

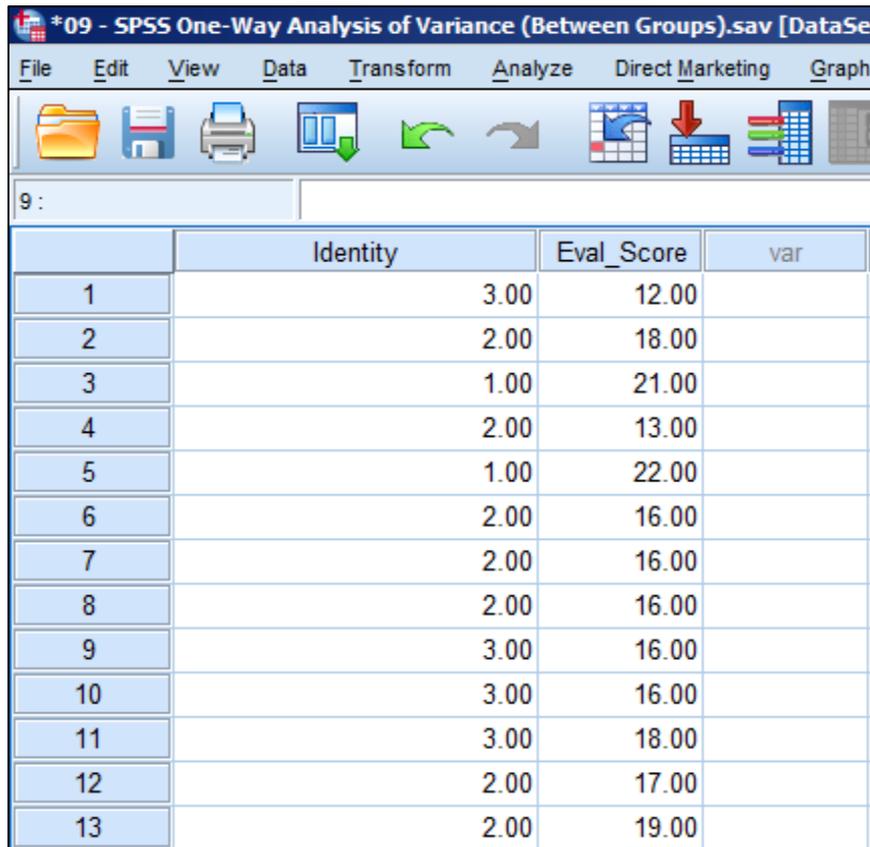
# Psyc 381

## One-way ANOVA (Between-Subjects)

### A brief how-to guide

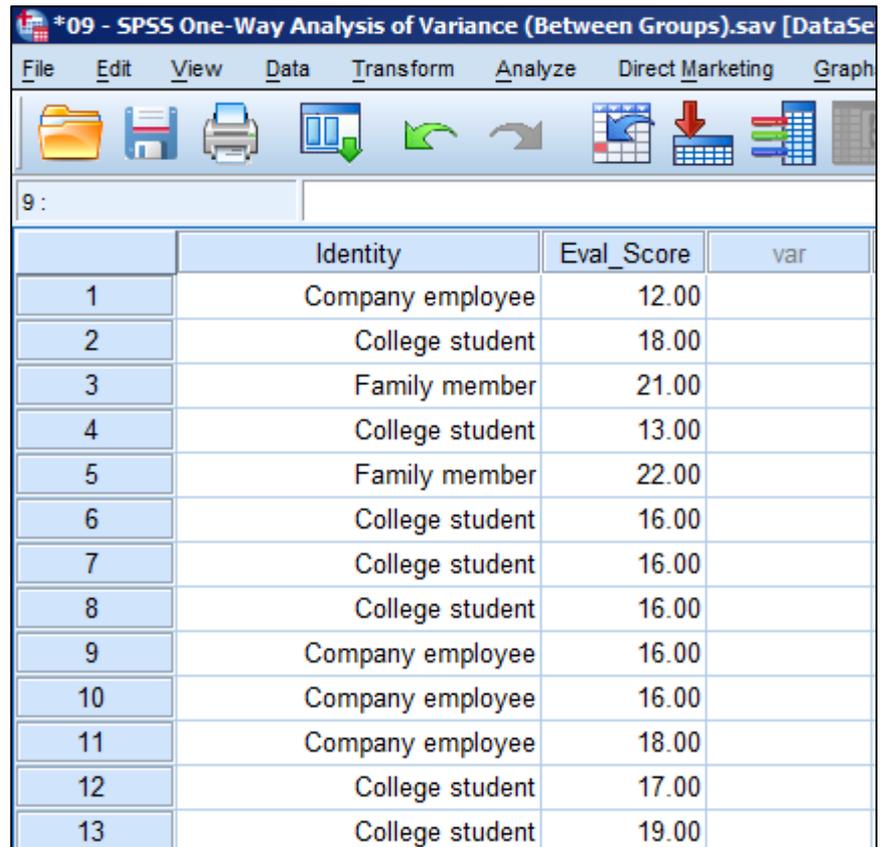
# Data Entry

- A one-way ANOVA (between-subjects) requires the use of two variables (predictor and outcome), thus two columns will be used. In either order, the predictor should be entered using numbers (e.g., 0, 1 or 1, 2 – be sure to add in the necessary value labels in the