APPENDIX A

SPSS in Less Than 30 Minutes

This appendix will teach you enough about SPSS to complete the exercises in *Statistics for People Who (Think They) Hate Statistics*. Learning SPSS is not rocket science—just take your time, work as slowly as you need to, and ask a fellow student or your instructor for help if necessary.

You are probably familiar with other Windows applications, and you will find that many SPSS features operate exactly the same. We assume you know about dragging, clicking, double-clicking, and working with Windows. If you do not, you can refer to one of the many popular trade computer books for help. SPSS works with Microsoft Windows versions 98, XP, 2000, and Me. It will not work with any earlier versions of Windows. The people at SPSS have yet to certify it with Vista so it's unofficial. But guess what? Use it—it works. SPSS 15 takes advantage of Windows's special architecture as well as other features, such as shortcuts, right-clicking, and multitasking.

This appendix is an introduction to SPSS (Version 15.x) and shows you just some of the things it can do. Almost all of the information in this appendix also can be applied to earlier versions of SPSS, from version 11 through the current version, 15.

Throughout the examples in this appendix, we will use the sample data set shown in Appendix C named Sample Data. You are welcome to enter that data manually or download it from the Sage Web site at http://www.sagepub.com/salkindstudy or the author's Web site at http://soe.ku.edu/faculty/Salkind/stats_fpwhs3e/.

STARTING SPSS

Like other Windows-based applications, SPSS is organized as a group and is available on the Start menu. This group was created when you first installed SPSS. To start SPSS, follow these steps:

1. Click Start, then point to Programs.

2. Click the SPSS icon. When you do this, you will see the SPSS opening screen as shown in Figure A.1. You should note that some computers are set up differently, and your SPSS icon might be located on the desktop. In that case, to open SPSS, just double-click on the icon.
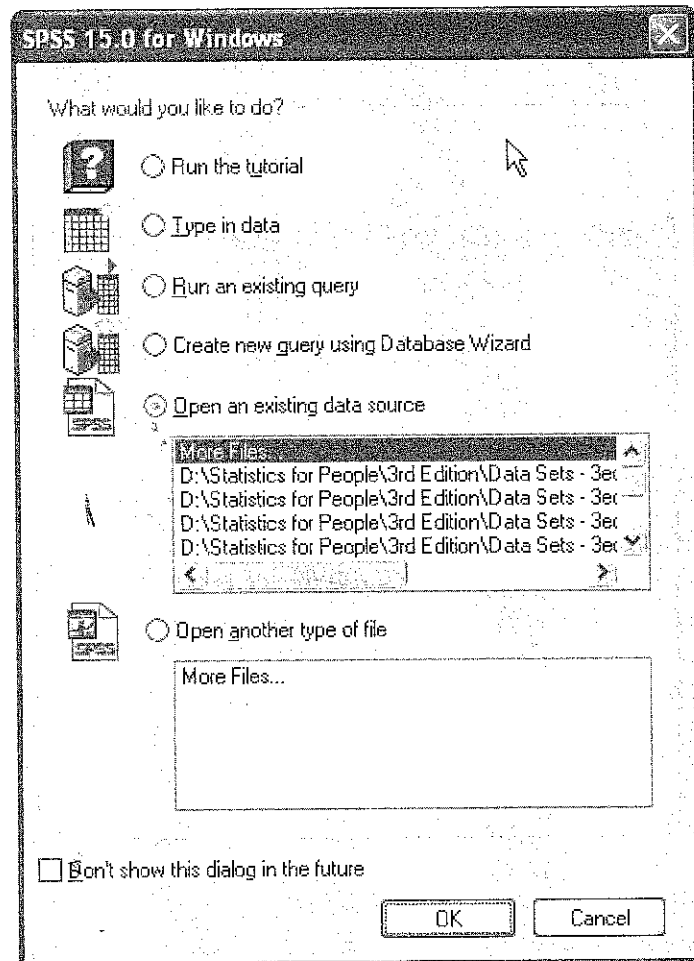
Figure A.1 The Opening SPSS Screen

The SPSS Opening Window

As you can see in Figure A.1, the opening window presents a series of options that allows you to select from running the SPSS tutorial, entering data, posing an established query, creating a new query using the Database Wizard, or opening an existing source of data (an existing file). Should you not want to see this screen each time you open SPSS, then click on the Don't show this dialog in the future box in the lower left corner of the window.

For our purposes, we will click the Type in data option and click OK because it is likely to be the one you first select upon opening and learning SPSS. Once you do this, the Data View window (also called the Data Editor) you see in Figure A.2 becomes active. This is where you enter data you want to use with SPSS once those data have been defined. Although you cannot see it when SPSS first opens, there is another open (but not active) window as well. This is the Variable View, where variables are defined and the parameters for those variables are set.
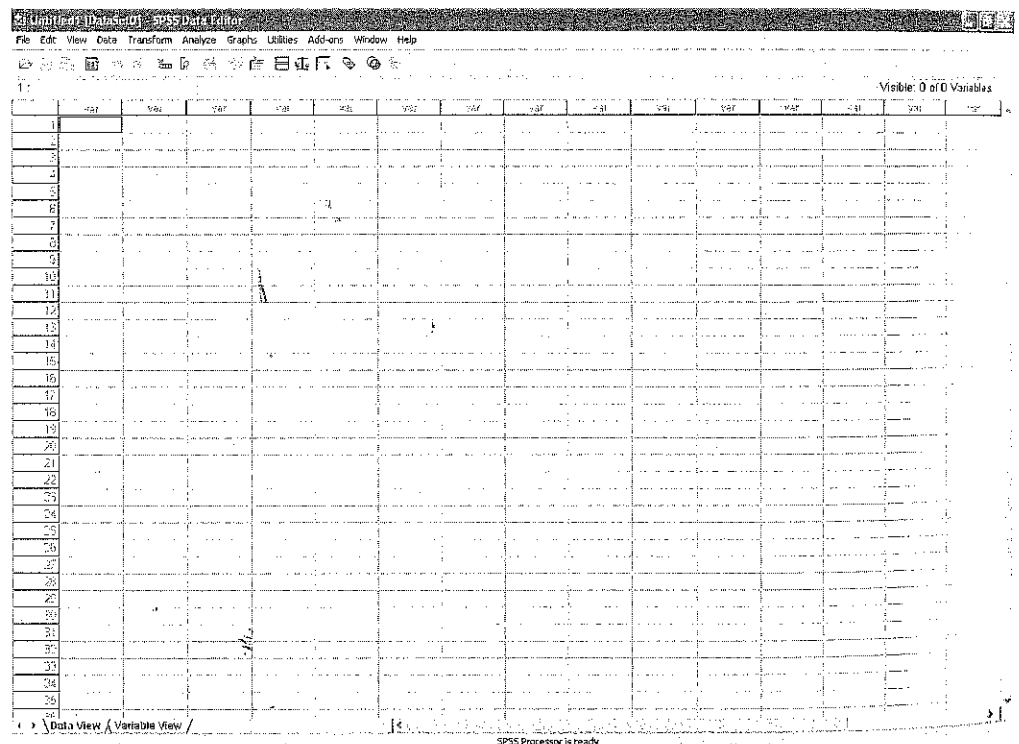

Figure A.2   The Data View Window

The Viewer displays statistical results and charts that you create. An example of the Viewer window is shown in Figure A.3. A data set is created using the Data Editor, and once the set is analyzed or graphed, you examine the results of the analysis in the Viewer.

