Data used in this guide: <a href="mailto:studentp.sav">studentp.sav</a> (<a href="http://www.cc.ysu.edu/~ghchang/stat/studentp.sav">http://www.cc.ysu.edu/~ghchang/stat/studentp.sav</a>)

#### Organize and Display One *Quantitative* Variable (Descriptive Statistics, Boxplot & Histogram)

- 1. Move the mouse pointer on **Analyze**, click the left button of the mouse and move through the following menu selections:
  - Analyze  $\Rightarrow$  Descriptive Statistics  $\Rightarrow$  Explore ... (To perform Exploratory Analysis)

💼 studer	ntp - SPSS Da	ta Editor							
File Edit	View Data	Transform	Analyze	Graphs	Utilities	W	'indow	Help	
	a 🔍 🖻		Repor Descri	ts ptive Stati	► stics		il an le Freque	ncies	<u>_</u>
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3	3	7	Classi	Y	•	1		Т	Male
4	4	E	Data P	Reduction	•	9		Н	Female
5	5	E	Scale		•	8		Т	Female
6	6	7	Nonpa	arametric T	ests 🕨	0		Н	Male 🚽
<b>▲ ▶ \ Da</b> Examine	ta View 🖌 ∨a	riable View	Surviv Multip	al le Respons	e ►	or	is read	У	

2. In the Explore dialog box, click and select the variable (weight) to be studied.



3. In the Explore dialog box, click **Plots...** button. In the Explore: Plots dialog box, check the **Histogram** and **Normality plots with tests**, if they are needed, and click on **Continue button**. If Sig. value (or *p*-value) in the normality test table is less than .05, it implies that data may **not** be from normally distributed population. The values .200 and .236 are *p*-values calculated based on tow different tests.

Explore: Plots		×				
Boxplots © <u>F</u> actor levels together © <u>D</u> ependents together © <u>N</u> one	Descriptive <u>S</u> tem-and-leaf Histogram	Continue Cancel Help				
✓ Normality plots with tests ✓ Spread vs. Level with Levene Test						
<ul> <li>None</li> <li>Power estimation</li> </ul>	None O Power estimation					
<ul> <li>C Iransformed Power: Natural log ▼</li> <li>C Untransformed</li> </ul>						



- 4. In the Explore dialog box, click on **OK** button. The SPSS will put the results, histogram, stemplot and descriptive statistics, in the OUTPUT window.
- 5. If one wishes to explore the quantitative variable for separate categories of a qualitative variable, select that qualitative variable and put it in the **Factor List** and click **OK**. (See the example in last two pages of this document.)

#### Organize and Display One Qualitative(Categorical) Variable (Pie or bar charts)

1. Move the mouse pointer on **Analyze**, click the left button of the mouse and move through the following menu selections:

📰 studer	ntp - SPSS Da	ta Editor							
File Edit	View Data	Transform	Analyze	Graphs	Utilities	; W	'indow	Help	
			Report	ts	•		i an ir	HI K	<u>a</u>
			Descri	ptive Statis	stics 🕩	·	Freque	ncies	
1 : no		1	Compa	are Means	→	•	Descrip	otives	
ŕ	no	hoight	Gener	al Linear M	odel 🕨	•	Explore	э	cov 🔺
	110	neigin	Correl	ate	•	•	Crossta	abs	
1	1		Regre:	ssion	•	T		11	- emale
2	2	6	Logline	ear	•	9		Н	Female
3	3	7	Classif	y	•	1		Т	Male
4	4	E	Data R	eduction	•	9		Н	Female
5	5	E	Scale		•	8		Т	Female
6	6	7	Nonpa	rametric T	ests 🕨	0		Н	Male 🖵
<b>▲</b> )\Da	Data View / Variable View				Survival 🕨				
Frequencie	Frequencies Multiple Response For is ready								

Analyze ⇒ Descriptive Statistics ⇒ Frequencies ...

2. In the Frequencies dialog box, click and select the variable (sex) to be studied.



3. In the Frequencies dialog box, click **Charts...** button, if one wishes to display chart. In the Frequencies: Charts dialog box check on the desired chart and select either Frequencies or Percentages to be displayed and click **Continue** button.

