How can I do tests of simple main effects in SPSS?

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The process of conducting tests for simple main effects in SPSS involves analyzing the effects of a single independent variable on a dependent variable, while controlling for the other independent variables. This can be achieved by using the "Split File" function to create separate groups for each level of the independent variable and then performing individual analyses for each group. The results of these analyses can then be compared to determine any significant differences between the groups. Additionally, the use of post-hoc tests such as the Bonferroni or Tukey method can help identify specific group differences. Overall, conducting tests for simple main effects in SPSS allows for a more in-depth understanding of the impact of individual independent variables on the dependent variable.

How can I do tests of simple main effects in SPSS? | SPSS FAQ

Let's read in an example dataset, crf24, adapted from Kirk (1968, First Edition).

get file 'c:https://stats.idre.ucla.edu/wp-content/uploads/2016/02/crf24.sav'.

These data are from a 2×4 factorial design. The variable y is the dependent variable. The variable a is an independent variable with two levels, while b is an independent variable with four levels. Let's look at a table of cell means and standard deviations.

means table = y by a by b.

	Cases					
Included	Excluded	Total				
N	Percent	N	Percent	N	Percent	
Y * A * B	32	100.0%	0	.0%	32	100.0%

A	B	Mean	N	Std. Deviation
1	1	3.75	4	1.500
2	4.00	4	.816	
3	7.00	4	.816	
4	8.00	4	.816	
Total	5.69	16	2.120	
2	1	1.75	4	.500
2	3.00	4	.816	
3	5.50	4	.577	
4	10.00	4	.816	
Total	5.06	16	3.316	
Total	1	2.75	8	1.488
2	3.50	8	.926	
3	6.25	8	1.035	
4	9.00	8	1.309	
Total	5.38	32	2.756	

Now let's run the ANOVA.

glm y by a b.

	N	
A	1	16
2	16	
B	1	8

2	8	
3	8	
4	8	

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	217.000(a)	7	31.000	40.216	.000
Intercept	924.500	1	924.500	1199.351	.000
A	3.125	1	3.125	4.054	.055
B	194.500	3	64.833	84.108	.000
A * B	19.375	3	6.458	8.378	.001
Error	18.500	24	.771		
Total	1160.000	32			
Corrected Total	235.500	31			
a R Squared = .921 (Adjusted R Squared = .899)					

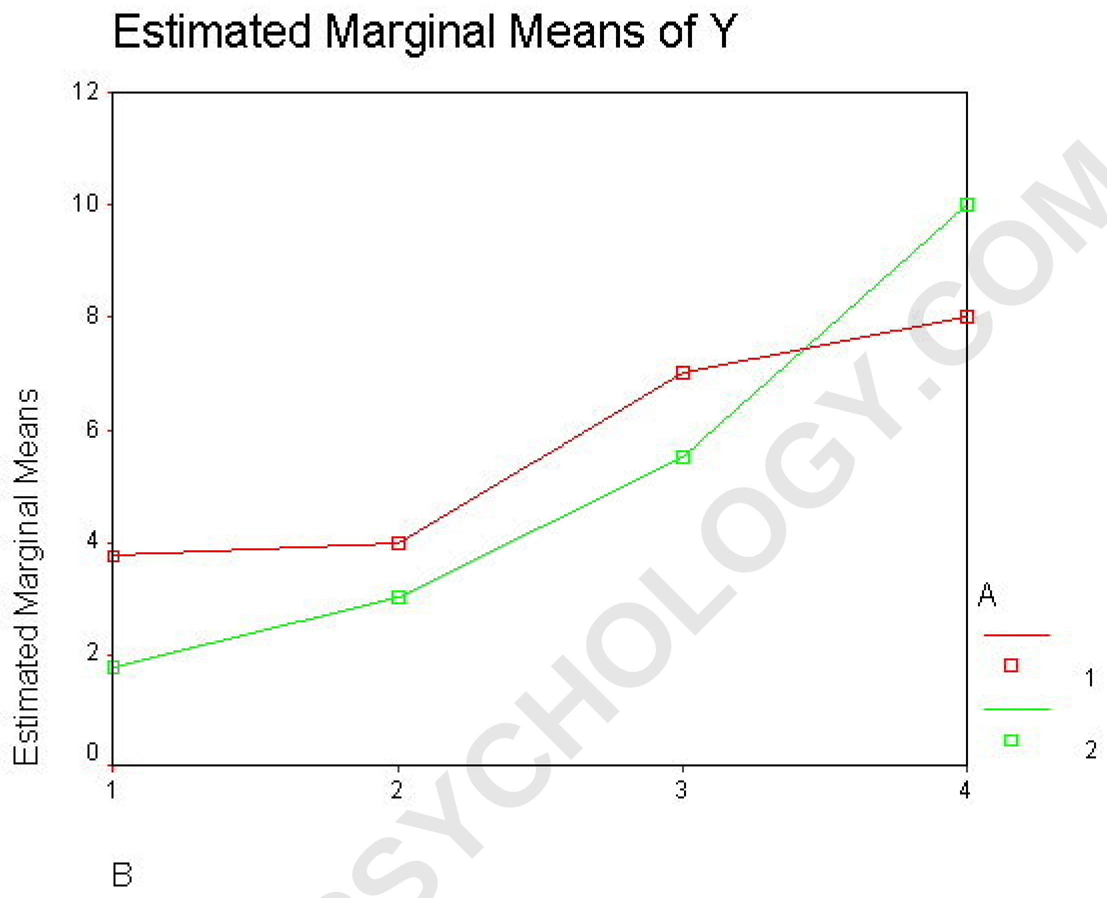
We see that in addition to a significant main effect for b there is a significant a*b interaction effect. Before we do any of the tests of simple main effects, let's graph the cell means to get an idea of what the interaction looks like.