If you think the Data Editor is similar to a spreadsheet in form and function, you are right. In form, it certainly is, because the Data Editor consists of rows and columns just like in Excel and Lotus 1-2-3. Values can be entered and then manipulated. In function as well, the Data Editor is much like a spreadsheet. Values that are entered can be transformed, sorted, rearranged, and more.
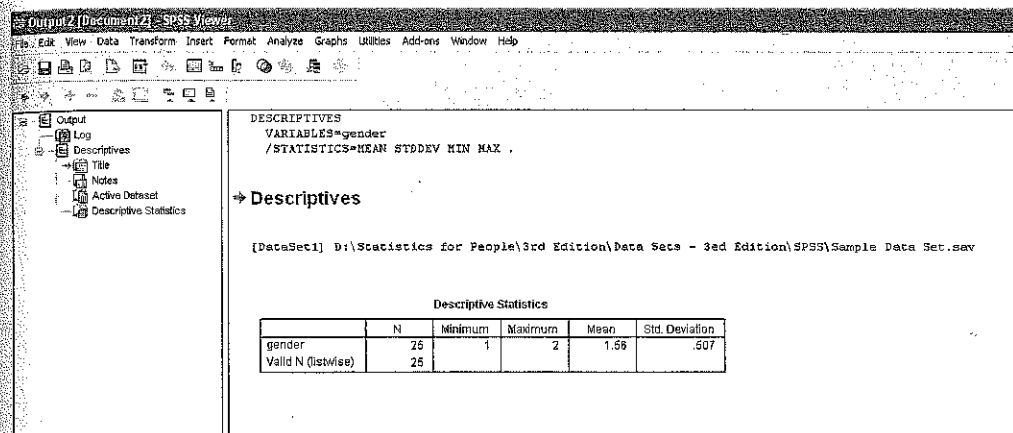

Figure A.3   The Viewer

THE SPSS TOOLBAR AND STATUS BAR

The use of the Toolbar, the set of icons that is underneath the menus, can greatly facilitate your SPSS activities. If you want to know what an icon on the Toolbar does, just place the mouse pointer on it, and you will see a tip telling you what the tool does. Some of the buttons on the Toolbar are dimmed, meaning they are not active.

The Status Bar, located at the bottom of the SPSS window, is another useful on-screen tool. Here, you can see a one-line report regarding in which activity SPSS is currently involved. The message *SPSS for Windows processor is ready* tells you that SPSS is ready for your directions or input of data. Or, *Running Means . . .* tells you that SPSS is in the middle of the procedure named Means.

USING SPSS HELP

If you need help, you have come to the right place. SPSS offers help that is only a few mouse clicks away, and it is especially useful when you are in the middle of a data file and need information about an SPSS feature. SPSS Help is so comprehensive that even if you are a new SPSS user, it can show you the way.

You can get help in SPSS by pressing the F1 function key (see Figure A.2) or using the Help menu you see in Figure A.4.
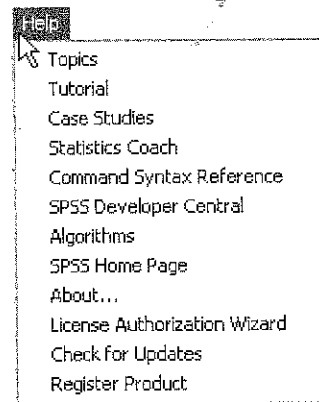

Figure A.4   The Various Help Options

There are 10 options on the Help menu, greatly expanded from earlier versions of SPSS, and 6 are directly relevant to helping you.

- Topics gives you a list of topics for which you can get help.
- Tutorial offers you a short tutorial on all aspects of using SPSS.
- Case Studies gives you real live examples of how SPSS can be applied.
- Statistics Coach walks you through procedures step by step.
- Command Syntax Reference helps you to learn and use SPSS's programming language.
- SPSS Home Page takes you to the home page for SPSS on the Internet.
- About . . . gives you some technical information about SPSS, including the current version on which you are working.
- License Authorization Wizard provides you with the tool to authorize a license.
- Register Product allows you to register your SPSS product(s).
- Check for Updates automatically connects to the SPSS mother ship to check if there are any updates you should be aware of.

Using the F1 Function Key

Any time you need help on any feature of SPSS, there is a quick and easy way to get it. Press the F1 function key while you are working, and you will see the Help dialog box shown in Figure A.5.
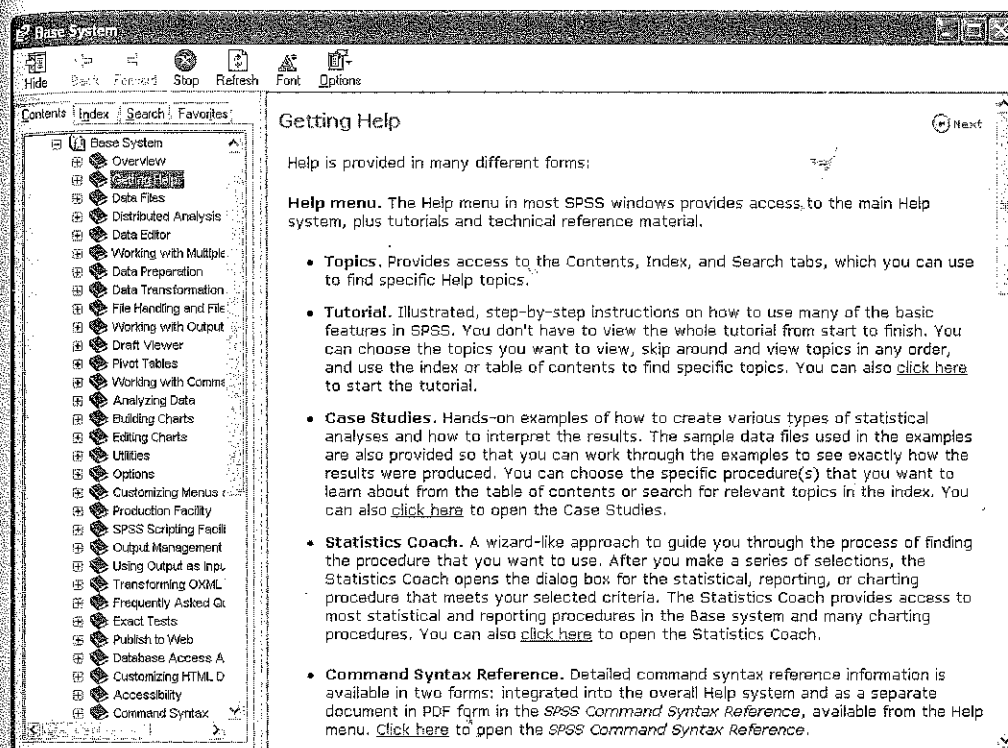

