

APPENDIX A

SPSS Statistics in Less Than 30 Minutes

This appendix will teach you enough about SPSS Statistics (let's just call it 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 way. 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 XP, Vista, and versions 7 and 8. It will not work with any earlier versions of Windows.

This appendix is an introduction to SPSS (Version 21) 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, 21.

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 those data manually or download the set from the SAGE website at <http://www.sagepub.com/salkind5e> or the author's website at <http://www.onlinefilefolder.com>. The username is *ancillaries* and the password is *files*.

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 and then point to Programs.
2. Find and 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



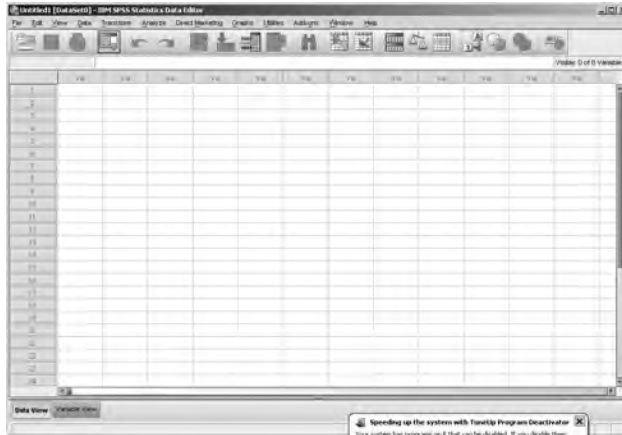
The SPSS Opening Window

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 this option 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.

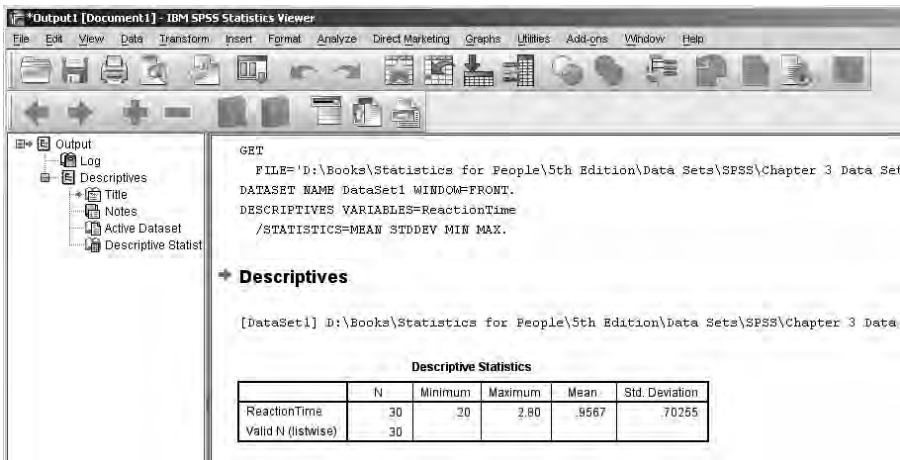
Figure A.2 The Data View Window



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 an Excel spreadsheet. Values can be entered and then manipulated. In function as well, the

Figure A.3 The Viewer



Data Editor is much like a spreadsheet. Values that are entered can be transformed, sorted, rearranged, and more.

THE SPSS TOOLBAR AND STATUS BAR

The use of the Toolbar—the set of icons below 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.

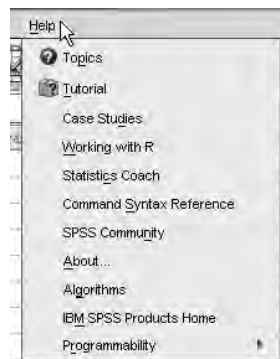
The Status Bar, located at the bottom of the SPSS window, is another useful on-screen tool. Here, you can see a one-line report telling you which activity SPSS is currently involved in. The message *SPSS for Windows processor is ready* tells you that SPSS is ready for your directions or input of data. As another example, *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 Help 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 (which is greatly expanded from earlier versions of SPSS), and 6 of these are directly relevant to helping you.

