enter the variable name in the blank near the top (“id” in the example).



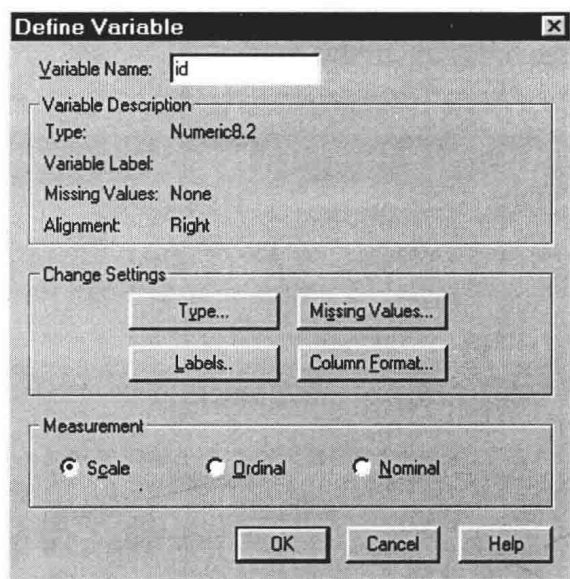
From the Define Variable dialog box, SPSS allows you to enter variable labels by clicking on the *Labels* button. Variable labels allow you to associate a description with each variable. These descriptions can describe the variables themselves or the values of the variables. For most procedures, SPSS requires numerical values. Thus, for data such as the day of the class (e.g., Mon/Wed/Fri and Tues/Thurs) we need to first code the values as numbers. For example, we can assign the number 1 to Mon/Wed/Fri and the number 2 to Tues/Thurs. To help us keep track of the numbers we have assigned to the values, we can click on the *Value Label* command.



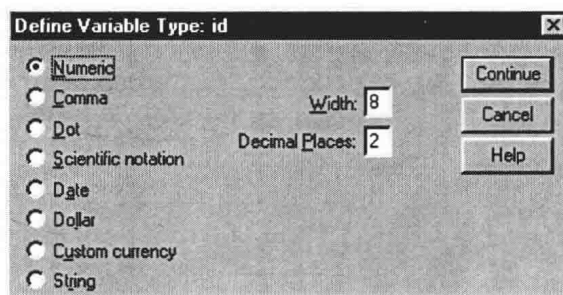
When you enter a value label, you must click *Add* after each entry. That will move the associated value and label into the bottom section of the window. When all labels have been added, click on *Continue* to return to the Define Variable window.

New with version 8.0 is the ability to indicate the measurement scale on which the variable is measured. You can select Nominal, Ordinal, or Scale. In SPSS, a scale variable is an interval or ratio-scaled variable. You need to select the appropriate measurement scale in the *Measurement* section of the define variable dialog box. Note that this feature applies only to some chart functions.

In addition to naming and labeling the variable, you have the option of defining the variable type. To do so, simply click on the *Type* button (see dialog box to the left). This will bring up the Define Variable Type dialog box shown below. Using this dialog box you



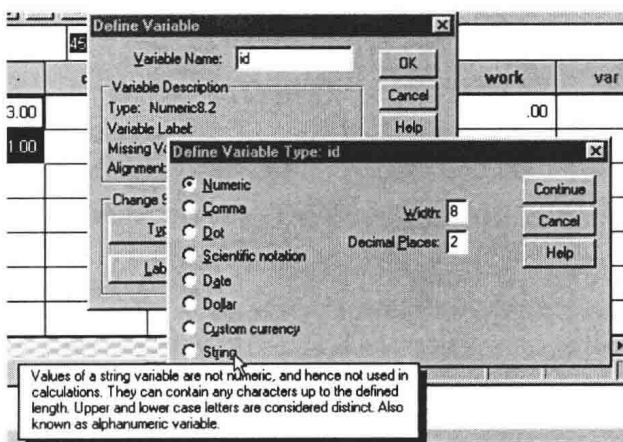
can tell SPSS what kind of data you will be entering. The default value is a numeric field that is eight digits wide with two decimal places displayed. If your data are more than eight digits to the left of the decimal place, they will be displayed in scientific notation (e.g., the number 2,000,000,000 will be displayed as 2.00E+09). SPSS maintains accuracy beyond two decimal places, but all output will be rounded to two decimal places unless otherwise indicated in the *Decimal Places* blank.



