Chapter 2

Using ViSta

This chapter presents a tutorial on how to use ViSta. The tutorial covers ViSta's structured graphical user interface, including guidemaps, workmaps, menus and toolbar; ViSta's listener window; and ViSta's data analysis language, including scripts.

2.1 Introduction

This chapter is a tutorial introduction to ViSta, the Visual Statistics System. When you first run ViSta you will see two windows, one titled "ViSta WorkMap" and the other "Listener". Depending on startup options, you may also see ViSta's guidemap window, titled "Load Your Data". The workmap and guidemap windows are ViSta's structured graphical user interface for statistical data analysis. The listener is ViSta window for displaying and typing character information.

Section 2.2 teaches you how to use the guidemap window. This window contains maps that guide you through advanced data analyses. The maps have been constructed by an expert.

Section 2.3 teaches you how to use the workmap window. Unlike a guidemap, the workmap doesn't exist at the beginning of the analysis. It is constructed as you work your way through an analysis. Thus, the workmap records the steps you take during a data analysis session. It also provides a means to revisit earlier steps in the analysis and a way to launch new analysis ideas from earlier steps.

Section 2.4 teaches you how to use the "Listener" window. This window listens to your analysis and displays messages about its progress. It is also the place where you can type statements in ViDAL, ViSta's data analysis language, and in Lisp, the underlying language. In the MS-Windows version the Listener window is also where help, reports and other printed information appears. (In the Macintosh version, these appear in other windows).

In addition to these windows, there are several menus on the menubar. The menus allow you to create data analyses. Some of the menu items are paralleled by button in the workmap's toolbar. In this chapter we describe how to use ViSta's guidemap, workmap and listener windows, and how to use ViSta's menus and toolbar.

2.2 Using GuideMaps

In this section you will follow steps in a tutorial that teaches you how to analyze data using ViSta's guidemap. You will also see the workmap begin to be formed, and how it records major analysis steps.

1. **Show the GuideMap.** If the **Load Your Data** guidemap is not showing, use the **Show Guidemap** item of the **Command** menu to show it. You will then see the **Load Your Data** guidemap window.

   The guidemap window contains the very simple guidemap shown in Figure 1. This guidemap has an entry point (the top arrow), a highlighted (dark) button named Load Data, and an exit point (the bottom arrow) which is an automatic link to the next guidemap, one that provides data analysis guidance.

You use guidemaps by clicking on highlighted buttons. If you click on the ?? side of a highlighted button you see help for the button. If you click on the !! side, the button's action takes place. Then the button turns gray (meaning it is inactive) and guidance flows along the connecting arrow to the next step. In this case the next step is to see the data analysis guidemap.

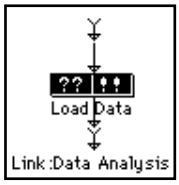

Figure 1: A Simple Guidemap

Click on the ?? side of the Load Data button and read the help (you may have to scroll the help to see the top of it). The help tells you that you load data into ViSta by clicking on the !! portion of the Load Data button. Thus, this guidemap guides you to load data, the first step of every data analysis. You do this next.

2. **Load a datafile.** To load data, click on the !! side of the **Load Data** button in the guidemap (Mac users may have to move the help window aside). You will see a dialog box that opens to the data folder (Mac users may have to find the data folder). Use this dialog box to load the `EXAMPLE1.LSP` datafile (datafiles are explained below). A data icon, titled Car-Prefs, appears in the WorkMap window, as shown in Figure 2. The icon represents multivariate data, with the tiny vertical bars representing variables. More will be said about the icon, and how it works, in section 2.3.

Figure 2: A Data Icon

The new guidemap shown in Figure 3 has appeared in the guidemap window. The window is now named **Data Analysis**. This guidemap has an entry point (the arrow at the top) which is followed by five buttons.The button named Link:Explore is highlighted and ready to use. The middle three buttons are connected into a loop structure, indicating that transforming data, analyzing them, and looking at the resulting model may be repeated several times.

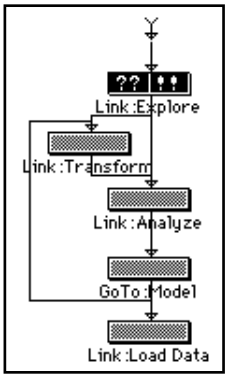

Figure 3: Data Analysis Guidemap

The highlighting of the buttons in the new guidemap guides you to the Link:Explore button. When you click on its ?? side you will get help that explains that this button will display a new guidemap for exploring data. (Actually, you can click on the left half of any button for help, not just highlighted buttons). If you click on the !! side you will see this new guidemap. (A Link: button always takes you to a new guidemap.)

