SPSS for Experimental Analysis

(Version 1: 11/10/2015)

Background Information

IBM SPSS Statistics is a software package used for statistical analysis, data management, and data documentation. It allows even novice researchers to do their own statistical analysis with ease. This program is widely used by individuals with interests in social sciences, market research, health research, surveys, government, and education research.

This intermediate workshop is designed to further expand knowledge on statistical analysis and SPSS functions beyond the introductory level such as running descriptive or inferential analysis types, make charts with curves and change measurement types in chart builder, transform data, importing excel files, and using the variable window to manage data more effectively.

Required Skills

Before beginning, the following skills are required:

- Basic knowledge of Statistical terminology
- Basic knowledge of SPSS functions
- Experience with software navigation (keyboard and mouse)
- Basic Excel knowledge

Agenda

- Entering Raw Data
  - Defining variables
  - Entering Data
- How to sort data in Data view
- How to run Inferential analysis (Pearson correlation, t-test, regression, chi square ANOVA One-Way, ANOVA Multivariate, Post-Hoc)
- Format charts

Sorting Your Data in Data View

Sorting your data visually organizes your data

1. Select *Data > Sort Cases*
2. In the *Sort Cases* window select your variable you wish to sort and move it to the *Sort By* window
3. Select your *Sort Order* and select *Okay*

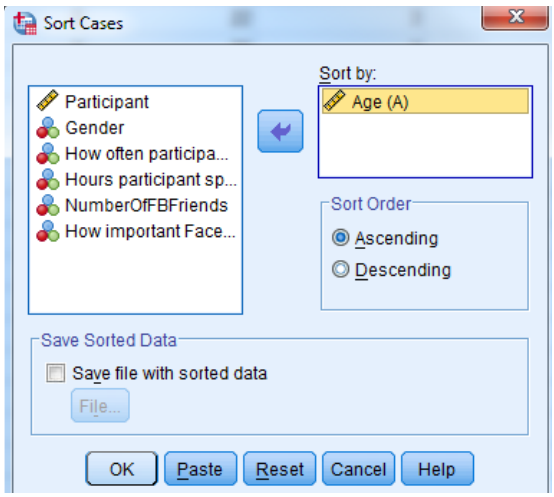

Figure 1 - Sort Cases window

Your data is now changed in the Data View tab

Activity: Sort the data by *score* in ascending order

Testing Reliability

Crosstabs and Chi-Square

1. Go to the top menu
2. Select *Analyze > Descriptive Statistics > Crosstabs*
3. A dialog box will appear, select your independent variable in the left box and move it over to *Row(s)* using the arrow button
4. Select your dependent variable and move it over to the *Column(s)* box
5. To find the Chi-Square: Click *Statistics > Chi-square > Continue*

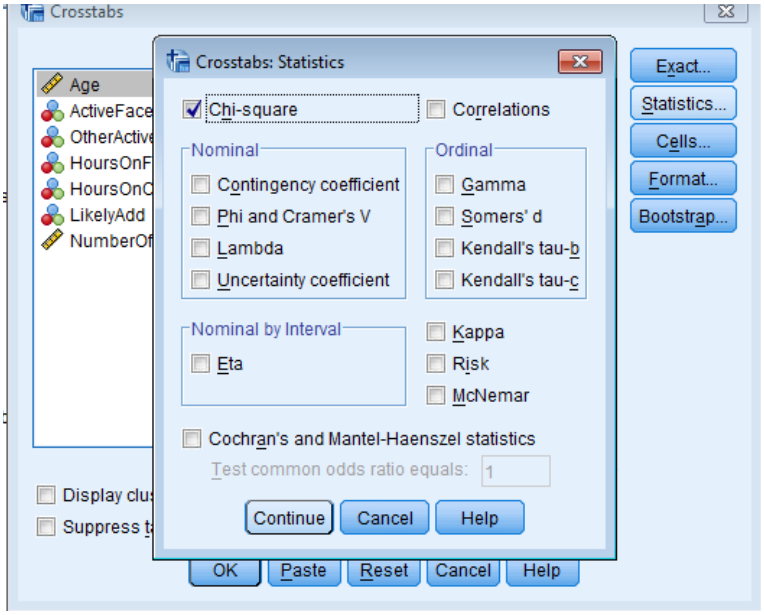

Figure 2 - Crosstabs: Statistics window in from of the Crosstabs window (step 5 shown)

6. Click the *Okay* button

Activity: Make a crosstab with a chi-square of *score* and *watch*

Scale Reliability

To analyze weather or not two observers recorded a behavior correctly you can use the reliability tool under the scale analysis

1. In the tope toolbar select: *Analyze > Scale > Reliability Analysis*
2. Click over the two variables for comparison over to *Items*
    a. You can add extra tests under statistics
3. Once finished click *OK*
4. Your reliability will appear in the output window

Splitting your Data

Splitting the data in your .spv file allows you to temporarily compare different tests across subsets of your data. If you wanted to compare t-test of treatment and test scores but also wanted to see the difference in these results across gender, splitting the file will give you two t-test results: one for each gender.

Creating a split

1. Go to the top menu
2. Select *Data > Split File*. The Split File dialog box will appear.
3. Move the variable you wish to split your file by to the *Groups Based on* box using the arrow button.
4. Choose either: *Compare Groups* or *Organize output by groups*
5. Select *OK* when finished.

Keep in mind that once you split your data your file will appear to be no different, so it's best to remove the split as soon as you are finished to prevent obtaining skewed results.

Removing a split

1. Go to the top menu
2. Select *Data > Split File*. The Split File dialog box will appear.
3. Select *Analyze all cases, do not create groups.*
4. Select *OK* when finished.

- Alternativly you can use the syntax command: SPLIT OFF.

Pearson's Correlation

A correlation is a statistical device that measures the strength of a degree of a supposed linear association between two or more variables. One of the more common measures used is the Pearson Correlation, which estimates a relationship between two interval variables.

1. Go to the top menu
2. Select *Analyze > Correlate > Bivariate*. The Bivariate Dialog Box will open
3. Decide what variables you want to correlate (you can do many at once)

4. Move your variables over to the *Variable* box using the arrow button
5. Select the *Pearson Correlation Coefficient* check box (if not already checked)
6. Select the *two-tailed* or *one-tailed* test of significance bubble

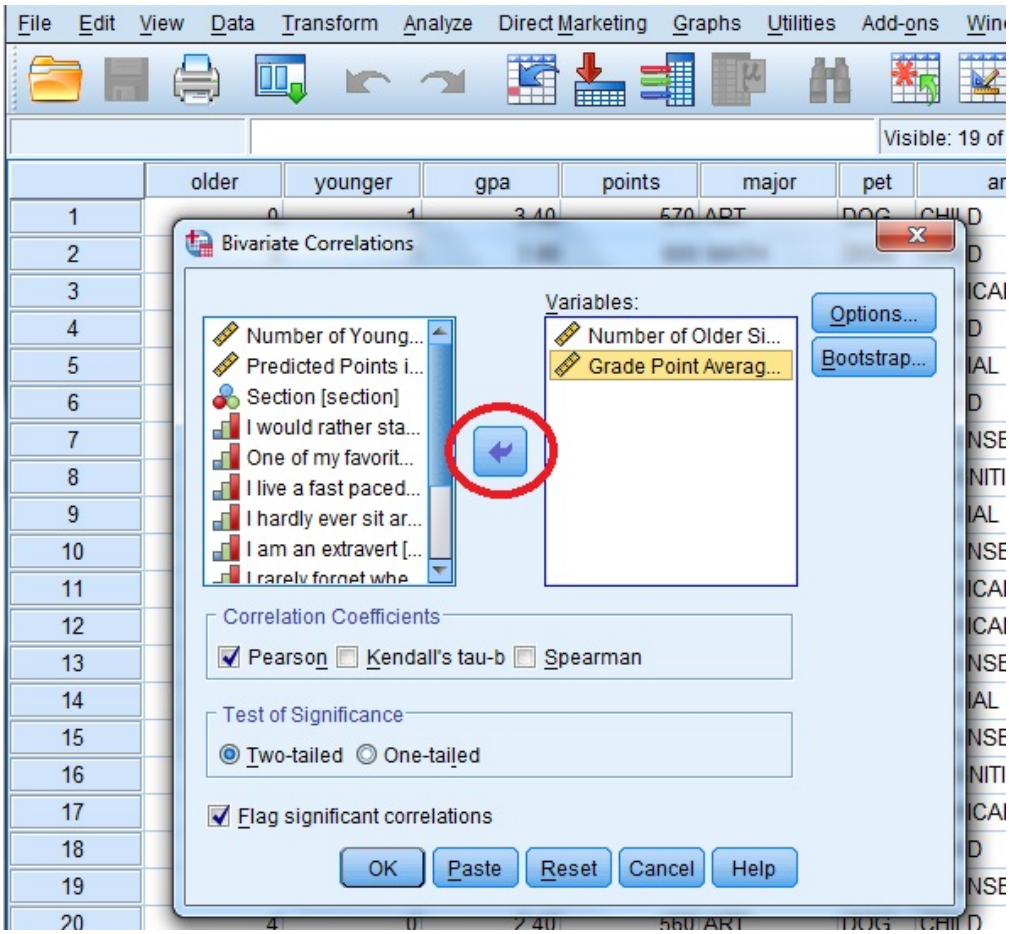

Figure 3 - Bivariate Correlations window (step 4 shown)

7. Click *Okay* and the output viewer window will appear with the correlations table

Options

Under the Options dialogue window you can add descriptive statistics to your Pearson correlation.

Activity: Create a Pearson's Correlation using *Minutes,*and *Score*

Linear Regression (Independent T-test) Analysis

Regression analysis is about predicting the future (the unknown) based on data collected from the past (the known). Such an analysis determines a mathematical equation that can be used to figure out what will happen within a certain range of probability. The analysis is performed on a single dependent variable and it takes into account which independent variables have more effect than others. One type of regression analysis linear regression, which is used when the projections are expected to be in a straight line with actual values.

1. Go to the top menu
2. Select *Analyze > Regression > Linear*
    - The Linear Regression window will appear

3. Select your dependent variable and move it to the *Dependent* box using the arrow button
4. Select your independent variable(s) and move them into the *Independent(s)* box using the arrow button

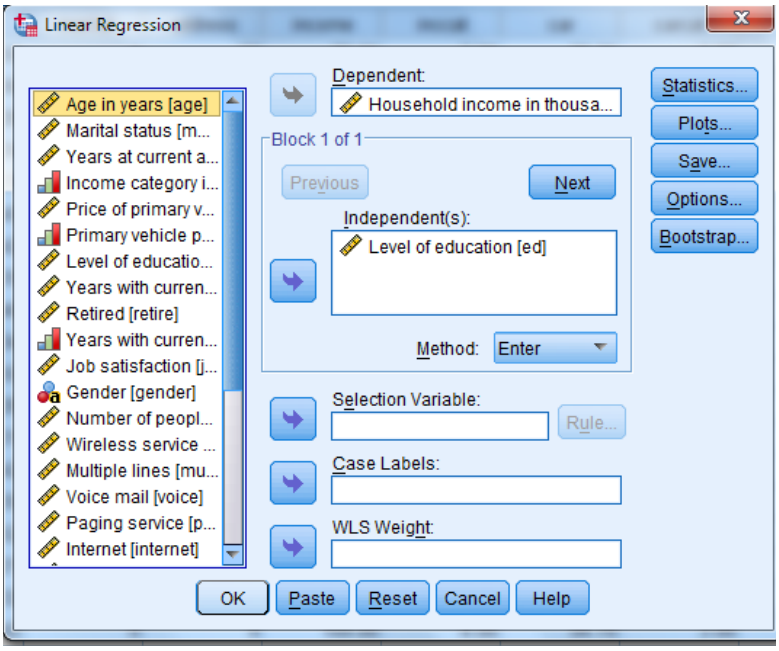

Figure 4 - Linear Regression window (steps 1-4 completed)

5. Click *Okay*

Several tables will appear in the output window, the *Coefficients*[a] table contains the coefficients required to make predictions.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	53.108	2.330		22.794	.000
	Level of education	6.327	.817	.096	7.742	.000

a. Dependent Variable: Household income in thousands

Figure 5 - Coefficients table

Activity: drag *score* to the test variables box, and move *watch* to group variable

An independent T-test is used to determine the likelihood that two independent data samples came from populations with identical means. If this were true, then the difference between the means should equal zero. In this case, the null hypothesis would indicate that two means are equal.

Two variables are required in the data set. One variable is the measured parameter. Examples include weight, height or frequency. The second variables divide the data set into two groups. The means of light and dark groups will be compared.

1. Go to the top menu
2. Select *Analyze > Compare Means > Independent Samples T Test.* The Independent-Samples T Test dialog box will open
3. Select continuous variables that you want to test from the list

4. Click on the arrow that will send them to the *Test Variables* box
5. Select the categorical variable from which you are going to extract the groups for comparison and send it to the *Grouping Variable* box by pressing the lower arrow

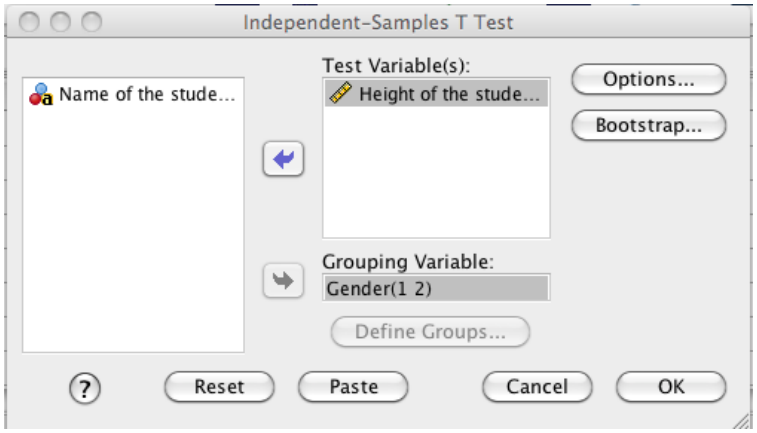

Figure 6 - Independent-Samples T Test window (steps 1-5 completed)

6. Click on the *Define Groups* button
7. The *Define Groups* window will pop up
8. Click *Continue* after specifying your group values

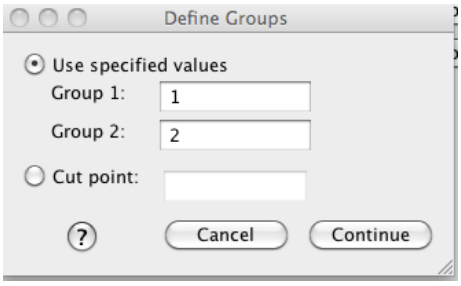

Figure 7 - Define Groups window

9. Click *Okay* to view your output

Options

Using the options tool you can adjust the confidence interval and missing participants

Paired Sample (Dependent) T-Test

This type of t-test is used if an observed difference between the two means of a paired samples set is statistically significant. It is the same test as a dependent t-test

1. Select *Analyze > Compare Means > Paired Samples T-Test*
2. Highlight the two variables upon which you want to run your analysis. When you have the two highlighted, send them over to the right column with the arrow button. You can then define more variable pairs if you wish, but if that's all you want, then just click *OK*
    a. Under Options you can set the Confidence Interval Percentage