SPSS accepts a variety of data types.

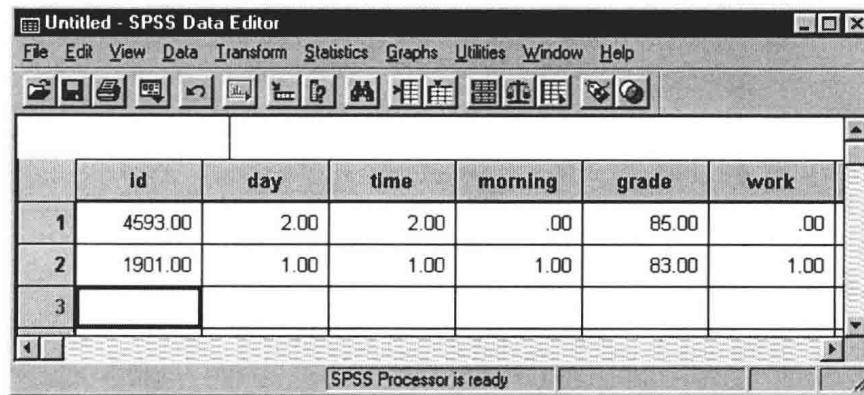
To learn more about each variable type, you can right-click (click the right mouse button) with the pointer over the variable type. This general procedure (right-clicking over part of the active window) works to get help with most SPSS functions and screens.

In our example, we will be using numeric variables, so you should now click *Continue*.



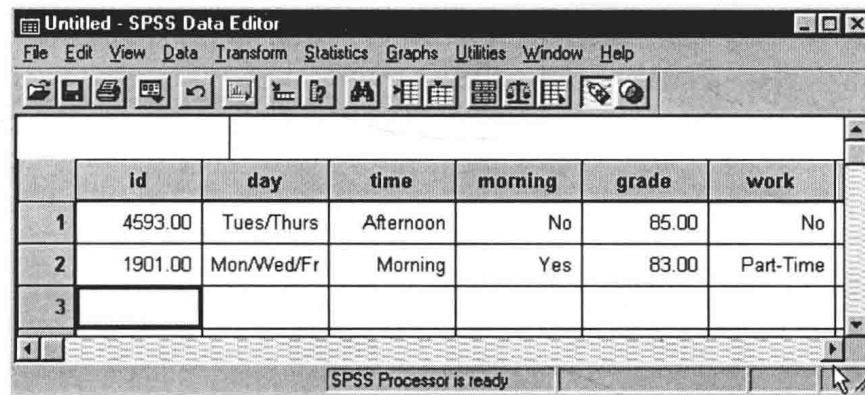
Practice Exercise

Create a data file for the two sample students and six variables presented in Example 1.2.1 above. Name your variables: ID, DAY, TIME, MORNING, GRADE, and WORK. You should code DAY as 1 = Mon/Wed/Fri, 2 = Tues/Thurs. Code TIME as 1 = morning, 2 = afternoon. Code MORNING as 0 = No, 1 = Yes. Code WORK as 0 = No, 1 = Part-Time, 2 = Full-Time. Be sure you enter variable labels for your different values.

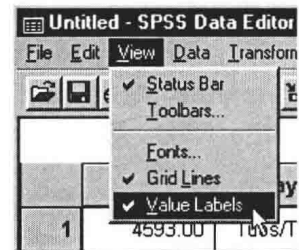


Be sure you enter the correct measurement scale type for each.

When done, you should have a data window that looks something like the window on the upper left. Notice that SPSS puts the variable names as column labels, and the cells contain the data as entered. This same Data Window can be changed to look something like the lower window to the left instead. Note that in this case the data cells display the variable labels that correspond to each value entered.



The two windows above represent two views of the same data. To toggle between the two views, you can click *Value Labels* under the *View* menu. You can also click the *Value Labels* icon on the toolbar (second from right in the windows above).



