S 4 Testing of statistical hypotheses - dependent selectionEry (t - test for paired values)

$$= \frac{| \; |\sqrt{\;}}{}$$

| |¯ ... Absolute value of the average difference...
standard deviation of the differences

EXAMPLE

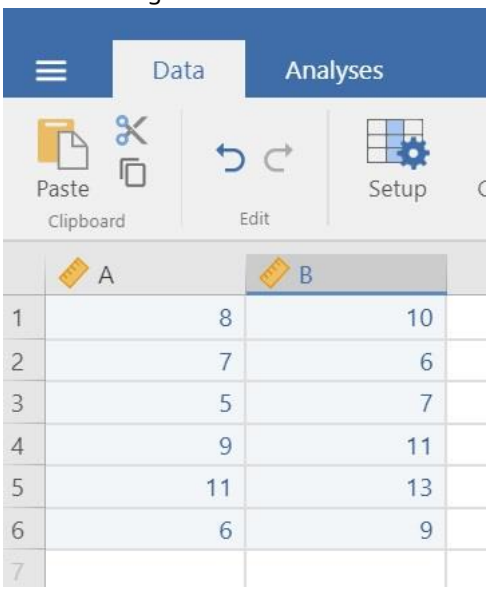
Randomly selected men from the basic set of teacher training program with TV conducted for one month circular training in teaching athletics. We measured the number of push-ups before and after the strengthening. The values of the sample are given in the table. We are interested in whether the additions are materially and statistically significant. In other words, if the chosen method of stimulating strength is effective.

Proband	1. measurement 1	2. measurement 2
1	8	10
2	7	6
3	5	7
4	9	11
5	11	13
6	6	9
¯	7.67	9.33

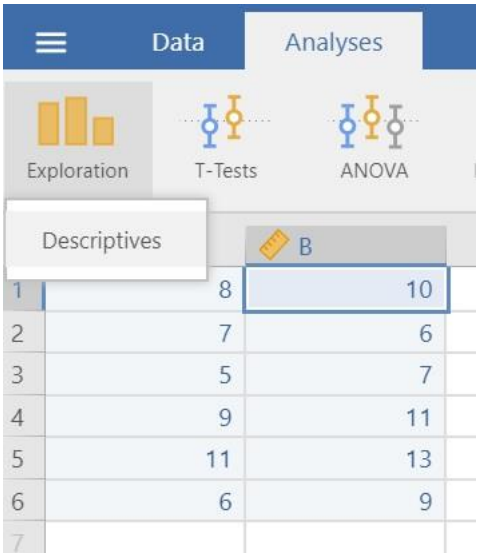
Calculation procedure:

As in the previous examples, the condition of using the T test for dependent selections is a normal frequency distribution. Therefore, we will test it first:

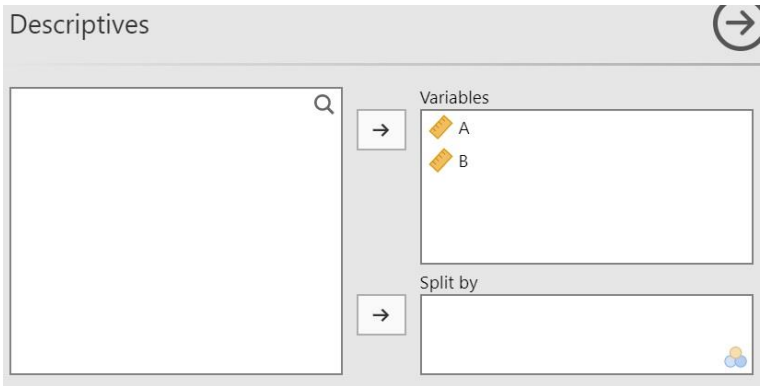
After entering the data into the card *Data* and their designation as metric... ..



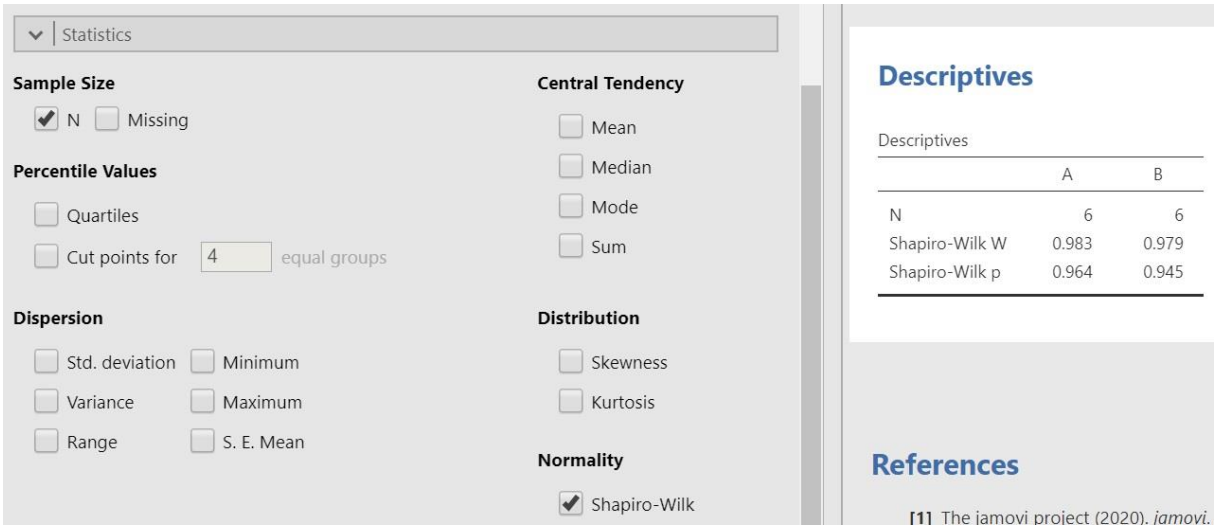
We continue with the choice *Analyzes → Exploration → Descriptives*