After clicking on the !! side of the Link:Explore button you will see the **Explore Your Data** guidemap shown in Figure 4. We will use this guidemap in the next step to explore data.

3. **Explore the Data.** Button highlighting of the **Explore Your Data** guidemap tells you to browse your data or to return to the guidemap you just came from. Click on the **Browse Data** button to see the data. A portion of what you see is shown in Figure 5.

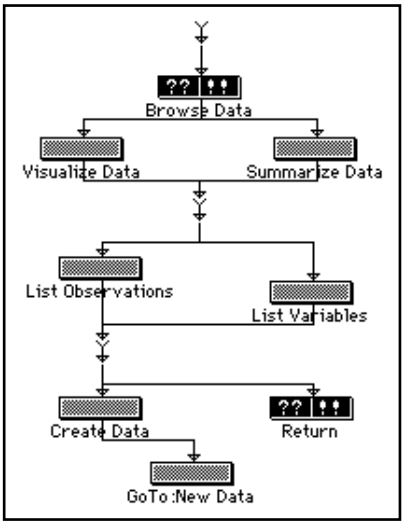

Figure 4:
The Guidemap for exploring data.

These data are ratings, made by 25 people, of their preferences for each of 17 automobiles. The data are from an unpublished 1982 study (Sarle, personal communication) in which people rated their preference for each automobile on a scale from 0 (no preference) to 9 (strongest preference). The judges were employees of a large statistical software house. Most of the judges were programmers, but two of the judges were in the marketing section, one was the president of the company, and one was the grandmother of one of the programmers. Looking over the list of automobiles, you will see that some were manufactured in America, some in Europe, and some in Japan.

When you are finished looking at the data, use the close box on the datasheet window to close the datasheet.

17 Vars / 25 Obs	cadillac	chevrole	chevrole	chevrole
	Numeric	Numeric	Numeric	Numeric
pgmr1	0.00	0.00	0.00	0.00
pgmr2	8.00	0.00	4.00	6.00
pgmr3	0.00	5.00	5.00	2.00
pgmr4	7.00	1.00	3.00	7.00
pgmr5	9.00	2.00	3.00	4.00
pgmr6	9.00	0.00	0.00	0.00
pgmr7	0.00	0.00	5.00	0.00
pgmr8	4.00	4.00	8.00	7.00
Prsdnt	9.00	2.00	1.00	2.00
pgmr9	1.00	3.00	4.00	3.00

Figure 5: A Portion of the Datasheet.

Notice that the selection of active guidemap buttons has changed: The **Browse Data** button is gray, and the **Visualize Data** or **Summarize Data** are highlighted. This means that you are no longer guided to browse the data (since you've already done it) and are guided to visualize or summarize instead.

Visualize the Data: Click **Visualize Data** to display a visualization of the car preferences data. The visualization consists of five windows: a scatterplot-matrix (upper left), a spinnable 3D scatterplot (upper middle), a scatterplot (lower left), a histogram (lower middle), and a list of observation labels (right). We will explain how to use the visualization in another chapter. For now, if you wish to explore how the windows work, go right ahead. Then, close the visualization by clicking the

close box of the scatterplot-matrix. It will close all visualization windows for you.

Summarize the Data: After you close the data visualization you will see that the **Visualize Data** button has become gray because you've finished the visualization step. However, the **Summarize Data** button is still highlighted. Clicking the **Summarize Data** button displays statistics that summarize the data. You will see that the median, mean and variance of the automobiles' preference ratings vary considerably, but that the minimums and maximums are about the same.

If you are using a Macintosh you should close the summary window before proceeding to the next steps.

Note that once you have used a highlighted button, it turns gray, indicating that it is no longer a step that you are guided to do. Also note that after you have used both the **Visualize Data** and **Summarize Data** buttons, the **List Observations** and **List Variables** buttons become highlighted, indicating that you are now guided to take these next two steps.