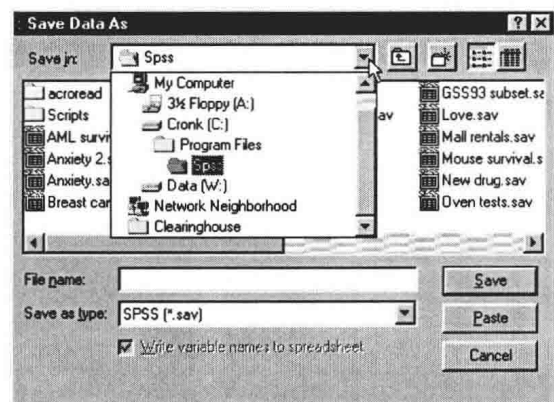
Section 1.4 Loading and Saving Data Files

Once you have entered your data, you will need to save it for later use, so that you can retrieve it when needed.

Loading and saving SPSS data files works in the same way as most Windows-based software. Under the *FILE* menu, there are *OPEN* and *SAVE* commands. SPSS data files have a *.SAV* extension (the extension is the last three letters of the file name; this tells Windows that it is an SPSS data file).

Save Your Data

When you save your data file (by clicking *File* then clicking *Save*, or by clicking on the disk icon), pay special attention to where you save it. Most systems default to the location *<c:\program files\spss>*. You will probably want to save your data on a floppy so that you can take the file with you, in which case you would select the location *<a:>*.



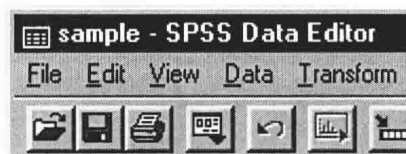
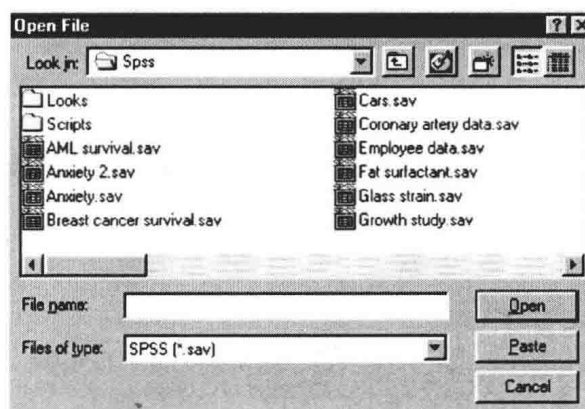
Load Your Data

When you load your data (by clicking *File* then clicking *Open*, or by clicking the open file folder icon), you get a similar window. This window lists all files with the .SAV extension. If you have trouble locating your saved file, make sure you are looking in the right directory.

Practice Exercise

To be sure that you have mastered saving and opening data files, name your sample data file “sample” and save it on a floppy disk. Once saved, SPSS will display the name of the file at the top of the data window.

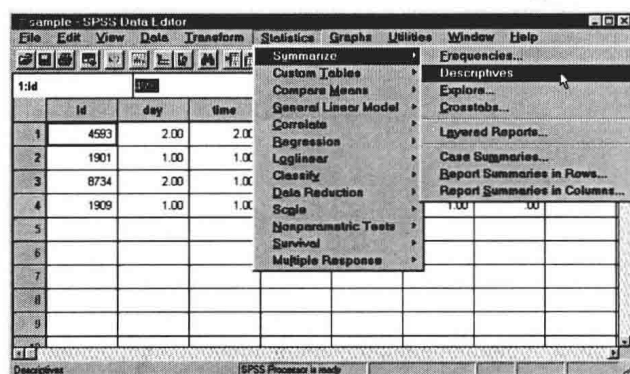
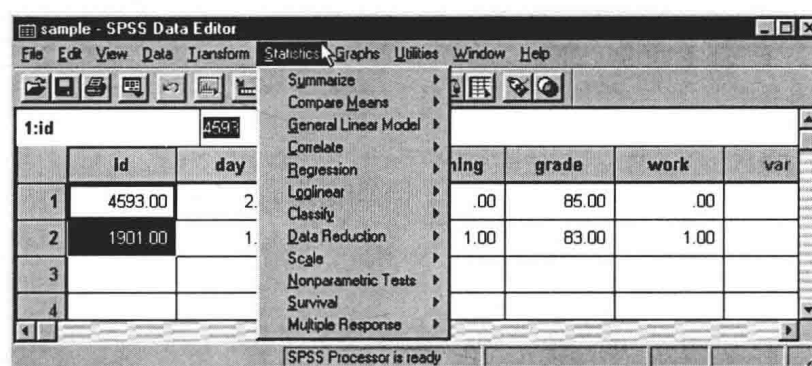
After you have saved your data, exit SPSS (by clicking on *File* then on *Exit*). Restart SPSS and load your data.



