

Tonight we will illustrate how to do post-hoc tests in SPSS using the same data set as last week:

1. Planned comparisons: Bonferroni Procedure and Dunnett's test,
2. Pairwise comparison: Tukey, and
3. Post-Hoc correction: Scheffé's procedure

1-1. Bonferroni adjustment: We have 4 planned comparisons as below;

(1) $H_0 : \mu_1 = \mu_2$

(2) $H_0 : \mu_1 = \mu_4$

(3) $H_0 : \mu_2 = \mu_4$

(4) $H_0 : \mu_3 = \mu_4$

	Factor 1	Factor 2	Factor 3	Factor 4	p-value	Adjusted p-value	Significant?
Contrast (1)	1	-1	0	0			
Contrast (2)	1	0	0	-1			
Contrast (3)	0	1	0	-1			
Contrast (4)	0	0	1	-1			

- a. What should be your family wise alpha in terms of the Bonferroni procedure for the comparisons you plan to make?

What would be your family wise alpha if you had five contrasts?

- b. Run SPSS for the four contrasts above, record the p-value and adjusted p-value for each contrast, and decide which contrast(s) is(are) significant.

1-2. Dunnett test: A researcher wants to compare the 28-hour group with the other groups.

- a. What should be the reference group to do so?
- b. Which group(s) is(are) significantly different from 28-hour group?

2. Tukey test:

- a. Conduct the Tukey test.
- b. Which groups are different from each other?

3. Scheffé procedure:

- a. Conduct the Scheffe test.
- b. Which groups are different from each other?

4. In conclusion or summary:

- a. Let's compare significant levels from all procedures for contrast 2. Which procedure yields the lowest/highest p-value? Does the type of test used affect your conclusion?

	p-value
Bonferonni adjustment	
Dunnett	
Tukey	
Scheffe	

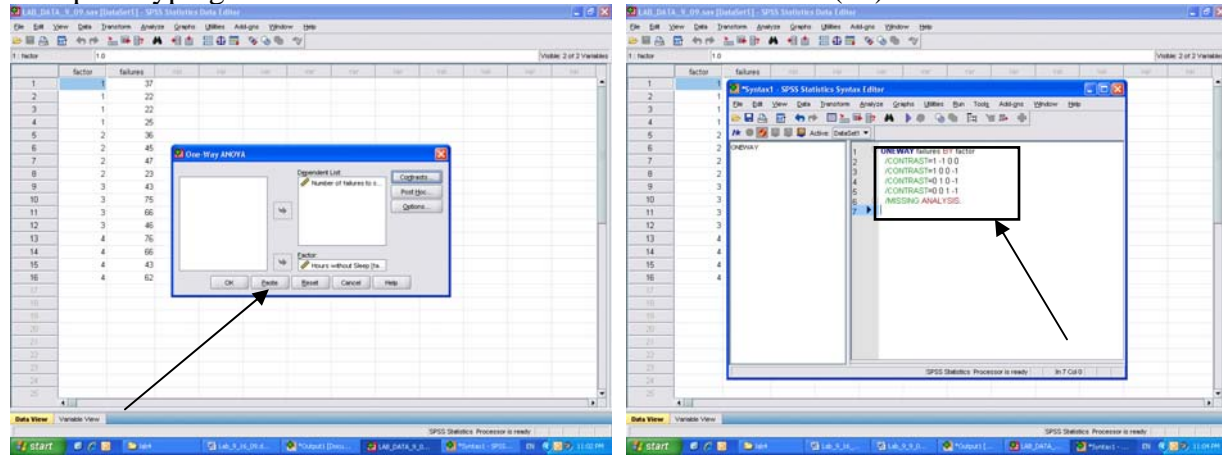
- b. How about the contrast of group 2 to 4? Which procedure yields the lowest/highest p-value? Does the type of test used affect your conclusion?

	p-value
Bonferonni adjustment	
Dunnett	
Tukey	
Scheffe	

HELP

1-1.

After coding the first contrast, click on paste. You will see a syntax mode as shown in figure 2 Complete typing contrasts as a box below and then click on run (all).



ONEWAY failures BY factor

/CONTRAST=1 -1 0 0

/CONTRAST=1 0 0 -1

/CONTRAST=0 1 0 -1

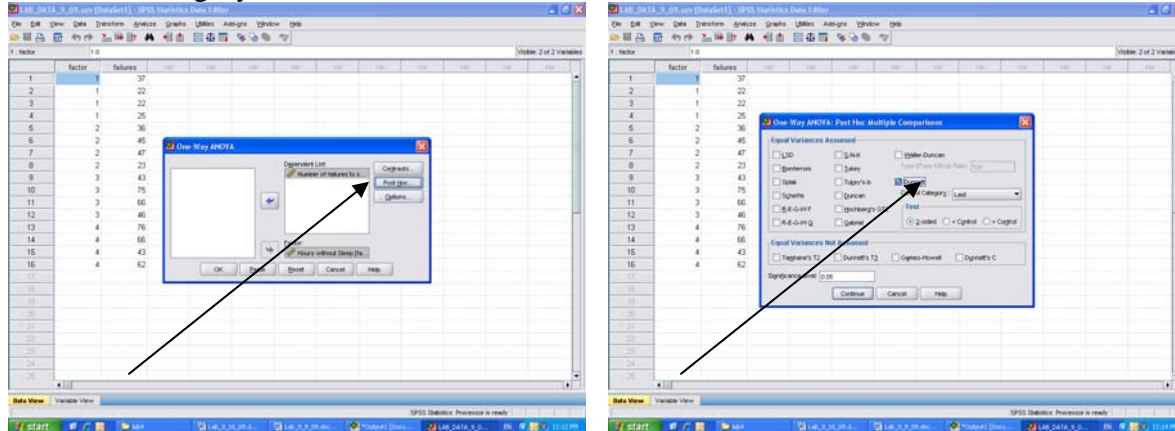
/CONTRAST=0 0 1 -1

/MISSING ANALYSIS.

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	-11.25	8.673	-1.297	12	.219
		2	-35.25	8.673	-4.064	12	.002
		3	-24.00	8.673	-2.767	12	.017
		4	-4.25	8.673	-.490	12	.633
	Does not assume equal variances	1	-11.25	6.530	-1.723	5.165	.144
		2	-35.25	7.777	-4.533	4.496	.008
		3	-24.00	8.811	-2.724	5.699	.036
		4	-4.25	10.383	-.409	5.922	.697

1-2. Click on Post Hoc rather than contrast, and then select Dunnett. Make sure you choose last as control category.



Multiple Comparisons

Number of failures to spot objects on screen
Dunnett t (2-sided)^a

(I) Hours without Sleep	(J) Hours without Sleep	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
4 hrs	28 hrs	-35.250*	8.673	.004	-58.52	-11.98
12 hrs	28 hrs	-24.000*	8.673	.043	-47.27	-.73
20 hrs	28 hrs	-4.250	8.673	.927	-27.52	19.02

a. Dunnett t-tests treat one group as a control, and compare all other groups against it.

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

2 and 3. Do the same thing but select Tukey/Sheffe instead.

Tukey HSD

(I) Hours without Sleep	(J) Hours without Sleep	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
4 hrs	12 hrs	-11.250	8.673	.582	-37.00	14.50
	20 hrs	-31.000*	8.673	.017	-56.75	-5.25
	28 hrs	-35.250*	8.673	.007	-61.00	-9.50
12 hrs	4 hrs	11.250	8.673	.582	-14.50	37.00
	20 hrs	-19.750	8.673	.158	-45.50	6.00
	28 hrs	-24.000	8.673	.071	-49.75	1.75
20 hrs	4 hrs	31.000*	8.673	.017	5.25	56.75
	12 hrs	19.750	8.673	.158	-6.00	45.50
	28 hrs	-4.250	8.673	.960	-30.00	21.50
28 hrs	4 hrs	35.250*	8.673	.007	9.50	61.00
	12 hrs	24.000	8.673	.071	-1.75	49.75
	20 hrs	4.250	8.673	.960	-21.50	30.00

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

Scheffe

(I) Hours without Sleep	(J) Hours without Sleep	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
4 hrs	12 hrs	-11.250	8.673	.651	-39.32	16.82
	20 hrs	-31.000*	8.673	.029	-59.07	-2.93
	28 hrs	-35.250*	8.673	.013	-63.32	-7.18
12 hrs	4 hrs	11.250	8.673	.651	-16.82	39.32
	20 hrs	-19.750	8.673	.214	-47.82	8.32
	28 hrs	-24.000	8.673	.105	-52.07	4.07
20 hrs	4 hrs	31.000*	8.673	.029	2.93	59.07
	12 hrs	19.750	8.673	.214	-8.32	47.82
	28 hrs	-4.250	8.673	.970	-32.32	23.82
28 hrs	4 hrs	35.250*	8.673	.013	7.18	63.32
	12 hrs	24.000	8.673	.105	-4.07	52.07
	20 hrs	4.250	8.673	.970	-23.82	32.32

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

Tukey HSD^a

Hours without Sleep	N	Subset for alpha = 0.05	
		1	2
4 hrs	4	26.50	
12 hrs	4	37.75	37.75
20 hrs	4		57.50
28 hrs	4		61.75
Sig.		.582	.071

Scheffe^a

Hours without Sleep	N	Subset for alpha = 0.05	
		1	2
4 hrs	4	26.50	
12 hrs	4	37.75	37.75
20 hrs	4		57.50
28 hrs	4		61.75
Sig.		.651	.105