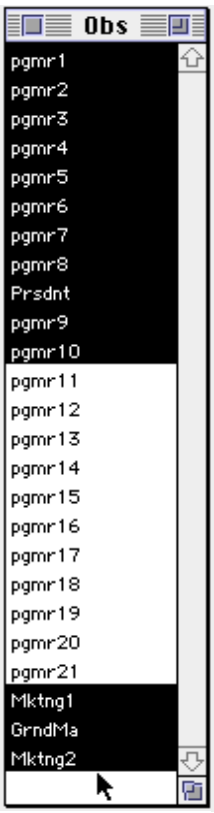

Figure 6: Subsetting Data

4. **Subset the Data**: We now are guided to display the observation and variable windows. Click on these two buttons to see observation labels and variable names. Note that after you do this the next two guidemap buttons are highlighted.The variables and observations windows can be used for subsetting the data. We will do this to select a subset of people for later analysis.

   To select a subset of the people you must first click on the **Obs** window to make it the active window. Then, drag your cursor over `pgmr1` through `pgmr10`. These observations become highlighted, as in Figure 6. Now, stretch out the window or scroll to the end of the list of labels. Next, shift-drag (hold down the shift key, then drag your mouse) over the last three people. They are labeled `Mktng1`, `GrndMa` and `Mktng2`. Now two groups of people will be highlighted. The window should now look like Figure 6. These are the selected observations that will be included in the next step.

5. **Create Data Subset**: Next you will use the **Create Data** guidemap button to create a new dataset using the selections you just made in the observations window. Click the **Create Data** button. When the dialog box appears it suggests the name `Created-From-Car-Prefs`. Change the name by selecting the text, typing `subset` and clicking OK. A new data icon named subset appears in the workmap, which now looks like Figure 7. Notice that the top icon is high-

lighted, indicating it is still the "current" data. Also notice that the name of the bottom button in the guidemap has changed from **GoTo:New Data** to **GoTo:subset**.

Now, while watching the two data icons, click on the **GoTo:subset** button in the guidemap. This changes the highlighting of the workmap to match that shown in Figure 8. This highlighting indicates that the new dataset is now the current one. Also, a new **Save Your Data** guidemap has appeared in the guidemap window. We will get to it in a moment.

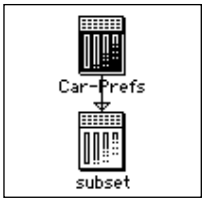

Figure 7: Car-Prefs are the current data.

The most important thing to note about the workmap's new subset data icon is that it is connected to the Car-Prefs icon by an arrow. The arrow indicates that the subset data is derived from the CarPrefs data. The purpose of the workmap is to present a visual map of the series of steps you take during a data analysis session, and to show how various statistical objects (i.e., datasets, data models and data analysis procedures) are derived from other objects by the operations and analyses you perform during the session. The icons show the steps, and the arrows show the flow of steps.

Note that the variable window now lists only the subset of selected variables. Also, a check-marked menu item has been added to the bottom of the data menu. The highlighted icon in the workmap and the check-marked item in the menu show that the subset data are the "current" data.

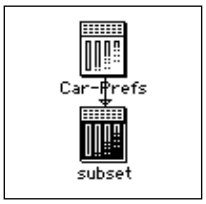

Figure 8: Subset is the current data.

It is important to understand that the guidemap you now see is for the subset data, not for the Car-Prefs data. You can demonstrate that this is the case by clicking on the Car-Prefs icon in the workmap. When you do this, the guidemap changes back to the one guiding the analysis of the Car-Prefs data (its the one that you just used to create the subset data).

Click on this guidemap's Return button. You return to the Data Analysis guidemap for Car-Prefs. Notice that the button-highlighting on this guidemap has changed to reflect the fact that you have finished exploring the Car-Prefs data, and are ready to either transform or analyze these data. Also notice that the guidemap for the subset data (which you can see by clicking on the subset data icon in the workmap), still shows that you need to explore these data.

You are now finished with the guidemap tutorial. Please close the guidemap window and proceed on to the next section, which presents the workmap tutorial. At some later time you might wish to proceed from here using guidemaps to see how you would continue the analysis using their guidance.

2.3 Using WorkMaps

So far, you have learned how to have ViSta's guidemaps guide you through the initial stages of a data analysis. Along the way you have seen a workmap begin to form in the workmap window. In this section you load in a new dataset and learn how to analyze it (and the previous dataset) using ViSta's workmap, menus and toolbar. You will continue to see the workmap form and see how it records the steps in your analysis. Finally, you will use the workmap to return to a preceding analysis step to pursue new analysis directions.

