

2x2 Between Subjects ANOVA

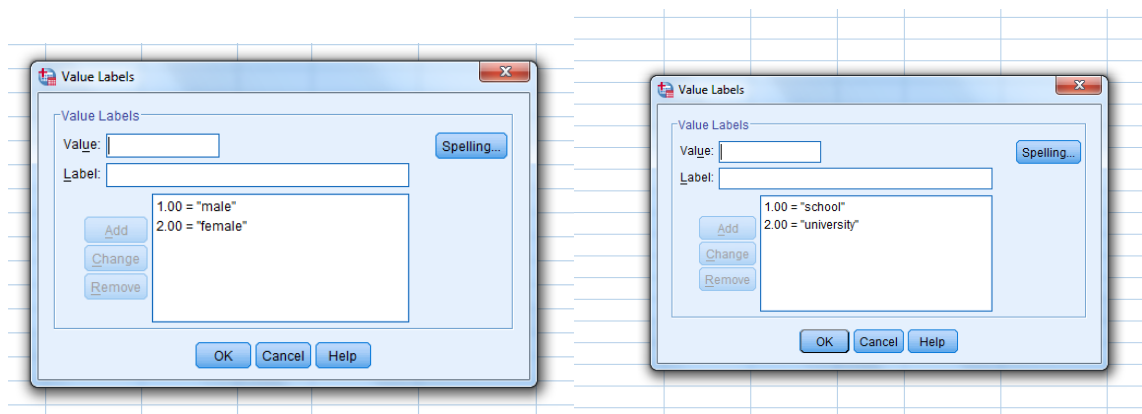
In this workshop you will practice a procedure for using SPSS to analyse data from studies where more than one Independent Variable (IV) has been studied for their effect on the Dependent Variable (DV). This will take the form of a 2x2 between-subjects ANOVA, which is used when you have two IV's that are between-participants.

We will use the example of interest in politics (DV) according to gender (IV) and education level (IV). In this case, we have grouped the participants according to their gender 'male' or 'female', and we have also grouped them according to the highest level of education they have received; 'school' or 'university'.

First, click on the 'Variable View' tab at the bottom and define each of the columns as shown below initially, by simply typing in the column names as shown in the 'Name' column of the variable view.

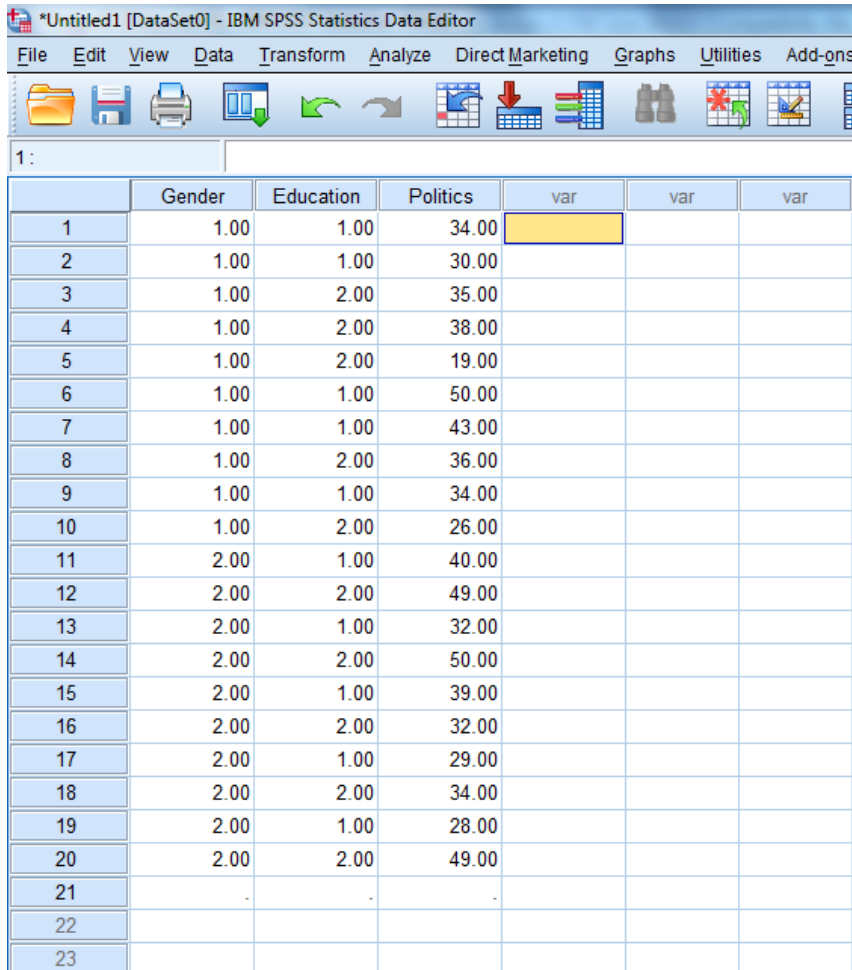
	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Gender	Numeric	8	2		None	None	8	Right	Unknown	Input
2	Education	Numeric	8	2		None	None	8	Right	Unknown	Input
3	Politics	Numeric	8	2		None	None	8	Right	Unknown	Input
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											