variable view) to represent the different groups (two or more groups can be compared at one time in this test), and the outcome should be entered using the measured values.



9:

	Identity	Eval_Score	var
1	3.00	12.00	
2	2.00	18.00	
3	1.00	21.00	
4	2.00	13.00	
5	1.00	22.00	
6	2.00	16.00	
7	2.00	16.00	
8	2.00	16.00	
9	3.00	16.00	
10	3.00	16.00	
11	3.00	18.00	
12	2.00	17.00	
13	2.00	19.00	

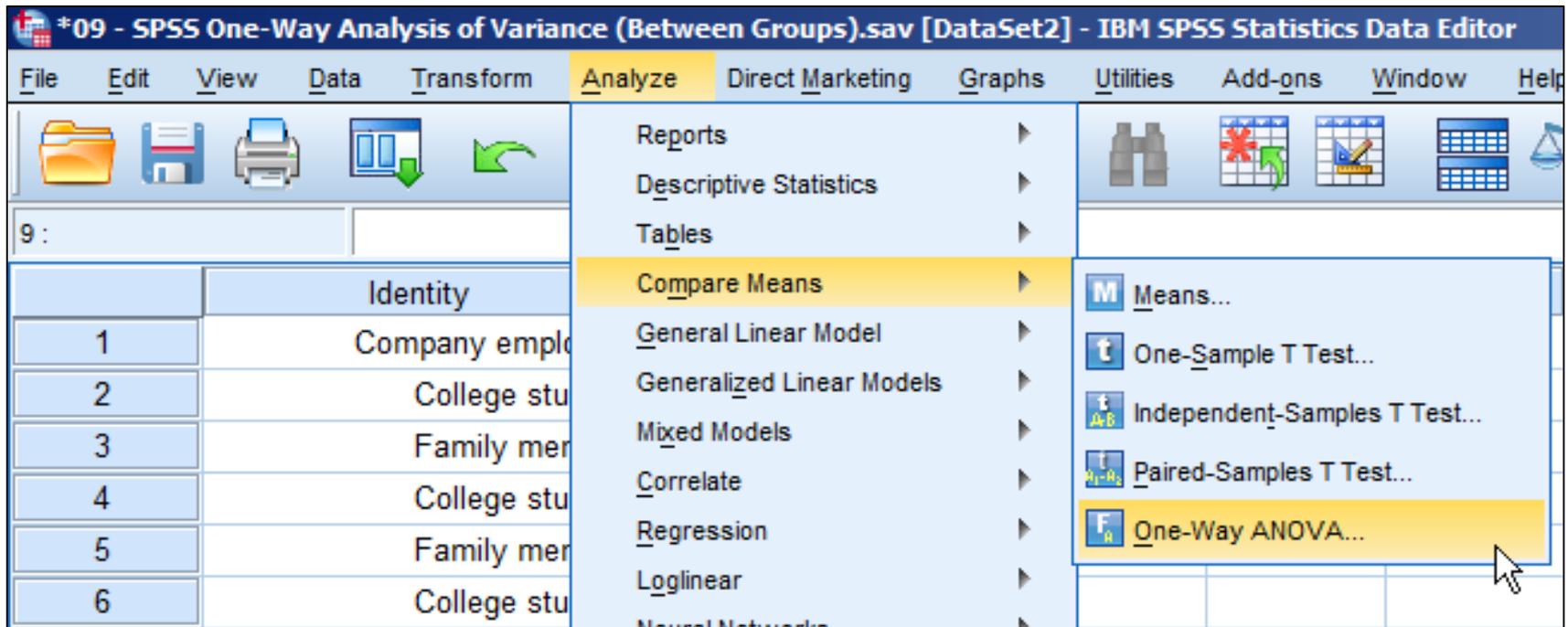


9:

	Identity	Eval_Score	var
1	Company employee	12.00	
2	College student	18.00	
3	Family member	21.00	
4	College student	13.00	
5	Family member	22.00	
6	College student	16.00	
7	College student	16.00	
8	College student	16.00	
9	Company employee	16.00	
10	Company employee	16.00	
11	Company employee	18.00	
12	College student	17.00	
13	College student	19.00	

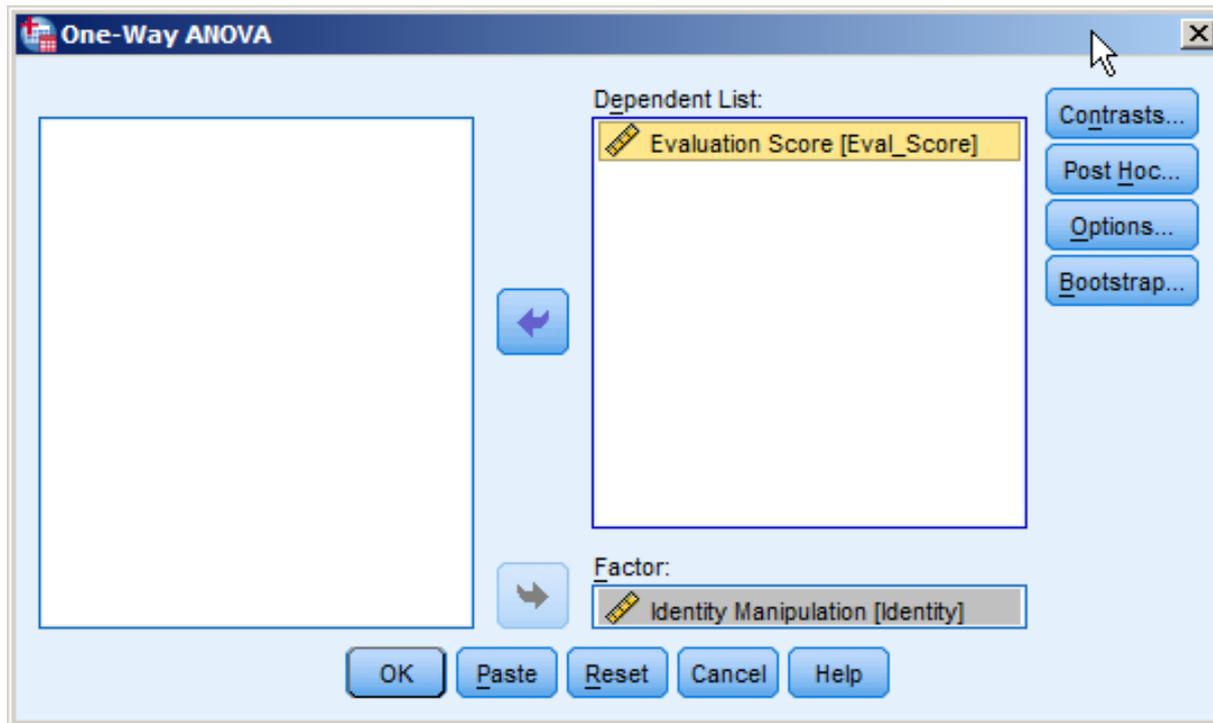
# Start the analysis

- To request a one-way ANOVA (between-subjects) in SPSS, navigate to the following menu option:



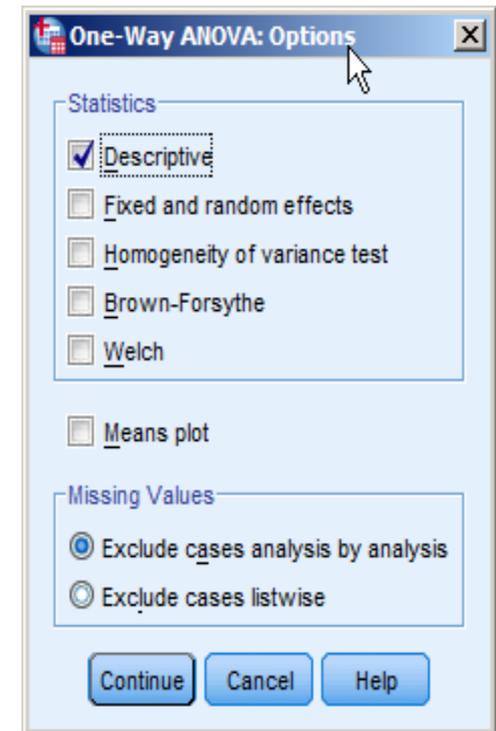
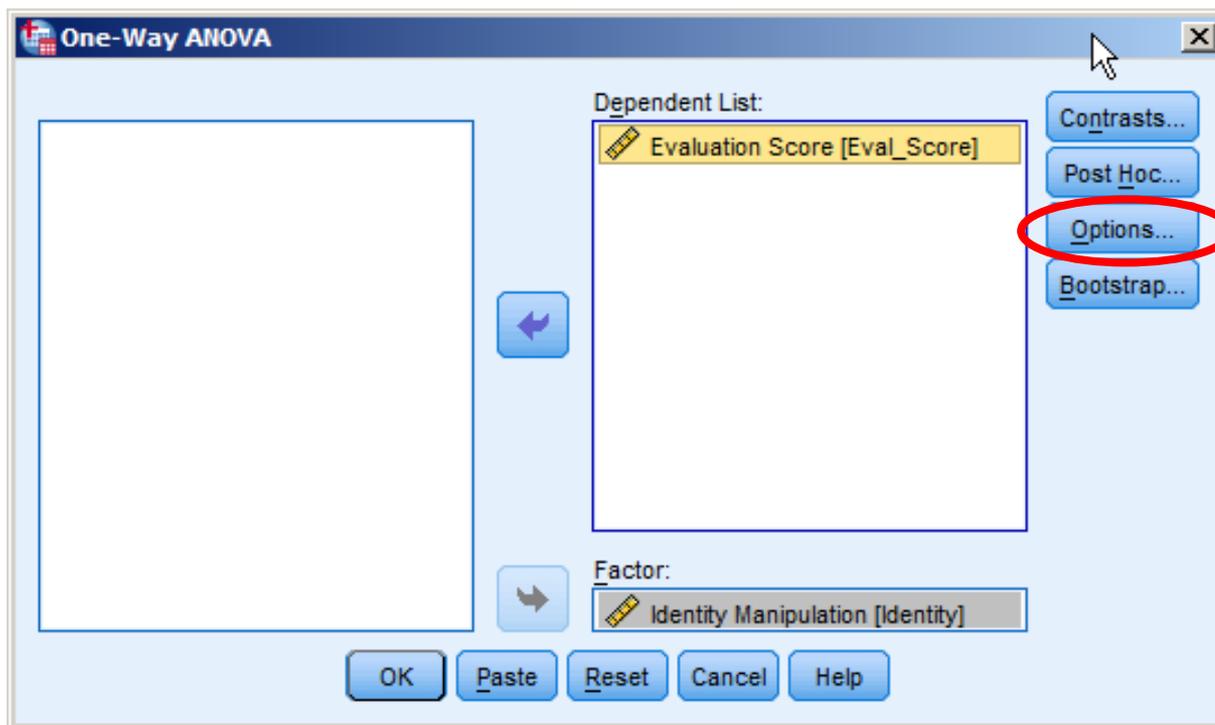
# Selecting the variables

- Once you have selected the correct analysis, you need to identify the variables you want to use in the analysis using the menu below.
  - The predictor (or independent variable) needs to be moved to the “Factor” box. SPSS will then use all available groups (or conditions) to conduct the analysis.
  - The outcome variable needs to be placed into the “Test Variable” box – any variable in this box will be compared between the different groups as described in the data set (via the column of the predictor).



# Requesting additional output

- The previous menu will generate the “source table” associated with the analysis of variance (e.g.,  $SS$ ,  $df$ ,  $MS$ ,  $F$ ), but typically a set of descriptive statistics will be reported as part of your summary. These values (means,  $SDs$ ,  $ns$ ) can be requested in the “options” menu and selecting the appropriate checkbox.



# Requesting additional output

- It is a typical practice to conduct a post-hoc test in the event of a statistically significant  $F$  value. By pressing the “Post-hoc” menu, you can request one or more specific post-hoc tests.