Frequencies: Charts	×				
Chart Type None Bar charts Pie charts Histograms With normal curve	Continue Cancel Help				
Chart Values • Frequencies C Percentages					

4. In the Frequencies dialog box, click on OK button. The SPSS will put the results, frequency distribution table and bar chart (if checked), in the OUTPUT window.

	sex								
					Cumulative				
		Frequency	Percent	Valid Percent	Percent				
Valid	Female	9	40.9	40.9	40.9				
	Male	13	59.1	59.1	100.0				
	Total	22	100.0	100.0					



## Examine Relation Between Two Quantitative Variables by Chart (Scatter Plot)

1. Click and move through the following menu selections:

Graphs	₽	Scatter	•••
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🚞 studer	📰 studentp - SP55 Data Editor 📃 🔲 🗙							
File Edit	View Data	Transform A	nalyze	Graphs Utilities	Wi	ndow	Help	
<b>F 2 8 2 1 1 1 1</b>				Gallery Interactive	•	±∎ ≣	<b>I</b> 🔊	0
1 : no		1		Bar				
	no	height	wei	Line		coi	n	sex 📥
1	1	6		Area			Н	Female
2	2	63		Pie			Н	Female
3	3	72		High-Low	_		Т	Male
4	4	60		Pareto			Н	Female
5	5	65		Control			Т	Female
6	6	72		Boxplot			Н	Male
7	7	64		Error Bar			Н	Female
8	8	71		Scottor			Н	Male 🚽
<b>▲</b> )\Da	ta View 🖌 🗸	riable View 🖌		Histogram			-	
Scatter				P-P		is ready	,	

2. In Scatterplot dialog box, click the Simple option and click Define button.



3. In **Simple Scatterplot** dialog box, select the two variables (height and weight) to be studied. If one wishes to build a regression model for predicting height using weight variable, usually choose height variable for Y Axis (as response variable) and choose weight variable for X Axis (as explanatory variable). One can select sex variable for the **Set Markers by:** field to make scatter plot display scatter dots with different color for different sex.

<b>:::::::::::::::::::::::::::::::::::::</b>			×			
<ul> <li>no</li> <li>birthday</li> <li>cian (coin)</li> </ul>	Þ	Y Axis: I ∲ height	OK Paste			
con [coin]     sex [sex]     pulse1	$\rightarrow$	X Axis: I ⊯ weight	Reset Cancel			
<ul> <li></li></ul>	►	Set Markers by:	Help			
	►	Label Cases by:				
Template Use chart specifications from: File						
Titles Options						

4. In the Simple Scatterplot dialog box, click on **OK** button. The SPSS will put the scatter plot in the OUTPUT window. The following scatter plot is based on the data in **studentp.sav** file with the first case dropped, since the height information for the first case is incorrect.



5. One can double click on the any part of the chart in the SPSS output window to bring up the chart editor for editing the scatter plot. A fitted line can be added to the chart using the **Chart** option in the chart editor menu bar.

# **Examine Relation Between Two Qualitative Variables (Contingency Table and Cluster Bar Chart)**

- 1. Click and move through the following menu selections:
  - Analyze ⇒ Descriptive Statistics ⇒ Crosstabs ...

📰 studen	tp - SPSS Da	ta Editor						
File Edit	View Data	Transform	Analyze Graphs	Utilities	Windo	w Help		
Calor	a 🗉 🗠		Reports	+	la la	deel 🔊	<u>a</u>	
			Descriptive Stat	tistics 🕩	Free	quencies		
3 : height		7	Compare Means	s 🕨	Des	criptives		
ľ –	no	hoight	General Linear I	Model 🕨	Exp	lore	cov 🔺	
	10	neigni	Correlate		Cros	sstabs	Sex	
1	1		Regression		4	11	- emale-	
2	2	6	Loglinear		9	Н	Female	
3	3	7	Classify	•	1	Т	Male	
4	4	E	Data Reduction	•	9	Н	Female	
5	5	E	Scale	•	8	Т	Female	
6	6	7	Nonparametric	Tests 🕨	0	Н	Male	
7	7	B	Survival	• •	8	Н	Female	
8	8	7_		ise 🕨	10	Н	Male	
<b>I</b> → \Da	Data View Variable View							
Crosstabs	Crosstabs SPSS Processor is ready							

2. In Crosstabs dialog box, select the categorical variables for Row variable and Column variable, and click **OK** button.