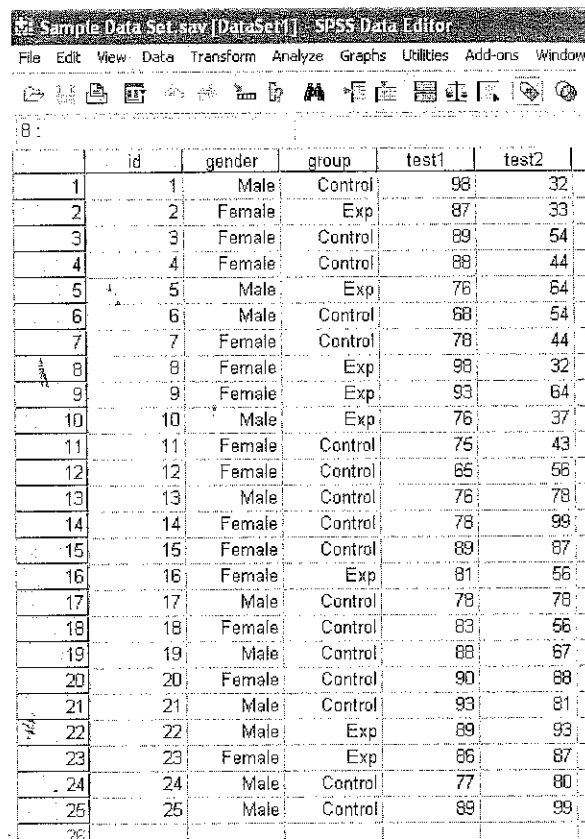**Figure A.5** SPSS Help

The Contents Tab

The Contents Tab describes the major headings for help. Double-clicking on any one heading provides a list of possible topics that you might want to consult for the help you need. The Index tab in SPSS Help provides an alphabetical listing of help topics. The Search Tab allows you to enter any words that may be part of a help screen. SPSS then searches for the word, rather than just presenting help on a topic. In effect, you are searching all the words in all the topics. Finally, Favorites on the help menu lets you segregate those topics you think you might have to go back to for more help. It's a way of saving your favorite help topics so you can quickly locate them again.

A BRIEF TOUR OF SPSS

Now, sit back and enjoy a brief tour of what SPSS can do. Nothing fancy here. Just some simple descriptions of data, a test of significance, and a graph or two. What we are trying to show you is how easy it is to use SPSS.

Opening a File

You can enter your own data to create a new SPSS data file, use an existing file, or even import data from such applications as Microsoft Excel into SPSS. Any way you do it, you need to have data to work with. In Figure A.6, the data contained in Appendix C are shown, called Sample Data, and they are also available on the Internet site.

id	gender	group	test1	test2
1	Male	Control	98	32
2	Female	Exp	87	33
3	Female	Control	89	54
4	Female	Control	88	44
5	Male	Exp	76	64
6	Male	Control	68	54
7	Female	Control	78	44
8	Female	Exp	98	32
9	Female	Exp	93	64
10	Male	Exp	76	37
11	Female	Control	75	43
12	Female	Control	65	56
13	Male	Control	76	78
14	Female	Control	78	99
15	Female	Control	89	87
16	Female	Exp	81	56
17	Male	Control	78	78
18	Female	Control	83	56
19	Male	Control	88	67
20	Female	Control	90	88
21	Male	Control	93	81
22	Male	Exp	89	93
23	Female	Exp	66	87
24	Male	Control	77	80
25	Male	Control	89	99

Figure A.6   An Open SPSS File

A Simple Table and Graph

Now it is time to get to the reason why we are using SPSS in the first place—the various analytical tools that are available.

First, let's say we want to know the general distribution of males and females. That is all, just a count of how many males and how many females are in the total sample we are working with. We also want to create a simple bar graph of the distribution.

In Figure A.7, you will see the output that provides exactly the information we asked for, which was the frequency of the number of males and females. We used the Frequencies option on the Descriptive Statistics (under the main menu Analyze) to compute these values. Then, we used the Graphs option to create a simple bar graph of the frequency, as you can also see in Figure A.7.
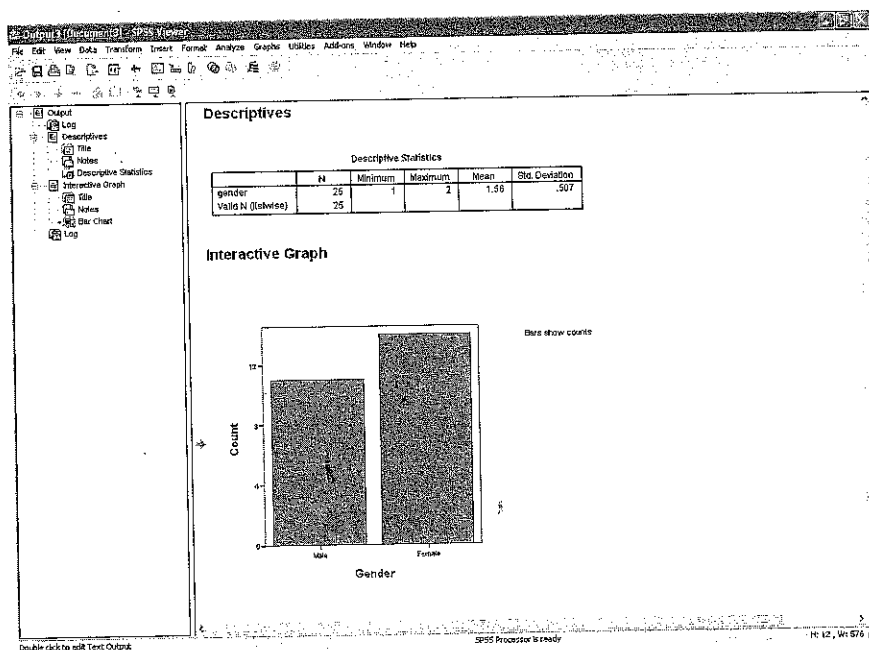

Figure A.7 The Results of a Simple Descriptive Analysis

A Simple Analysis

Let's see if males and females differ in their average test1 scores. This is a simple analysis requiring a t test for independent samples. The procedure is a comparison between males and females for the mean of test1 for each group.

In Figure A.8, you can see a partial summary of the results of the *t* test. Notice that the listing in the left pane (the outline view) of the SPSS Viewer now shows the Frequencies, Graph, and *t* test procedures listed. To see any part of the output, all we need do is click on that element. Almost always, when SPSS produces output in the Viewer, you will have to scroll to see the entire output.
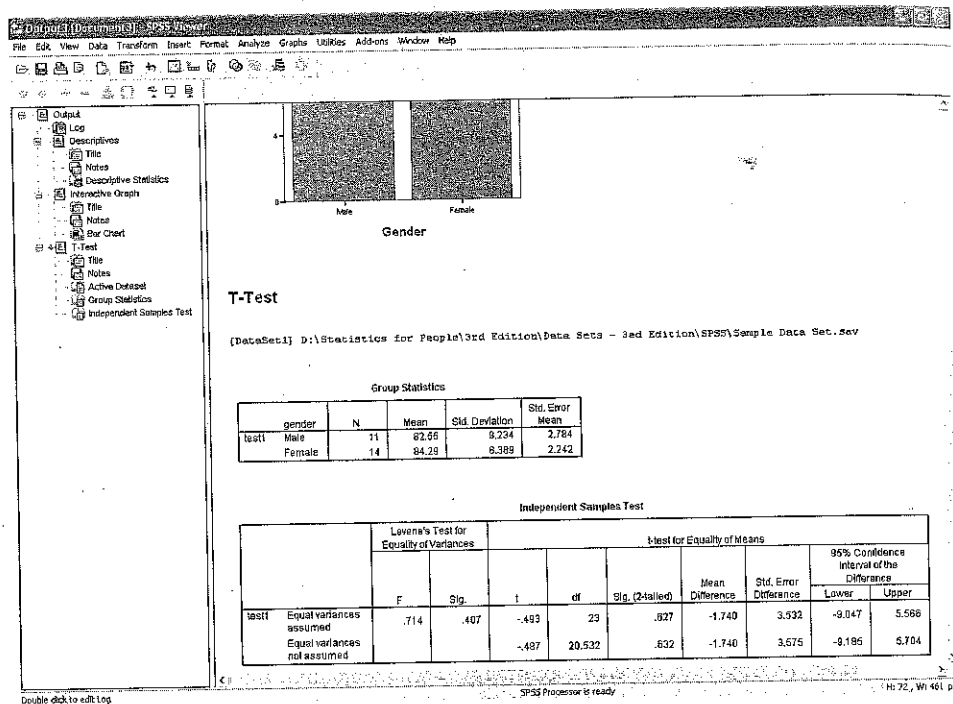

Figure A.8   The Results of an Independent Samples *t* Test

CREATING AND EDITING A DATA FILE

As a hands-on exercise, let's create the beginning of the sample data file you see in Appendix C. The first step is to define the variables in your data set and then to enter the data. You should have a new Data Editor window open (Click File → New → Data).
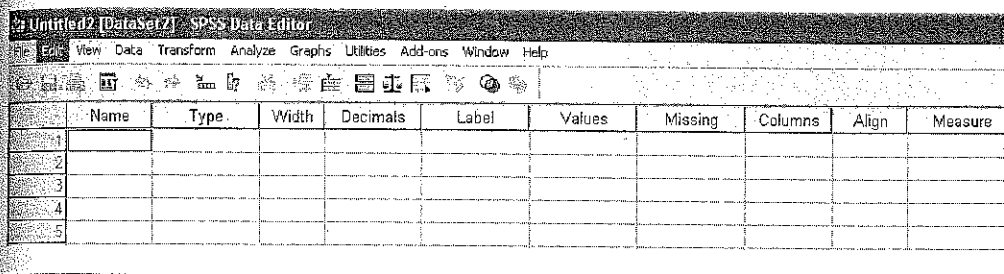
Defining Variables

SPSS cannot work unless variables are defined. You can have SPSS define the variables for you, or you can do the defining yourself, thereby having much more control over the way things

look and work. SPSS will automatically name the first variable VAR00001. If you defined a variable in row 1, column 5, then SPSS would name the variable VAR00005 and also number the other columns sequentially. But you can also define variables, assigning a name of your choice.

Custom Defining Variables: Using the Variable View Window

In order to define a variable, you must first go to the Variable View window by clicking the Variable View tab at the bottom of the SPSS screen. Once that is done, you will see the Variable View window, as shown in Figure A.9, and be able to define any one variable as you see fit.

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1										
2										
3										
4										
5										

Figure A.9   The Variable View Window

Once in the Variable View window, you can define variables along the following parameters:

Name provides a name for a variable up to eight characters.

Type defines the type of variable, such as text, numeric, string, scientific notation, and so on.

Width defines the number of characters wide that the column housing the variable will occupy.

Decimals defines the number of decimals that will appear in the Data View.

Label defines a label up to 256 characters for the variable.

Values defines the labels that correspond to certain numerical values (such as 1 for male and 2 for female).

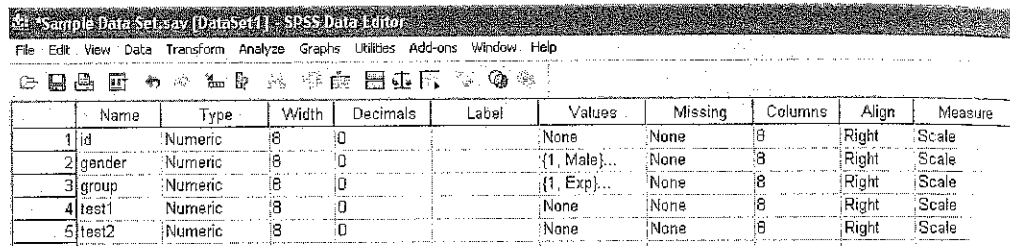Missing indicates how missing data will be dealt with.

Columns defines the number of spaces allocated for the variable in the Data View window.

Align defines how the data are to appear in the cell (right, left, or center aligned).

Measure defines the scale of measurement that best characterizes the variable (nominal, ordinal, or interval).

If you place the cursor in the first cell under the Name column, enter any name, and press the Enter key, then SPSS will automatically provide you with the default values for all the variable characteristics. Even if you are not in the Data View screen (click the tab on the bottom of the window), SPSS will automatically name the variables var0001, var0002, and so on.
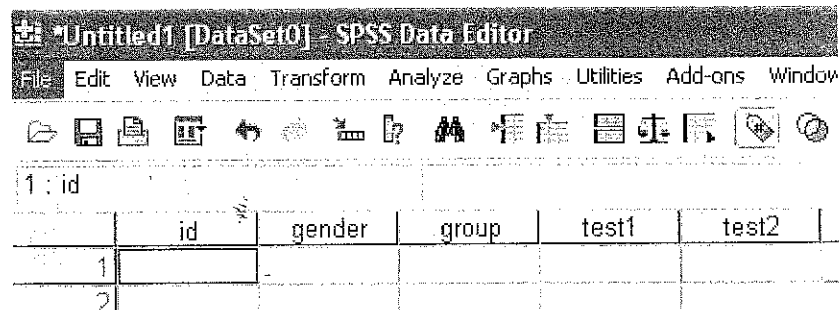
In the Variable View, enter the names of the variables as you see in Figure A.10.

Sample Data Set.sav [DataSet1] - SPSS Data Editor

File   Edit   View   Data   Transform   Analyze   Graphs   Utilities   Add-ons   Window   Help

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	id	Numeric	8	0		None	None	8	Right	Scale
2	gender	Numeric	8	0		{1, Male}...	None	8	Right	Scale
3	group	Numeric	8	0		{1, Exp}...	None	8	Right	Scale
4	test1	Numeric	8	0		None	None	8	Right	Scale
5	test2	Numeric	8	0		None	None	8	Right	Scale

Figure A.10   Defining Variables in the Variable View Window

Now, if you wanted, you could switch to the Data View (see Figure A.11) and just enter the data as you see in Figure A.6. But first, let's look at just one of the cool SPSS bells and whistles.

Untitled1 [DataSet0] - SPSS Data Editor

File   Edit   View   Data   Transform   Analyze   Graphs   Utilities   Add-ons   Window

1 : id

	id	gender	group	test1	test2	
1						
2						

Figure A.11   The Data View Window Ready to Have Data Entered With the Defined Variables

Defining Variable Labels

You can leave your data appearing as numerical values in the SPSS Data Editor, or you can have labels represent the numerical values (as you saw in Figure A.6).