6. **Load another datafile.** Use the **File** menu's **Open Data** item to open the `EXAMPLE2.LSP` datafile (opening a datafile is the same as loading it and then browsing it). You will see a datasheet of the new data, part of which is shown in Figure 9. The new dataset is about the same 17 automobiles as those in the previous dataset. However, the new data is ratings, by a consumer organization, of the automobiles on 10 scales. The scales rate quality on a 1 to 5 scale (5 is best). Close the datasheet when you have finished looking at the data.

10 Vars / 17 Obs	mpg	reliabil	accelera	braking	handling	ride
	Numeric	Numeric	Numeric	Numeric	Numeric	Numeric
cadillac eldorado	3.00	2.00	3.00	4.00	5.00	4.00
chevrolet chevette	5.00	3.00	3.00	5.00	4.00	2.00
chevrolet citation	4.00	1.00	5.00	5.00	5.00	5.00
chevrolet malibu	3.00	3.00	3.00	3.00	4.00	4.00
ford fairmont	3.00	3.00	2.00	4.00	3.00	4.00
ford mustang	3.00	2.00	4.00	4.00	3.00	2.00
ford pinto	4.00	1.00	3.00	4.00	3.00	1.00
honda accord	5.00	5.00	5.00	4.00	5.00	3.00

Figure 9: Part of the Datasheet for the Car Ratings data.

When you close the datasheet you will see that the workmap now has three icons on it, as is shown in Figure 10. There is a new CarRatings icon for the newly opened datafile. This icon is not connected to any previous icon, indicating that the data are independent from the previous sets of data. The new icon is highlighted (dark), indicating it is the current data.

Clicking on an icon in various ways has various effects. A single click on an unselected (light) icon selects the icon, changing its highlighting and making the icon's data the current data. A double click on an icon opens it to show its datasheet.[1] You can drag icons to a new location by placing your cursor on an icon, pressing your mouse button down, and dragging to a new location while holding down the button. You can also

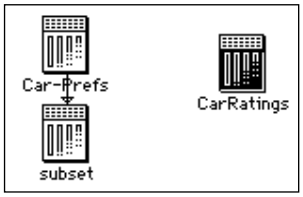

Figure 10: Three Data Icons

drag icon-trees (an icon and all the icons attached below it) by holding down the shift key before dragging. Try each of these to see how they work.

You may have noticed that the **Data, Transform,** and **Analyze** menus are highlighted and ready to use. If you look at the **Data** menu, you will see that there are **Car-Prefs, subset,** and **CarRatings** menu items at the end. One of these items is check-marked. The check-mark in the menu corresponds to the highlighted icon. These are two different ways of showing you that these data are the "current" data. One and only one data object is the current data.

Use the menu to make the **CarRatings** data the current data. Notice how the highlighting of icons changes.

7. **Explore the Data**. You explore data by using items of the **Data** menu, especially the **Visualize Data**, and **Summarize Data** items. The **Browse Data**, **List Variables**, and **List Observations** can also be used to produce windows which give you details of the data. Each menu item has the same action as the guidemap button with the same name, except that some menu items give you a choice of options, whereas guidemap buttons always give you the default option. We don't explain how to use these menu items in detail here, since there were already explained in section 2.2. However, since these are different data than were used in section 2.2, you should use these menu items to explore these data.

8. **Normalizing Data**.At this point you will normalize the CarRatings data. You do this by selecting the data (clicking on its icon) and choosing the **Transform** menu's **Normalize Data** item. This gives you a dialog box with options for normalizing the data. The default options, which normalize variables to have a mean of zero and a standard-deviation of 1, are appropriate, so simply click "OK".

   As shown in Figure 11, two icons are added to the workmap: First, the Norm procedure icon, is connected to the CarRatings icon, then the Norm-CarRatings data icon is connected to the procedure icon. The procedure icon is a short and wide icon containing mathematical symbols. These symbols represent the mathematical nature of an analysis procedure. The arrows that connect the three icons indicate that the ratings data have flowed through the normalization procedure, which produces a new dataset of normalized ratings. You can use the **Summarize Data** menu

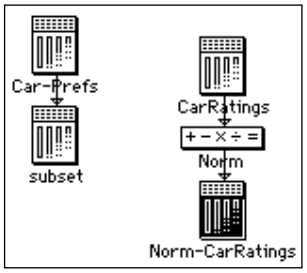

Figure 11: Workmap after normalizing

1. The Macintosh workmap provides popup menus. An option-click on an icon shows a popup menu of things that can be done with that icon. An option-click on the workmap background shows a menu of things that can be done on the workmap.

item if you wish to check the normalization (variable means should be zero and standard deviations should be one).