📲 Crosstabs		×
<ul> <li>no</li> <li>Image: bootdap</li> <li>Image: b</li></ul>	Row(s):         Image: white sex [sex]         Column(s):         Image: white sex [coin]	OK Paste Reset Cancel Help
	Previous Layer 1 of 1	xt
Display clustered bar ch	narts	
Suppress tables		
	Statistics Cells Format	

3. In Crosstabs dialog box, click on **Cells** ... button to specify whether or not to display the percentage information and then click **Continue** button to go back to Crosstabs dialog box.

rosstabs: Cell Display						
Counts	Continue					
Observed	Cancel					
Expected	Help					
- Percentages	Residuals					
Row	Unstandardized					
🔽 Column	🔲 Standardized					
🗖 Total	🗖 Adj. standardized					

4. One can also check on **Display clustered bar charts** option in the Crosstabs dialog box to display clustered bar chart with only frequency (count) information. If percentages are needed be displayed, go through Graphs options.

📲 Crosstabs		×	
<ul> <li>no</li> <li>height</li> <li>weight</li> <li>birthday</li> <li>pulse1</li> <li>pulse2</li> </ul>	Row(s):         Image: sex [sex]         Image: sex [sex]         Column(s):         Image: sex [coin]	OK Paste Reset Cancel Help	
<ul> <li>Display clustered bar ch</li> <li>Suppress tables</li> </ul>	Previous Layer 1 of 1	Next	To perform a <u>chi-square test</u> , click on <b>Statistics</b> button and check the <b>Chi-square</b> box. The chi-square test results will be displayed in SPSS output window after clicking on OK from the Crosstabs diaglog box

5. In the Crosstabs dialog box, click on **OK** button. The SPSS will put a contingency table and also a clustered bar chart in the OUTPUT window if the clustered bar chart box is checked.



## Clustered Bar Chart (Make a separate cluster bar chart)

1. Move the mouse pointer on **Graphs**, click the left button of the mouse and move through the following menu selections:

📰 studer	ntp - SPSS Da	ta Editor					
File Edit	View Data	Transform A	nalyze	Graphs Utilities	Wi	ndow Help	L
			Gallery Interactive	•	<b>₫₿</b> [	<u>s</u>	
3 : height		72		Bar	=		
	no	height	wei	Line		coin	sex 📤
1	1			Area		Н	Female
2	2	63		Pie		Н	Female
3	3	72		High-Low	_	Т	Male
4	4	60		Pareto		Н	Female
5	5	65		Control		Т	Female
6	6	72		Boxplot		Н	Male
7	7	64		Error Bar		Н	Female
8	8	71		Cashban	-	Н	Male
<b>▲</b> )\Da	Data View Variable View					_	
Bar				P-P		is ready	11.

Graphs ⇒ Bar ...

2. In Bar Charts dialog box, click the **Clustered** option. Check the **Data in Chart Are** option in Summaries for groups of cases and click **Define** button.



3. Select the two variables (sex and coin) to be studied. One can select sex variable for the Category Axis and coin variable for Clusters and check of % of cases and click OK. (Sometimes, percentage information are better for understanding the data)

📲 Define Clustered Bar:	Summaries for Groups of (	lases	×
<ul> <li>no</li> <li>height</li> <li>weight</li> <li>birthday</li> <li>pulse1</li> <li>pulse2</li> </ul>	Bars Represent  N of cases C Cum. n of cases O Other summary function Variable: Change Sur	© % of cases © Cum. % of cases	OK Paste Reset Cancel Help
	Category Axis: Category Axis: Con [coin] Define Clusters by: Sex [sex] Template Use chart specifications File	from:	Titles Options



\* Chart editor can be used to modify the chart and change the color or pattern in the chart. To activate the chart editor, one can simply double click any part of the chart in the SPSS Output window.

Examine Relation Between One *Quantitative* Variable with One Qualitative Factor Variable (Side-by-side boxplot, descriptive measures for sub-categories.)

1. Move the mouse pointer on **Analyze**, click the left button of the mouse and move through the following menu selections:

<b>5</b>	tuden	tp - Sl	PSS Da	ta Editor								- 🗆 ×
File	Edit	View	Data	Transform	Analyze	Graphs	Utiliti	es	W	indow	Help	
62					Repor	ts		F	F	l an I r	<b>=</b> 1 (as	<u>a</u>
			<b>•</b> <u> </u>		Descri	ptive Stat	istics	×		Freque	ncies	
3:h	eight			7	Compa	are Means	5	۲		Descrip	tives	
É		n	0	height	Gener	al Linear I	Model	×		Explore	·	cov 🔺
<u> </u>			4	neigin	Correl	ate		×		Crossta	abs	364
	1		1		Regre	ssion		<b>۲</b>	1		11	emaie
	2		2	6	Logline	ear		►	9		Н	Female
	3		3	7	Classif	fy		F	1		Т	Male
	4		4	6	Data R	Reduction		۲	9		Н	Female
	- 5		5	E	Scale			F	8		Т	Female
	6		6	7	Nonpa	arametric '	Tests	Ł	O		Н	Male
	- 7		7	E	Surviv	al Is Bassa		ł	8		Н	Female
	8		8	7.		le Respon	ise	<u> </u>	lo		Н	Male
	]∖Da	ta Viev	N ( Ve	riable View	7	Ī			-		_	
Exam	nine					SPS	5S Proc	ess	or	is read	У	

Analyze  $\Rightarrow$  Descriptive Statistics  $\Rightarrow$  Explore ... (To perform Exploratory Analysis)

2. In the Explore dialog box, click and select the variables (weight) and (sex) to be studied.



Click the variable to be selected (weight) from the list of variables on the left for analysis and click the select button, the button with a dark triangular shape in it, to select the variable into Dependent List box. Select the sex variable in Factor List box to observe the difference between the weights from both genders. 3. In the Explore dialog box, click **Plots...** button. In the **Explore: Plots** dialog box, check the **Histogram** and **Normality plots with tests**, if they are needed, and click on **Continue button**. If Sig. value (or *p*-value) in the normality test table is less than .05, it implies that data may **not** be from normally distributed population.

Explore: Plots		×
<ul> <li>Boxplots</li> <li>Factor levels together</li> <li>Dependents together</li> <li>None</li> </ul>	Descriptive Stem-and-leaf Histogram	Continue Cancel Help
Normality plots with test     Spread vs. Level with Level     None     Power estimation     Transformed Power     Untransformed	vene Test	

4. In the Explore dialog box, click on **OK** button. The SPSS will put the results, histograms, stemplots, descriptive statistics, and side-by-side boxplot in the OUTPUT window.

		Des	cilptives		
	sex			Statistic	Std. Error
weight	Female	Mean		134.89	7.983
		95% Confidence	Lower Bound	116.48	
		Interval for Mean	Upper Bound	153.30	
		5% Trimmed Mean		133.99	
		Median		135.00	
		Variance		573.611	
		Std. Deviation		23.950	
		Minimum		106	
		Maximum		180	
		Range		74	
		Interquartile Range		38	
		Skewness		.705	.717
		Kurtosis		.173	1.400
	Male	Mean		192.85	9.035
		95% Confidence	Lower Bound	173.16	
		Interval for Mean	Upper Bound	212.53	
		5% Trimmed Mean		190.11	
		Median		185.00	
		Variance		1061.141	
		Std. Deviation		32.575	
		Minimum		150	
		Maximum		285	
		Range		135	
		Interquartile Range		25	
		Skewness		1.990	.616
		Kurtosis		5.449	1.191

Descriptives

\* Tests of normality for weight variable, one for male and one for female.

		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk			
	sex	Statistic	df	Sig.	Statistic	Sig.		
weight	Female	.165	9	.200*	.945	9	.633	
	Male	.243	13	.035	.812	13	.010	

**Tests of Normality** 

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

\* Two histograms for weights, one for male and one for female.



\* Side-by-side box plot for comparing weight between male and female students.