You can include a /plot subcommand with the glm command to get a

plot of the cell means.

```
glm y by a b
/plot = profile(b*a).
```

<output omitted>



The interaction is clearly shown where the two lines cross over between levels b3 and b4. We will now do a test of simple main effects looking at differences in a at each level of b. This is done by including a /emmeans subcommand with the glm command.

glm y by a b

/emmeans = tables(a*b)compare(a).

	N	
A	1	16
2	16	
B	1	8
2	8	
3	8	
4	8	

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
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Intercept	924.500	1	924.500	1199.351	.000
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A * B	19.375	3	6.458	8.378	.001
Error	18.500	24	.771		
Total	1160.000	32			
Corrected Total	235.500	31			
a R Squared = .921 (Adjusted R Squared = .899)					

	Mean	Std. Error	95% Confidence Interval		
A	B	Lower Bound	Upper Bound		
1	1	3.750	.439	2.844	4.656
2	4.000	.439	3.094	4.906	
3	7.000	.439	6.094	7.906	
4	8.000	.439	7.094	8.906	
2	1	1.750	.439	.844	2.656
2	3.000	.439	2.094	3.906	

3	5.500	.439	4.594	6.406	
4	10.000	.439	9.094	10.906	

	Mean Difference (I-J)	**Std. Error**	**Sig.(a)**	**95% Confidence Interval for Difference(a)**			
B	**(I) A**	**(J) A**	**Lower Bound**	**Upper Bound**			
1	**1**	**2**	2.000(*)	.621	.004	.719	3.281
2	**1**	-2.000(*)	.621	.004	-3.281	-.719	
2	**1**	**2**	1.000	.621	.120	-.281	2.281
2	**1**	-1.000	.621	.120	-2.281	.281	
3	**1**	**2**	1.500(*)	.621	.024	.219	2.781
2	**1**	-1.500(*)	.621	.024	-2.781	-.219	
4	**1**	**2**	-2.000(*)	.621	.004	-3.281	-.719
2	**1**	2.000(*)	.621	.004	.719	3.281	
Based on estimated marginal means							
* The mean difference is significant at the .050 level.							
a Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).							

B	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	
1	**Contrast**	8.000	1	8.000	10.378	.004
Error	18.500	24	.771			
2	**Contrast**	2.000	1	2.000	2.595	.120
Error	18.500	24	.771			

3	**Contrast**	4.500	1	4.500	5.838	.024
Error	18.500	24	.771			
4	**Contrast**	8.000	1	8.000	10.378	.004
Error	18.500	24	.771			
Each F tests the simple effects of A within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.						

Note:

Statisticians do not universally approve of the use of tests of simple main effects. In particular, there are concerns over the conceptual error rate. Tests of simple main effects are one tool that can be useful in interpreting interactions. Caution should be exercised in interpreting the results of analyses of simple main effects. In general, the results of tests of simple main effects should be considered suggestive and not definitive.

You can get more information on this topic by visiting: