

TECHNOLOGY
SUPPORT

JMP PRO 14

SHORTCOURSE HANDOUT



TEXAS TECH UNIVERSITY
Information Technology Division

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JMP Pro 14

ShortCourse Handout

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This ShortCourse is designed to acquaint you with the basics of **JMP Pro 14** under **Windows**. For more detailed information, please consult the official JMP documentation. This ShortCourse assumes that the users are familiar with **Elementary Statistics**.

Texas Tech University JMP Campus License

- The latest version of **JMP Pro** software is available at no cost to TTU students, faculty, and staff members for download @ <http://www.depts.ttu.edu/itts/software/index.php>
- If you have any questions or need assistance, please contact IT Help Central at 742-HELP (4357) or ithelpcentral@ttu.edu

Credits

This document was adapted from the following resources:

- **Discovering JMP 12®**, Copyright © 2015, SAS Institute Inc., Cary, NC, USA http://www.jmp.com/support/help/Discovering_JMP.shtml (accessed 7/8/2016)
- **JMP® Learning Library** http://www.jmp.com/en_us/learning-library.html (accessed 7/8/2016)
- **Tutorials** for performing basic statistical tasks, including links to datasets <http://web.utk.edu/~cwiek/201Tutorials/>, (accessed 7/8/2016).
- **JMP Start Statistics: A Guide to Statistics and Data Analysis Using JMP**, Fifth Edition, SAS Publication.

Introduction

JMP (pronounced “jump”), a product from **SAS**, is a powerful and interactive data visualization and statistical analysis program. JMP is used by researchers to perform a wide range of statistical analyses and modeling. You can use JMP to quickly uncover trends and patterns in data, create interactive graphs and charts to explore your data and discover relationships. JMP dynamically links data with graphics for interactive exploration, understanding, and visualization of the data. This allows one to click on any point in a graph, and see the corresponding data point highlighted in the data table, and other graphs. It can work with variety of data formats, such as **text** files, Microsoft **Excel** files, **SAS** datasets, and other databases. It supports Windows, Macintosh and Linux operating systems. You can use JMP to explore and summarize large amounts of data, and develop powerful statistical models to predict the future.

This ShortCourse provides a general introduction to the JMP software. It introduces the structure of the JMP Window; preparing and manipulating data; using interactive graphs to learn from your data; and performing simple statistical analyses.

This ShortCourse assumes that the users are familiar with **Elementary Statistics**.

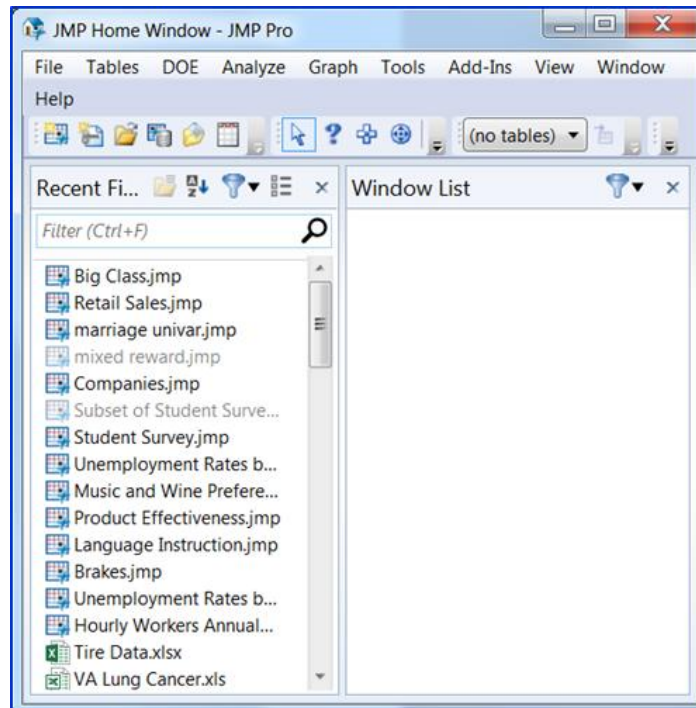
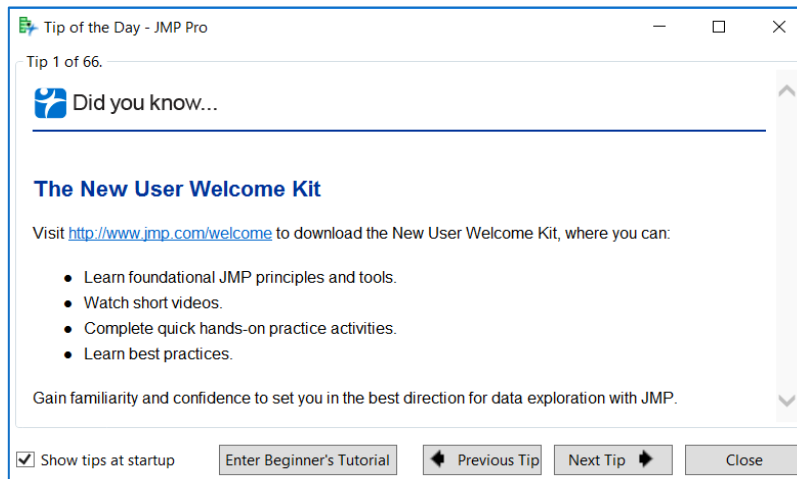
Course Objectives

After completing this ShortCourse, you should be able to:

- Create a data table;
- Change the modeling type of a variable;
- Create different types of charts;
- Calculate Numerical Summaries of Quantitative Data;
- Perform One Sample t-Test;
- Perform Paired t-Test;
- Perform Two Sample t-Test; and
- Save Results in Journals.

Starting JMP

- **Start -> All Programs -> JMP 14 -> JMP Pro 14**
- On Windows, opening view of JMP, is known as the **JMP Home Window**.
- You will see "**Tip of the Day**" window. The Tip of the Day window contains **66 tips**. And every time you open JMP, it will advance to the next tip of the day if you do have this set to **Show tips at start up**. You can use the **Next Tip** or **Previous Tip** to scroll through these. If you don't want this to appear every time you open JMP, uncheck the box in the lower left corner next to "**Show tips at startup**", and close this window.



JMP Help

You can open JMP Help in several ways.

- Search and view JMP Help (on Windows) using the **Help > Help Contents**, **Search Help**, and **Help Index** options.
- Press the **F1 key**.
- To get help on a specific part of a data table or report window, select the **Help** tool from the **Tools** menu and then click anywhere in a data table or report window to see the Help for that area.

Opening a JMP Data Table

- From **Help** menu, select **Sample Data Library**. The data tables are organized in Outlines by subject matter, also in alphabetical list.
- Double-click on **Linnerud.jmp** data file.
- Also from HELP menu -> Sample Data provides an Index to some Sample Data. Also Alphabetical List of All Sample Data Files.

The screenshot shows the JMP Pro interface with a data table named 'Linnerud'. The table has the following columns: Age, Weight, O2 Uptake, Run Time, Rest Pulse, and Run. The data is organized into rows, with a summary section at the bottom showing 31 total rows, 0 selected, 0 excluded, 0 hidden, and 0 labelled.

	Age	Weight	O2 Uptake	Run Time	Rest Pulse	Run
1	38	81.87	60.055	8.63	48	
2	38	89.02	49.874	9.22	55	
3	40	75.07	45.313	10.07	62	
4	40	75.98	45.681	11.95	70	
5	42	68.15	59.571	8.17	40	
6	44	85.84	54.297	8.65	45	
7	43	81.19	49.091	10.85	64	
8	44	73.03	50.541	10.13	45	
9	44	89.47	44.609	11.37	62	
10	44	81.42	39.442	13.08	63	
11	45	66.45	44.754	11.12	51	
12	45	87.66	37.388	14.03	56	
13	47	79.15	47.273	10.60	47	
14	47	77.45	44.811	11.63	58	
15	48	91.63	46.774	10.25	48	
16	48	61.24	47.920	11.50	52	
17	49	81.42	49.156	8.95	44	
18	49	76.32	48.673	9.40	56	

Summary:

Rows	Count
All rows	31
Selected	0
Excluded	0
Hidden	0
Labelled	0

JMP Data Table

A data table is a collection of data organized in rows and columns. It is similar to a Microsoft Excel spreadsheet, but with some important differences (Discovering JMP 12 book, page 49):

Formulas	
Excel	Formulas are applied to individual cells.
JMP	Formulas are applied only to entire columns. “Calculating Values with Formulas” on page 66 in the <i>“Working with Your Data”</i> chapter describes how to use formulas.
Column Names	
Excel	Column names are part of the grid. Numbered rows and labeled columns extend past the data. Numeric and character data reside in the same column.
JMP	Column names are not part of the grid. There are no rows and columns beyond the existing data. The grid is only as big as the data. A column is either numeric or character. If a column contains both character and numeric data, the entire column’s data type is character, and the numbers are treated as character data.
	“Understanding Modeling Types” on page 120 in the <i>“Analyzing Your Data”</i> chapter describes how data type influences platform results.
Tables and Worksheets	
Excel	A single spreadsheet contains several tables, or worksheets.
JMP	JMP does not have the concept of worksheets. Each data table is a separate .jmp file and appears in a separate window.
Data Grid	
Excel	Data can be located anywhere in the data grid.
JMP	Data always begins in row 1 and column 1.
Analysis and Graph Reports	
Excel	All data, analyses, and graphs are placed inside the data grid.
JMP	Results appear in a separate window.

The **JMP data table** has **four components**. the **data grid**, **Columns panel**, **Rows panel**, and **Table panel**.

- The **data grid** is arranged in **columns** (variables) and **rows** (observations).
- In the **Columns panel** (on the left), you can select a column or columns, change the name of a column, and move one or more columns to a different location in the data grid. Icons in the Columns panel indicate the modeling type of each variable.
- In the **Rows panel** (on the left), you can determine the total number of rows and the number of rows selected, if any.
- In the **Table panel** (on the left), you can add a **table variable command** that can store explanations or notes about the data stored in the data grid. Many of the sample data files have a table variable called **Notes**.

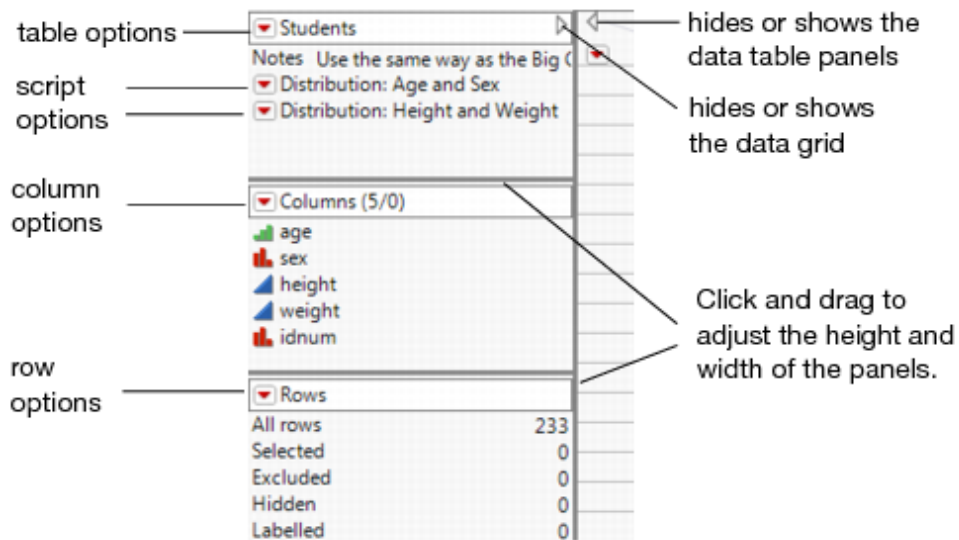
Red Triangle Menus

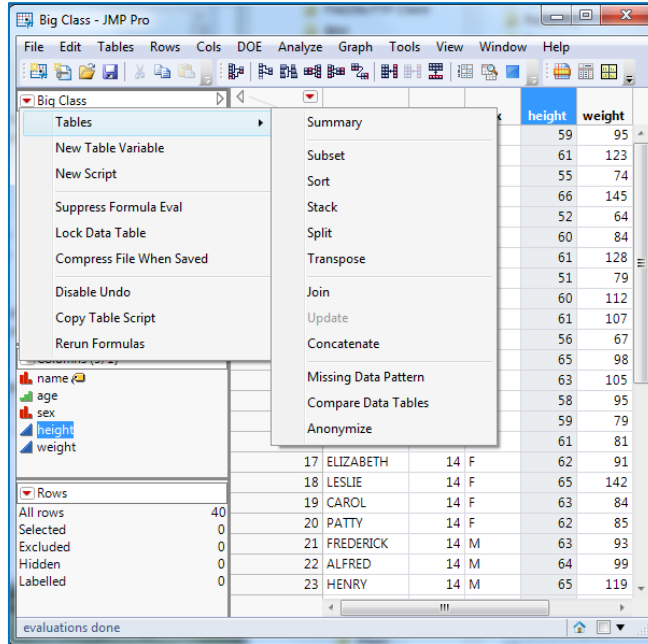
Commands are always available by **right-clicking** and through red triangle menus



(downward pointing red icon).

Active Areas of a JMP Data Table





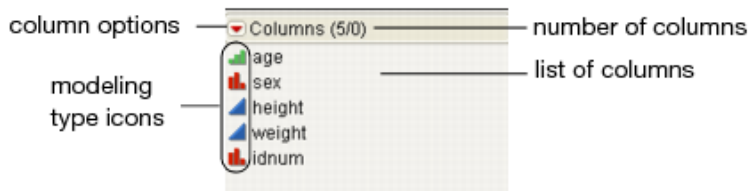
The Columns panel contains the following information:

- **Column** options (same options as the **Cols** menu)
- Total number of columns and number of columns selected in the data table
- A list of columns found in the data table
- **Icons** indicating each column’s **modeling type**. Click on an icon to change the modeling type.
- Icons representing **characteristics** and **properties** assigned to the columns

About Data Types and Modeling Types

A column in a JMP data table can contain different types of information. However, all information in a single column must have the same data and **modeling types**.

- When you import data, JMP guesses which data and modeling types to use. Therefore, you should verify that JMP has guessed correctly.
- When you manually insert data into JMP, you should assign a data type and a modeling type at that time.






Understanding JMP Modeling Types

Data can be of different types. JMP refers to this as the modeling type of the data.

Following table describes the three modeling types in JMP.

Modeling Types

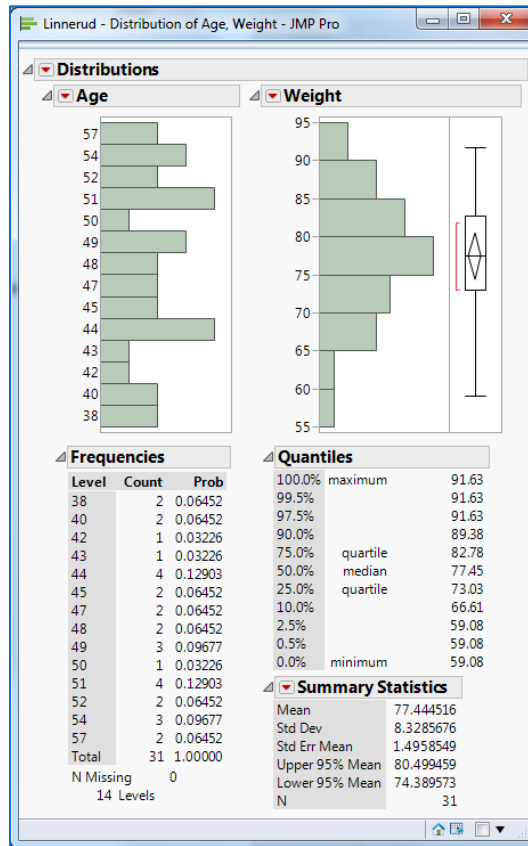
Modeling Type	Description	Examples	Specific Example
 Continuous	Numeric data only. Used in operations like sums and means.	Height Temperature Time	The time to complete a test might be 2 hours, or 2.13 hours.
 Ordinal	Numeric or character data. Values belong to ordered categories.	Month (1,2,...,12) Letter grade (A, B, ..., F) Size (small, medium, large)	The month of the year can be 2 (February) or 3 (March), but not 2.13. February comes before March.
 Nominal	Numeric or character data. Values belong to categories, but the order is not important.	Gender (M or F) Color Test result (pass or fail)	The gender can be M or F, with no order. Gender categories can also be represented by a number (M=1 and F=2).

Note: The ordinal and nominal modeling types are treated the same in most analyses, and are often referred to collectively as **categorical**.

Modeling Type Results

Different modeling types produce different results in JMP. To see an Example:

- Using the **Linnerud.jmp**, select **Analyze -> Distribution**.
- Select **Age** and **Weight** and click **Y, Columns**.
- Click **OK**.



Although Age and Weight are both numeric variables, they are not treated the same.

Comparison of Results for weight and age

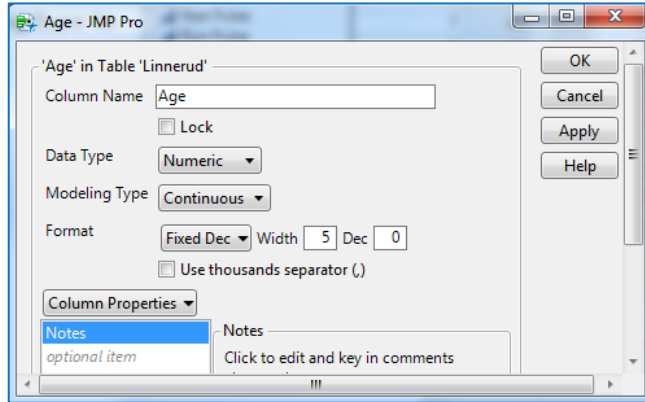
Variable	Modeling Type	Results
Weight	Continuous	Histogram, Quantiles, and Summary Statistics
Age	Ordinal	Bar chart and Frequencies

Changing the Modeling Type

To treat a variable differently, change the modeling type. For example, in [Distribution Results for Age and Weight](#), the modeling type for Age is ordinal.

Remember that for an **ordinal variable**, JMP calculates **frequency counts**. To find the **average age** instead of frequency counts. Change the modeling type to **continuous**, which shows the mean age.

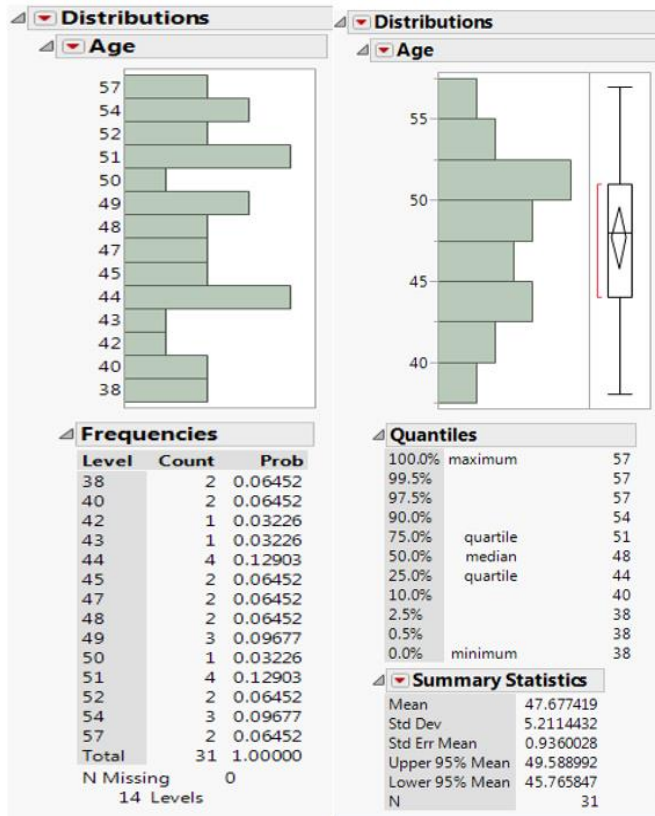
- Double-click the Age column heading.
- Change the **Modeling Type** to **Continuous**.
- Click **OK**.
- Select **Analyze** -> **Distribution**.
- Select **Age** and **Weight** and click **Y, Columns**.
- Click **OK**.












Notice that Different Modeling Types for age produces different results, when Age is **ordinal** and **continuous**. When age is ordinal, you can see the frequency counts for each age.

For example, age 48 appears 2 times.

When age is continuous, you can find the mean age, which is nearly 48 (47.677)

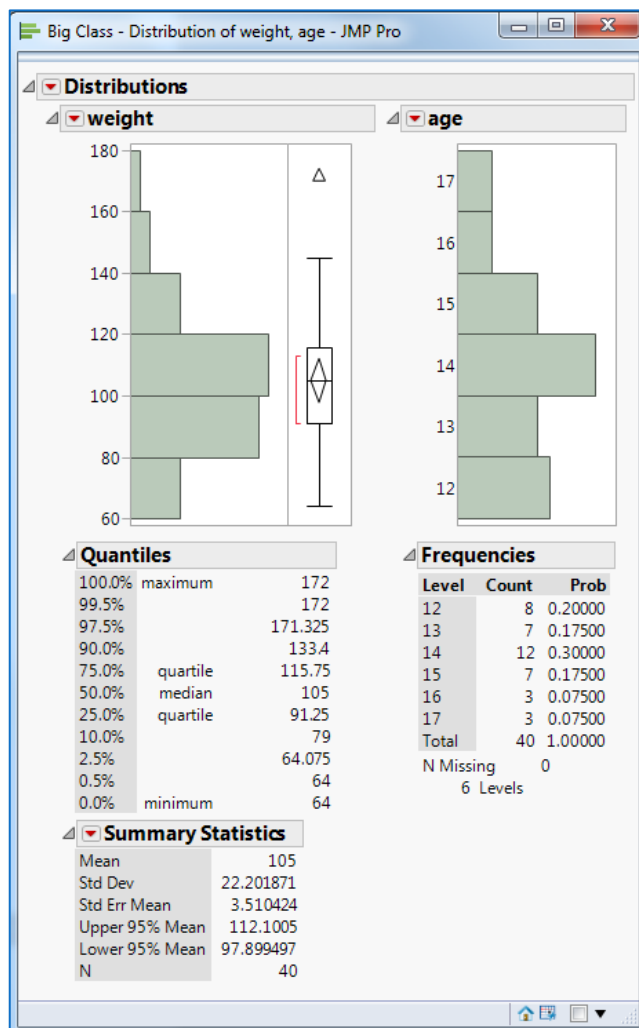


Icons that can appear in the Columns panel are described as follows:

-  Indicates that points on plots corresponding to the column are labeled by the value instead of the row number. See Label Rows and Columns in Enter and Edit Data.
-  Indicates that the column is excluded from the calculations. See Exclude Rows and Columns in Enter and Edit Data.
-  Indicates that the column is not included in graphs. See Hide Rows and Columns in Enter and Edit Data.
-  Can be X or Y. Indicates that the column has been assigned the preselected role of x or y. See Assign a Preselected Analysis Role in The Column Info Window.
-  Indicates that the column contains one or more properties. Click to reveal a list of properties the column contains.
-  Indicates that the values in the column result from a formula. When formula evaluation is suppressed, the icon appears gray. Double-click to view and edit the formula. See Use Formula Editor Options in Formula Editor.
-  Indicates that the range check or the list check option is turned on. Click to view and edit the range or list. See Range Check in The Column Info Window and List Check in The Column Info Window.
-  Indicates that the column has been assigned the preselected role of *weight*. See Assign a Preselected Analysis Role in The Column Info Window.
-  Indicates that the column has been assigned the preselected role of *frequency*. See Assign a Preselected Analysis Role in The Column Info Window.

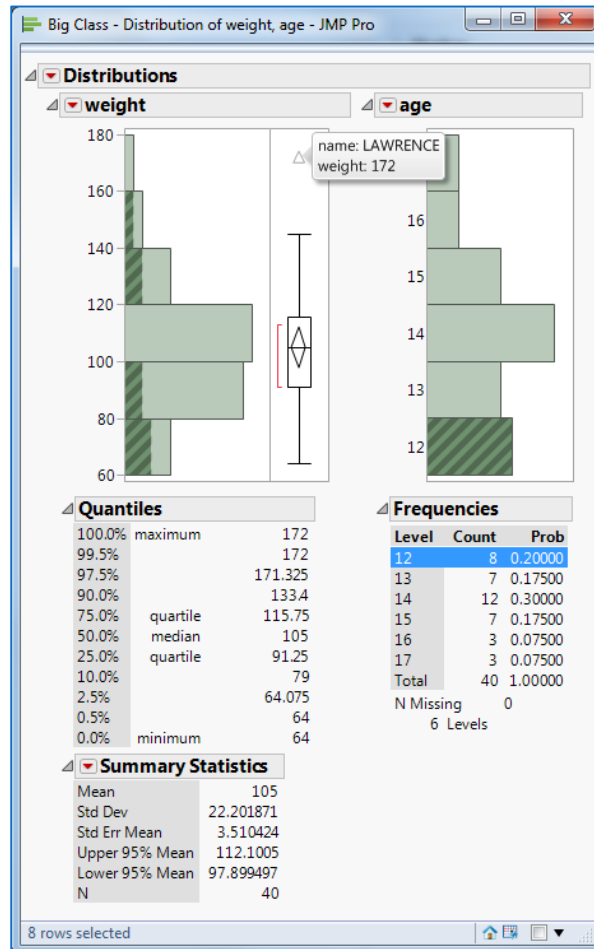
To find the distribution of the weight and age columns in the Big Class table

- From **Help** menu, select **Sample Data Library**.
- Double-click on **Big Class** data file.
- From **Analyze** menu and select the **Distribution** command. This is called **launching the Distribution platform**. The launch dialog appears, prompting you to choose the variables you want to analyze.
- Click on **weight** to highlight it in the variable list on the left of the dialog.
- Click **Y, Columns** to add it to the list of variables on the right of the dialog, which are the variables to be analyzed.
- Similarly, select the **age** variable and add it to the analysis variable list.
- **Note:** The term variable is the name of the column in the data table. Picking variables to fill roles is sometimes called **role assignment**.
- Click **OK**.



Interacting with the Surface of the Report

- All JMP reports are live objects (works with interactivity).
- Click on one of the histogram bars, for example, the age bar for 12-year-olds.
- The bar is highlighted, along with portions of the bars in the other histogram and certain rows in the data table corresponding to the highlighted histogram bar. This is the dynamic linking of rows in the data tables to plots.
- On the right of the weight histogram is a box plot with a single point near the top (Outlier).
- Move the mouse over that point to see the label, LAWRENCE, appear in a popup box.
- Click on the point in the plot.



Disclosure Icons

- Each report title is part of the analysis presentation outline.
- Click on the diamond on the side of each report title to alternately open and close the contents of that outline level.

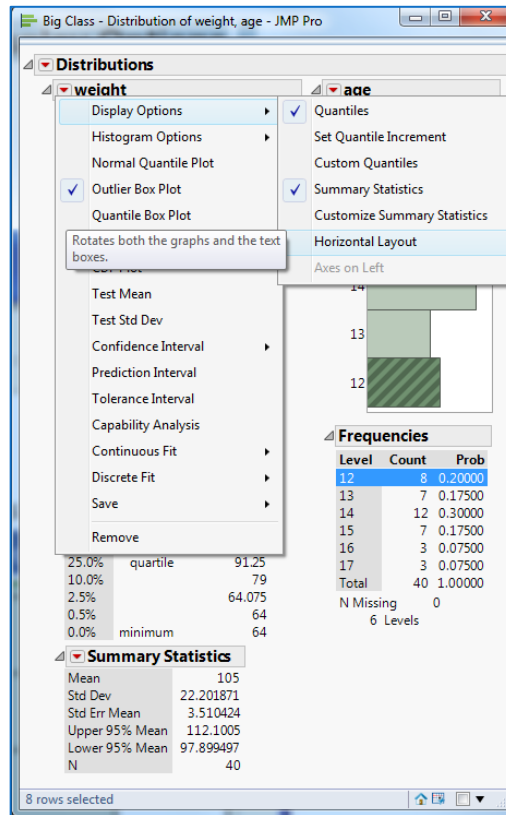


Disclosure icons open and close sections of the report.

Contextual Popup Menus


- There is a small red triangle (a hot spot) on the title bar at the top of the analysis window that accesses popup menu commands for the analysis. This popup menu has commands specific to the platform.

- Hot spots on the title bars of each histogram contain commands that only influence that histogram. For example, you can change the orientation of the graphs in the **Distribution platform** by **checking** or **unchecking Display Options -> Horizontal Layout**
- Click on one of the menus next to weight or age and select **Display Options -> Horizontal Layout**.





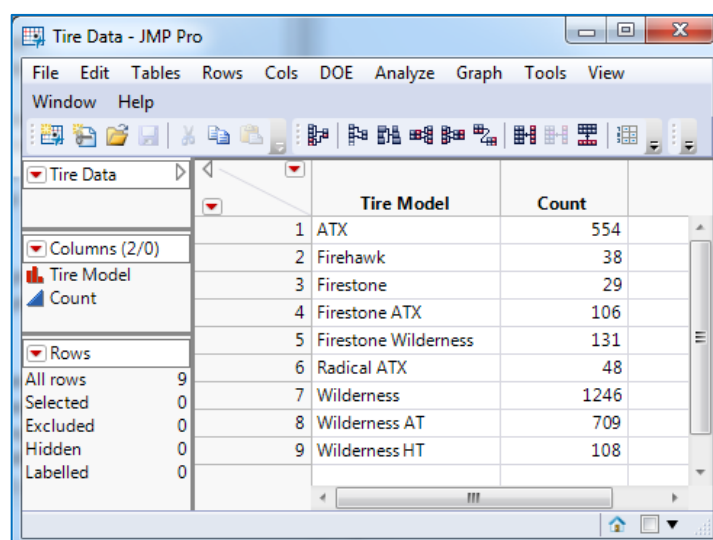
Click on the Blue bar of the Report to see the Tool Pallet.

- The Hand (Graber) tool is for grabbing objects. Select the grabber, then click and drag in a continuous histogram.
- The brush is for highlighting all the data in a rectangular area. Try getting the brush and dragging in the histogram. To change the size of the rectangle, Alt-drag (Windows).
- The lasso is for selecting points by roping them in.

- The crosshairs  are for sighting along lines in a graph. You can measure points and distances in graphs, or easily find the exact value, or coordinates, of points and distances on plots and graphs. To do this, click the crosshairs tool and click and hold anywhere on a graph. The coordinate values appear where the crosshairs intersect the vertical and horizontal axis as you drag the crosshairs within a plot.
- The magnifier is for zooming in to certain areas in a plot. Hold down the Alt (Windows) key and click to restore the original scaling.

Creating Data Table, Tire Model

- Using the **Home Window**, click on the **File** menu -> **New** -> **Data Table**
- Click at the **Column 1** heading, type **Tire Model**, and then press the **Enter** key.
- In the cell just below the column heading **Tire Model**, type **ATX**. Continue entering the tire models, pressing the **Enter** key after each entry.
- Double click just to the right of the column heading **Tire Model**, to add another column (**Column 2**)
- Name this column **Count** and enter the data
- **Save** this file as **Tire Data**. You will notice that under **Columns** (2/0) the **Tire Model** column has **red vertical bars**  next to it, indicating that this column contains character data. The **Count** column has a **blue sideways arrowhead** , indicating that this column contains quantitative data.



The screenshot shows the JMP Pro interface with a data table titled 'Tire Data'. The table has two columns: 'Tire Model' and 'Count'. The 'Tire Model' column is marked with red vertical bars, indicating character data, and the 'Count' column is marked with a blue sideways arrowhead, indicating quantitative data. The data rows are as follows:

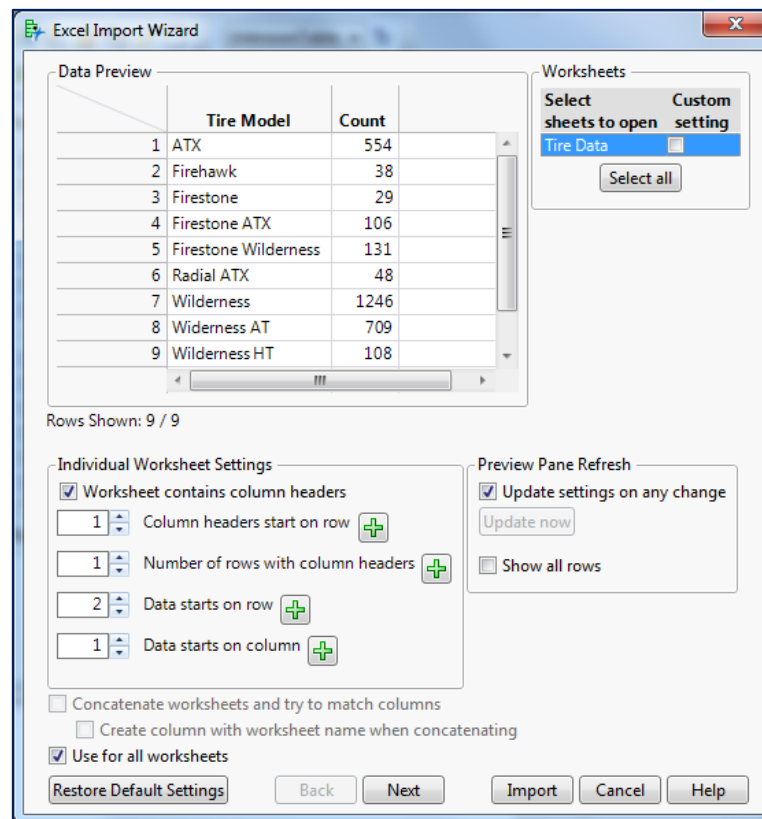
	Tire Model	Count
1	ATX	554
2	Firehawk	38
3	Firestone	29
4	Firestone ATX	106
5	Firestone Wilderness	131
6	Radical ATX	48
7	Wilderness	1246
8	Wilderness AT	709
9	Wilderness HT	108

Exporting a JMP File to Excel

- From **File** menu select **Save As...**
- Change the **Save as type** box to **Excel Workbook (*.xlsx; *.xls)**.
- Click **Save**.

Importing an Excel File into JMP

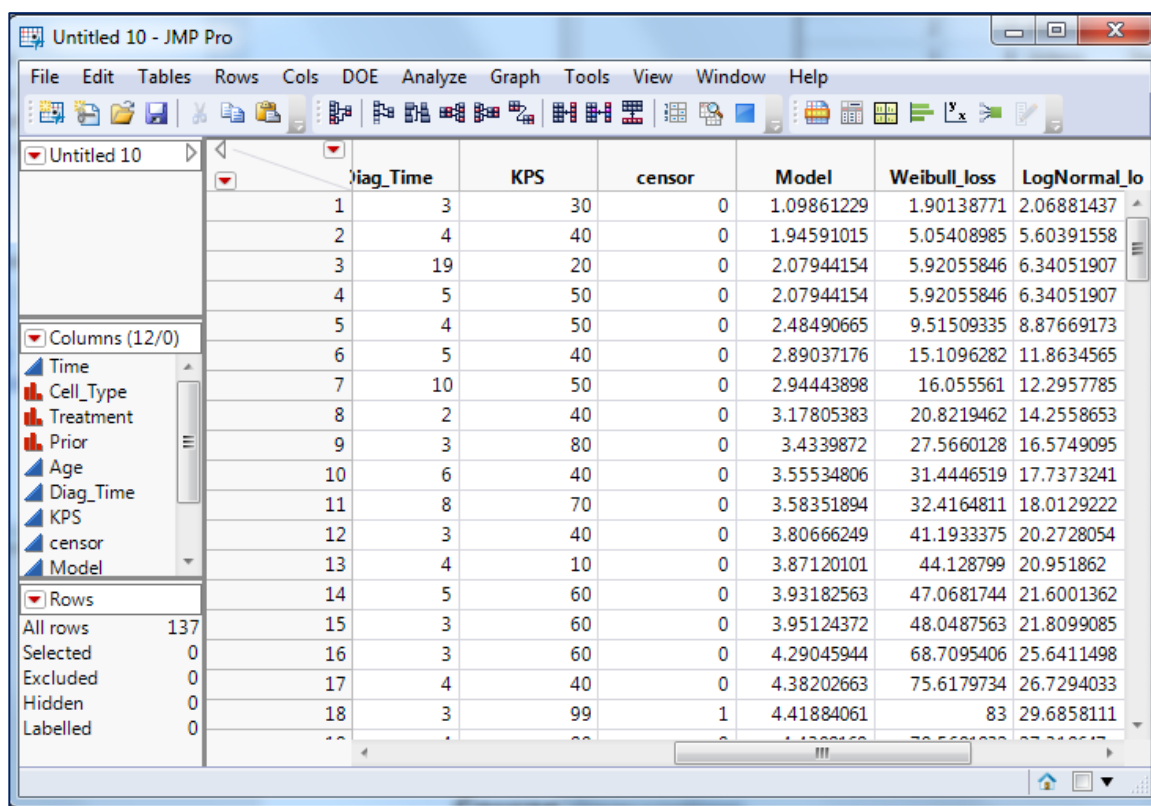
- From the **File Menu**, Select the **Open...**
- Navigate to the **Tire Data in Excel** file.
- Double click the **Tire Data in Excel** file.
- Click **Import**.



Copying and Pasting Data

You can move data into JMP by copying and pasting from another application, such as Excel or a text file.

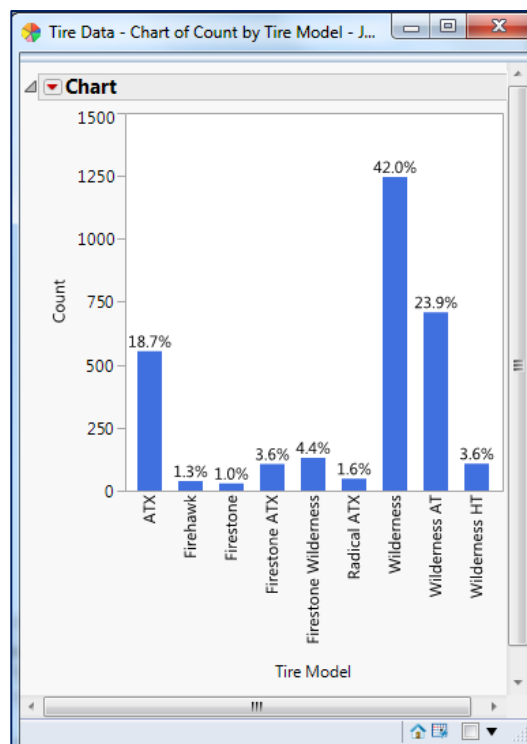
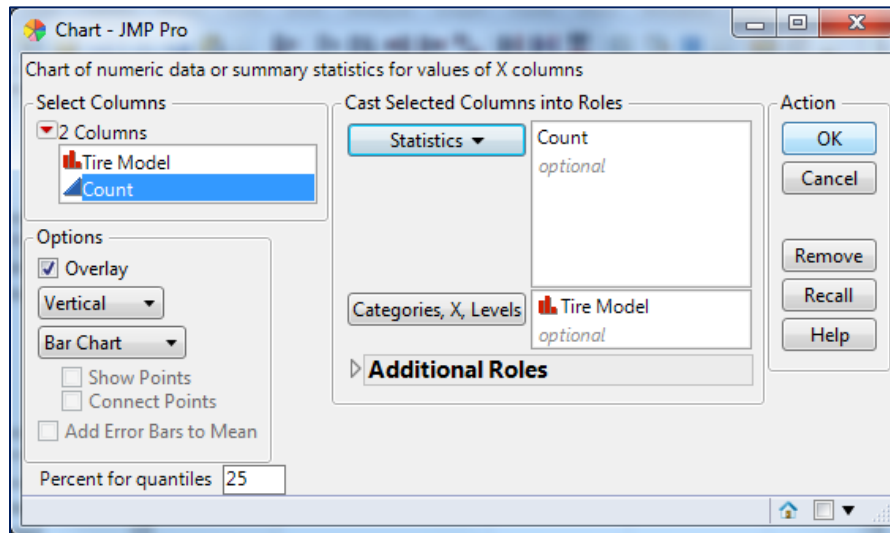
- Open the **VA Lung Cancer.xls** file in Excel, located in the **Sample Import Data** folder (C:\Program Files\SAS\JMPPRO\14\Samples\Import Data\). In the ATLC computer labs is located at <Z:\facilities\Shortcourses\ShortCourse Materials\SAS and SPSS\SAS\JMP Pro\Samples\Import Data>.
- Click the **Select all** button, to select all of the rows and columns, **including the column names**. There are 12 columns and 138 rows.
- Click **Next -> Import**.
- From **Edit** menu -> **Select all**
 - **Edit -> Copy with column names**.
- In JMP, select **File > New > Data Table** to create an empty table.
- From **Edit** menu > **Paste with Column Names** to paste the data and column headings. **Note:** If the data that you are pasting into JMP does *not* have column names, then you can use **Edit > Paste**.



Creating a Column Chart, using the [Tire Model](#) Data File

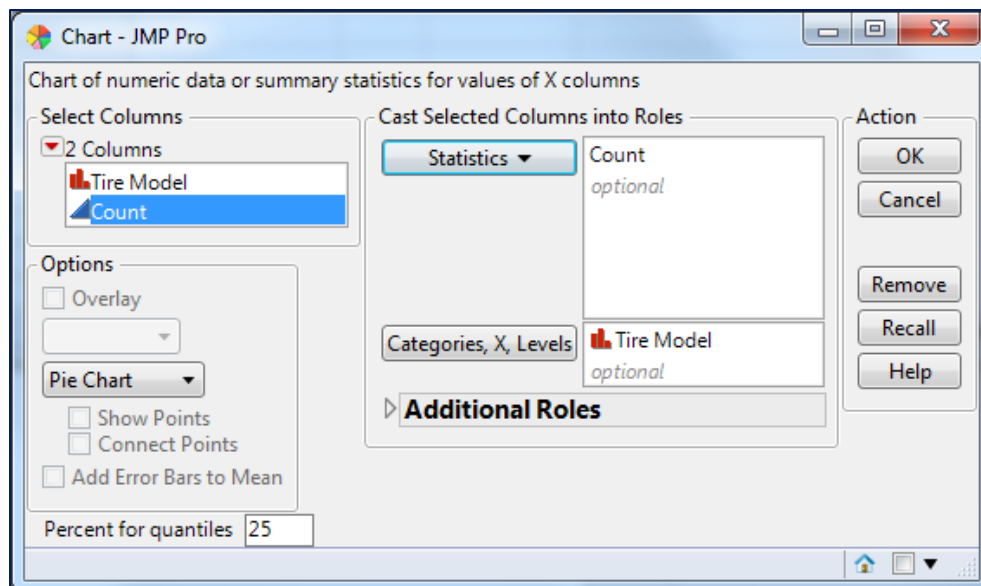
- Open the **Tire Data**.
- Click the **Graph** menu and select **Chart**
- Click the column **Tire Model**, then click the **Categories, X, Levels** button.

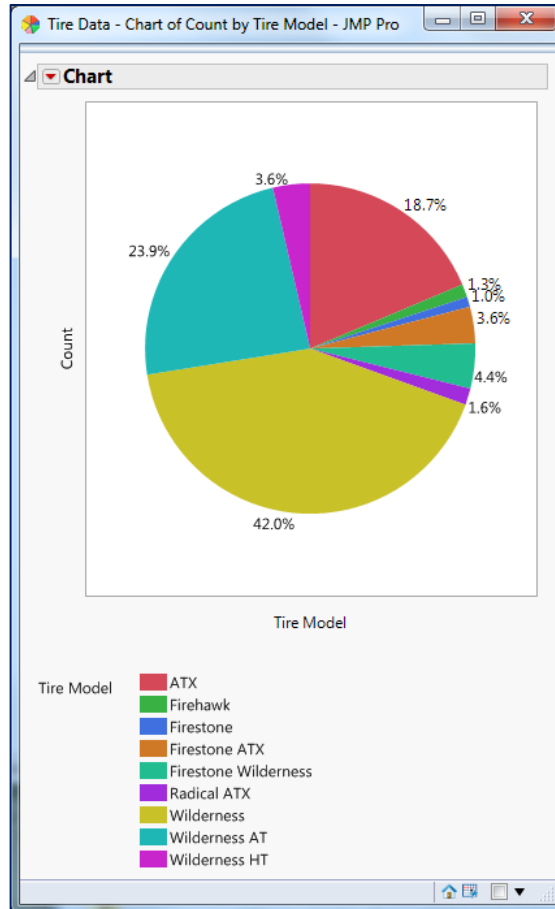
- Click the column **Count**, then click the down arrow next to **Statistics** and select **Data**. Click **OK**.
- To display the percent of the total each category represents, click on the red down arrow next to **Chart** and select **Label Options**, and then **Label by Percent of Total Values**.
- To adjust the plot frame but preserve the proportions (aspect ratio), hold down the Shift key and click-and-drag the corner of the frame.



Creating a Pie Chart, using the [Tire Model](#) Data File

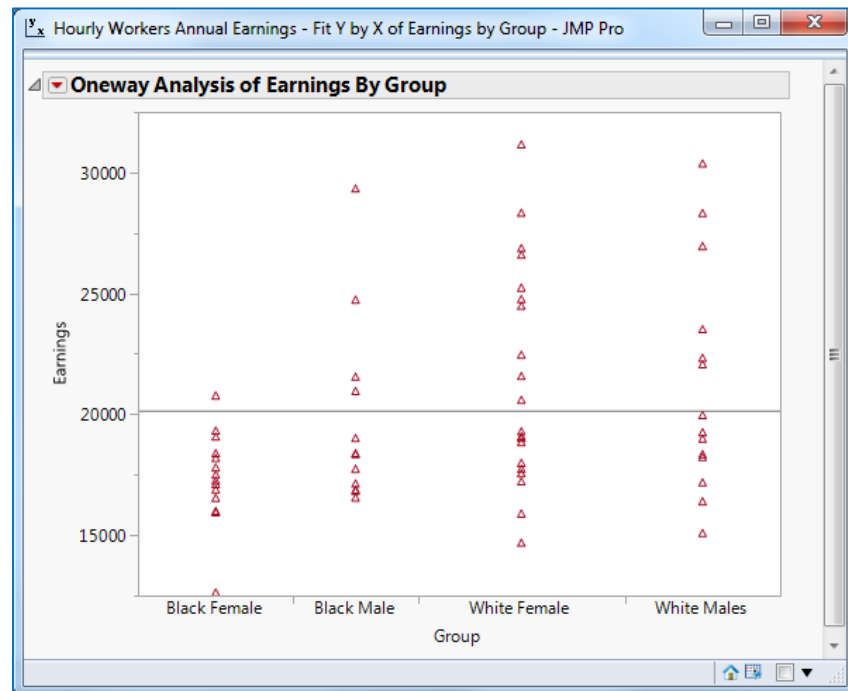
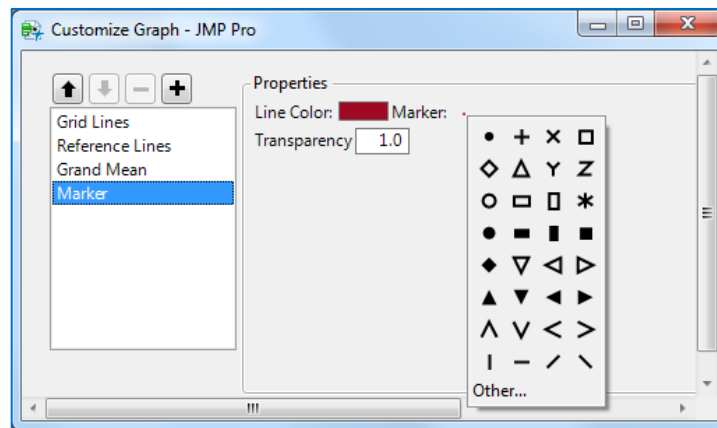
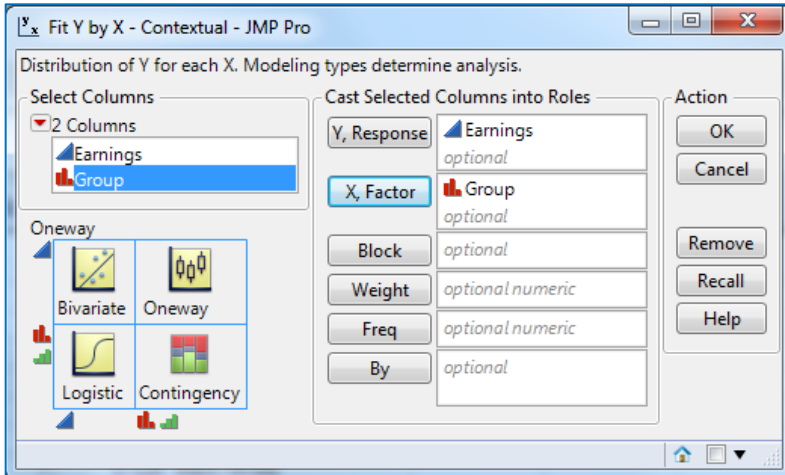
- Click the **Graph** menu and select **Chart**
- Click on the down arrow next to **Bar Chart** and select **Pie Chart**.
- Click the column **Tire Model**, and then click the **Categories, X, Levels** button.
- Click the column **Count**, and then click the down arrow next to **Statistics** and select **Data**.
- Click **OK**.
- Right-click the chart **Legend** -> **Legend Settings ...** -> select **Vertical** (for **Item Direction:**) -> click OK.
- To display the percent each "slice" of the pie accounts for, click on the red down arrow next to **Chart**, select **Label Options**, and then select both **Show labels** and **Label by Percent of Total Values**.
- To keep the percent labels from overlapping, position your cursor in the lower right corner of the white portion of this graphic. When your cursor changes to a 2-headed arrow at a 45-degree angle, click and drag to the right.

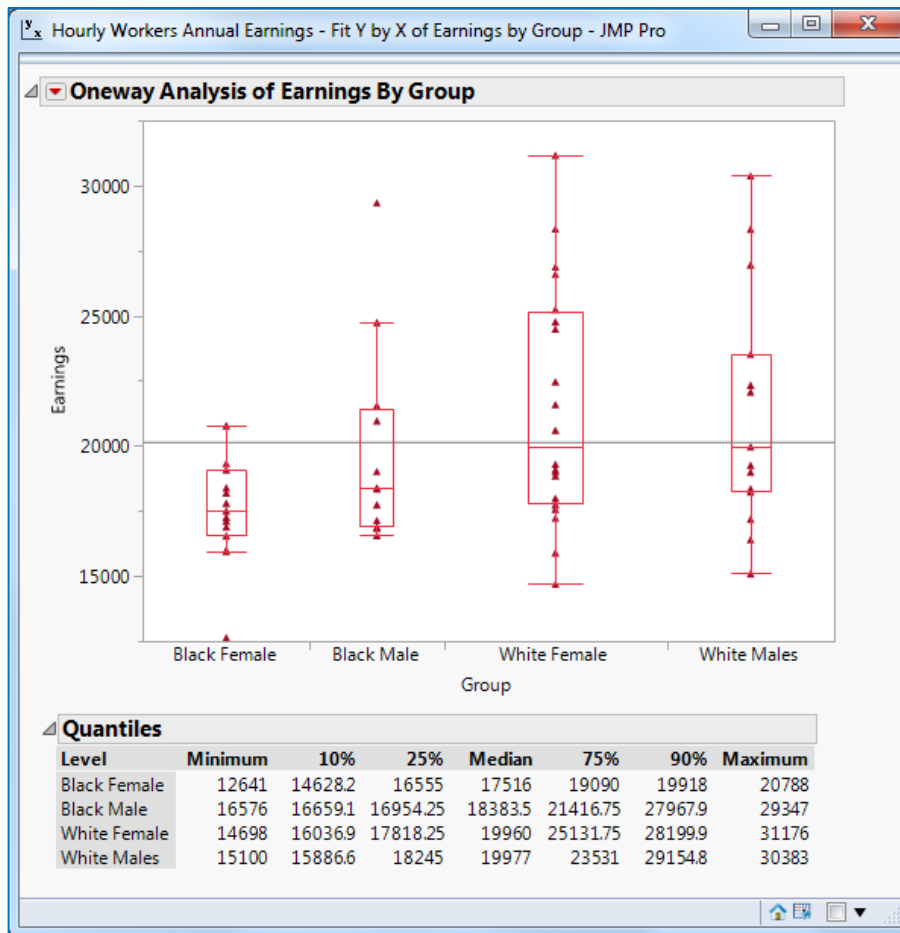




Side-by-Side Box Plot, using the [Hourly Workers Annual Earnings](#) data file

- Open the **Hourly Workers Annual Earnings.jmp** data file
- From **Analyze** menu, select **Fit Y by X**
- Click the column **Earnings**, then click **Y, Response**.
- Click the column **Group**, then click **X, Factor**.
- Click **OK**.
- **To customize the graph:**
 - Right-click the graph -> **Marker Size** -> **1, Small**
 - Right-click the graph ->**Customize** ->**Marker** -> **Line Color:**
(change the color. Also change the **Marker:**
- Click the red down arrow next to **One-way Analysis of Earnings by Group** and select **Quantiles**.





Creating a Histogram, using [Unemployment Rates by State 2000](#) data file

- Open the [Unemployment Rates by State 2000.jmp](#) file located @ [\(Z:\facilities\Shortcourses\ShortCourse Materials\SAS and SPSS\SAS\JMP Pro\Samples\Import Data\)](#).
- From **Analyze** menu, select **Distribution**.
- Click the **Percent** column, then click the **Y, Columns** box
- Click **OK**
- Click on the red down arrow next to **Percent**, select **Display Option**, then **Horizontal Layout**
- Click once again on the red arrow next to **Percent**, select **Histogram Options**, then **Count Axis**
- You can also add relative frequency to the y-axis.
 - Click the red arrow next to **Percent**, select **Histogram Options**, then **Prob Axis**.

- If you don't want both the count axis and the relative frequency axis displayed, uncheck the **Count Axis** option (red arrow, **Histogram Options, Count Axis**).

	State	Percent
1	Alabama	4
2	Alaska	6.1
3	Arizona	3.3
4	Arkansas	3.9
5	California	4.3
6	Colorado	2.1
7	Connecticut	1.5
8	Delaware	3.3
9	Florida	3.2
10	Georgia	3
11	Hawaii	3.6
12	Idaho	5
13	Illinois	4.5
14	Indiana	2.7
15	Iowa	2.5
16	Kansas	3.2
17	Kentucky	3.7
18	Louisiana	5.3
19	Maine	2.6
20	Maryland	3.3
21	Massachusetts	2

The distribution of values in each column

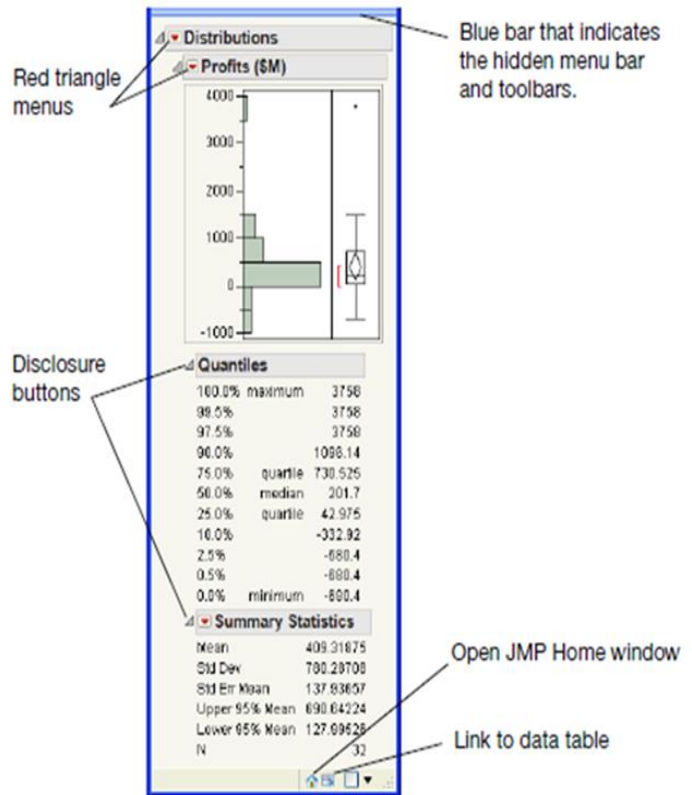
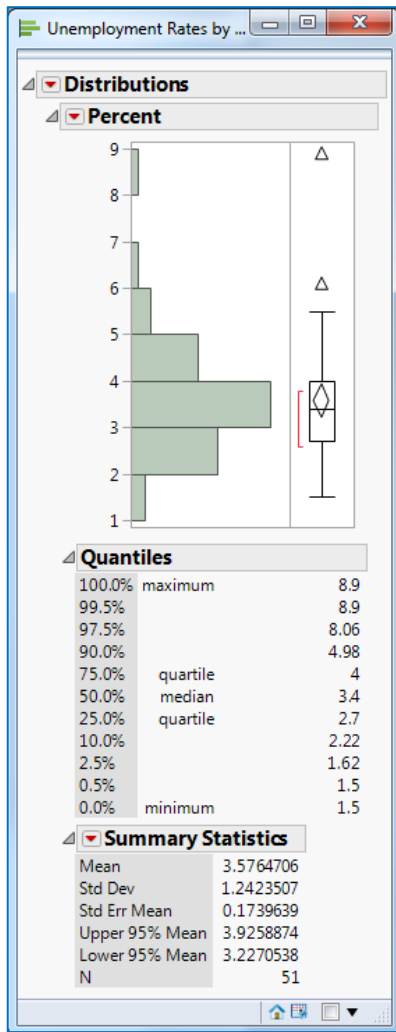
Select Columns: 2 Columns
 State
 Percent

Histograms Only

Cast Selected Columns into Roles

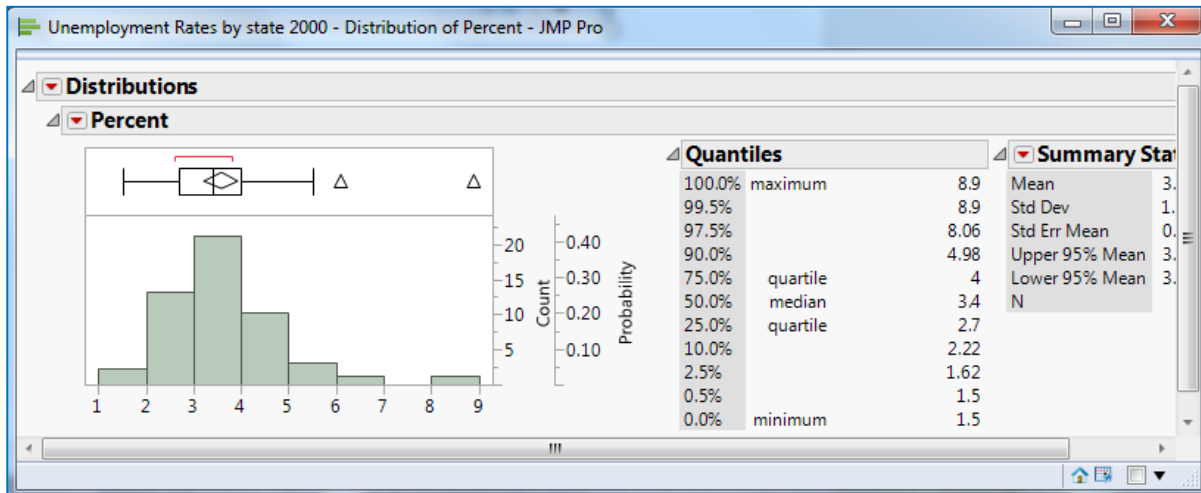
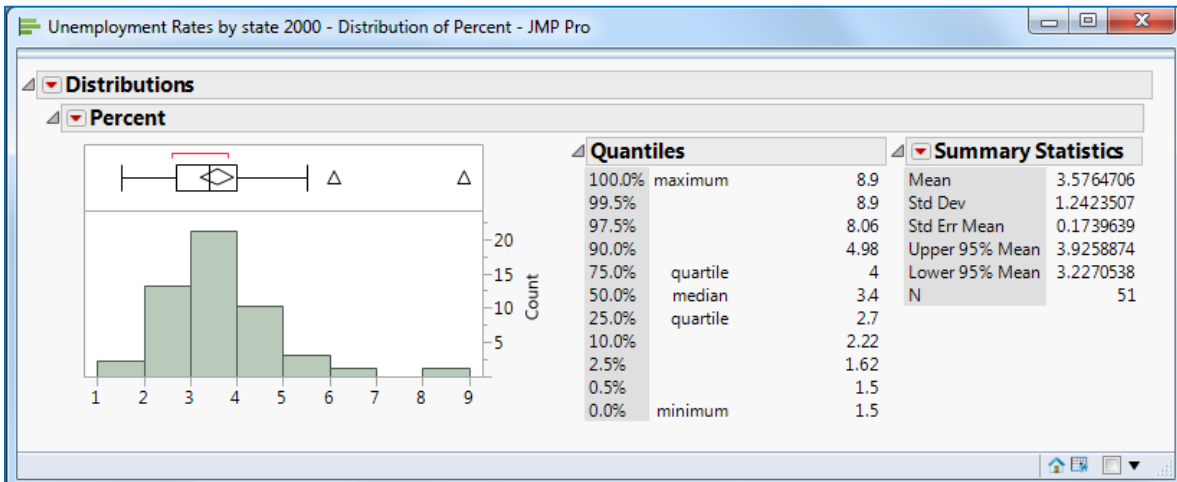
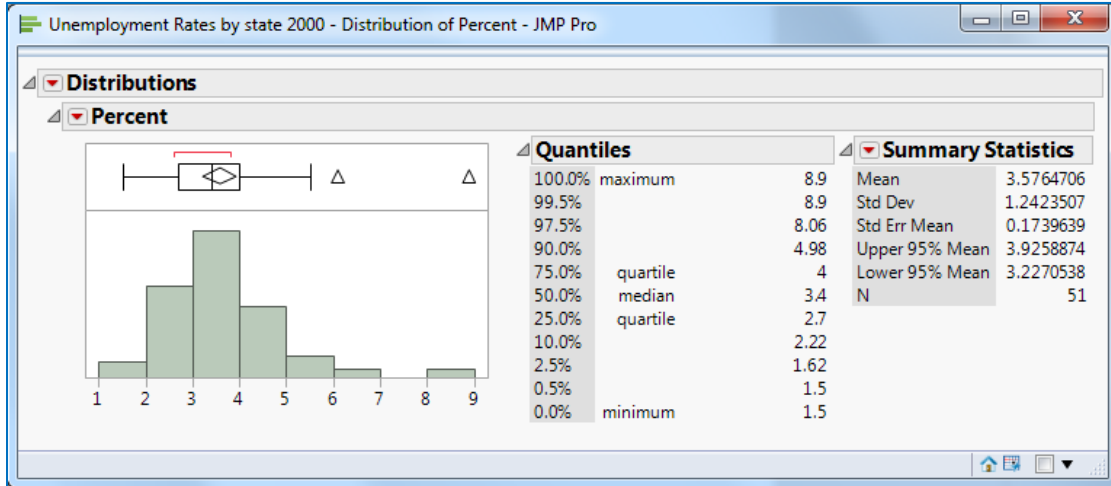
Y, Columns	Percent
Weight	optional numeric
Freq	optional numeric
By	optional

Action: OK, Cancel, Remove, Recall, Help




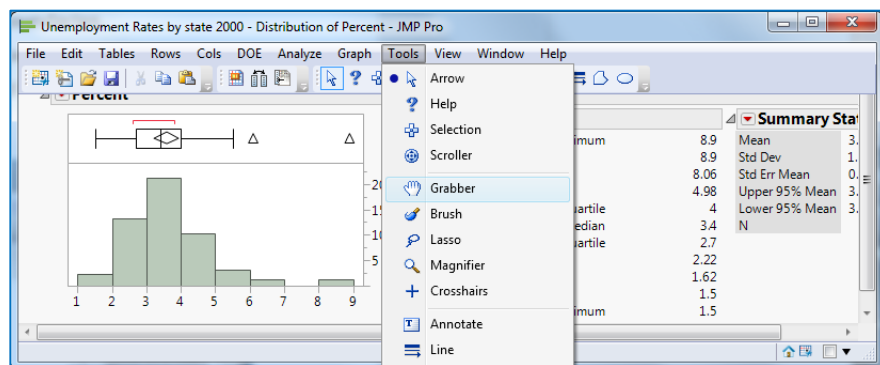
Report Window

- The report window contains basic plots or graphs and preliminary analysis reports. The results appear in an outline format, and you can show or hide any report by clicking on the disclosure button.
- **Red triangle** menus contain options and commands to request additional graphs and analyses at any time.
- Place your mouse pointer over the **blue bar** at the top of the window to see the menu bar and the toolbars.
- Click the **data table** button to bring the data table that was used to create this report to the front.
- Click the **Home Window** button to return to the Home window.



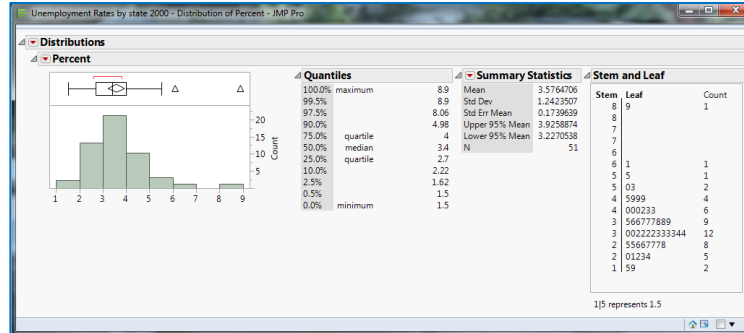
Changing the Number of Bins and Class Boundaries for histogram

- Hover or click just below the title bar on the light-blue line to reveal the menus and toolbar
- Go to the **Tools** menu and select the **Grabber** tool 
- Place the Grabber tool (Hand tool) on top of the histogram bars and click and drag - up and down and side to side - to see the histogram change class boundaries.
- If you plan to continue using JMP, go to the **Tools** menu and select the default **Arrow** tool.



Stem and Leaf Plot, using the [Unemployment Rates by State 2000](#) data file

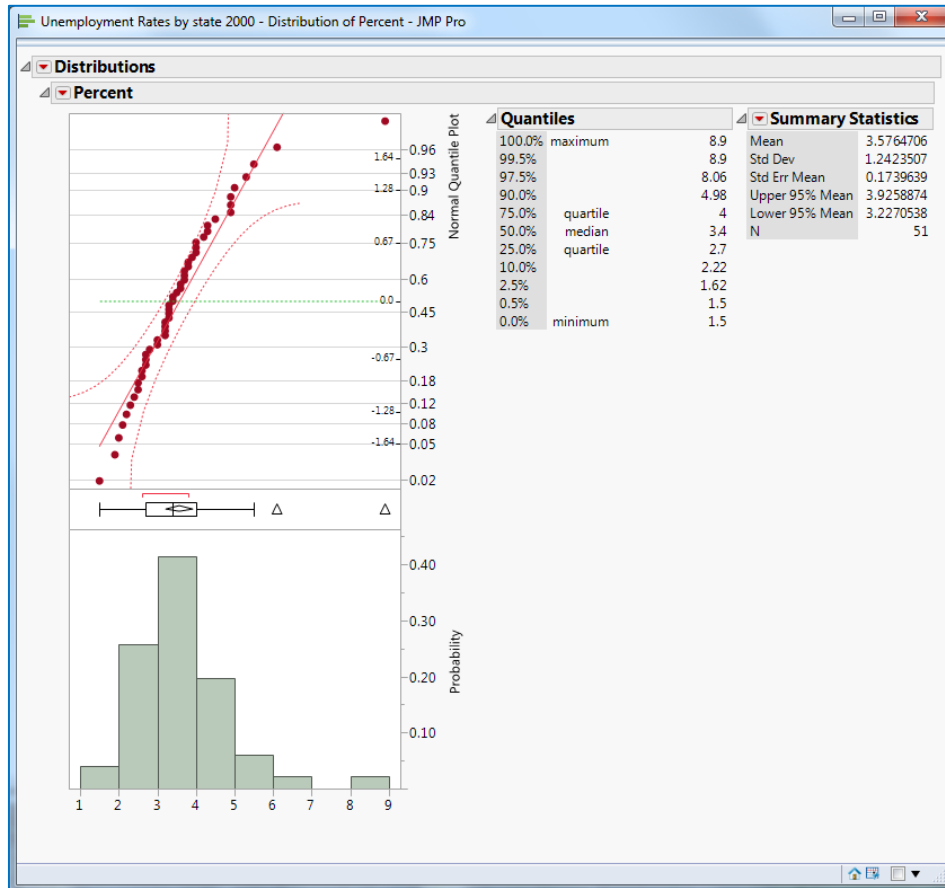
- Open the Unemployment Rates by State 2000.jmp file located @ [\(Z:\facilities\Shortcourses\ShortCourse Materials\SAS and SPSS\SAS\JMP Pro\Samples\Import Data\)](#).
- From **Analyze** menu, select **Distribution**.
- Click the **Percent** column, then click the **Y, Columns** box
- Click **OK**
- Click the red arrow next to **Percent** and select **Stem and Leaf**



Normal Probability Plot, using the [Unemployment Rates by State 2000](#) data

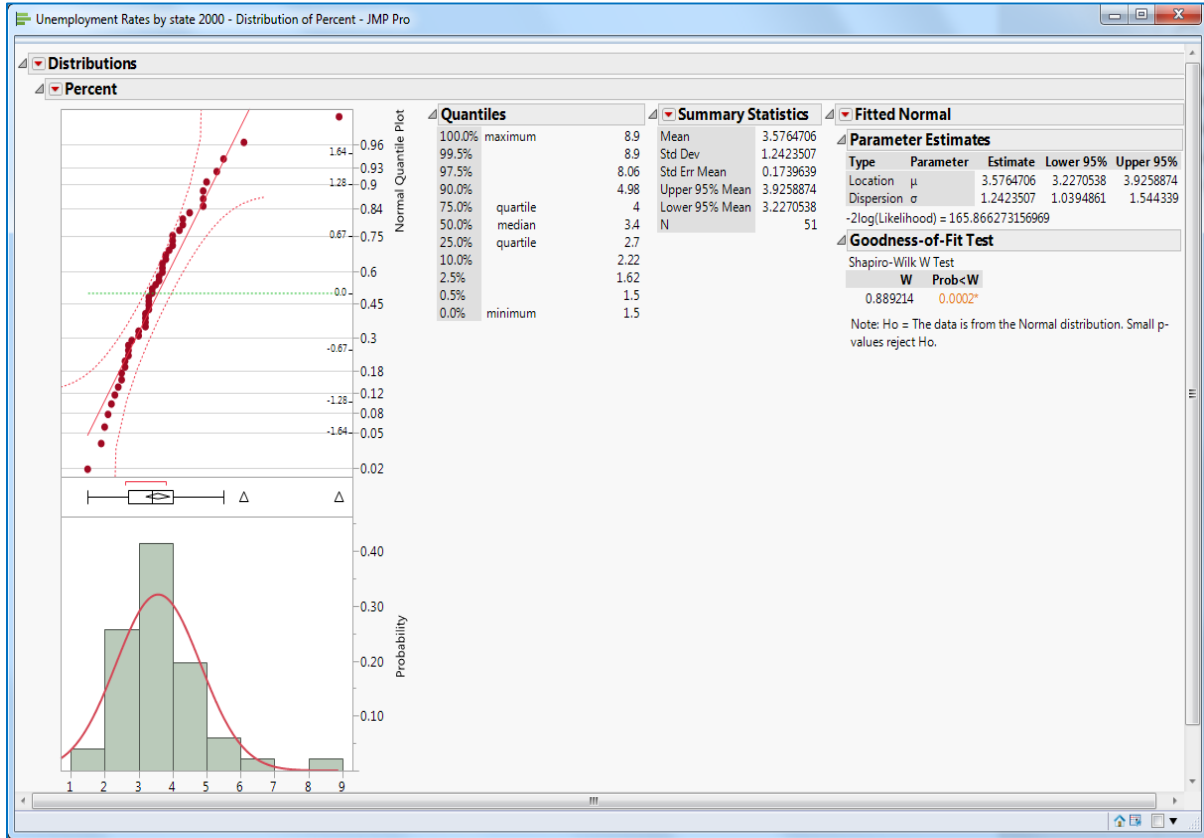
- Open the [Unemployment Rates by State 2000.jmp](#) file located @ ([Z:\facilities\Shortcourses\ShortCourse Materials\SAS and SPSS\SAS\JMP Pro\Samples\Import Data](#)).
- From **Analyze** menu, select **Distribution**.
- Click the **Percent** column, then click the **Y, Columns** box
- Click **OK**
- Click on the red down arrow next to **Percent**, select **Display Option**, then **Horizontal Layout**
- Click once again on the red arrow next to **Percent**, select **Histogram Options**, then **Prob Axis**
- Click the red down arrow next to **Percent** and select **Normal Quantile Plot** (JMPs terminology for the Normal Probability Plot).
- Right-click the **Normal Quantile Plot** -> **Customize** -> change the Marker color, and the shape.

- Adjust the graph.



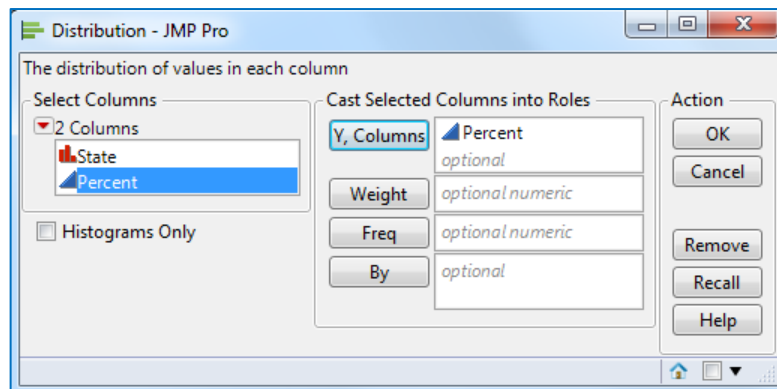
Goodness of Fit Test

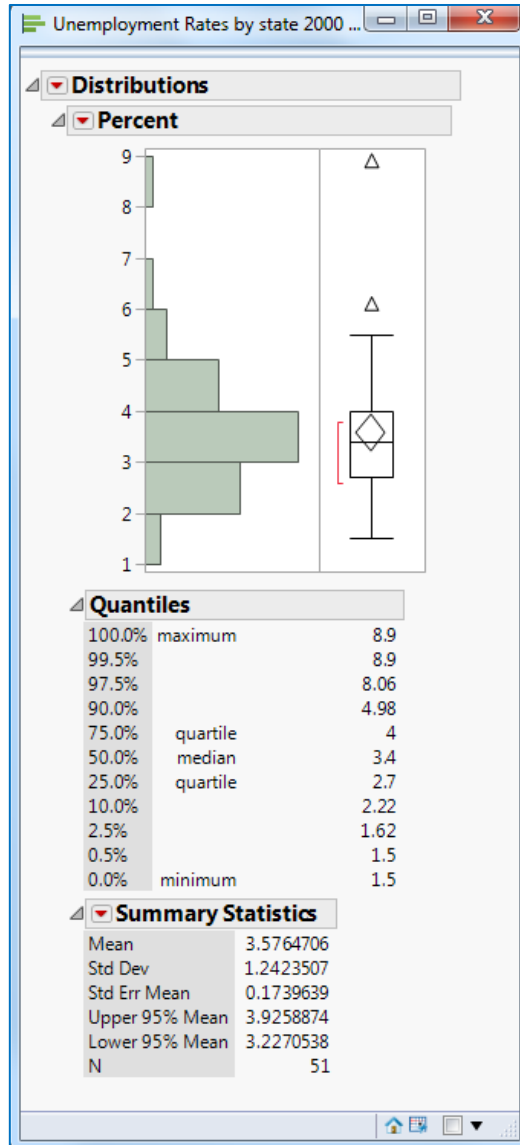
- Click the red down arrow next to **Percent** and select **Continuous Fit**, then select **Normal**.
- Click the red down arrow next to **Fitted Normal** and select **Goodness of Fit**.
- The smaller the **P-Value** (the number under **Prob<W**), the less likely it is that the data comes from a normal distribution. Therefore, since P-value = 0.0002, it is unlikely that data came from a normal distribution.



Calculating Numerical Summaries of Quantitative Data, using [Unemployment Rates by State 2000](#) data file

- Open the Unemployment Rates by State 2000.jmp data file
- From **Analyze** menu, select **Distribution**.
- Click the **Percent** column, then click the **Y, Columns** box.
- Click **OK**.



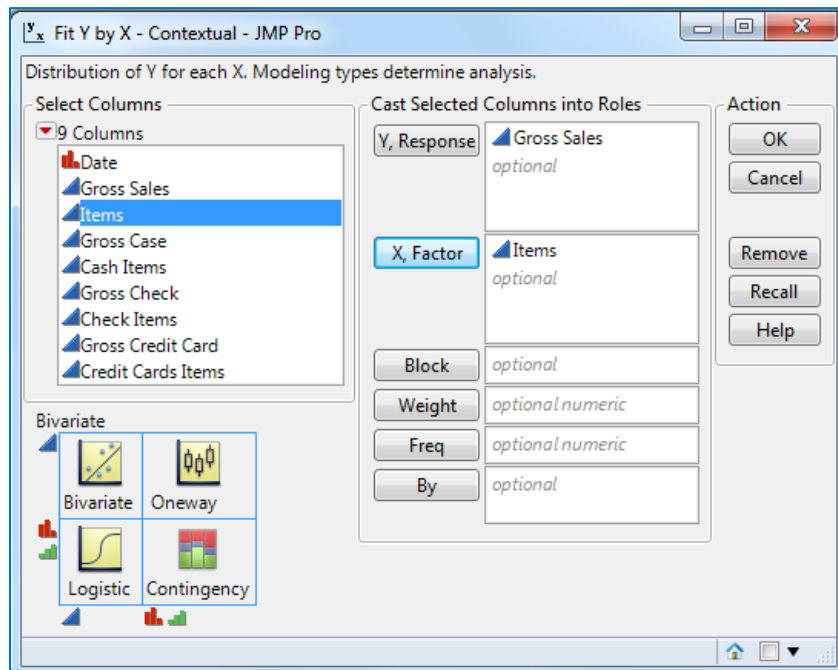


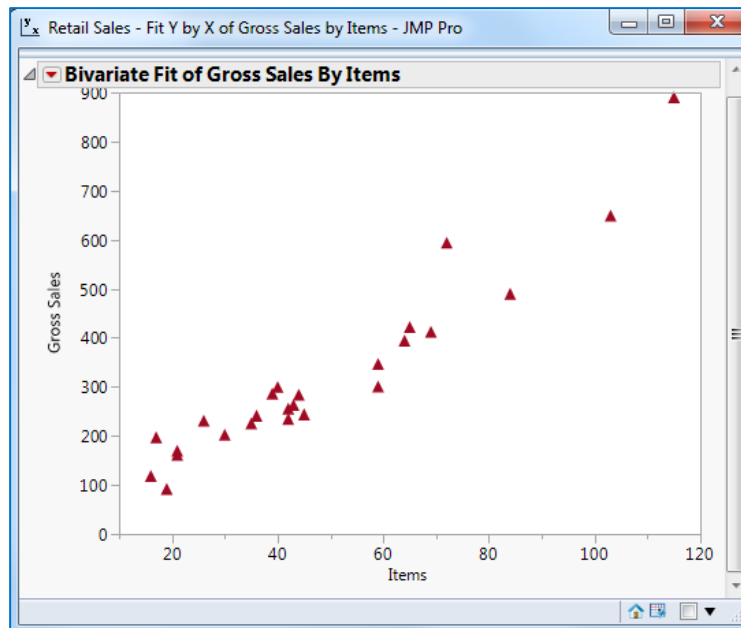
Scatter Plot, using the [Retail Sales](#) data file

- Open the **Retail Sales.jmp** data file
- From **Analyze** menu, select **Fit Y by X**.
- Click the column **Gross Sales**, then click **Y, Response**.
Click the column **Items**, then click **X, Factor**.

- Click **OK**.

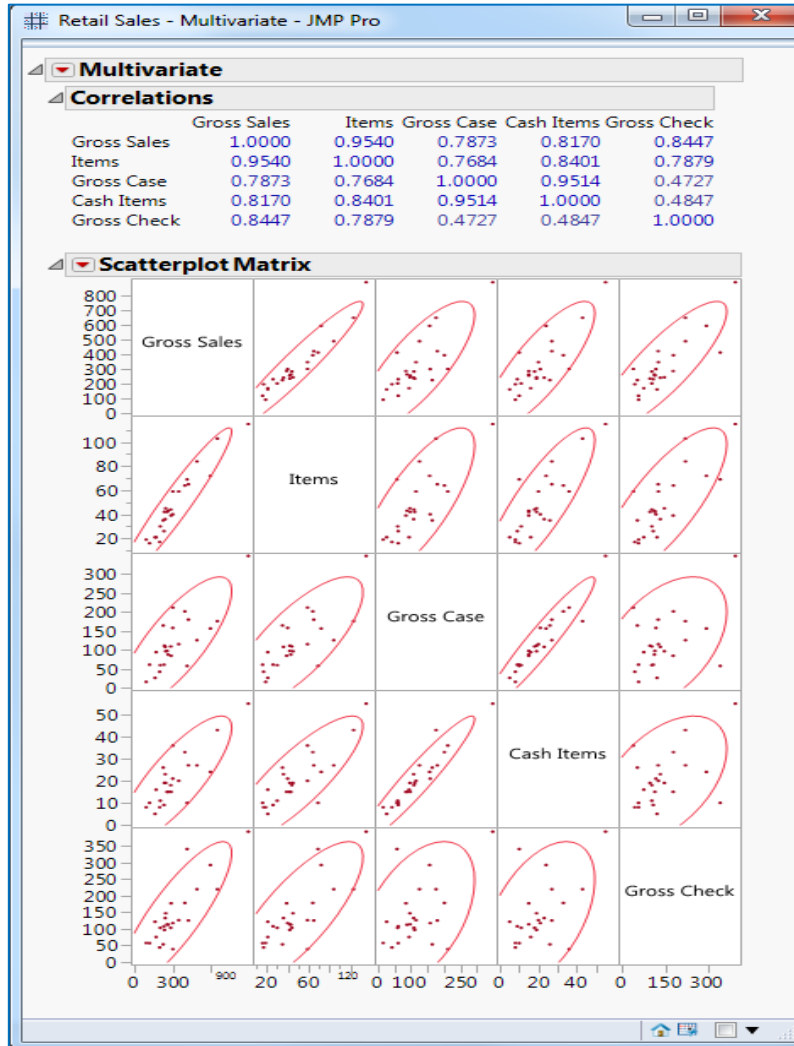
	Date	Gross Sales	Items	Gross Case
1	04/01/2000 12:00:00	890.5	115	348.2
2	04/03/2000 12:00:00	197	17	42
3	04/04/2000 12:00:00	231	26	61
4	04/05/2000 12:00:00	170	21	94
5	04/06/2000 12:00:00	202.5	30	59.5
6	04/07/2000 12:00:00	225.5	35	164.5
7	04/08/2000 12:00:00	489.7	84	125.7
8	04/10/2000 12:00:00	234.8	42	110.8
9	04/11/2000 12:00:00	161.5	21	26
10	04/12/2000 12:00:00	284	44	109
11	04/13/2000 12:00:00	422	65	180
12	04/14/2000 12:00:00	300.7	59	211.8
13	04/15/2000 12:00:00	412.4	69	57.5
14	04/17/2000 12:00:00	346.8	59	115
15	04/18/2000 12:00:00	92.3	19	15.3
16	04/19/2000 12:00:00	255.8	42	97.3
17	04/20/2000 12:00:00	118.5	16	61
18	04/21/2000 12:00:00	286.5	39	84.5
19	04/22/2000 12:00:00	594	72	156.5
20	04/24/2000 12:00:00	263.29	43	87.56





Correlation, using the [Retail Sales](#) data file

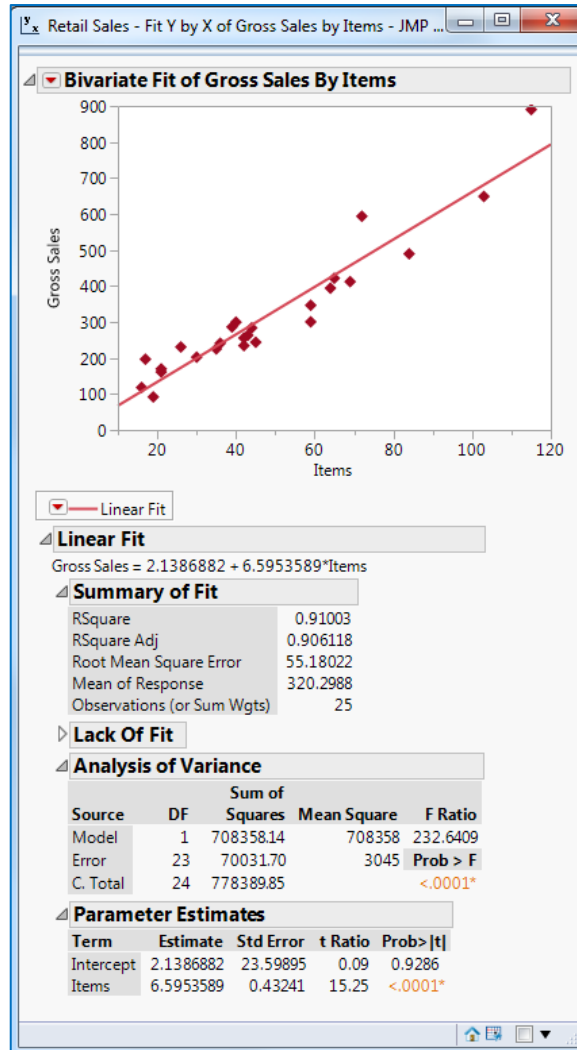
- From **Analyze** menu, select **Multivariate Methods**, then **Multivariate**.
- Select some (or all) of the quantitative variables and then click **Y, Columns**.
- Click **OK**.