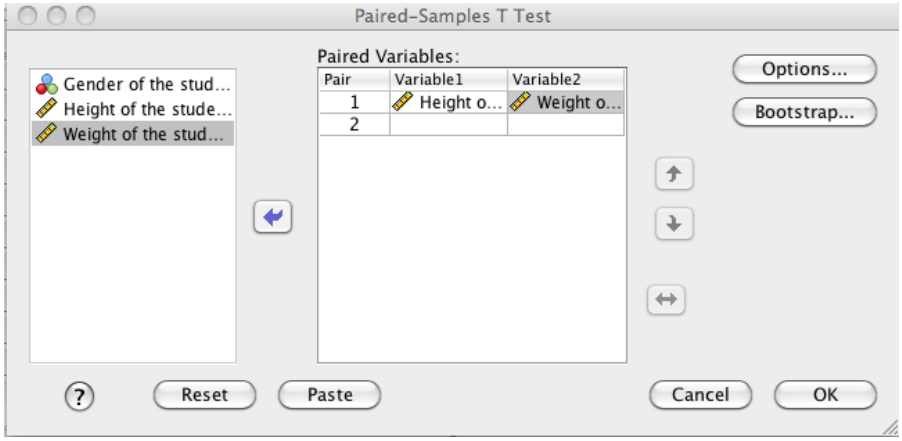

Figure 8 - Paired-Samples T Test window (step 2 shown)

Options

Using the options tool you can adjust the confidence interval and missing participants

Independent T-Test

This test requires a categorical and a quantitative value

1. In the Data View tab Go to the top menu
2. Select *Analyze > Compare Means > Independent Samples T Test*
3. Move your dependent quantitative variable to the *Test Variable* box
4. Move your independent qualitative variable to the *Grouping Variable* box
    a. Click *Define Groups.* Add the coded values of your variable
5. Select Ok when finished

ANOVA

One-Way ANOVA

One-way analysis of variance (One-Way ANOVA) is the analysis of the variance of values (of a dependent variable) by comparing them against another set of values (the independent variable). It is a hypothesis that the mean of the tested variable is equal to that of the factor.

1. In the Data View tab Go to the top menu
2. Select *Analyze > Compare Means > One-Way ANOVA*
3. Move your dependent variable to the *Dependent list* box
4. Move your independent variable to the *Factor* box
    a. Click *Options* if you want to add any extra statistics to your analysis

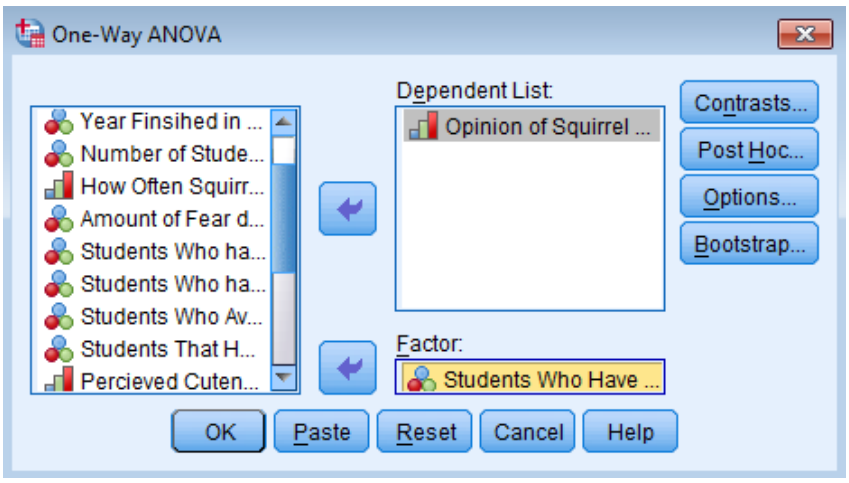

Figure 9 - One-Way ANOVA window (steps 3 and 4 shown)

5. Click *OK.* The output viewer window will open showing your One-Way ANOVA

Post Hoc

To add an multiple comparisons (like a Tukey, Bonferroni, etc.) use the *Post Hoc..* dialogue window, you can also change the significance level here as well.