Next, label the values for each of your IV's. Click on the 'Values' column in the 'Gender' row, and click on the small blue box that appears. You will then see the dialogue box where you can define your variable. Here the example shows the IV of gender is coded "1=male, 2=female", and the education level is coded "1=school, 2=university".



Click back to the 'Data View' tab and enter the data as shown below, which represents data from males and females from two levels of educational achievement. The interest in politics (DV) is

recorded as a continuous number according to percentage of interest recorded on a politics questionnaire.

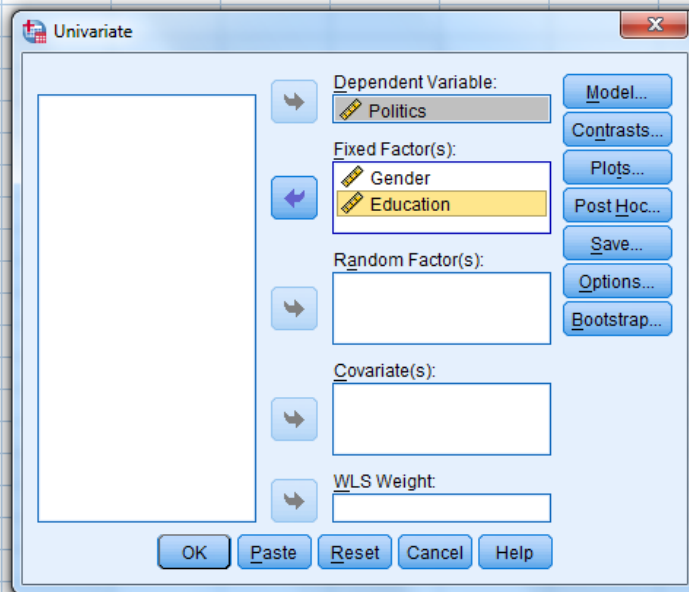


	Gender	Education	Politics	var	var	var
1	1.00	1.00	34.00			
2	1.00	1.00	30.00			
3	1.00	2.00	35.00			
4	1.00	2.00	38.00			
5	1.00	2.00	19.00			
6	1.00	1.00	50.00			
7	1.00	1.00	43.00			
8	1.00	2.00	36.00			
9	1.00	1.00	34.00			
10	1.00	2.00	26.00			
11	2.00	1.00	40.00			
12	2.00	2.00	49.00			
13	2.00	1.00	32.00			
14	2.00	2.00	50.00			
15	2.00	1.00	39.00			
16	2.00	2.00	32.00			
17	2.00	1.00	29.00			
18	2.00	2.00	34.00			
19	2.00	1.00	28.00			
20	2.00	2.00	49.00			
21	.	.	.			
22						
23						

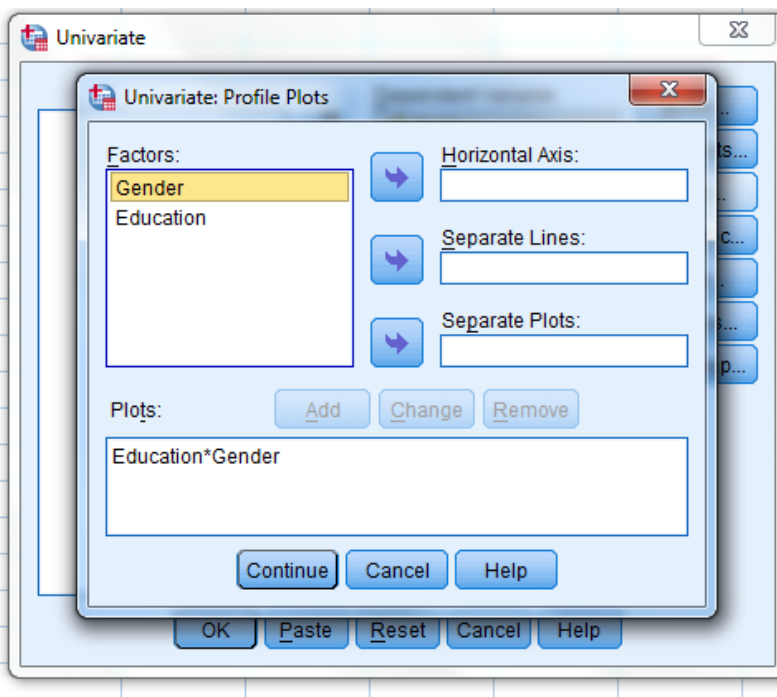
Remember: One row of data = one participant's data (including grouping for the between variables in this case).