9. **Transpose Data.** You now return to the subset data to transpose it in preparation for a "preference mapping" analysis (?????). A preference mapping analysis is a principal component analysis of data where the variables are the people making the preference ratings, and the observations are the things being rated (automobiles, in this case). This is the transpose of the normal way data are arranged. For this reason we must transpose our data.

   First, click on the subset data to make it the current data. Then, to transpose the data, choose **Transpose Data** from the **Transform** menu. Now the workmap should look like Figure 12. Note that two icons have been added to the workmap, like with the normalization step. We have a new procedure icon (named Trnsps) and a new data icon (named Trnsps-subset). As before, these icons represent the flow of data, this time of the subset data through the transpose procedure into the new, transposed subset data. Double clicking Trnsps-subset will open its datasheet, revealing that there are now 14 variables, which are the judges, and 17 observations, which are the automobiles. Close the datasheet when you are finished looking at it.

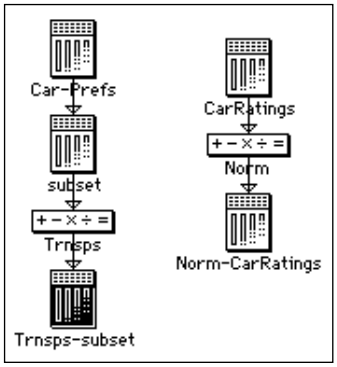

Figure 12: Workmap after Transposing

10. **The Toolbar**. By choosing the **Command** menu's **Show Toolbar** item, you can add a toolbar to the workmap (if the toolbar isn't showing, use the menu item to display it now). The toolbar is shown below. The first toolbar button

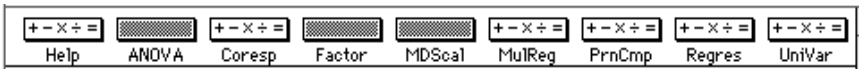

Figure 13: ViSta's toolbar.

   gives help about the workmap. The rest of the buttons provide access to ViSta's analysis procedures. Buttons that have math symbols in them are active and ready to use. Buttons that are gray are not active. Clicking on an active button is the same as choosing the corresponding item from the **Analyze** menu (button names are abbreviations of menu items in the **Analyze** menu). The toolbar can be hidden by choosing the **Command** menu's **Hide Toolbar** item.

11. **Analyze the Transposed Data.** You will now perform a principal component analysis of the transposed data. To do this choose the **Analyze** menu's **Principal Components** item (or click on the toolbar's "PrnCmp" button). The procedure's icon, named PrnCmp, is added to the workmap. It is connected to the subset data icon, indicating that the data are "flowing" into the analysis proce-

dure. A dialog box appears to allow you to set procedure options. The default, to analyze correlations, is appropriate, so just click OK.

When the analysis is finished, a model icon named PCA-Trnsps-subset is added to the workmap. You may have to scroll the workmap window to see it. The workmap now looks like Figure 14. This icon is shaped like a data icon, but it has mathematical symbols as well as variable symbols, representing the fact that a model is the result of applying a mathematical procedure to data. As shown in Figure 14, the model icon is connected to the PrnCmp procedure icon, indicating that the data which flowed into the analysis procedure have been processed by the procedure to produce a model of the data. The model icon is named PCA-Trnsps-subset, indicating that it is a Principal Components model of the transposed subset data.

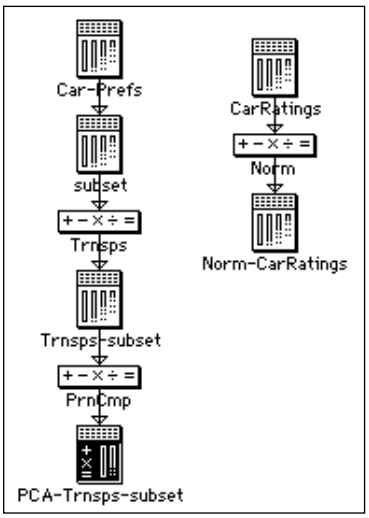

Figure 14: Workmap after Principal Component Analysis

12. **Explore the Model**:[2] Now you can use the **Model** menu's **Visualize Model** and **Report Model** items to see the model of the data.

