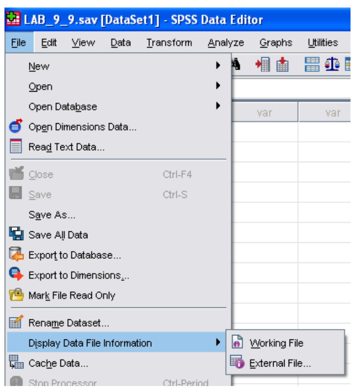
Lab: 09/09/09

Tonight we will illustrate how to run contrasts when the:

1. independent variable is qualitative (simple and complex contrasts)
2. independent variable is quantitative (trend contrasts)

While we typically think of qualitative vs. quantitative as two different types of independent variables, as in the lecture we may reflect on the difference and just use one dataset to illustrate both. All computations and output is consistent with tonight's lecture (so check back with notes if you need more background).

1. Open data set 1
   a. File>Display Data File Information>Working File



The 'data dictionary' provides the layout of the data file which includes variable and value labels. This is a useful menu option to use in the future.

We are working with the 'Vigilance While Sleep Deprived' experiment.
The ANOVA Table for this experiment:

ANOVA

Number of failures to spot objects on screen

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3314.250	3	1104.750	7.343	.005
Within Groups	1805.500	12	150.458		
Total	5119.750	15			

As we now know, a significant F ratio is an 'omnibus' or overall test that tells us "differences among the treatment means are present". However, it does not tell us where these differences exist (i.e., which groups are different). Some researchers, therefore, forgo the F test and move directly to 'planned comparisons' among groups. However, other researchers like to consider the F test as a 'gateway' test—meaning, it will let you know whether at least one difference exists [if a non-significant F ratio is found, all group differences can be said to result from error and the gate is 'closed'-no need to go further].

Furthermore, as you also saw tonight:

- The Mean Square of the Within Groups is used in calculating contrasts
- When the contrasts are orthogonal, you are further partitioning the Between Groups SS

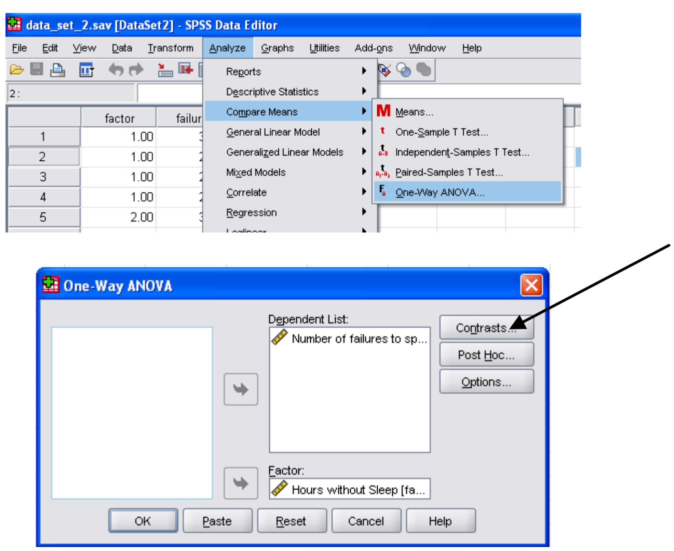
<u>When the Independent Variable is Qualitative:</u>

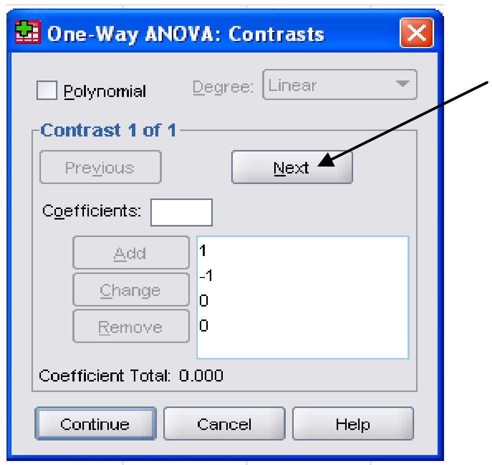
Example 1: We have 4 planned comparisons

$$(1)\quad H_0 : \mu_1 = \mu_2$$
$$(2)\quad H_0 : \mu_1 = \mu_4$$
$$(3)\quad H_0 : \mu_2 = \mu_3$$
$$(4)\quad H_0 : \mu_3 = \mu_4$$

Fill in the rest of the table with your coefficients: Remember **they must sum to zero**

	Factor 1	Factor 2	Factor 3	Factor 4
Null 1	1	-1	0	0
Null 2				
Null 3				
Null 4				





Continue to click Next until all contrasts are included>Continue>OK

Contrast Coefficients

Contrast	Hours without Sleep			
	4 hrs	12 hrs	20 hrs	28 hrs
1	1	-1	0	0
2	1	0	0	-1
3	0	1	-1	0
4	0	0	1	-1

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
Number of failures to spot objects on screen	Assume equal variances	1	-11.2500	8.67347	-1.297	12	.219
		2	-35.2500	8.67347	-4.064	12	.002
		3	-19.7500	8.67347	-2.277	12	.042
		4	-4.2500	8.67347	-.490	12	.633
	Does not assume equal variances	1	-11.2500	6.53038	-1.723	5.165	.144
		2	-35.2500	7.77684	-4.533	4.496	.008
		3	-19.7500	9.48573	-2.082	5.393	.088
		4	-4.2500	10.38328	-.409	5.922	.697

From our lecture slides…Why is this….?

Why does SPSS infuriate you at this moment? What other information is difficult to 'see'?

- From our vigilance exam

- $MS_{S/A} = 150.458$
- $df_A = 1$; $df_{S/A} = 12$

P-values obtained using "fdist" function in Excel

$$(1)\quad F_{\hat{\psi}_1} = \frac{SS_{\hat{\psi}_1}/df_A}{MS_A} = \frac{253.125}{150.458} = 1.68;\ p = 0.219$$

$$(2)\quad F_{\hat{\psi}_2} = \frac{SS_{\hat{\psi}_2}/df_A}{MS_A} = \frac{2485.125}{150.458} = 16.52;\ p = 0.002$$

$$(3)\quad F_{\hat{\psi}_3} = \frac{SS_{\hat{\psi}_3}/df_A}{MS_A} = \frac{780.125}{150.458} = 5.19;\ p = 0.042$$

$$(4)\quad F_{\hat{\psi}_4} = \frac{SS_{\hat{\psi}_4}/df_A}{MS_A} = \frac{36.125}{150.458} = 0.240;\ p = 0.633$$

What about a complex comparison?

$$H_0 : \mu_1 = \frac{\mu_2 + \mu_3}{2}$$

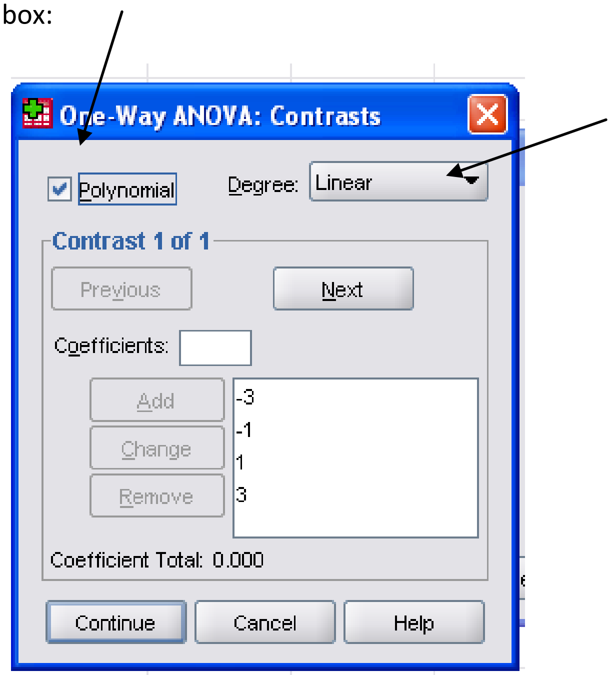
	Factor 1	Factor 2	Factor 3	Factor 4
Null 1	1	-.5	-.5	0
		OR		
Null 1: Relative Weights	2	-1	-1	0

Compare your output:

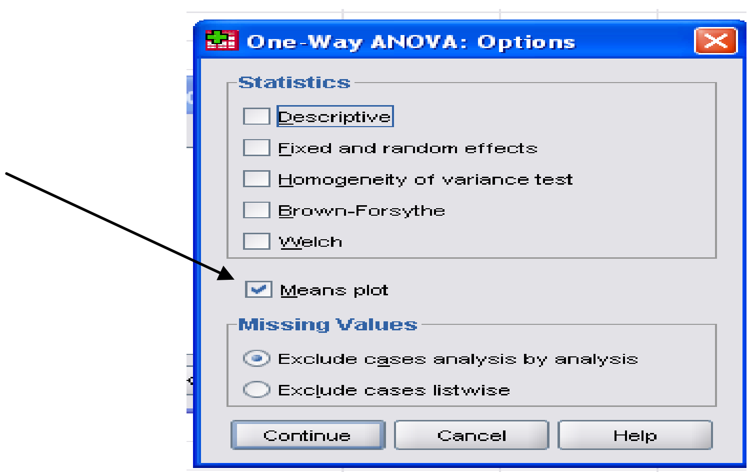
What does this contrast mean?? How might you change it?

<u>When the Independent Variable is Quantitative:</u>

When you get to the contrast box:

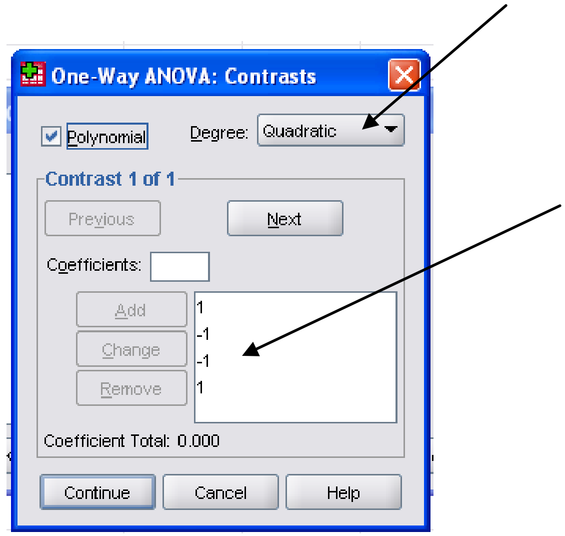


Also, provide a visual>Options>Mean Plots



Is the output a little better?

Now check Quadratic: Do we continue with Cubic?



ANOVA

Number of failures to spot objects on screen

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		3314.250	3	1104.750	7.343	.005
	Linear Term	Contrast	3150.050	1	3150.050	20.936	.001
		Deviation	164.200	2	82.100	.546	.593
	Quadratic Term	Contrast	49.000	1	49.000	.326	.579
		Deviation	115.200	1	115.200	.766	.399
	Within Groups		1805.500	12	150.458		
	Total		5119.750	15			

Final thought: A way to remember the difference between Qualitative and Trend Contrasts