Why would you want to change the label of a variable? You probably already know that, in general, it makes more sense to work with numbers (like 1 or 2) than with string or alphanumeric variables (such as male or female).

But it sure is a lot easier to look at a data file and see words rather than numbers. Just think about the difference between data files with numbers representing various levels (such as 1 and 2) of a variable and with the actual values (such as male and female). The Values option in the Variable View screen allows you to enter *values* in the cell, but what you will see are value *labels.*

If you click the ellipsis button in the Values column (see Figure A.12), you will see the Value dialog box, as shown in Figure A.13.

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	id	Numeric	8	2		None	None	8	Right	Scale
2	gender	Numeric	8	2		None	None	8	Right	Ordinal
3	group	Numeric	8	3		None	None	8	Right	Ordinal
4	test1	Numeric	8	2		None	None	8	Right	Ordinal
5	test2	Numeric	8	2		None	None	8	Right	Ordinal
6										

Figure A.12 The Values Column in the Variable View Screen
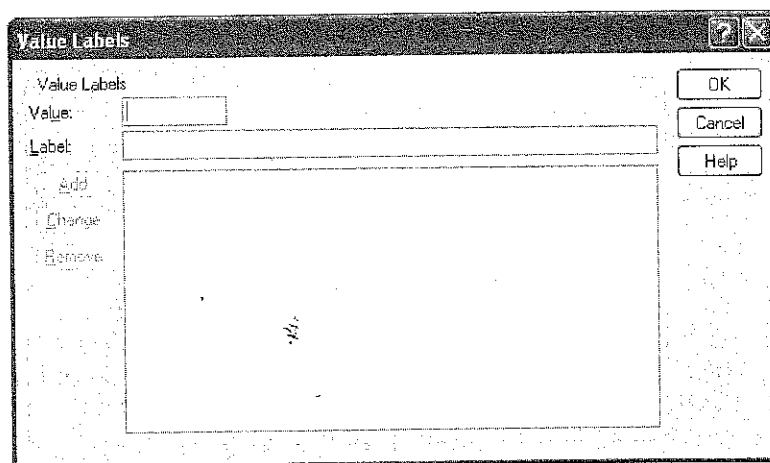
Figure A.13 The Value Labels Dialog Box

Changing Variable Labels

To assign or change a variable label, follow these steps. Here, we will label males as 1 and females as 2.

1. For the variable gender, click on the ellipsis (see Figure A.12) to open the Value Labels dialog box.

2. Enter a value for the variable, which, in this case, will be 1 for males.

3. Enter the value label for the value, which is male.

4. Click Add.

5. Do the same for female and value 2. When you finish your business in the Define Labels dialog box (see Figure A.14), click OK, and the new labels will take effect.
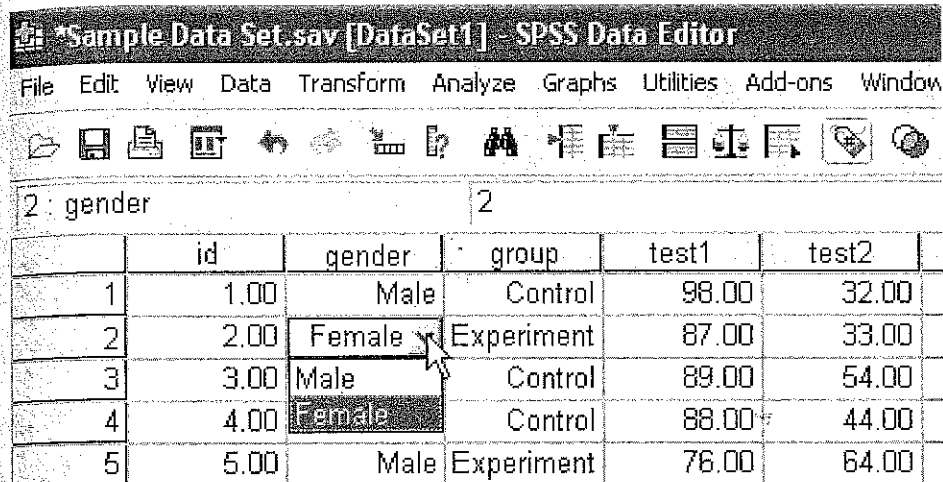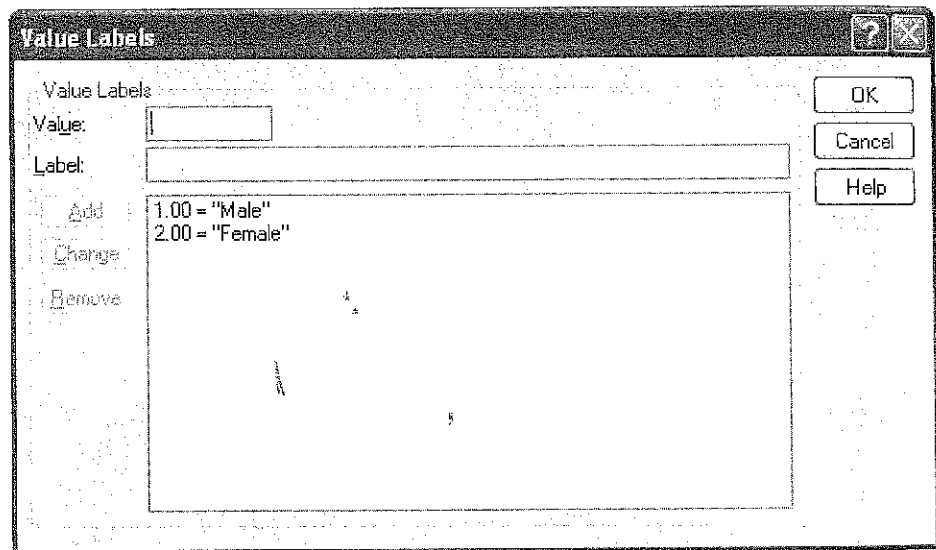

Figure A.14   The Completed Value Labels Dialog Box

When you select View → Variable Labels from the main menu, you will see the labels in the Data Editor as you do in Figure A.15. Notice how the value of the entry in Figure A.15 is actually 2, even though the label in the cell reads Female.

*Sample Data Set.sav [DataSet1] - SPSS Data Editor

File   Edit   View   Data   Transform   Analyze   Graphs   Utilities   Add-ons   Window

2 : gender   2

	id	gender	group	test1	test2	
1	1.00	Male	Control	98.00	32.00	
2	2.00	Female	Experiment	87.00	33.00	
3	3.00	Male	Control	89.00	54.00	
4	4.00	Female	Control	88.00	44.00	
5	5.00	Male	Experiment	76.00	64.00	

Figure A.15   Seeing Variable Labels

Opening a Data File

Once a file is saved, you have to open or retrieve it when you want to use it again. The steps are simple.

1. Click File → Open. You will see the Open Data File dialog box.

2. Find the data file you want to open, and highlight it.

3. Click OK.

A quick way to find and open an SPSS file is by clicking on its name at the bottom of the File menu. SPSS lists the most recently used files there.

PRINTING WITH SPSS

Here comes information on the last thing you will do once a data file is created. Once you have created the data file you want or completed any type of analysis or chart, you probably will want to print out a hard copy for safekeeping or for inclusion in a report or paper. Then, when your SPSS document is printed and you want to stop working, it is time to exit SPSS.

