Exercise 3

t-procedures for paired data / t-procedures for independent samples

Two groups, each consisting of 10 teachers of Spanish, followed an intensive summer school course in Spanish. Before and after the course they underwent a listening test. The table below gives the scores before and after the course. (Data courtesy of Joseph A. Wipf, Department of Foreign Languages and Literatures, Purdue University.)

Group	Before	After
1	30	29
1	28	30
1	31	32
1	26	30
1	20	16
1	30	25
1	34	31
1	15	18
1	28	33
1	20	25
2	30	32
2	29	28
2	31	34
2	29	32
2	34	32
2	20	27
2	26	28
2	25	29
2	31	32
2	29	32

1. Download the table Spanish.sav from: http://www.let.rug.nl/~heeringa/statistics/stat03_2013/ and load the table in SPSS.

2. We want to test whether the scores 'After' are higher than the scores 'Before'. Make side-by-side boxplots of the two groups. What would you expect?

3. Formate H0 and Ha.

4. Test whether the data is normally distributed. **First** calculate the difference of the scores 'After'-'Before'. Make a normal-quantile plot and do the Shapiro-Wilk test. What do you conclude?

5. Test whether the scores 'After' are higher than the scores 'Before' by means of a paired-samples t-test. What do you conclude?

6. Calculate the effect size.

7. Now we compare groups 1 and 2 with each other. We focus on the scores 'Before'. Make side-by-side boxplots of the two groups. What would you expect?

8. Formulate H0 and Ha.

9. Test whether the data is normally distributed. For both group 1 and group 2 make a normal-quantile plot and run the Shapiro-Wilk test. What do you conclude?

10. Perform a independent-samples t-test. When doing so SPSS will also runs the Levene's test. Are the variances the same?

11. What do you conclude on the basis of the output of the t-test?

12. Calculate the effect size.