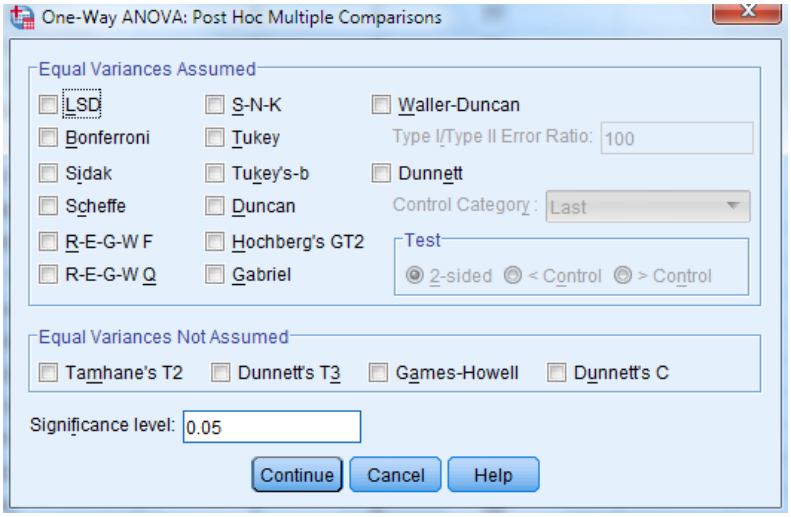

Figure 10- Post Hoc dialogue window

1. **Activity:** Make a One-Way ANOVA with *score* as the Dependent and *watch* as the factor

GLM Univariate

To make a univariate glm

1. In the Data View tab Go to the top menu
2. Select *Analyze* > *General Linear Model* > *Univariate*
3. Move your dependent variable to the *Dependent list* box
4. Move your independent variables to the *Factor Factors* box
5. Press *OK* when finished. The output viewer window will open showing your Univariate ANOVA

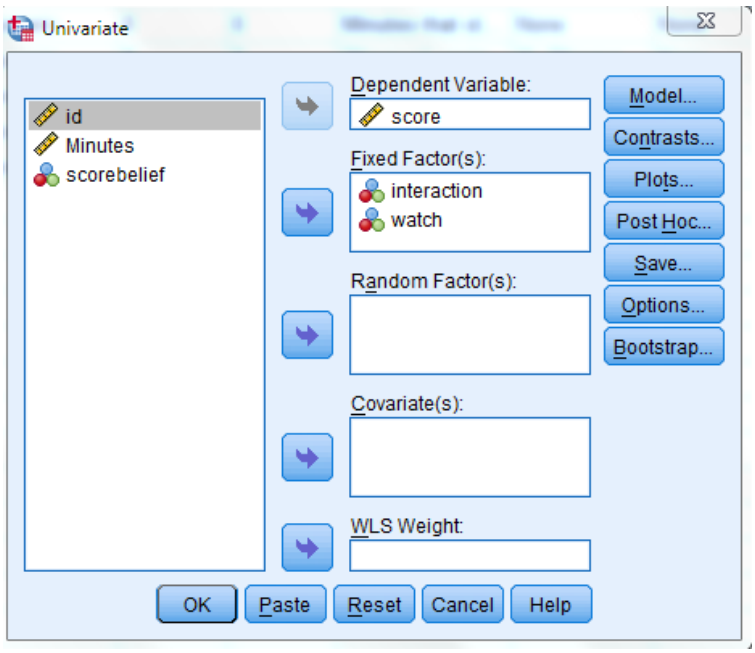

Figure 11 - Univariate window

Post Hoc

To add an multiple comparisons (like a Tukey, Bonferroni, etc.) use the *Post Hoc.*. dialogue window

Options

You can open this dialogue window to display additions to your univariate test such as estimate of effect size, descriptive statistics, etc.