    Visualize Model: The **Model** menu's **Visualize Model** item produces a visualization of the model -- a model-eye's view of the data. Each model's visualization is unique. The Principal Components visualization is similar to the data visualization already discussed: There are five windows. Two of these windows are identical to data visualization windows (the scatterplot-matrix and observation list windows). The Scree Plot is a plot of fit. It plots the eigenvalue (a measure of fit) for each component. The spinplot and biplot (shown in Figure 15) differ from the data visualization's spinplot and scatterplot, respectively, by the addition of vectors, one for each variable (judge). A vector points from the origin to the side of the space that contains observations with the highest scores on the variable. For these data, a vector points to the side of the space which has the automobiles most preferred by the judge.

    An interesting feature of the model visualization can be seen by using the observation list window to select all of the automobiles made in Europe and Japan. There are five of them -- two Hondas, two Volkswagens, and a Volvo. (They are located in two groups. The selection of the second group can be added to the already selected first group by shift-dragging the cursor over the group.) Note

2. This step assumes you are somewhat familiar with Principal Component Analysis. You can skip this step without any loss of continuity.

that all of the European/Japanese automobiles are located on the right side of the biplot and spinplot. If you select all of the American automobiles you will see that they are on the left side of the space. Since the data that are being analyzed are preference judgments, the principal components analysis is showing us that a major aspect of preference is where automobiles are manufactured. More exploration reveals that expensive automobiles (Cadilac and Lincoln) are located at the bottom-left of the space, while inexpensive automobiles (Pinto, Chevette) are located at the top-left. Thus, this is another aspect of preference.

Finally, the vectors in the biplot and spinplot are also interesting. Since the data are preference judgments, and since each variable is a judge, the vectors point from the origin in the most preferred direction. If you visually project each automobile at right-angles onto a judge's vector, you have the model of that judge's preferences. Thus, the many vectors pointing towards imported automobiles mean that these cars are preferred by many judges. The vectors that point towards the "five o'clock" position are for judges who prefer expensive automobiles. There are not many judges who prefer American automobiles (only the marketing people!) nor are there many who prefer inexpensive automobiles (only the grandmother!). When you are finished, close the spreadplot.

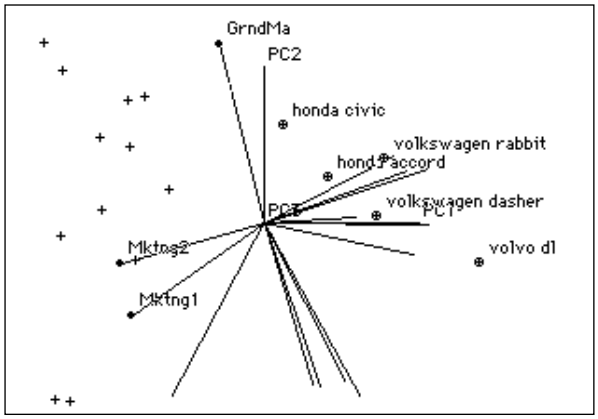

Figure 15: Spinplot of Preference analysis, a Principal Components Analysis of Preferences

Report Model: The **Model** menu's **Report Model** item produces a report of the results of the data analysis, including a list of the variables that were analyzed, of the options that were used, and all of the relevant statistics. For the Principal Components analysis, the report includes the usual information produced by a principal components analysis, including various fit indices, eigenvectors, and scores.

13. **Create Data**: You can create datasets that contain the important numerical results of analyses. You do this by selecting a model icon and then using the **Model** menu's **Create Data** item. Select the PCA-subset model icon and then use the **Create Data** menu item. A dialog box gives you the choice of creating three datasets, one of scores, one of coefficients, and one that is a copy of the data that were analyzed. Set the choices so you only create scores, and then click OK. A new dataset is created and represented by a data icon attached to the model icon. You can use the **Data** menu to explore the scores.

14. **Merging Data Objects.** You can merge two data objects into one data object. This can be done so that either observations or variables are merged.

    Merge Variables: When you use the **Data** menu's **Merge Variables** item, you create a new dataset that has all of the variables from the "current" dataset as well as all of the variables from the "previous" dataset – i.e., the one that was current before the current one.