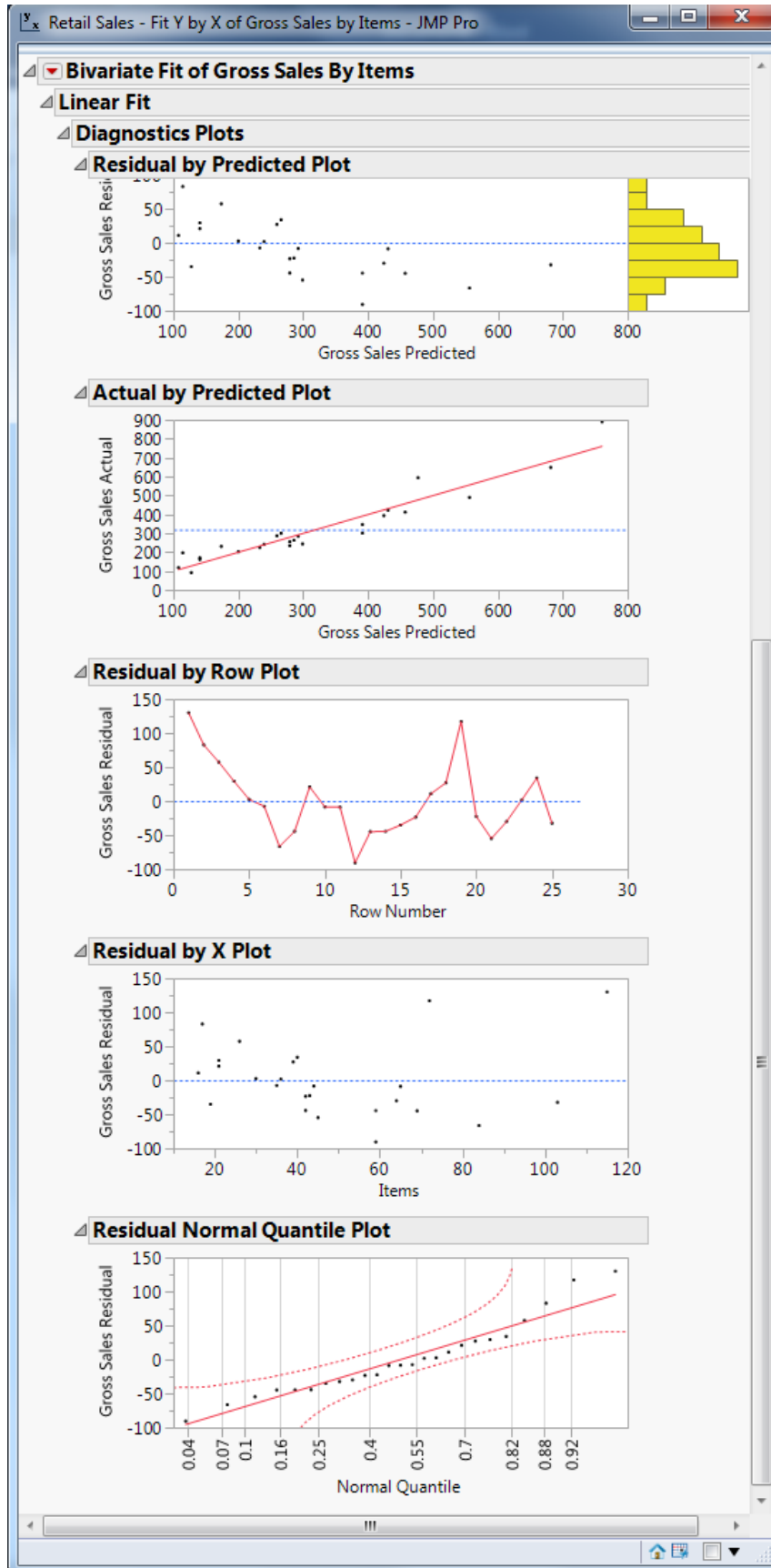


Least-Squares Regression Line, Residuals Plot and Histogram of Residuals, using the [Retail Sales](#) data file

- From **Analyze** menu, select **Fit Y by X**.
- Click the column **Gross Sales**, then click **Y, Response**.
- Click the column **Items**, then click **X, Factor**.
- Click **OK**.
- Click on the red down arrow next to **Bivariate Fit of Gross Sales By Items** and select **Fit Line**.
- To generate the residuals plot, click the red down arrow next to **Linear Fit** and select **Plot Residuals**.

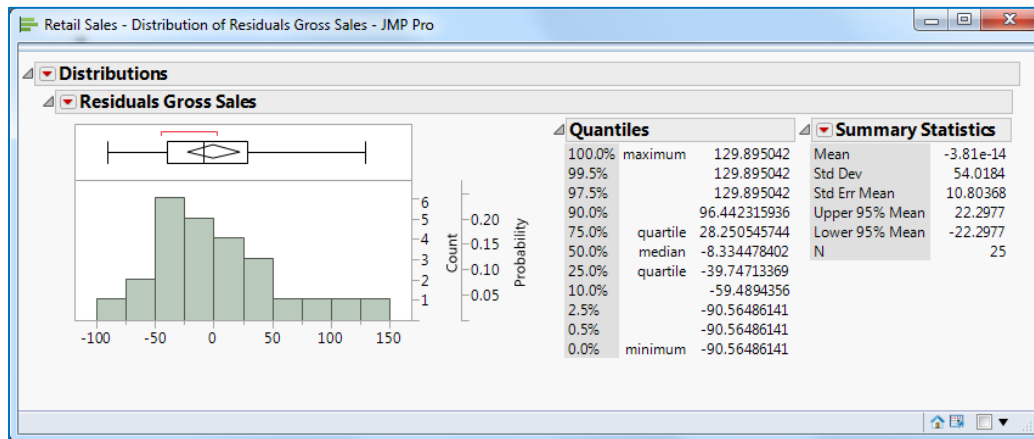
- To make a histogram of the residuals, click the red arrow next to **Linear Fit** and select **Save Residuals**. Now the **Residuals Gross Sales**, is added to the data file (last column).





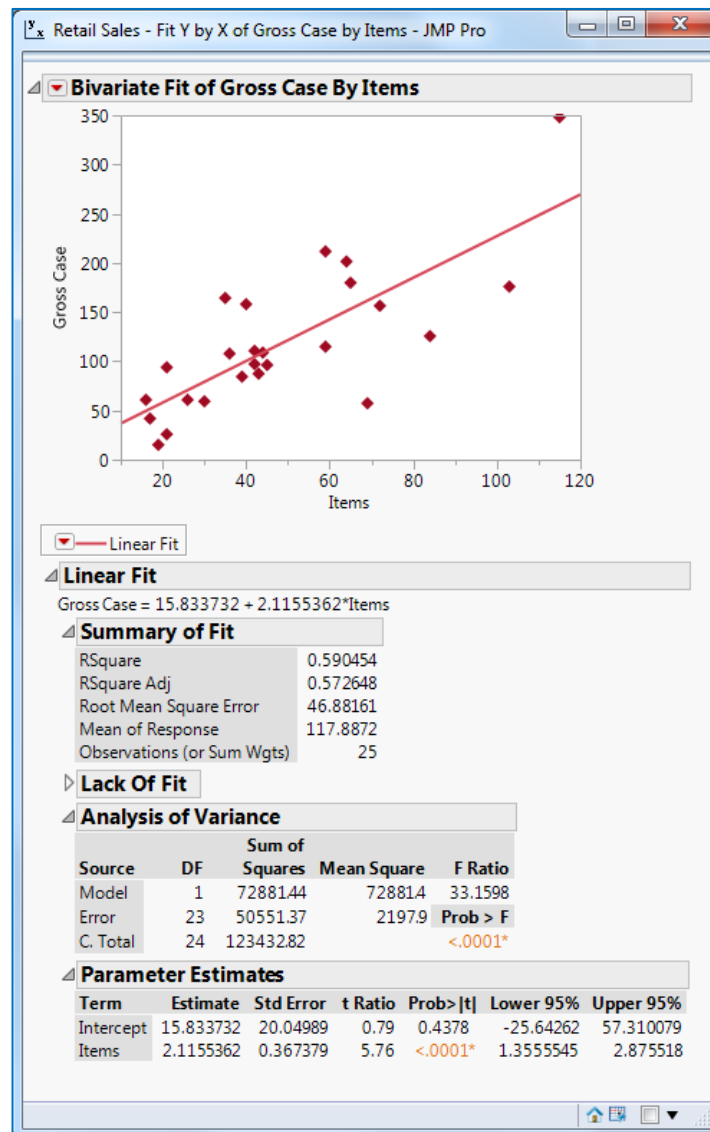
To Create Histogram and Box Plots for the [Residuals Gross Sales](#) column

- From **Analyze** menu, select **Distribution**
- click the **Residuals Gross Sales**, and then click **y, column** -> click **OK**.
- Click the red down arrow next to **Residuals Gross Sales**, select **Display Option**, then the **Horizontal Layout**
- Click once again on the red arrow next to **Residuals Gross Sales**, select **Histogram Options**, then **Count Axis**.



Inference About Regression Coefficients, using [Retail Sales](#) data file

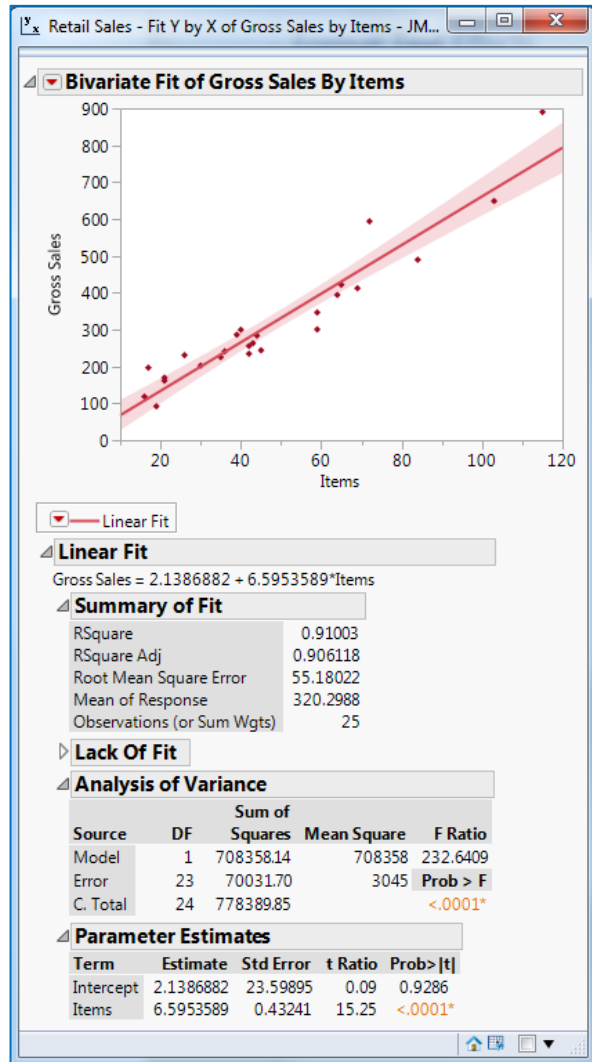
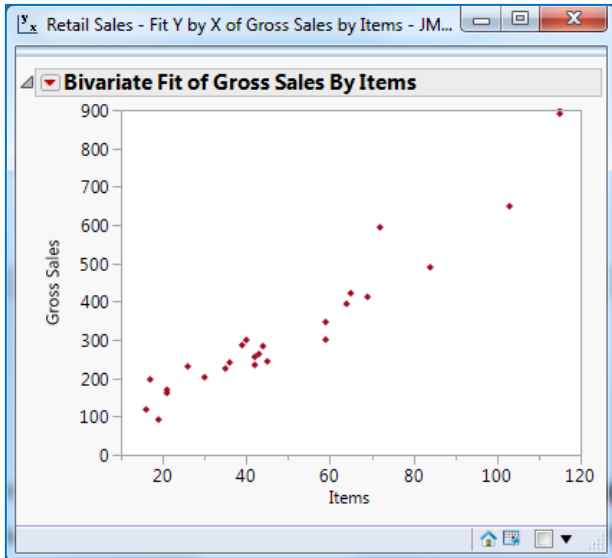
- Open the **Retail Sales.jmp** data file
- From **Analyze** menu, select **Fit Y by X**.
- Click the column **Gross Sales**, then click **Y, Response**.
- Click the column **Items**, then click **X, Factor**.
- Click **OK**.
- Click on the red down arrow next to **Bivariate Fit of Gross Sales By Items** and select **Fit Line**.
- The t Ratios, displayed in the **Parameter Estimates** output, are the t values for testing the null hypothesis that the corresponding population regression coefficients are zero. And, the values under **Prob>|t|** are the p-values associated with the same tests (and, with a 2-sided alternative hypothesis).
- To get a 95% confidence intervals for the population regression coefficients, right click on the **Parameter Estimates** area (below the words **Parameter Estimates**).
Go to **Columns**, then select **Lower 95%**, then **Upper 95%** as follows.

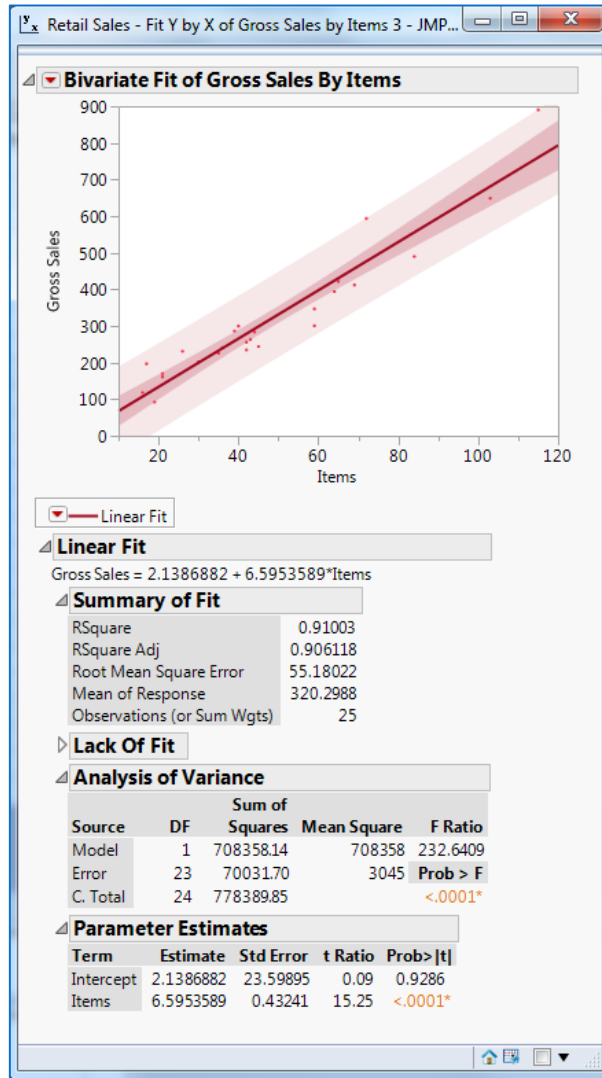


Confidence Intervals and Prediction Intervals for Regression Response, using the [Retail Sales](#) data file

- From **Analyze** menu, select **Fit Y by X**.
- Click the column **Gross Sales**, then click **Y, Response**.
- Click the column **Items**, then click **X, Factor**.
- Click **OK**.
- Right-click the graph -> **Marker Size** -> **1, Small**.
- Right-click the graph -> **Customize** -> select color and shape for Marker

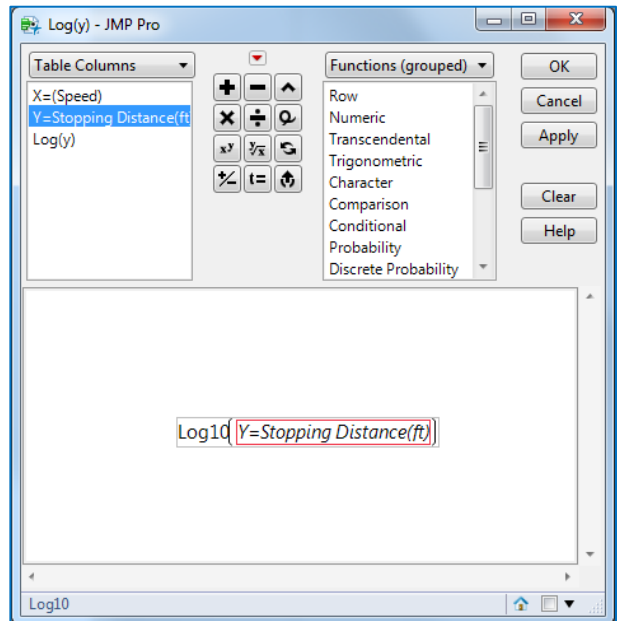
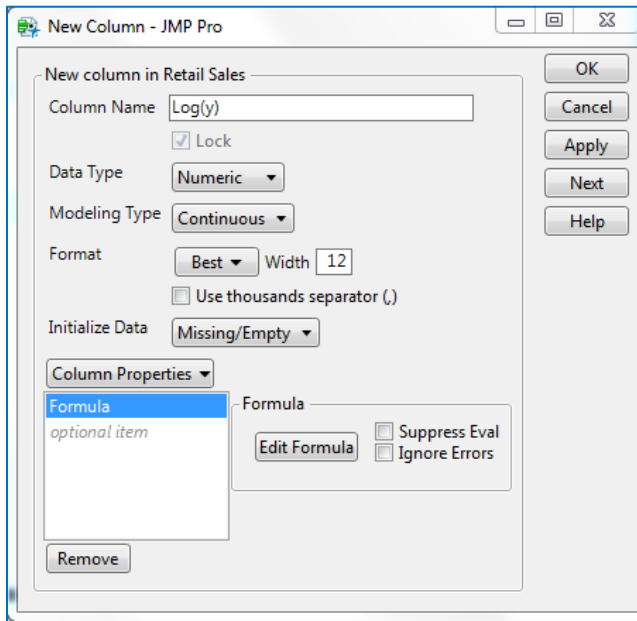
- Click on the red down arrow next to **Bivariate Fit of Gross Sales By Items** and select **Fit Line**.
- Click the red down arrow next to **Linear Fit** and select the **Confid Shaded Fit**. And you will see, on the scatter plot, the 95% confidence interval for the mean value of y for a given value of x for all values of x.
- Click again on the red down arrow next to **Linear Fit** and select the **Confid Shaded Indiv**. And you will now also see, on the scatter plot, the 95% prediction interval for a single value of y for a given value of x for all values of x. **Notice** these bands are wider than the confidence interval bands.
- If you wish to display 99% confidence and prediction intervals rather than 95%, click the red down arrow next to **Linear Fit**, go to **Set a Level**, then 0.01. You should see both sets of bands get wider.





Log Transformation, using the [Brakes](#) data file

- Open the **Brakes.jmp** data file
- Add another column to the table by going to the **Cols** menu and selecting **New Column**.
- Name this new column **Log(y)**.
- Click the black down arrow next to **Column Properties** and select **Formula**.
- Under the **Functions** list select **Transcendental** and select **Log10**.
- Click the column **Y = Stopping Distance**.
- Click **OK**.



Brakes - JMP Pro

File Edit Tables Rows Cols DOE Analyze Graph Tools View Window Help

	X=(Speed)	Y=Stopping Distance(ft)	Log(y)
1	20	64	1.806179974
2	20	62	1.7923916895
3	20	59	1.7708520116
4	30	114	2.0569048513
5	30	118	2.0718820073
6	30	105	2.0211892991
7	40	153	2.1846914308
8	40	171	2.2329961104
9	40	165	2.2174839442
10	50	231	2.3636119799
11	50	203	2.3074960379
12	50	238	2.3765769571
13	60	317	2.5010592622
14	60	321	2.5065050324
15	60	276	2.4409090821

Columns (3/0): X=(Speed), Y=Stopping Distance(ft), Log(y)

Rows: All rows (15), Selected (0), Excluded (0), Hidden (0), Labelled (0)

evaluations done

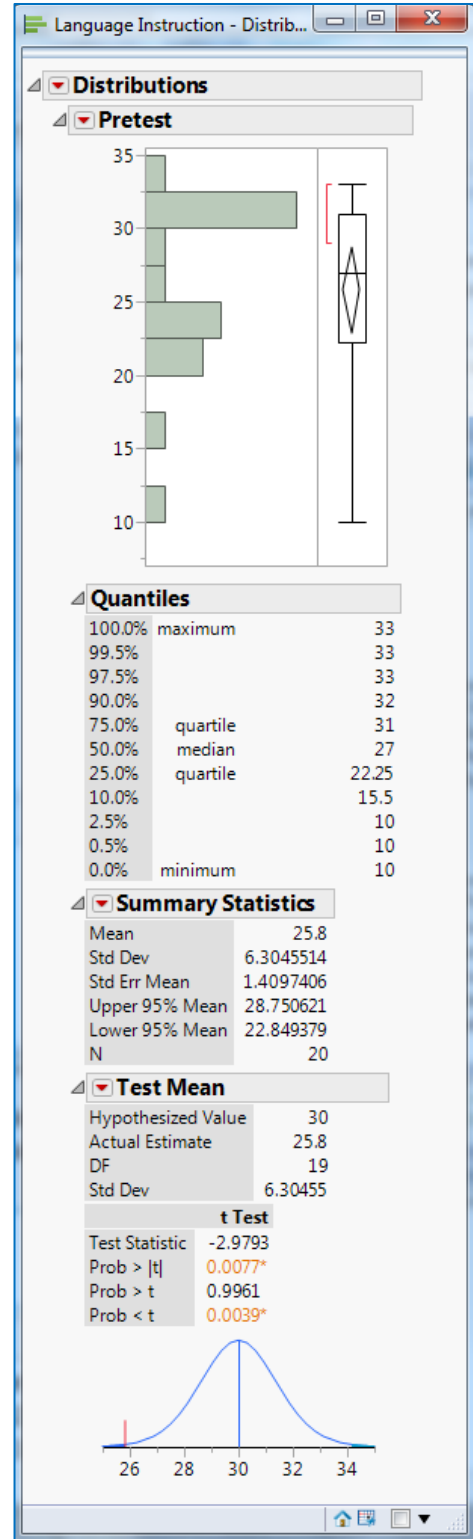
One Sample t Test, using the [Language Instruction](#) data file

- Open the **Language Instruction.jmp** data file
- Click the **Analyze** menu, then select **Distribution**.
- Click the **Pretest** column, then click **Y, columns**.
- Click **OK**. The 95% confidence interval for the mean is displayed under **Summary Statistics**.
 - If you want to produce, for example, a 90% confidence interval for the mean, click the red down arrow next to **Pretest**, select **Confidence Interval**, select **0.90**.
- Click on the red down arrow next to **Pretest** and select **Test Mean**.
- Suppose your Null Hypothesis is that the mean is 30. Type 30 in the **Specify Hypothesized Mean** text box and click **OK**.

Prob>|t| = .0077 is the p-value for $H_a: \mu \neq 30$

Prob>t = .9961 is the p-value for $H_a: \mu > 30$

Prob<t = .0039 is the p-value for $H_a: \mu < 30$

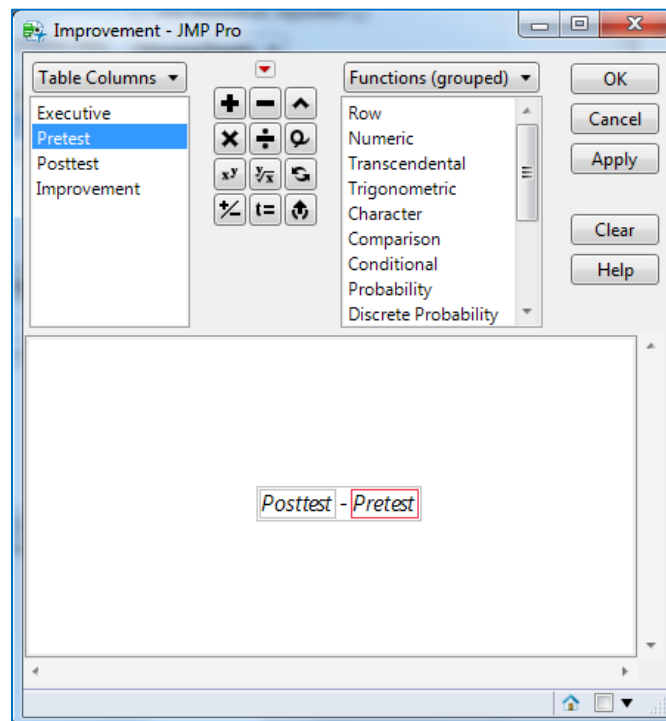


Paired t Procedures, using the [Language Instruction](#) data file

- We will create a new column (new variable) called "**Improvement**", which is

$$\mathbf{Improvement = Posttest - Pretest.}$$

- Click on the **Cols** menu, go to **New Column....**
- Type **Improvement** in the **Column Name** text box. Then, click the black down arrow next to **Column Properties**, and pull to **Formula**.
- Click the **Posttest** column, then the **minus sign** in the collection of buttons.
- Then click the **Pretest** column.
- Click **OK**, then **OK** again.
- To produce confidence intervals and/or do hypothesis tests, click the **Analyze** menu, then select **Distribution**.
- Click the **Improvement** column, then click **Y, columns**.
- Click **OK**. The 95% confidence interval for the mean is displayed under **Summary Statistics**.



Language Instruction - JMP Pro

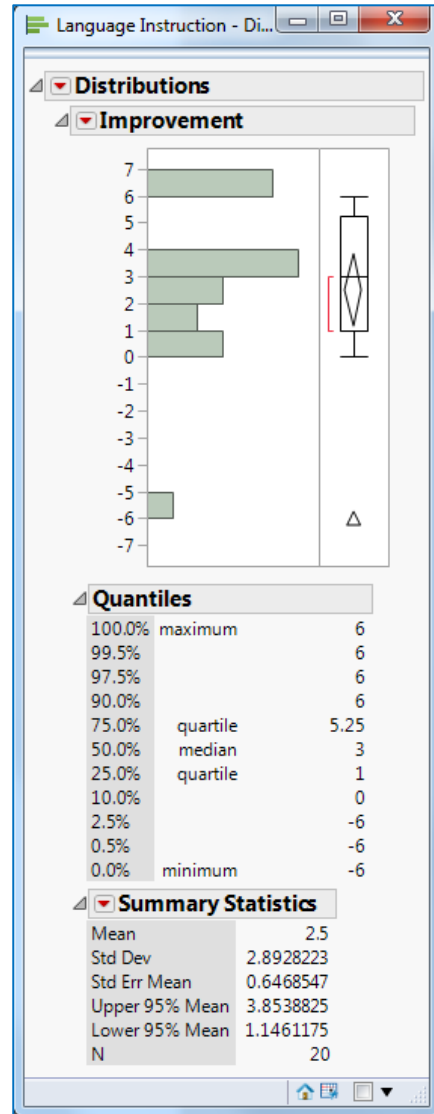
File Edit Tables Rows Cols DOE Analyze Graph Tools View Window Help

	Executive	Pretest	Posttest	Improvement
1	1	32	34	2
2	2	31	31	0
3	3	29	35	6
4	4	10	16	6
5	5	30	33	3
6	6	33	36	3
7	7	22	24	2
8	8	25	28	3
9	9	32	26	-6
10	10	20	26	6
11	11	30	36	6
12	12	20	26	6
13	13	24	27	3
14	14	24	24	0
15	15	31	32	1
16	16	30	31	1
17	17	15	15	0
18	18	32	34	2
19	19	23	26	3
20	20	23	26	3

Columns (4/0)
 Executive
 Pretest
 Posttest
 Improvement

Rows
 All rows 20
 Selected 0
 Excluded 0
 Hidden 0
 Labelled 0

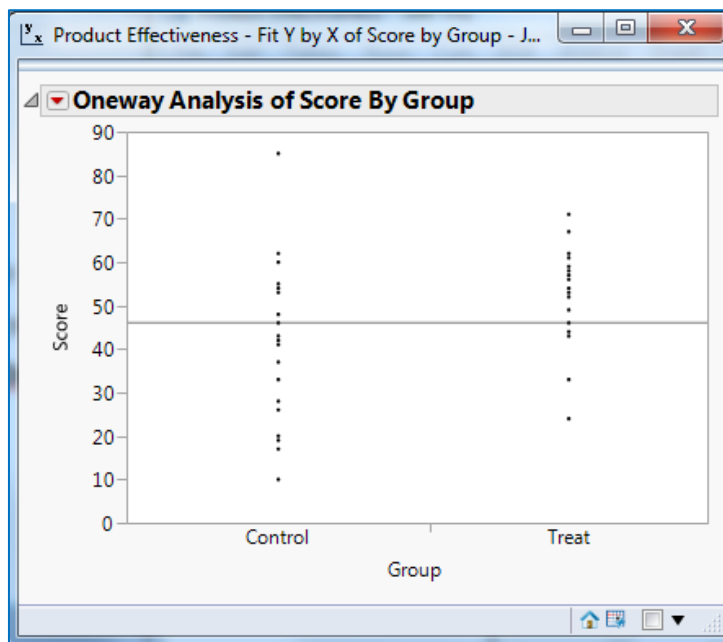
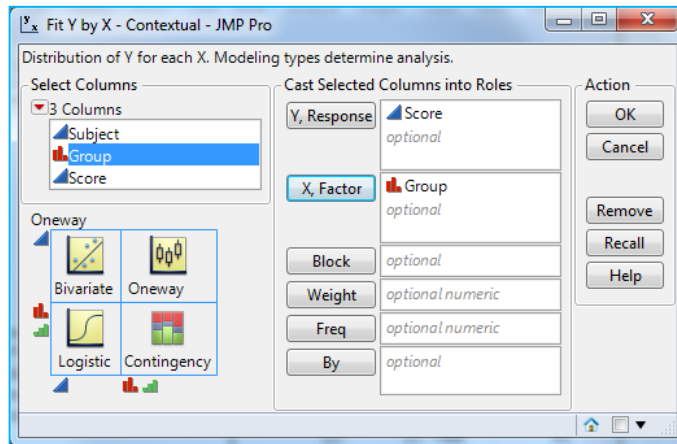
evaluations done

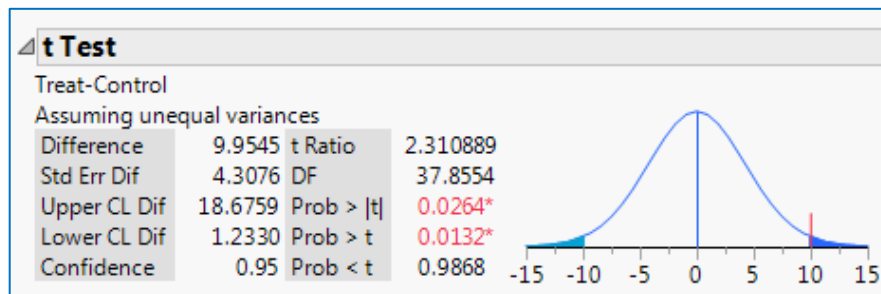


Two Sample t Test (assuming unequal population variances), using the [Product Effectiveness data](#) file

Notice that **Group** is a categorical variable and **Score** is a quantitative variable.

- From the **Analyze** Menu, select **Fit Y by X**.
- Click the column **Score** and then click **Y, Response**.
- Click the column **Group** and then click **X, Factor**.
- Click **OK**. Right-click the graph -> Marker size ->0, Dot.
- Click the red down arrow next to **One-way Analysis of Score By Group** and select **t Test**.





Prob>|t| = .0264 is the p-value for $H_a: \mu_1 - \mu_2 \neq 0$

Prob>t = .0132 is the p-value for $H_a: \mu_1 - \mu_2 > 0$

Prob<t = .9868 is the p-value for $H_a: \mu_1 - \mu_2 < 0$

By default, the **Upper CL Dif** and **Lower CL Dif** is the 95% confidence interval for $\mu_1 - \mu_2$ (Notice the **Confidence 0.95** in the lower left). If you want, for example, a 98% confidence interval, click the red down arrow next to **One-way Analysis of Score By Group** and select **Set a Level**, then **Other...**

- Type 0.02 and click **OK**.

Chi Square Test for Two-Way Table, using the Music and Wine Preference data file (Test of Independence for two categorical variables)

- Click on the **Analyze** menu, select **Fit Y by X**.
- Click the **Wine** column, then click **Y, Response**.
- Click the **Music** column, then click **X, Factor**.
- Click the **Frequency** column, then click **Freq**.
- Click **OK**.
- The statistics inside each cell in the Contingency Table are the default values. These statistics can be hidden and/or other statistics can be displayed. For example, in addition to the actual cell counts, it can be useful to look at the expected cell count and the contribution of each cell to the **Chi Square** statistics.
 - Click on the red down arrow next to **Contingency Table** and uncheck **Total%**, **Col%**, and **Row%**. Leave the check next to **Count**. Add check marks next to **Expected** and **Cell Chi Square**.

Music and Wine Preference - JMP Pro

	Music	Wine	Frequency
1	None	French	30
2	None	Italian	11
3	None	Other	43
4	French	French	39
5	French	Italian	1
6	French	Other	35
7	Italian	French	30
8	Italian	Italian	19
9	Italian	Other	35

Fit Y by X - Contextual - JMP Pro

Distribution of Y for each X. Modeling types determine analysis.

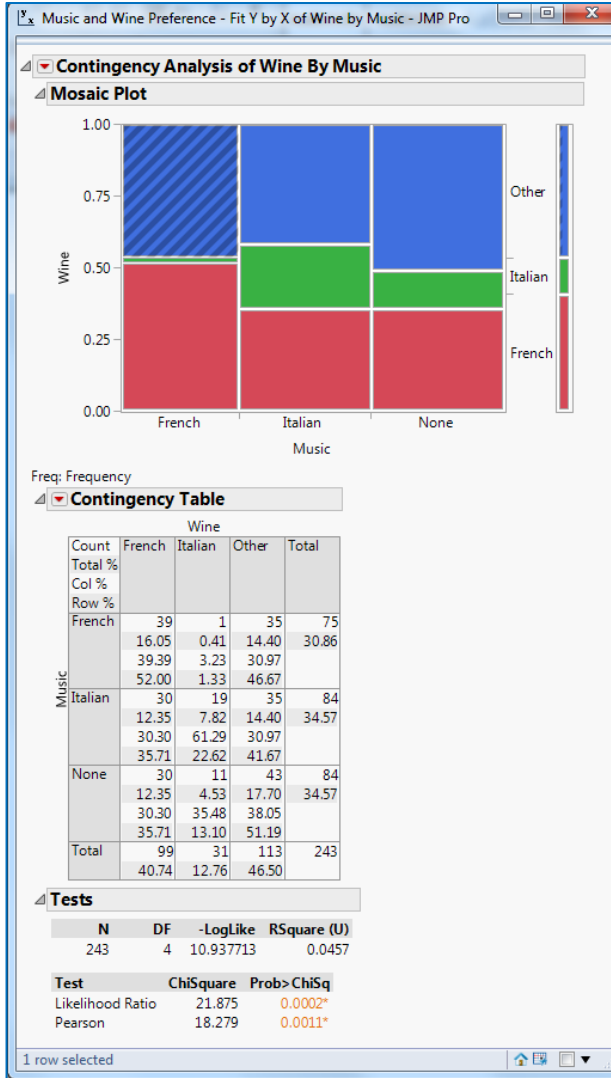
Select Columns: 3 Columns (Music, Wine, Frequency)

Cast Selected Columns into Roles:

- Y, Response: Wine (optional)
- X, Factor: Music (optional)
- Block: (optional)
- Weight: (optional numeric)
- Freq: Frequency
- By: (optional)

Contingency: Bivariate, Oneway, Logistic, Contingency


Action: OK, Cancel, Remove, Recall, Help

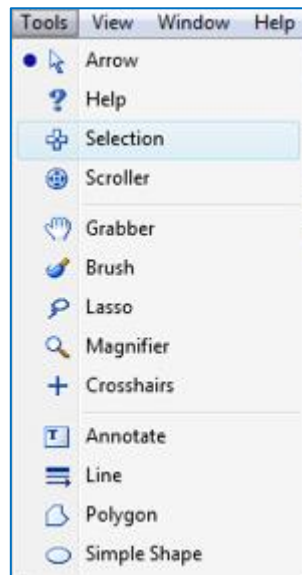


Contingency Table

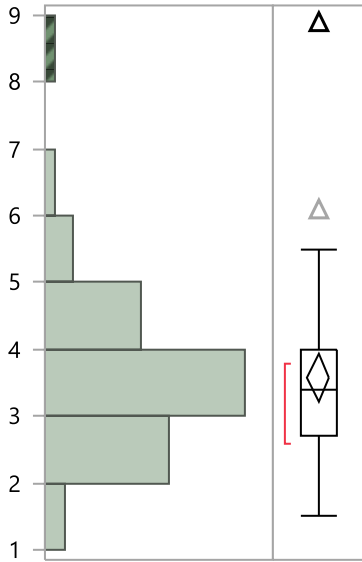
		Wine			
Count		French	Italian	Other	Total
Music	French	39	1	35	75
		30.5556	9.5679	34.8765	
		2.3337	7.6724	0.0004	
Italian	30	19	35	84	
	34.2222	10.716	39.0617		
	0.5209	6.4038	0.4223		
None	30	11	43	84	
	34.2222	10.716	39.0617		
	0.5209	0.0075	0.3971		
Total		99	31	113	243

Saving the Report in a Word file format

- Open the **Unemployment Rates by State 2000.jmp** file
- From the **Analyze** menu, then select **Distribution**.
Click the column **Percent**, then click **Y, Columns**.
Click **OK**.
- Using the Reports Tools menu (click on the **Blue Bar**), select the **Selection** tool.
- Place the selection cursor on the word Percent and click. All of the output should now be highlighted.
- From the **Edit** menu, select **Copy** (or-right-click -> copy).
- In Microsoft Word, position your cursor where you want your image, and **Right-click -> Paste**.
- Suppose you only want the graph in your report. In JMP, click anywhere on the highlighted output to deselect your previous selection.
- Move the Selection Tool on the graph to highlight it.
- Right-click the graph -> **Copy**
- In Word -> **Right-click -> Paste**.
- Click on  **Arrow** Tool, or type (a).



Percent

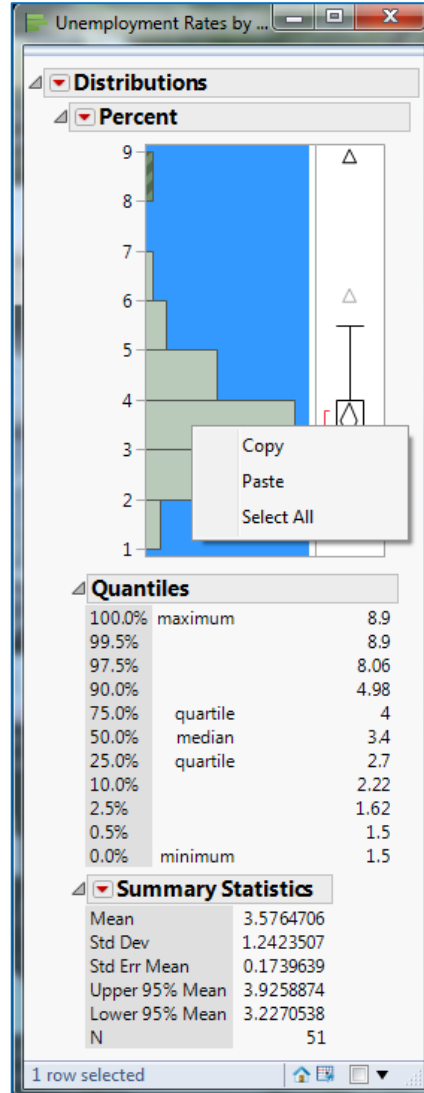


Quantiles

100.0%	maximum	8.9
99.5%		8.9
97.5%		8.06
90.0%		4.98
75.0%	quartile	4
50.0%	median	3.4
25.0%	quartile	2.7
10.0%		2.22
2.5%		1.62
0.5%		1.5
0.0%	minimum	1.5

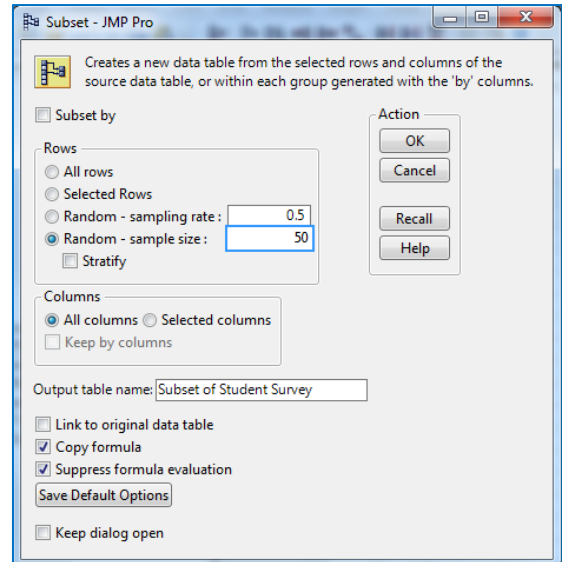
Summary Statistics

Mean	3.5764706
Std Dev	1.2423507
Std Err Mean	0.1739639
Upper 95% Mean	3.9258874
Lower 95% Mean	3.2270538
N	51



Simple Random Sample, using the [Student Survey](#) data file

- Open the [Student Survey.jmp](#) data file.
This data table has 931 rows
- To select a random sample of size 50 from this large data set.
 - Click the **Tables** menu and select **Subset**
 - Click the button next to **Random - sample size:** and type **50** in the text box next to this selection.
 - Click **OK**.
 - Click **File**, then **Save**.
 - Save this file to your desktop.



Row Number	GPA	Born in TN?	UT Your 1st Choice?	# Friends You Have on Facebook
1	4	3.68	Yes	Yes
2	22	3.25	No	Yes
3	35	2.93	No	Yes
4	51	2.99	Yes	Yes
5	73	3.6	Yes	Yes
6	96	3.08	Yes	Yes
7	131	2.7	Yes	Yes
8	134	3	No	Yes
9	146	2.77	Yes	No
10	164	3.7	Yes	Yes
11	171	3.5	Yes	Yes
12	182	3.09	Yes	Yes
13	191	2.87	No	No
14	202	3.5	No	No
15	205	3.05	Yes	Yes
16	252	3.71	Yes	No
17	311	3.63	Yes	Yes
18	331	3.21	Yes	No
19	339	2.75	Yes	Yes
20	341	2.91	Yes	Yes
21	348	2.69	No	No

Saving and Sharing Your Work

Once you have generated results from your data, JMP provides you with multiple ways to share your work with others. Here are some of the ways that you can share your work:

- Saving platform results as **journals** or **projects**
- Saving results, data tables, and other files in projects
- Creating **Adobe Flash** (SWF) versions of platform results
- Saving results as Interactive **HTML** (.htm, html)
- Saving results as a **PowerPoint presentation** (.pptx)

Saving Platform Results in Journals

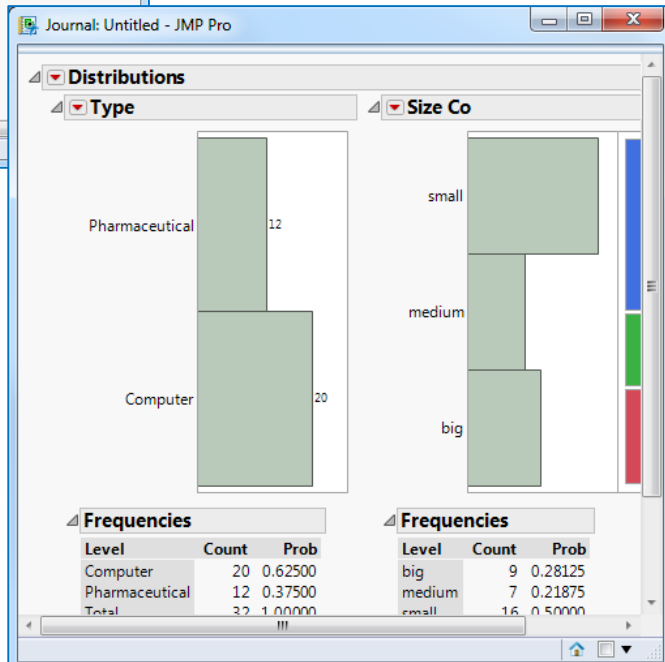
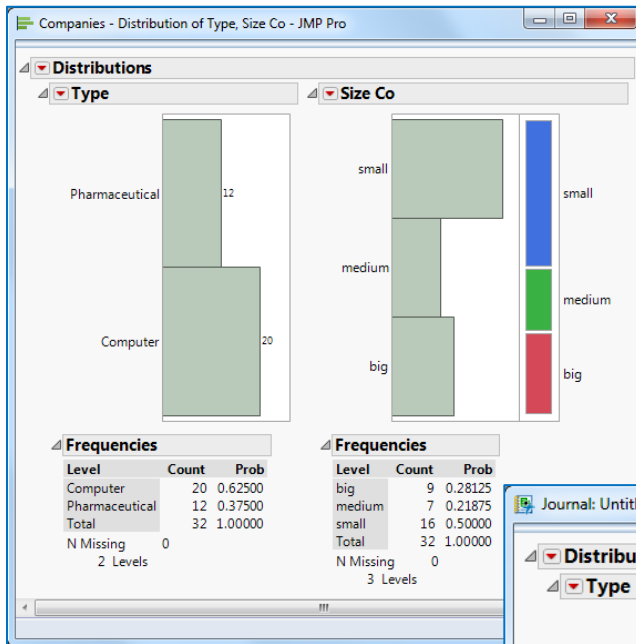
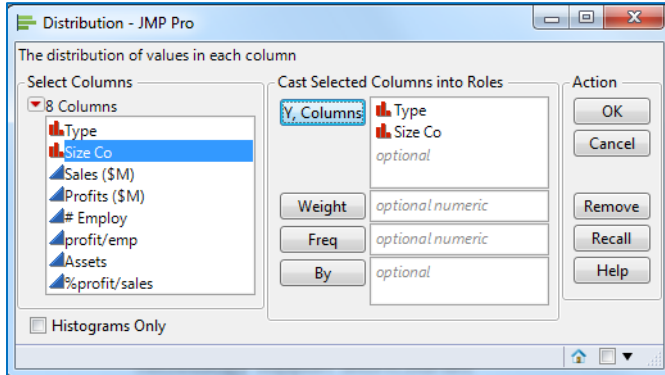
- Save platform reports for future viewing by creating a journal of the report window. The journal is a copy of the report window.
- You can edit or append additional reports to an existing journal. The journal is not connected to the data table. A journal is an easy way to save the results from several report windows in a single report window that you can share with others.

Create and Modify a Report and Save it to a Journal

- Select **Help** -> **Sample Data Library** and open **Companies.jmp**.
- Select **Analyze** -> **Distribution**.
- Select both **Type** and **Size Co** and click **Y, Columns**.
- Click OK.
- From the **red triangle** menu for **Type**, select **Histogram Options** -> **Show Counts**.
- From the **red triangle** menu for **Size Co**, select **Mosaic Plot**.
- On the Report Window, using the **Blue Bar** (hidden menu bar), select **Edit** -> **Journal**, to journal these results. The results are duplicated in a journal window.

Note: The results in the journal are not connected to the data table. In the Type bar chart, if you click the Computer bar, no rows are selected in the data table. Since the journal is a copy of your results, most of the red triangle menus do not exist. A journal does have a red triangle menu for each new report that you add to the

journal. **Rerun** the analysis in new window If you have the original data table that was used to create the original report, this option runs the analysis again. The result is a new report window.

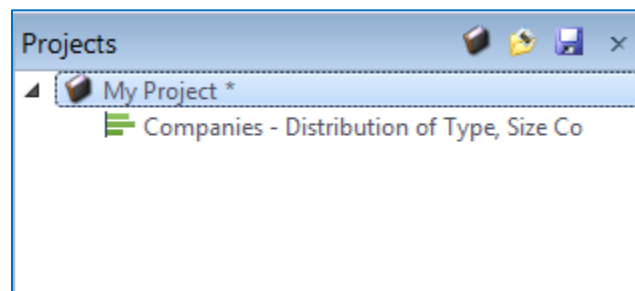


Creating Projects

Save multiple JMP file types (such as data tables, reports, and journals) in a single file by creating a project. The project file contains all the information needed to re-open all of the included files.

Create a Project and Add the Data Table and the Report to It

1. On the **Report Window** (using the Blue bar – hidden menu bar), and to start a new project, select **File -> New -> Project**. A new project appears in the **Home Window**.
2. **Right-click** the project (Untitled) and select **Rename**, and then enter a new name (My Project).
3. To add the **Distribution** results to the project, right-click on the project name and select **Add Window**.
4. In the Add Windows to Project window, select the Distribution results.
5. Click **OK**.
6. To add the **Companies.jmp** data table to the project, repeat step 3 and select the Companies data table from the window.
7. Click OK. The data table is added to the project.



JMP ELearning

JMP ELearning courses are available @ http://www.jmp.com/en_us/academic/academic-licensing.html#elearning. Each course produces a **certificate of completion**, and is **freely** available to all **TTU faculty, students, and staff members**.

- **JMP Software. A Case Study Approach to Data Exploration**

How to bring data into JMP, ask questions of the data, manipulate and clean up any issues with the data, create formulas where necessary, and create graphs

and summary reports from the data. Uses a case study-based approach. (7 hours)

- **JMP Software. Data Exploration, Academic Version**

A shortened version of the classic *JMP Software. Data Exploration* e-course (takes roughly 2 hours). Includes the following topics. Navigate the JMP interface, manage data effectively in JMP, explore data by using JMP software's extensive graphical capabilities, create and manage reports in JMP. Based on JMP 11.

- **JMP Software. ANOVA and Regression**

Introduction to statistics, comparing means, analysis of variance, simple linear regression, multiple regression, regression diagnostics, and analysis of covariance. (14 hours)

- **JMP Software. Classic Design of Experiments**

Introduction to design and analysis of experiments, multiple factor designs and blocking, screening designs, response surface methodology, and custom designs. (14 hours)

- **Instant Applications using JMP Application Builder**

Introduction to JMP applications, developing applications interactively, generalizing applications, and deploying applications. Based on JMP 11. (3.5 hours)

Online Resources

- **JMP 14 ONLINE DOCUMENTATION**

https://www.jmp.com/en_us/support/jmp-documentation.html

- **Examples and Tutorials**

http://www.jmp.com/support/help/Examples_and_Tutorials.shtml

- **JMP Learning Library** http://www.jmp.com/en_gb/learning-library.html

Where to Get Help

- Texas Tech University has site licenses for **JMP** software, and as a member of the TTU community, you have the right to have full 24 hours support from JMP.
- If you need help from me, please e-mail heide.mansouri@ttu.edu. Or call 834-2935 to make an appointment.

Please e-mail your comments or suggestions to. heide.mansouri@ttu.edu