Printing is almost as important a process as editing and saving data files. If you cannot print, you have nothing to take away from your work session. You can export data from an SPSS file to another application, but getting a hard copy directly from SPSS is often more timely and more important.

Printing an SPSS Data File

It is simple to print either an entire data file or a selection from one.

1. Be sure that the data file you want to print is the active window.

2. Click File → Print. When you do this, you will see the Print dialog box.

3. Click OK, and whatever is active will print.

As you can see, you can choose to print the entire document or a specific selection (which you will have already made in the Data Editor window), and to increase the number of copies from 1 to 99 (the max number of copies you can print).

Printing a Selection From an SPSS Data File

Printing a selection from a data file follows exactly the steps that we listed above for printing a data file, except that in the Data Editor window, you select what you want to print and click on the Selection option in the Print dialog box. The steps go like this:

1. Be sure that the data you want to print are selected.

2. Click File → Print.

3. Click Selection in the Print dialog box.

4. Click OK, and whatever you selected will be printed.

CREATING AN SPSS CHART

A picture is worth a thousand words, and SPSS offers you just the features to create charts that bring the results of your analyses to life. In this part of Appendix A, we will go through the steps to create several different types of charts and provide examples of

different charts. Then, we will show you how to modify a chart, including adding a chart title; adding labels to axes; modifying scales; and working with patterns, fonts, and more. For whatever reason, SPSS uses the words "graphs" and "charts" interchangeably.

Creating a Simple Chart

The one thing that all charts have in common is that they are based on data. Although you may import data to create a chart, in this example, we will use the data from Appendix C to create a bar chart (like the one you saw in Figure A.7) of the number of males and females in each group.

Creating a Bar Chart

The steps for creating any chart are basically the same. You first enter the data you want to use in the chart, select the type of chart you want from the Graphs menu, define how the chart should appear, and then click OK. Here are the steps we followed to create the chart you see in Figure A.7.

1. Enter the data you want to use to create the chart.

2. Click Graphs → Legacy Dialogs → Bar. When you do this, you will see the Bar Charts dialog box you see in Figure A.16.
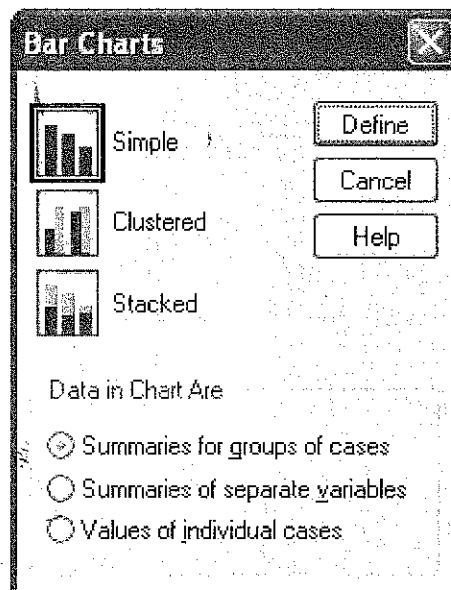
Figure A.16   The Bar Charts Dialog Box

3. Click Simple.

4. Click Summaries for groups of cases.

5. Click Define. When you do this, you will see the Define Simple Bar: Summaries for Groups of Cases dialog box.

6. Click Cum n of cases.

7. Click gender, then click ▸ to move the variable to the Category Axis area.

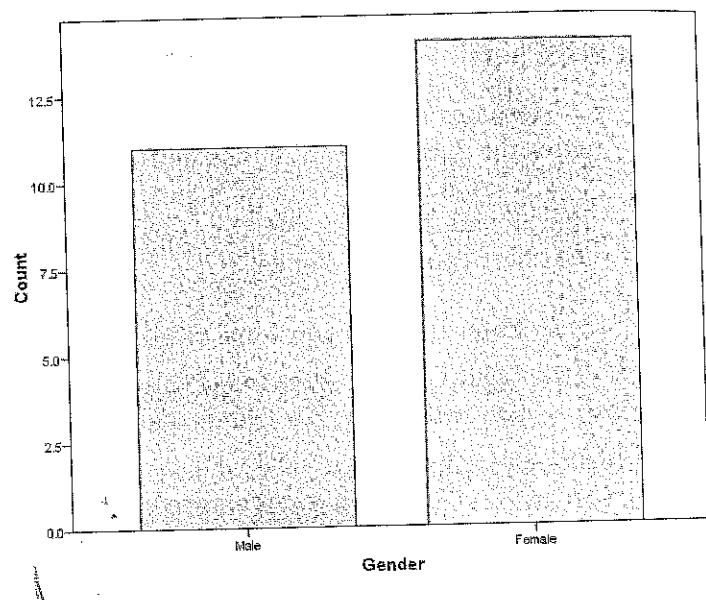8. Click OK, and you see the results of the chart in Figure A.17.

Graph

Figure A.17   A Simple Bar Chart

That's just the beginning of the chart, and to make any changes, you have to use the chart editor tools. Let's learn how to save the chart and then move to making changes.

Saving a Chart

A chart is only one component of the Viewer window. A chart is part of the output generated when you perform some type of analysis. The chart is not a separate entity that stands by itself, and it cannot be saved as such. To save a chart, you need to save the contents of the entire Viewer. Follow these steps to do that:

1. Click File → Save.

2. Provide a name for the Viewer window.

3. Click OK. The output is saved under the name that you provide with a .spo extension.

ENHANCING SPSS CHARTS

Once you create a chart as we showed you in the previous section, you could finish the job by editing the chart to reflect exactly what you want to say. Colors, shapes, scales, fonts, and more can be changed. We will be working with the bar chart that was first shown to you in Figure A.7.

Editing a Chart

The first step in editing a chart is to double-click on the chart, then click the maximize button. You will see the entire chart in Figure A.18 in the Chart Editor window.
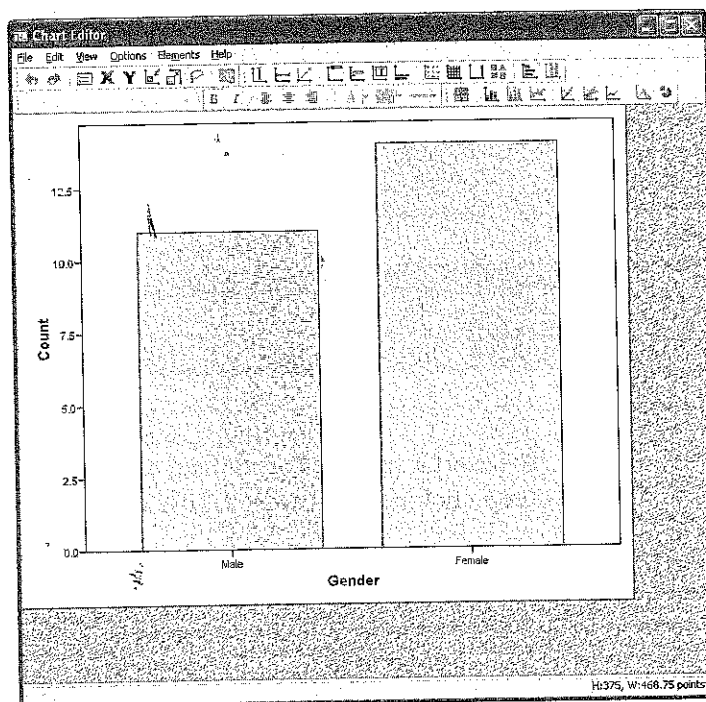

Figure A.18   The Chart Editor Window

Working With Titles and Subtitles

Our first task is to enter a title and subtitle on the chart you saw in Figure A.17.