Now you can start to run the ANOVA analysis. On the 'Analyze' menu, select the option for 'General linear model' and then the option for 'Univariate'.

You will see the following dialogue box (below). Transfer the DV (Politics) into the 'Dependent Variable' box, and transfer both IV's (gender and education) into the 'Fixed Factors' box.

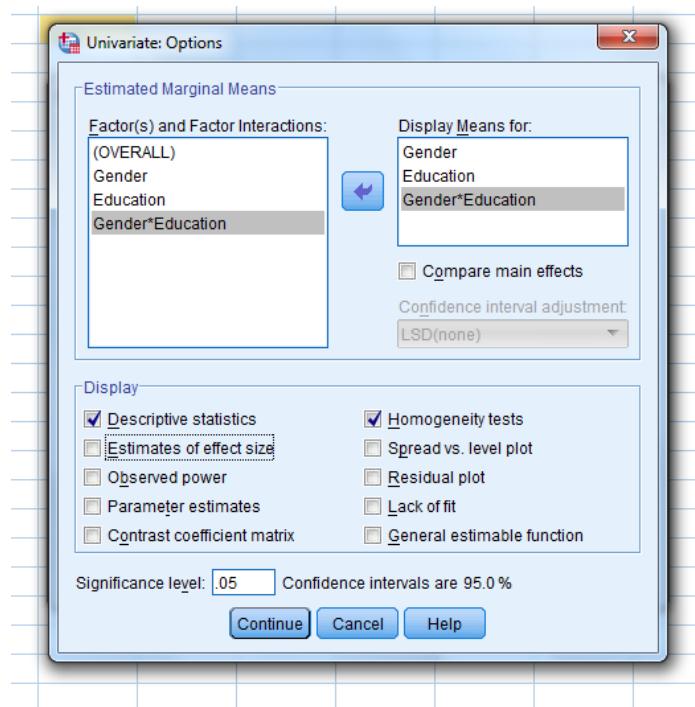


Click on the 'Plots' button. You will be presented with the Univariate: Profile Plots dialogue box. Transfer the IV 'Education' from the Factors box into the 'Horizontal Axis' box, and transfer the other IV 'Gender' into the 'Separate Lines' box. Click 'Add' and then 'Continue'.



Next, click on the 'Options' button. This will present you with the Univariate: Options dialogue box. Transfer 'Gender', 'Education' and 'Gender*Education' from the left box to the box labelled 'Display means for:'

Select the tick boxes for 'Descriptive statistics', 'Estimates of effect size' and 'Homogeneity tests', then press 'Continue'.



Finally press the 'OK' button to tell SPSS to run the ANOVA analysis.

SPSS will produce the following output tables (it also produces others):

Descriptive Statistics

In this table the descriptives are shown for different conditions of your study. This is useful for referring back to in order to understand where differences have been shown to be significant or non-significant. (N= number of scores in the grouping where shown).

Levene's Test of Equality of Error Variances

This test provides a test of one of the assumptions underlying analysis of variance. The value you are most interested in is the Sig. level. You want this to be *greater* than .05 and therefore *not* significant. A significant result suggests that the variance of your DV across the groups is not equal.

Tests of Between-Subjects Effects

The first thing you need to do is check for the possibility of an interaction effect. In the SPSS output, look at the line labelled Gender*Education. Check the Sig. column for whether the interaction is significant or not.

Secondly, you need to check the Main Effects of each IV. Find the column you are interested in (e.g., Gender). To determine whether there is a main effect for each IV, check in the column marked Sig. next to each variable.

Profile Plots

This graph will provide a good graphical illustration of your results. An interaction effect can usually be seen as a set of non-parallel lines. If the lines actually cross each other, you might expect a statistically significant interaction effect (which you can confirm using the statistics).

The format for reporting the output analysis for the interaction effect and the main effects is the same:

In its general format this is: **$F(df, df) = F\text{-value}, p </> .05$**

Write out the necessary output data (using the output table you have now produced) in the correct format (as described above). This should include an analysis of the main effects of each of the IV's and the effect of the interaction between both.

Hint: remember to check back to the descriptives to help you understand what each of these analyses has shown you about the effects.