    Take the following steps to merge the `Scores-PCA-subset` dataset with the `Norm-CarRatings` dataset: First click on the `Norm-CarRatings` data icon, to make it the "current" dataset. Then click on the `Scores-PCA-Trnsps-subset` data icon, making it the new "current" dataset and the `Norm-CarRatings` dataset the "previous" dataset. Now, choose the **Data** menu's **Merge Variables** item, and type a name for the merged dataset like "`Ratings-and-Scores`", clicking "OK". You will see a new data icon appear, with lines attached to the new data set from both of the datasets that have been merged together. The workmap will look like Figure 16.

    Note that to successfully merge variables, the two datasets must have the same number of observations (rows), otherwise, an error message appears. Furthermore, it generally only makes sense to merge variables if the two datasets have the same observations in the same order, not only the same number of observations. ViSta, however, does not check for this condition.

    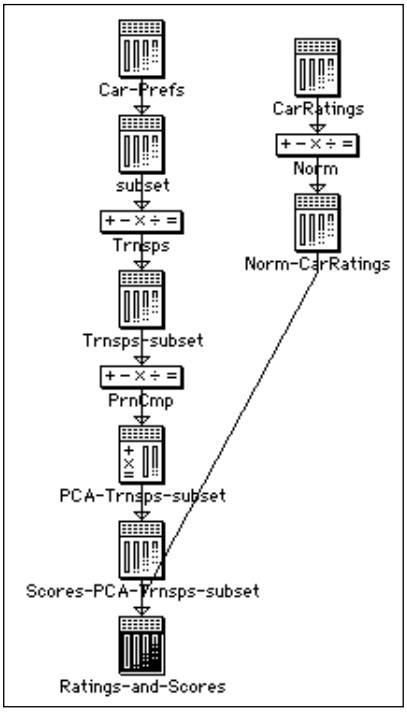

    Figure 16: Workmap after creating and merging datasets

    Merge Observations: The **Data** menu's **Merge Observations** item works in a fashion similar to the variable merging item. The item creates a new dataset that has observations from the current dataset as well as observations from the previous dataset. The two datasets must have the same number of variables (and, usually, should have the same variables in the same order).

15. **Save Data**: You can save a dataset by using the **Data** menu's **Save Data** item. To do this, select the dataset you wish to save, then use the menu item. For this tutorial, click on the `Ratings-and-Scores` data icon. Then choose the **Save Data** menu item. You will see a dialog box that lets you enter a name for the file the data will be saved in. Type in the name `ratscors`, then, click **save** to save the data. Now that

you have saved these data, you can, at any later time, load these data back into ViSta by using the **Data** menu's **Load Data** menu item.

16. **Save Model:** Save the model by selecting the `PCA-subset` model icon and then selecting the **Model** menu's **Save Model** menu item. You will see a dialog box. Type `pcacarpf` and click **Save**. The model is now saved and can be loaded in at a later time using the **Load Model** item.
17. **Load Model**: Now, load the model that you just saved back into ViSta. To do this, use the **Model** menu's **Load Model** item, then use the open file dialog box to select the file you just saved. Click **Open** and the model will be loaded. Notice that three new icons appear in the workmap. The first icon is a data icon for the data being modeled. The second is a procedure icon for the principal components analysis procedure. The third is a model icon for the model of the data. The three icons emphasize that a model is a specific data analysis procedure's representation of a specific set of data.
18. **Hiding the Workmap**. If you don't want to see the workmap, you can click its close box. This does not destroy the session's work structure, it only hides it. If you want the workmap and its structure to again be visible, select the **Show Workmap** item from the **Command** menu. Hiding the workmap improves the response time of the system, especially when the workmap is complex.
19. **Quitting ViSta**. To quit the analysis session, choose the **Quit** item from the **File** menu. ViSta will ask you if you wish to save data or models. If you do, click **Save**, then use the **Data** menu's **Save Data** item or the **Model** menu's **Save Model** item to save those data or models you wish to save. Then choose **Quit** again, and click **Quit** in the dialog box.

2.4 Using ViDAL

When ViSta is run, it can show as many as three windows. Two of these, the guidemap and the workmap, form ViSta's structured graphical user interface. We have demonstrated these in the preceding sections. The third is the listener window. It will be demonstrated in this section.

ViDAL, ViSta's Data Analysis Language, is one of ViSta's primary features. ViDAL lets users type at the keyboard rather than point and click at the graphical interface. The language consists of statements which correspond to menu items. The correspondence is straight-forward: The statement is identical to the menu item, except that spaces are replaced by dashes. For example, the **Show Variables** menu item is represented in the language by the `(show-variables)` function. Nearly everything that can be done by point-and-click can also be done by typing.

ViDAL can be typed into the listener window. Since everything that can be done by menus can also be done by typing, all of the tutorial presented in sections 2.2 and 2.3 can be performed by typing in the listener window. In addition, any Lisp state-

ment can be typed into the listener. Since ViSta's language consists entirely of Lisp statements, any mixture of Lisp, Lisp-Stat and ViDAL statements can be typed, giving you keyboard access to all aspects of ViSta, Lisp *and* Lisp-Stat.

In this section we present the statements that can be typed to perform the tutorial in the previous section. The step numbers and headings used in this section correspond to those in sections 2.2 and 2.3.

1. **Show the GuideMap.** While you can show the guidemap by typing `(show-guidemap)`, there is no reason to do this since you will not be using it.
2. **Load a datafile.** The `carprefs` data may be loaded from the example1.lsp datafile by typing:
   ```
   (load-data "example1")
   ```
3. **Explore the Data**. The data may be explored by typing the commands
   ```
   (browse-data)
   (visualize-data)
   (summarize-data)
   ```
   Note that the (visualize-data) function simply displays the visualization. To visually explore the data, use the mouse to point and click on various graphs.
4. **Subset the Data.** First, you list the variable names and observation labels by typing:
   ```
   (list-observations)
   (list-variables)
   ```
   Then, to select the observations that were selected in the tutorial by pointing and clicking in the observations window, you type:
   ```
   (select-observations '(
      "pgmr1" "pgmr2" "pgmr3" "pgmr4" "pgmr5" "pgmr6"
      "pgmr7" "pgmr8" "Prsdnt" "pgmr9" "pgmr10"
      "Mktng1" "GrndMa" "Mktng2"))
   ```
5. **Create Data Subset.** A new dataset, named `subset`, which only contains the selected variables, can be created by typing
   ```
   (create-data "subset")
   ```
6. **Load another datafile**. The `carratings` data are loaded by typing
   ```
   (load-data "example2")
   ```
7. **Explore the Data.** The `carratings` data can be explored using the same commands as those in step 3.
8. **Normalize the Data**. Type `(normalize-data)` followed by `(summarize-data)` to check on the normalization.
9. **Transpose the Data.** First, make the `subset` data the current data by typing
   ```
   (setcd subset)
   ```
   Here, `setcd` stands for "set current data". Then transpose the `subset` data by typing

```
(transpose-data)
```

10. **Show the Toolbar.** If the toolbar isn't showing in the workmap, type
    ```
    (show-toolbar)
    ```
11. **Analyze the Data.** To analyze the transposed subset data type:
    ```
    (principal-components :data trnsps-subset)
    ```
    Alternatively you could use the `setcd` function to select the data that you want to analyze, and then analyze the current data. This would involve typing
    ```
    (setcd subset)
    (principal-components)
    ```
12. **Explore the Model**. You can explore the principal components model of the carpref data by typing
    ```
    (visualize-model)
    (report-model)
    ```
    The `(visualize-model)` function simply displays the visualization. You then must explore the data by pointing and clicking on the visualization graphs. There are no keyboard statements that you can type to do this.
13. **Create Data**: You create default output datasets from the principal components analysis by typing `(create-data)`.
14. **Merging Data Objects**. You merge data objects by typing three functions:
    ```
    (setcd Norm-CarRatings)
    (setcd Scores-PCA-trnsps-subset)
    (merge-variables "Ratings-and-Scores")
    ```
    The first function sets the current-data to Norm-CarRatings. The second function sets the current-data to scores-pca-subset and makes the previous data Norm-CarRatings. Then the third function merges variables of the current data object with the previous data. Note that the name of the new data object is placed in quotes, but that whenever an already existing data object is referred to it is not placed in quotes (since Lisp-Stat knows it by its symbolic name).
15. **Save Data**: You save the new data by typing
    ```
    (save-data "ratscors")
    ```
    This saves the current data as the indicated file.
16. **Save Model**: You can also save the new model by typing the following two statements. The first expression sets the current-model to be pca-carprefs, while the second expression saves the model:
    ```
    (save-model "pcacarpf")
    ```
17. **Load Model**: You can load the model you just saved by typing
    ```
    (load-model "pcacarpf")
    ```
18. **Hiding the Workmap:** You can hide the workmap by typing
    ```
    (hide-workmap)
    ```
19. **Quitting ViSta**: Simply type `(quit)`.