After moving the data from both files to the item *Variables*

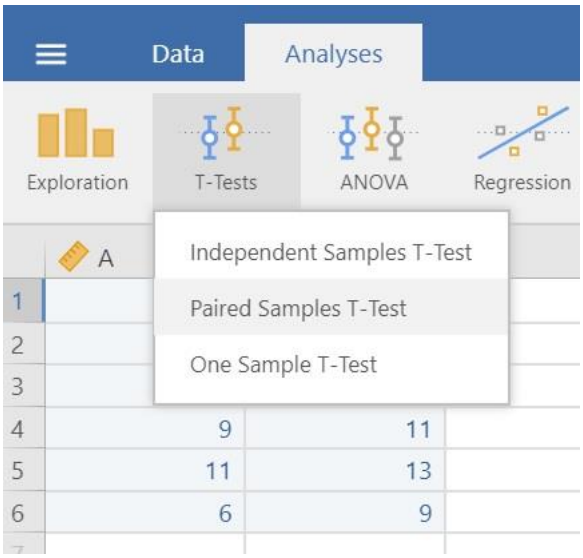


Check the option *Shapiro - Wilk* (frequency distribution normality test)

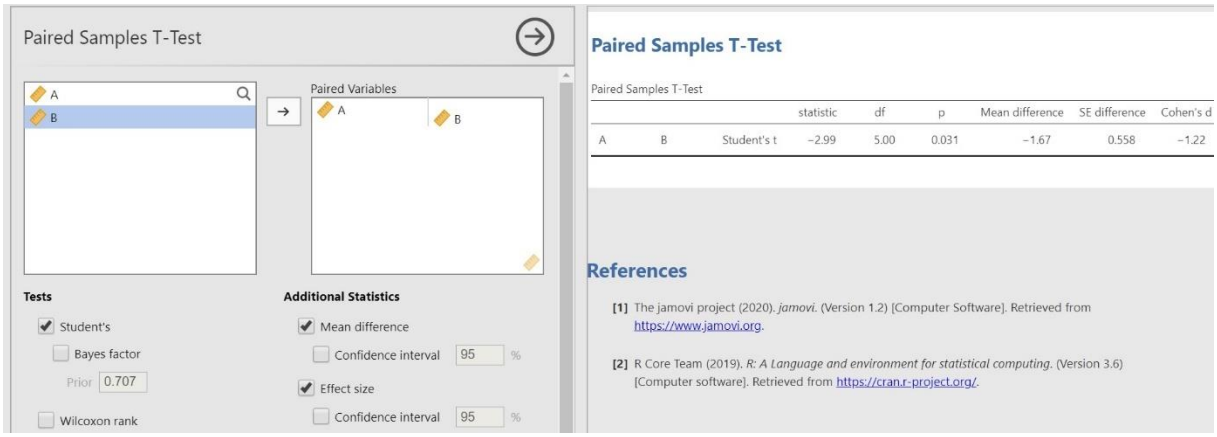


Values *p* in the result part 0.964 for set A and 0.945 for set B are higher than 0.05 and from this we conclude that both sets have a normal frequency distribution. The considered T test for comparing the averages of both dependent sets can therefore be used. Otherwise, we would have to use its nonparametric analogy, the Wilcoxon test (see seminar 9).

T test calculation for paired values: Option *Analyzes → T - Tests → Paired Samples T - Test*



After marking the appropriate options, we can read the results in the right part:



Value p <0.05 we deny H_0. The increments in the number of deflections are**statistically significant**. The use of a stimulus method for the development of strength skills has proved appropriate.

Calculation procedure **material significance** (effect size)

calculated according to the formula: $2 = \frac{2-1}{2+--1}$ $2 = \frac{-2.992-1}{-2.992+6-1} = 0.569$

The result is greater than 0.1 and therefore the observed difference is materially (practically) significant. This means that the change in performance between after the application of training is 57% influenced by the training program.

Alternative coefficient of materiality, Cohen d can be found by checking the appropriate option in the results section. See previous image. In this particular example, its value is | −1,22 | = 1.22. Interpretation of this coefficient see table in seminar 3.

TASK

Verify by t - test for paired values the first and second attempts of the dominant arm in a handshake test at your study group. The performances of ten random students can be found in the following table:

Dominant 1st experiment (kN)	Dominant 2nd experiment (kN)
37	40
20	21
25	23
54	46
30	36
35	39
70	70
15	31
50	60
21	21