Section 1.5 Running Your First Analysis

Any time you open a data window, you can run any of the analyses available. To get started, let's calculate the students' average grade. (With only two students, you can easily check your answer by hand, but imagine a data file with 10,000 student records.)

The majority of the available statistical tests are under the *Statistics* menu. This menu displays all the options available for your version of the SPSS program. Other versions may have slightly different sets of options.



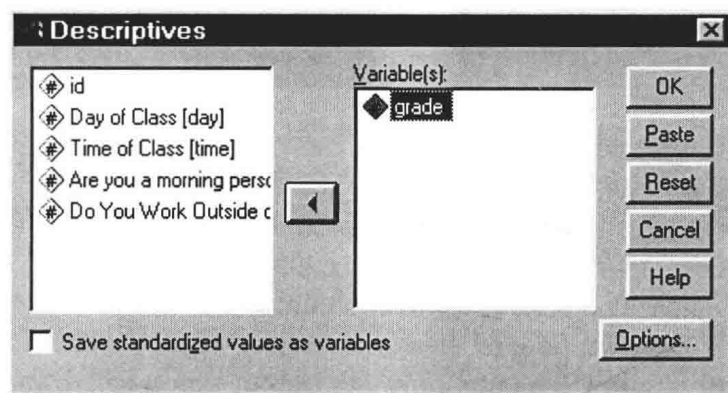
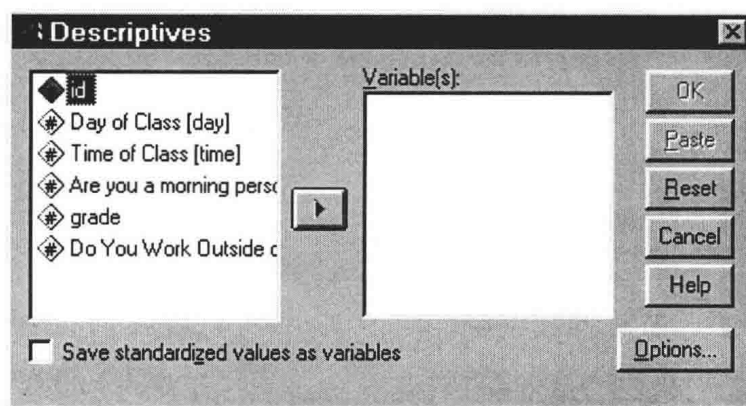
the right is an area labeled *Variables* where we can select the variables we would like to use in the analysis.

To calculate a **mean** (average) we are asking the computer to summarize our data set. Therefore, the command is run by clicking *Statistics*, then *Summarize*, then *Descriptives*.

This brings up the Descriptives dialog box shown on the next page. Note that the left side of the box contains a list of all of the variables in our data file. On

In version 8.0, the Descriptives dialog box lists the variable labels (and names), along with an icon indicating the variable type. Earlier versions list just the variable names.

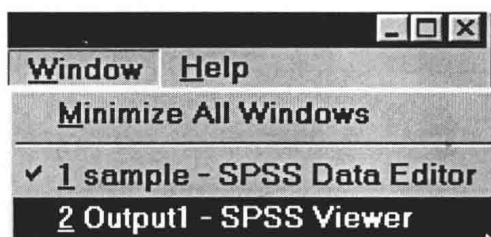
We want to compute the **mean** for the variable called **GRADE**. Thus, we need to select the variable name in the left window (by clicking on it). To transfer it to the right window, click on the arrow between the two windows. Note that double-clicking on the variable name will also transfer the variable to the right window, and this arrow can be used to transfer variables in either directions.



When we click on the **OK** button, the analysis will be conducted, and we will be ready to examine our output.

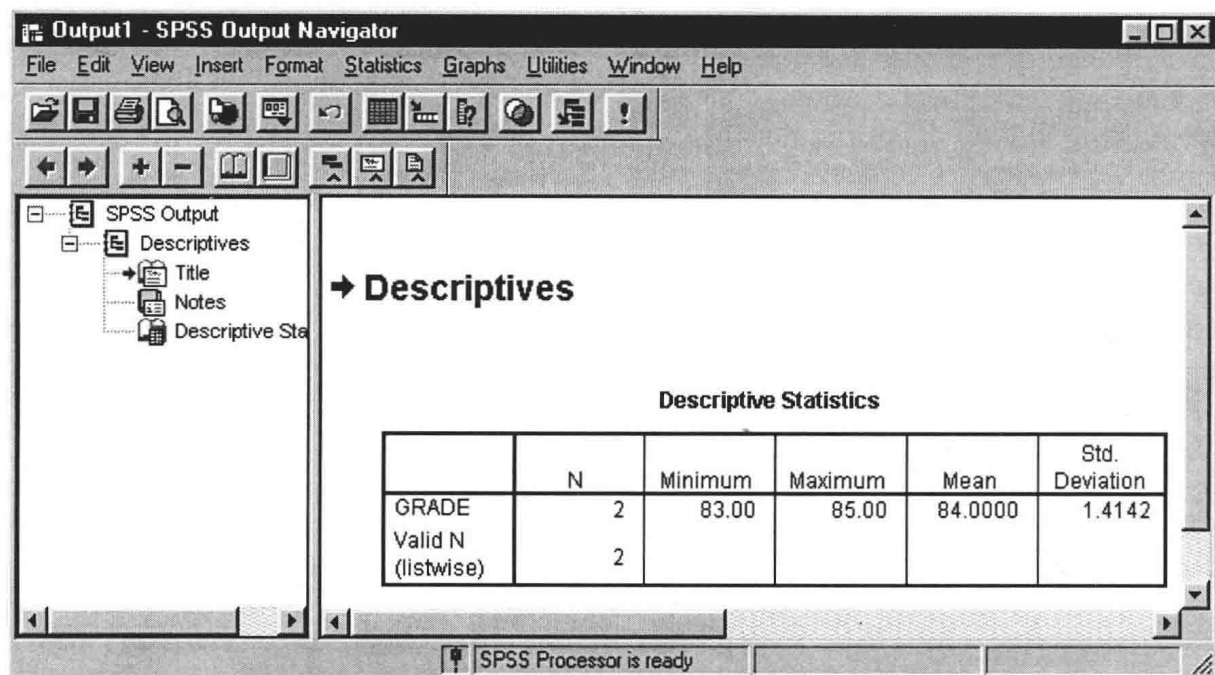
Section 1.6 Examining and Printing Output Files

After performing an analysis, your output is placed in the **output window**, and the output window becomes the active window. If this is the first analysis you have conducted since starting SPSS, then a new output window will be created. If you have run previous analyses and saved them, your output is added to the end of your previous output.



To switch back and forth between the data window and the output window, select the appropriate window using the **Window** menu bar.

The output window is split into two sections. The left section is an outline of the output (SPSS refers to this as the outline view). The right section is the output itself.



The section on the left of the output window provides an outline of the entire output window. All of the analyses are listed in the order in which they were conducted. Note that this outline can be used to quickly locate a section of the output. Simply click on the section you would like to see, and the right window will jump to the appropriate place.

Clicking on a statistical procedure also selects all of the output for that command. By pressing the *delete* key, that output can be deleted from the output window. This is a quick way to be sure that your output window contains only the output you want. Output can also be selected and pasted into a word processor by clicking *Edit* then *Copy* to copy the output. You can then switch to your word processor and click *Edit* then *Paste*.

To print your output, simply click *File* then *Print* or click on the printer icon on the toolbar. You will have the option of printing all of your output, or just the currently selected section. Be careful when printing! Each time you run a command, the output is added to the end of your previous output. Thus, you could be printing a very large output file containing information you may not want or need.

One way to ensure that your output window contains only the results of the current command is to create a new output window just before running the command. To do this, click *File* then *New* then *Output*. All your subsequent commands will go into your new output window.

Practice Exercise

Load the sample data file you created earlier (SAMPLE.SAV). Run the *Descriptives* command for the variable *GRADE* and print out the output. Your output should look like the example above. Next, select the data window and print it.