1. Click the Insert a Title icon (which looks like this [icon here] on the Toolbar. When you do this, as you see in Figure A.19, you can then edit the element Title right on the screen and enter what you wish.
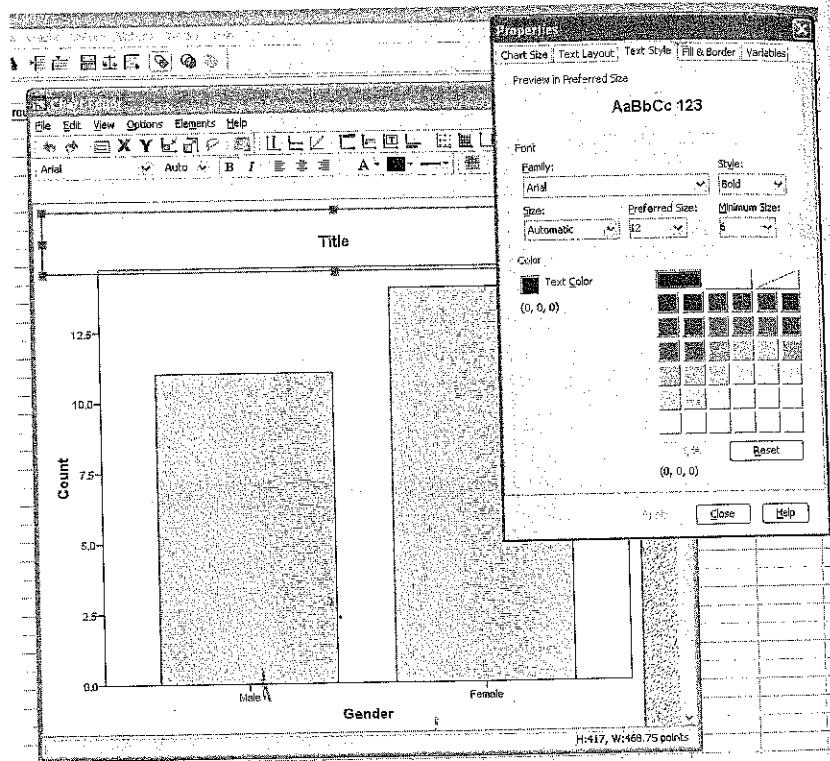

Figure A.19   Inserting a Title

2. To insert a subtitle (or, in fact, as many titles as you like), just keep clicking the Insert a Title toolbar.

Working With Fonts

Once you have created a title or titles, you can work with fonts by double-clicking on the text you want to modify, and you will see the Properties dialog box as shown in Figure A.20. Click on the Text Style tab as we have and you can make whatever changes you wish.
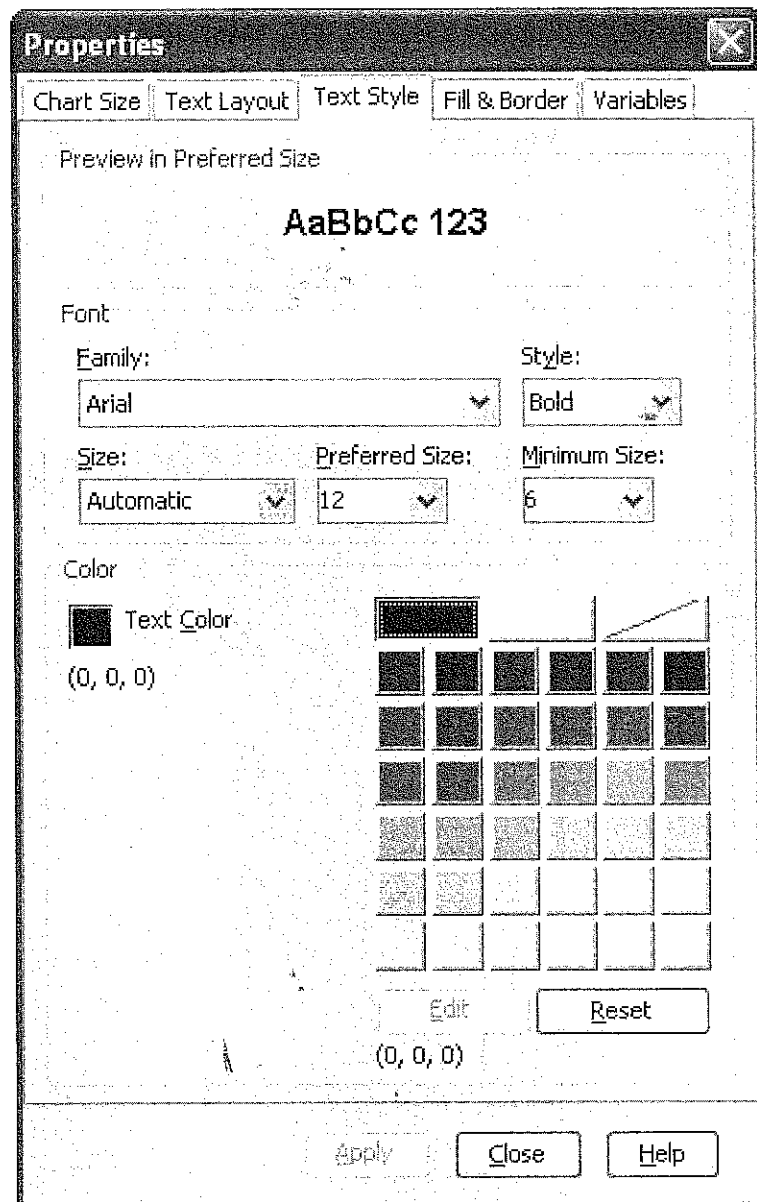
Figure A.20   Working With Fonts

Working With Axes

The x- and y-axes provide the calibration for the independent (usually the x-axis) variable and the dependent (usually the y-axis) variable. SPSS names the y-axis the Scale axis and the x-axis the Category axis. Each of these axes can be modified in a variety of ways. To modify either axis, double-click on the title of the axis.

How to Modify the Scale (y) Axis

To modify the *y*-axis, follow these steps:

1. Still in the chart editor? We hope so. Double-click on the label of the axis.
2. Click the Scale tab in the Properties dialog box. When you do this, you will see the Scale Axis dialog box, as shown in Figure A.21.
3. Select the options you want from the Scale Axis dialog box.

Figure A.21 The Scale Axis Dialog Box

How to Modify the Category (x) Axis

Working with the x-axis is no more difficult than working with the y-axis. Here is how the x-axis was modified.

1. Double-click on the label of the x-axis. The Category Axis dialog box opens. It is very similar to the Scale Axis dialog box that you saw in Figure A.21.

2. Select the options you want from the Category Axis dialog box.

   We made some text changes in the final graph such as:

   Changed Cumulative Frequency to Number

   Changed gender to Gender

When you are done making changes (and the chart looks something like that shown in Figure A.21), close the Chart Editor by double-clicking on the window icon or selecting File → Close.

DESCRIBING DATA

Now you have some idea about how data files are created in SPSS. Let's move on to some examples of simple analysis.

Frequencies and Crosstab Tables

Frequencies simply compute the number of times that a particular value occurs. Crosstabs allows you to compute the number of times that a value occurs when categorized by one or more dimensions, such as gender and age. Both frequencies and crosstabs are often reported first in research reports because they give the reader an overview of what the data look like. To compute frequencies, follow these steps. You should be in the Data Editor window.

1. Click Analyze → Descriptive Statistics → Frequencies. When you do this, you will see the Frequencies dialog box as shown in Figure A.22.
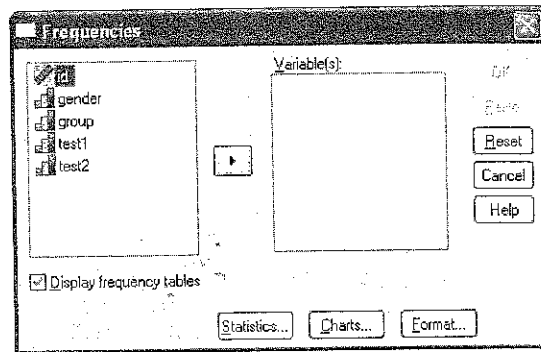
Figure A.22 The Frequencies Dialog Box

2. Double-click the variables for which you want frequencies computed. In this case, they are test1 and test2.

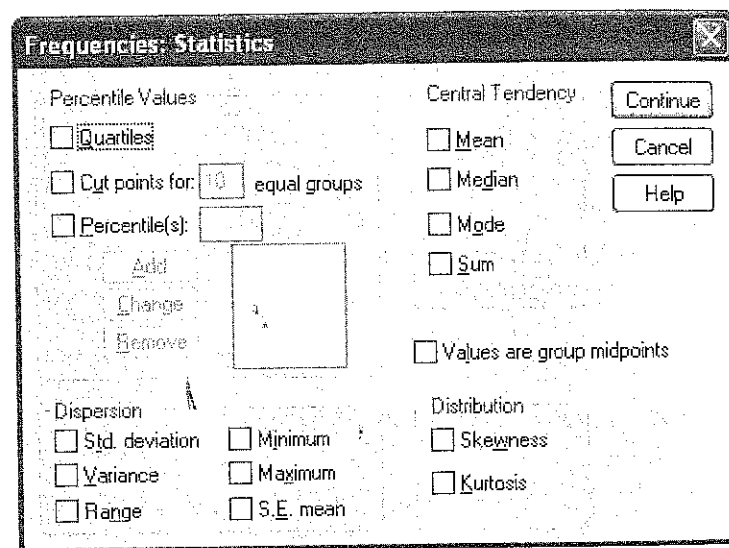3. Click Statistics. You will see the Frequencies: Statistics dialog box, as shown in Figure A.23.

Figure A.23 The Frequencies: Statistics Dialog Box

4. In the Dispersion area, click Std. deviation.

5. Under the Central Tendency area, click Mean.

6. Click Continue.

7. Click OK.

The output consists of a listing of the frequency of each value for test1 and test2, plus summary statistics (mean and standard deviation) for each, as you see in Figure A.24.

Frequencies

Statistics

|		test1	test2
N	Valid	25	25
	Missing	0	0
Mean		83.5200	64.2400
Std. Deviation		8.62709	21.64155

Figure A.24 Summary Statistics for test1 and test2

Applying the Independent Samples t Test

Independent *t* tests are used to analyze data from a number of types of studies, including experimental, quasi-experimental, and field studies such as those shown in the following example, where we test the hypothesis that there are differences between males and females in reading.

How to Conduct an Independent Samples t Test

To conduct an independent *t* test, follow these steps.

1. Click Analyze → Compare Means → Independent-Samples T Test. When you do this, you will see the Independent-Samples T Test dialog box, as shown in Figure A.25.
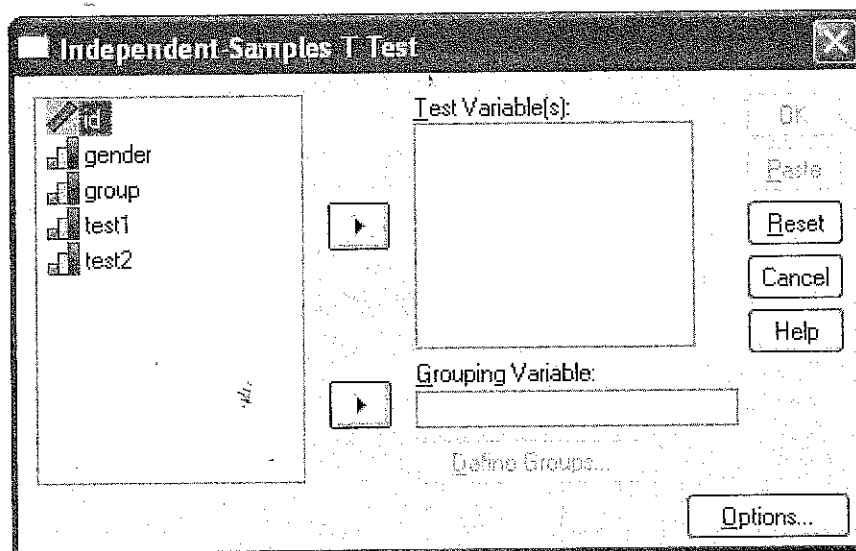
Figure A.25 The Independent Samples *T* Test Frequencies Dialog Box

The Independent Samples t Test Dialog Box

On the left-hand side of the dialog box, you see a listing of all the variables that can be used in the analysis. What you now need to do is define the test and the grouping variable.

2. Click test1, then click ▶ in the Test Variables box to move it to the Test Variables area.

3. Click gender, then click ▶ to move it to the Grouping Variable area.

4. Click Define Groups.

5. In the Group 1 box, type 1.

6. In the Group 2 box, type 2.

7. Click Continue.

8. Click OK.

The output contains the means and standard deviations for each variable, plus the results of the t test, as shown in Figure A.26.

T-Test

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
test1	Experimental	8	85.7500	7.81482	2.76296
	Control	17	82.4706	9.01469	2.18638

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
test1	Equal variances assumed	.679	.418	.883	23	.387	3.27941	3.71600	−4.40771	10.96654
	Equal variances not assumed			.931	15.801	.366	3.27941	3.52338	−4.19748	10.75630

Figure A.26 Results of the Simple t Test

We have just given you the briefest of introductions to SPSS, and certainly none of these skills means anything if you don't know the value or meaningfulness of the data you originally entered. So, don't be impressed by your or others' skills at using programs like SPSS. Be impressed when those other people can tell you what the output means and how it reflects on your original question. And be really impressed if you can do it!

EXITING SPSS

To exit SPSS, click File → Exit. SPSS will be sure that you get the chance to save any unsaved or edited windows and will then close.
Ta-da! You're done!