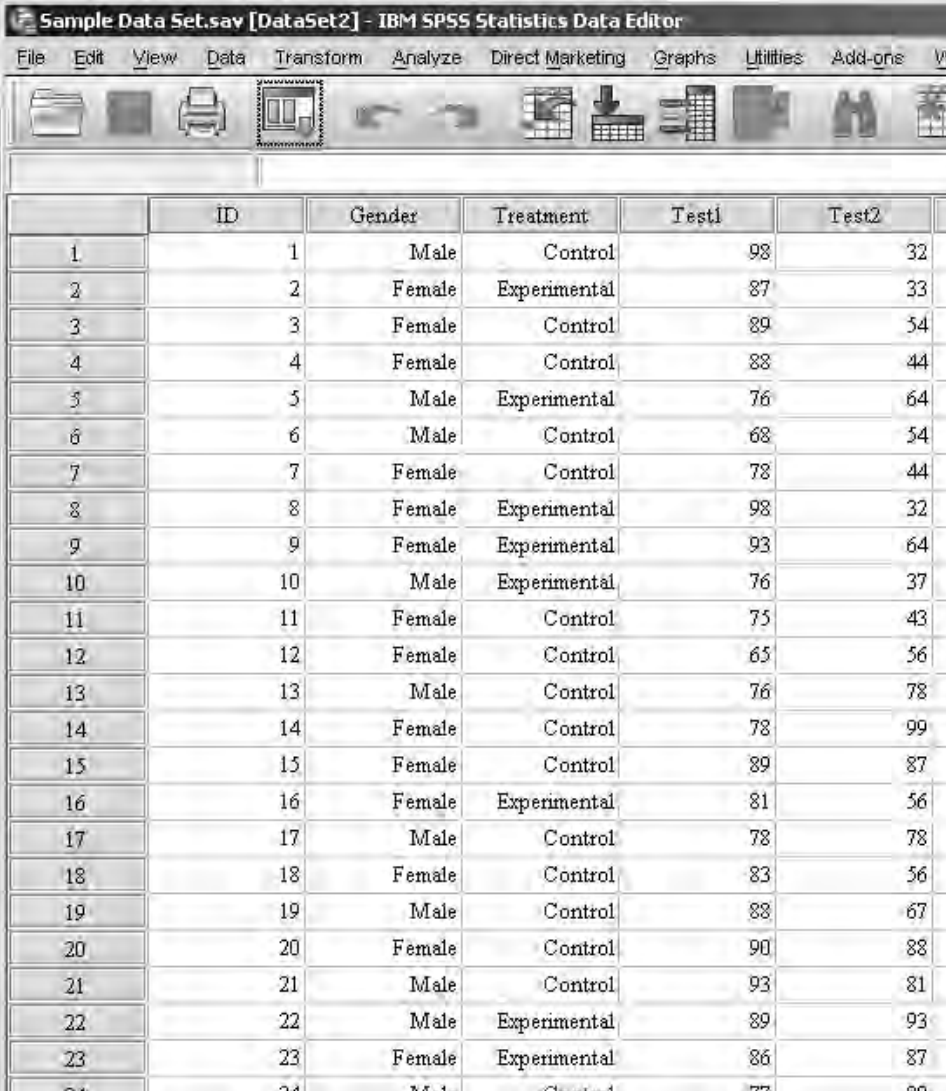
- *Topics* gives you a list of topics for which you can get help.
- *Tutorial* offers you a short tutorial on all aspects of using SPSS.
- *Case Studies* gives you real live examples of how SPSS can be applied.
- *Statistics Coach* walks you through procedures step-by-step.
- *Command Syntax Reference* helps you to learn and use SPSS's programming language.
- *Developer Central* provides you with information about creating add-ons and other program enhancements for SPSS.
- *About . . .* gives you some technical information about SPSS, including the version you are using.
- *Algorithms* focuses on the calculations that are used to produce the results you see in SPSS.
- *SPSS Inc. Home* takes you to the home page for SPSS on the Internet.
- *Check for Updates* automatically connects to the SPSS mother ship to check for any updates you should be aware of.

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.5, the data contained in Appendix C (called "Sample Data") are shown. They are also available on the book's companion website.

Figure A.5 An Open SPSS File


	ID	Gender	Treatment	Test1	Test2
1	1	Male	Control	98	32
2	2	Female	Experimental	87	33
3	3	Female	Control	89	54
4	4	Female	Control	88	44
5	5	Male	Experimental	76	64
6	6	Male	Control	68	54
7	7	Female	Control	78	44
8	8	Female	Experimental	98	32
9	9	Female	Experimental	93	64
10	10	Male	Experimental	76	37
11	11	Female	Control	75	43
12	12	Female	Control	65	56
13	13	Male	Control	76	78
14	14	Female	Control	78	99
15	15	Female	Control	89	87
16	16	Female	Experimental	81	56
17	17	Male	Control	78	78
18	18	Female	Control	83	56
19	19	Male	Control	88	67
20	20	Female	Control	90	88
21	21	Male	Control	93	81
22	22	Male	Experimental	89	93
23	23	Female	Experimental	86	87
24	24	Male	Control	77	80

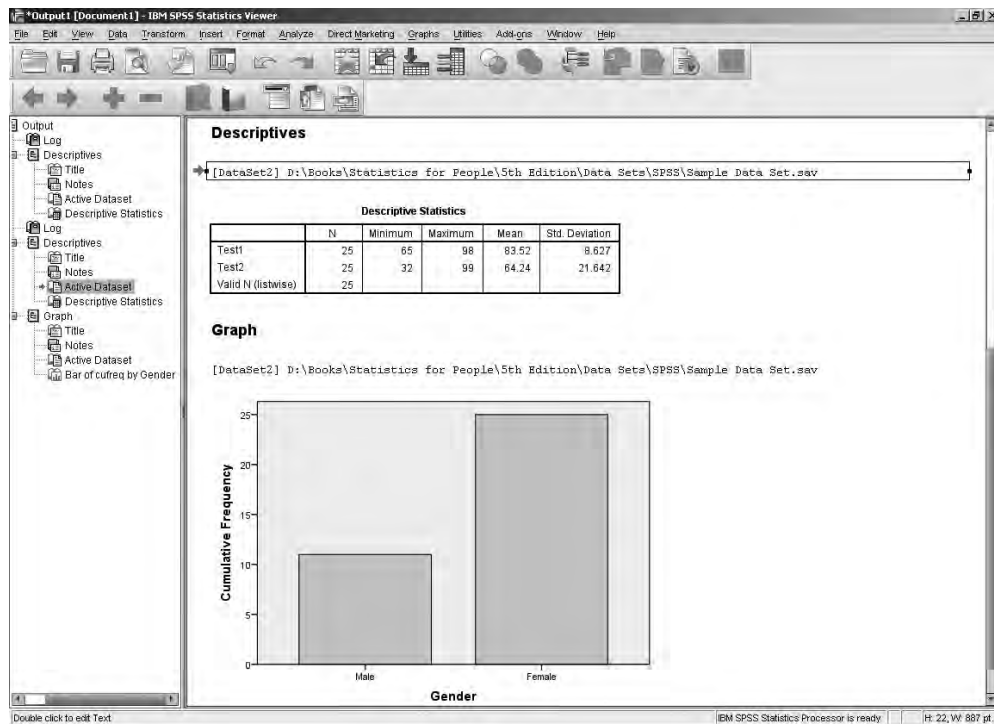
A Simple Table and Graph

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's all—just a count of how many males and how many females are in our total sample. We also want to create a simple bar graph of the distribution.

In Figure A.6, you 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 menu (under the main menu Analyze) to compute these values and create the graph.

Figure A.6 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.7, 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.7 The Results of an Independent Samples *t*-Test**T-Test**

[DataSet2] D:\Books\Statistics for People\5th Edition\Data Sets\SPSS\Sample Data Set.sav

Group Statistics				
Gender	N	Mean	Std. Deviation	Std. Error Mean
Test1 Male	11	82.55	9.234	2.784
Female	14	84.29	8.389	2.242

Independent Samples Test										
		Levene's Test for Equality of Variances		t-Test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Test1	Equal variances assumed	.714	.407	-.493	23	.627	-1.740	3.532	-9.047	5.566
	Equal variances not assumed			-.487	20.532	.632	-1.740	3.575	-9.185	5.704

CREATING AND EDITING A DATA FILE

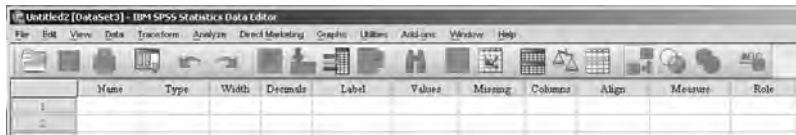
As a hands-on exercise, let's create the beginning of the sample data file you see in Appendix C. The first step is to define the variables in your data set, and the second step is to enter the data. You should have a new Data Editor window open (Click File → New → Data).

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 number the other columns sequentially.

Custom Defining Variables: Using the Variable View Window

To define a variable yourself, 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.8, and be able to define any one variable as you see fit.

Figure A.8 The Variable View Window

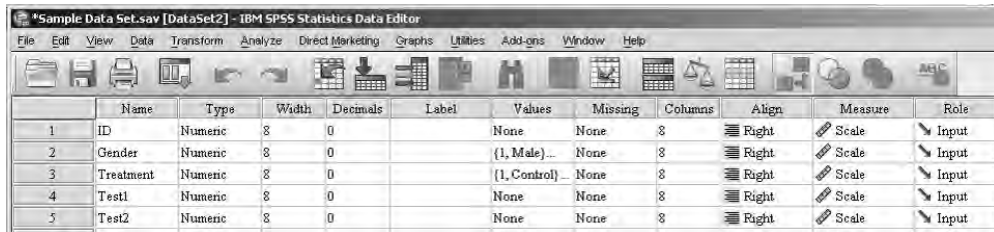
Once in the Variable View window, you can define variables along the following parameters:

- *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 of the column housing the variable.
- *Decimals* defines the number of decimals that will appear in the Data View.
- *Label* defines a label of 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 any 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).
- *Role* defines the part that the variable plays in the overall analysis (input, target, etc.)

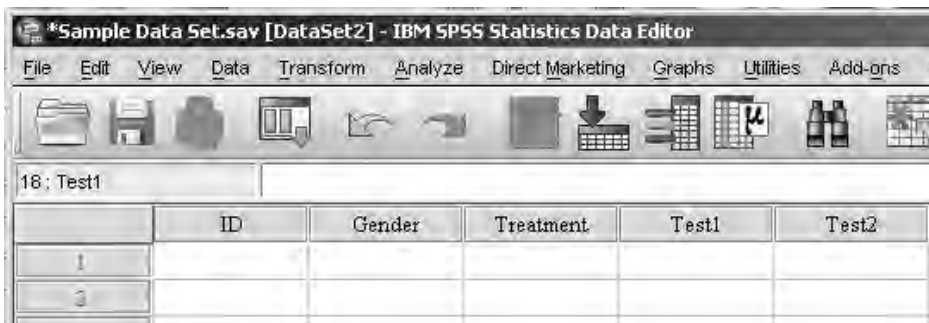
If you place the cursor in the first cell under the “Name” column, enter any name, and press the Enter key, then SPSS will automatically provide you with the default values for all the variable characteristics. Even if you are not in the Data View screen (click the tab on the bottom of the window), SPSS 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.9.

Now, if you wanted, you could switch to the Data View (see Figure A.10) and just enter the data as you see in Figure A.5. But first, let’s look at just one of the cool SPSS bells and whistles.

Figure A.9 Defining Variables in the Variable View Window


	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	ID	Numeric	8	0		None	None	8	Right	Scale	Input
2	Gender	Numeric	8	0		(1, Male)...	None	8	Right	Scale	Input
3	Treatment	Numeric	8	0		(1, Control)...	None	8	Right	Scale	Input
4	Test1	Numeric	8	0		None	None	8	Right	Scale	Input
5	Test2	Numeric	8	0		None	None	8	Right	Scale	Input

Figure A.10 The Data View Window Ready for Data Entry


18 : Test1	ID	Gender	Treatment	Test1	Test2
1					
2					

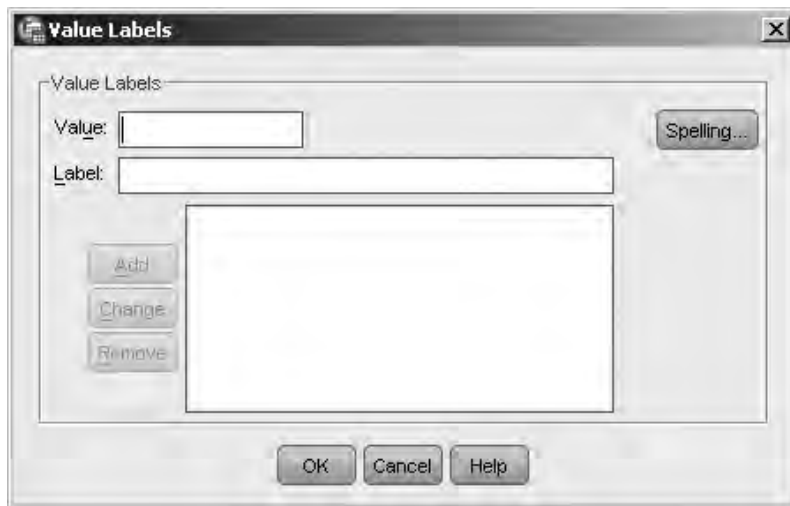
Defining Value Labels

You can leave your data as numerical values in the SPSS Data Editor, or you can have labels represent the numerical values (as you saw in Figure A.5).

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*.

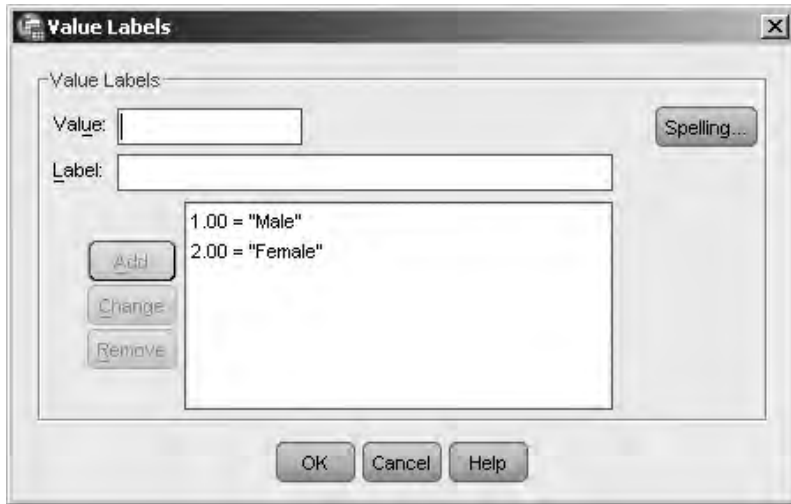
If you click the ellipsis button in the Values column (see Figure A.11), you will see the Value Labels dialog box, as shown in Figure A.12.

Figure A.11 The Values Column in the Variable View Screen**Figure A.12** The Value Labels Dialog Box

Changing Value 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.11) to open the Value Labels dialog box.
2. Enter a value for the variable—in this case, 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.13), click OK, and the new labels will take effect.

Figure A.13 The Completed Value Labels Dialog Box

When you select View → Variable Labels from the main menu (in the Data View), you will see the labels in the Data Editor. Notice how the value of the entry in Figure A.14 is actually 2, even though the label in the cell reads Female.

Figure A.14 Seeing Variable Labels

	ID	Gender	Treatment	Test1	Test2
1	1	Male	Control	98	32
2	2	Female	Experimental	87	33
3	3	Female	Control	89	54

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 to click 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 will be 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 you can increase the number of copies from 1 to 99 (the max number of copies you can print). You can also configure the Print dialog box so that a PDF file is produced.

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

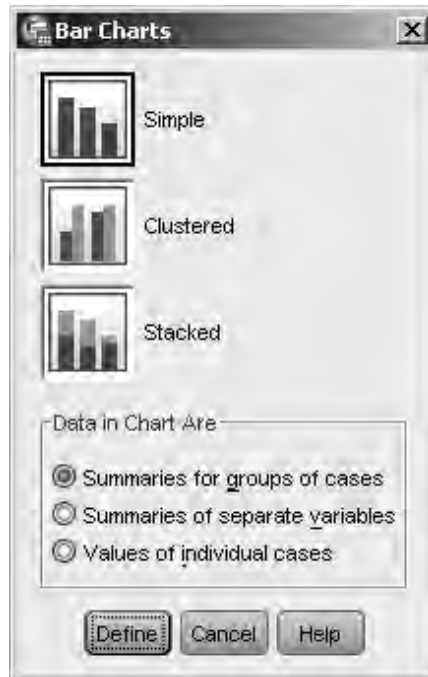
The one thing that all charts have in common is that they are based on data. Although you may import data to create a chart, in this example, we will use the data from Appendix C to create a bar chart (like the one you saw in Figure A.6) of the number of males and females in each group.

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.6.

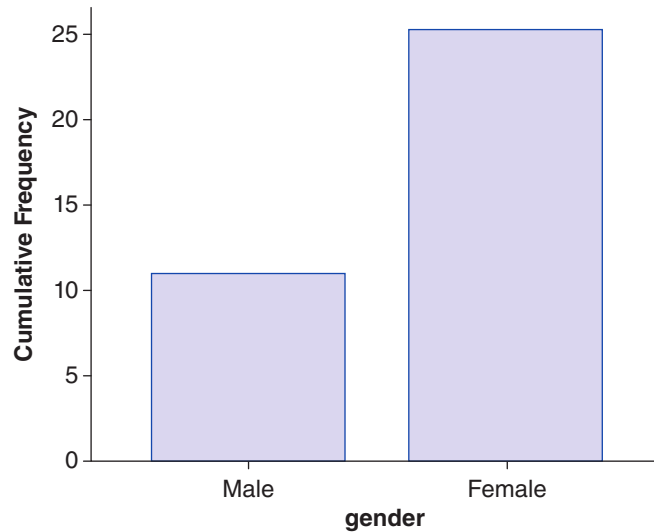
1. Enter the data you want to use to create the chart.
2. Click Graphs → Legacy Dialogs → Bar. When you do this, you will see the Bar Charts dialog box you see in Figure A.15.

Figure A.15 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 move the variable to the Category Axis area by dragging.
8. Click OK, and you see the results of the chart in Figure A.16.

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

Figure A.16 A Simple Bar Chart

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 an *.spo* extension.

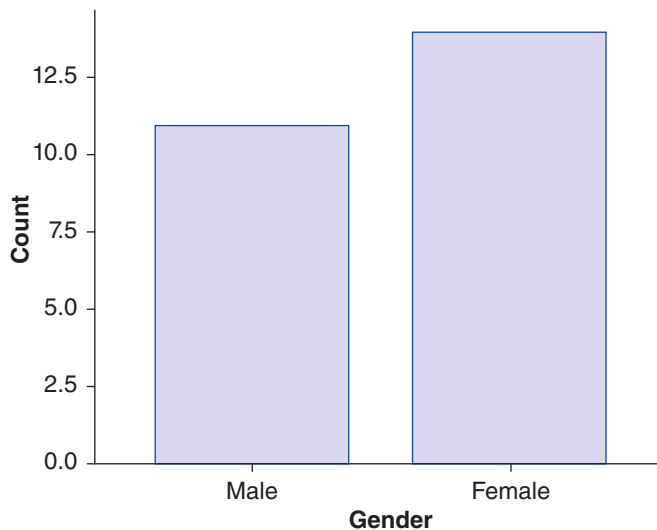
ENHANCING SPSS CHARTS

Once you create a chart as we showed you in the previous section, you can edit 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.6.

Editing a Chart

The first step in editing a chart is to double-click on the chart and then click the maximize button. You will see the entire chart in Figure A.17 in the Chart Editor window.

Figure A.17 The Chart Editor Window



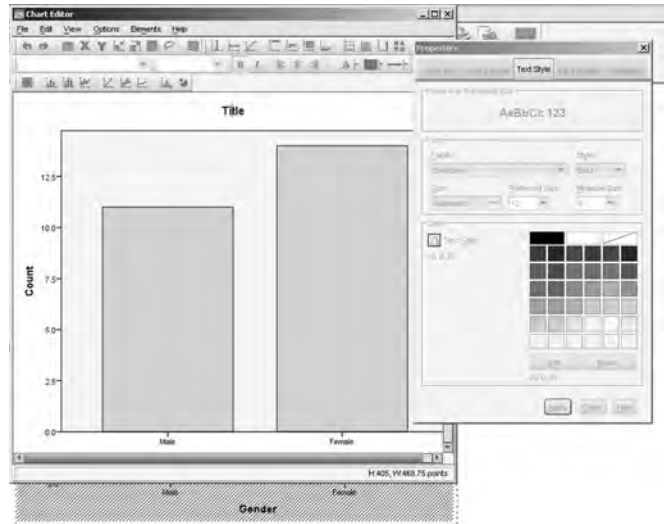
Working With Titles and Subtitles

Our first task is to enter a title and subtitle on the chart you saw in Figure A.16.

1. Click the Insert a Title icon on the Toolbar. When you do this, as you see in Figure A.18, you can edit the element Title right on the screen and enter what you wish.
2. To insert a subtitle (or, in fact, as many titles as you like), just keep clicking the Insert a Title toolbar.

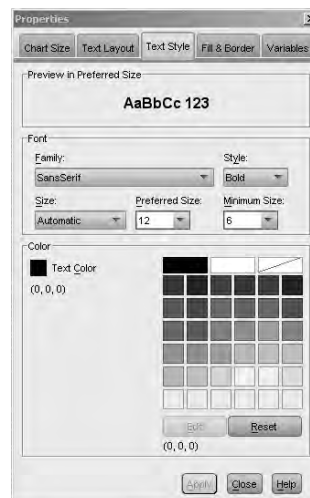
Working With Fonts

Once you have created a title or titles, you can work with fonts by double-clicking on the text you want to modify. You will see the Properties dialog box, as shown in Figure A.19. Click on the Text Style tab, and you can make whatever changes you wish.

Figure A.18 Inserting a Title

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.

Figure A.19 Working With Fonts

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 axis (not the axis label).
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.20.
3. Select the options you want from the Scale Axis dialog box.

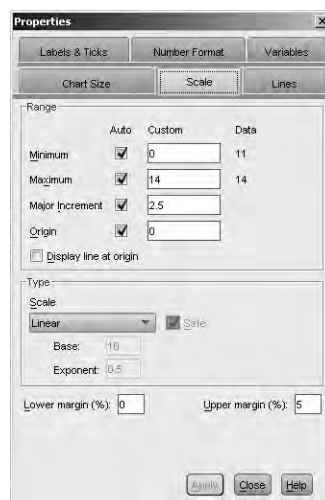
How to Modify the Category (x) Axis

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 x-axis. The Category Axis dialog box opens. It is very similar to the Scale Axis dialog box that you see in Figure A.20.
2. Select the options you want from the Category Axis dialog box.

When you are done, close the Chart Editor by double-clicking on the window icon or selecting File → Close.

Figure A.20 The Scale Dialog Box



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 allow 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 shown in Figure A.21.
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 shown in Figure A.22.
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.23.

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.

Figure A.21 The Frequencies Dialog Box

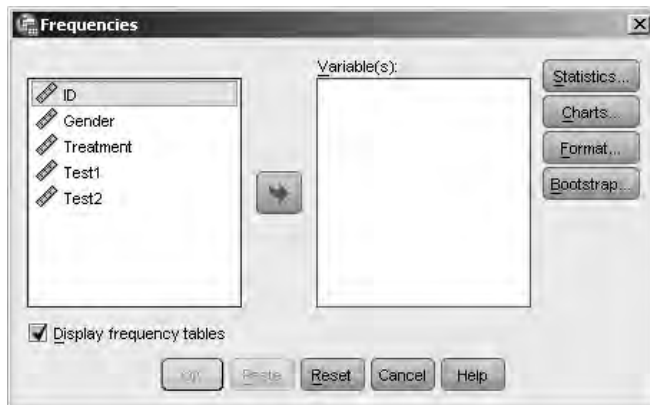


Figure A.22 The Frequencies: Statistics Dialog Box

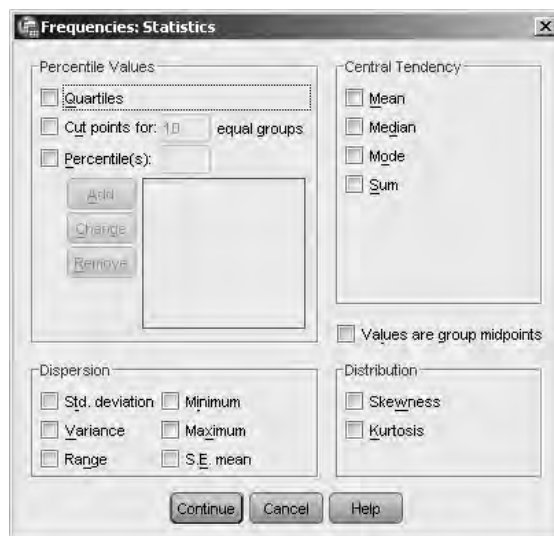


Figure A.23 Summary Statistics for test1 and test2

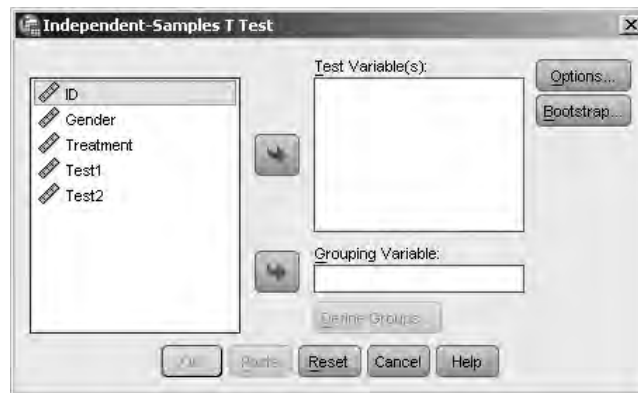
Statistics			
		Test1	Test2
N	Valid	25	25
	Missing	0	0
Mean		83.52	64.24
Std. Deviation		8.627	21.642

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.24.

Figure A.24 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 and drag it to the Test Variables area.
3. Click gender and drag 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 OK.

The output contains the means and standard deviations for each variable, plus the results of the t -test, as shown in Figure A.25.

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

Figure A.25 Results of the Simple *t*-Test

T-Test

[DataSet5] D:\Books\Statistics for People\5th Edition\Data Sets\SPSS\Sample Data Set.sav

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Test1	Male	11	82.55	9.234	2.784
	Female	14	84.29	8.389	2.242

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Test1	Equal variances assumed	.714	.407	-.493	23	.627	-1.740	3.532	-9.047	5.566
	Equal variances not assumed			-.487	20.632	.632	-1.740	3.676	-9.185	5.704

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!