The image shows two overlapping dialog boxes from the SPSS software. The background dialog is titled "One-Way ANOVA". It has a "Dependent List:" field containing "Evaluation Score [Eval\_Score]" and a "Factor:" field containing "Identity Manipulation [Identity]". On the right side of this dialog, there are four buttons: "Contrasts...", "Post Hoc...", "Options...", and "Bootstrap...". The "Post Hoc..." button is circled in red. The foreground dialog is titled "One-Way ANOVA: Post Hoc Multiple Comparisons". It is divided into two sections: "Equal Variances Assumed" and "Equal Variances Not Assumed". Under "Equal Variances Assumed", there are several test options with checkboxes: LSD, Bonferroni, Sidak, Scheffe, R-E-G-W F, R-E-G-W Q, S-N-K, Tukey, Tukey's-b, Duncan, Hochberg's GT2, and Gabriel. There are also checkboxes for "Waller-Duncan" and "Dunnett". A "Type I/Type II Error Ratio:" field is set to 100. A "Control Category:" dropdown menu is set to "Last". Under "Equal Variances Not Assumed", there are checkboxes for "Tamhane's T2", "Dunnett's T3", "Games-Howell", and "Dunnett's C". At the bottom, there is a "Test:" section with radio buttons for "2-sided", "< Control", and "> Control", with "2-sided" selected. A "Significance level:" field is set to 0.05. Buttons for "Continue", "Cancel", and "Help" are at the bottom.

# Reading the output

- Depending on the output requested, you will get a number of different pieces of output.
- If you request a set of descriptive statistics you will be shown a window like the one below.
  - Each subgroup will have their own set of descriptive statistics that are typically reported in a summary of results.

Descriptives								
Evaluation Score								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Family member	20	13.6000	4.77273	1.06721	11.3663	15.8337	7.00	23.00
College student	20	17.1500	3.84263	.85924	15.3516	18.9484	10.00	26.00
Company employee	20	12.9000	4.41171	.98649	10.8353	14.9647	7.00	21.00
Total	60	14.5500	4.67748	.60386	13.3417	15.7583	7.00	26.00

# Reading the output

- Depending on the output requested, you will get a number of different pieces of output.
- SPSS will auto-generate the source table associated with your ANOVA, from which the  $F$ -value (and its source components) and associated  $p$ -value can be found.

## ANOVA

Evaluation Score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	207.700	2	103.850	5.465	.007
Within Groups	1083.150	57	19.003		
Total	1290.850	59			

# Reading the output

- Depending on the output requested, you will get a number of different pieces of output.
- After the source table you will find any post-hoc test results you requested. Below is the first of two pieces of output from a “Tukey’s HSD” (or Tukey in the SPSS menu).

Multiple Comparisons						
Dependent Variable: Evaluation Score						
Tukey HSD						
(I) Identity Manipulation	(J) Identity Manipulation	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Family member	College student	-3.55000*	1.37850	.033	-6.8672	-.2328
	Company employee	.70000	1.37850	.868	-2.6172	4.0172
College student	Family member	3.55000*	1.37850	.033	.2328	6.8672
	Company employee	4.25000*	1.37850	.009	.9328	7.5672
Company employee	Family member	-.70000	1.37850	.868	-4.0172	2.6172
	College student	-4.25000*	1.37850	.009	-7.5672	-.9328

\*. The mean difference is significant at the 0.05 level.

# Reading the output

- This table (Tukey's HSD) displays the adjusted comparisons made across all possible pairwise comparisons available from your data. In red are the unique comparisons – SPSS will duplicate them so read carefully!
- You can then report on the observed mean difference and  $p$ -value when examining specific group differences.

Multiple Comparisons						
Dependent Variable: Evaluation Score						
Tukey HSD						
(I) Identity Manipulation	(J) Identity Manipulation	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Family member	College student	-3.55000*	1.37850	.033	-6.8672	-.2328
	Company employee	.70000	1.37850	.868	-2.6172	4.0172
College student	Family member	3.55000*	1.37850	.033	.2328	6.8672
	Company employee	4.25000*	1.37850	.009	.9328	7.5672
Company employee	Family member	-.70000	1.37850	.868	-4.0172	2.6172
	College student	-4.25000*	1.37850	.009	-7.5672	-.9328

\*. The mean difference is significant at the 0.05 level.

# Reading the output

- Depending on the output requested, you will get a number of different pieces of output.
- After the source table you will find any post-hoc test results you requested. Below is the second of two pieces of output from a “Tukey’s HSD” (or Tukey in the SPSS menu).
- This output just visually “bins” the various group together into subsets based on their difference
- Groups in the same bin are not “significantly” different from each other, whereas groups that do not share bins are “significantly” different from each other
- This output window is typically not reported in a results summary, with researchers opting to report on the observed mean difference between groups.

## Homogeneous Subsets

### Evaluation Score

Tukey HSD<sup>a</sup>

Identity Manipulation	N	Subset for alpha = 0.05	
		1	2
Company employee	20	12.9000	
Family member	20	13.6000	
College student	20		17.1500
Sig.		.868	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 20.000.