Plots

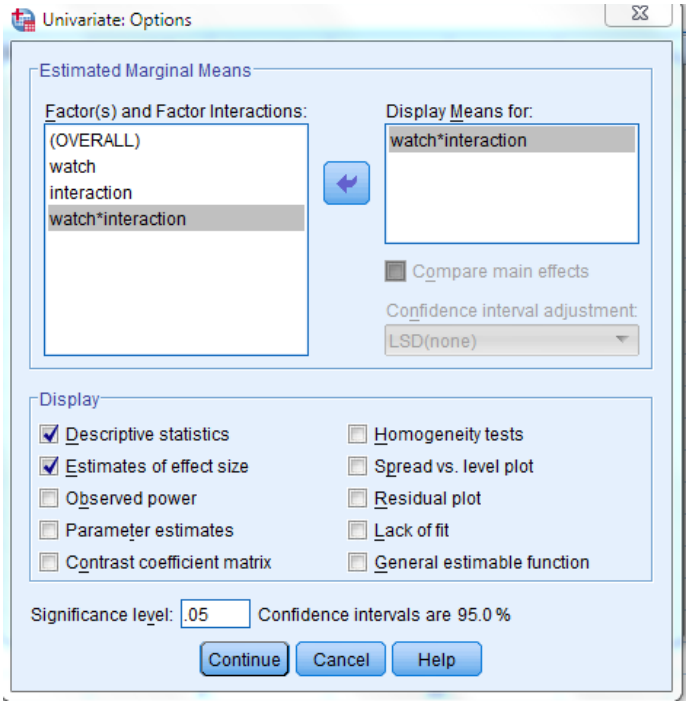

Figure 12- Univariate Options dialogue window

Activity: Make a GLM univariate with *score* and *interaction* and *watch* as the IV

Legacy Charts

1. Go to the top menu and select *Graphs > Legacy Dialogs*
2. Select the chart you want to make
3. A dialogue window will appear asking you to choose the type of sub-chart. Click *define* ones you selected the type of chart you want to create.

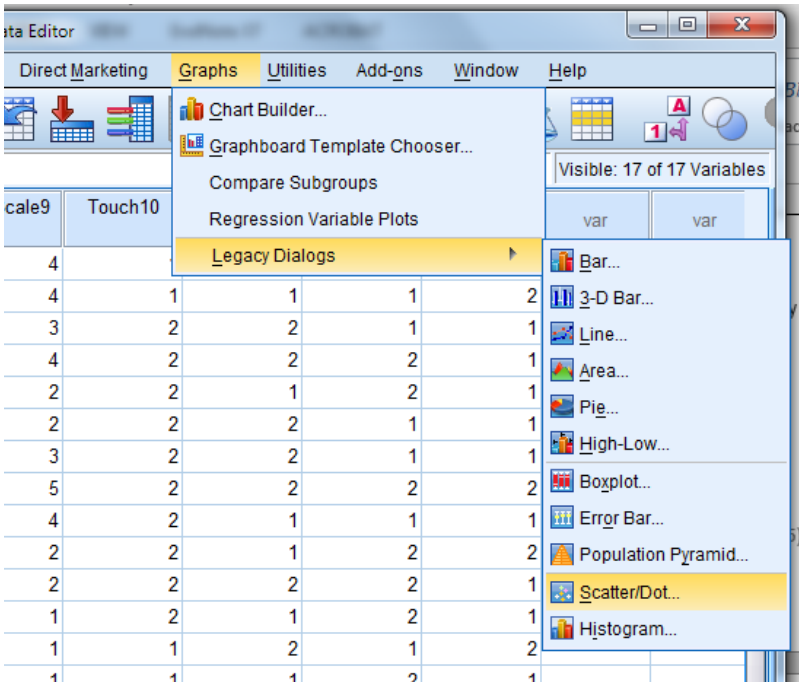

Figure 13 - selecting a Legacy Dialog chart

4. A new dialogue window will appear allowing you to build your chart
5. Click on the variables you want to move in the Y and X axis and drag them over using the  button.
6. Click on *Options* to add confidence intervals, standard error, standard deviation and special case labels
7. Click *OK* when finished
8. Your chart will appear in the output window.

Wrapping Up:

- Opening your existing .sav file
  - open files from the welcome menu or from the Data Editor
  - Don't forget to save often
- Sorting data from SPSS organizes your data
- If you need to create a new variable from an old one use the Transformation tool
- Pearson's correlations are labeled as bivariate correlations in SPSS
- Linear Regression analysis

- Independent and paired sample T tests are found under *Compare Means* in the analyze drop down
- You can create a chi-square analysis through the crosstab feature
- While ANOVA is found under *Compare Means* MANOVA's are found under *General Linear Model*
- There are many chart formatting options in the *Chart Editor*, just double click on your chart in the Output Viewer to access this