Conditions

Independent-samples t-test

A team of investigators has good reason to believe that a small dosage of a certain drug changes the speed with which people can make decisions. They decide to try to confirm this by carrying out an experiment in which the decision times of 14 people who have taken the drug are compared with those of a control group of 14 other people who have performed the task under a placebo condition. The experimenters expect that the average decision time of the experimental group will differ from that of the placebo group. The results are shown the following Table

Drug group

Case:	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Time:	390	494	386	323	660	406	345	425	421	407	386	550	470	393

Placibo Group

Case:	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Time:	446	749	599	460	390	477	556	440	471	501	492	392	578	398

Solution

For this test, the null hypothesis is that the means of samples are equal:

$$H_0: M_1 = M_2$$

$$H_a: M_1 \neq M_2$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{X_1X_2}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}},$$

$$S_{X_1X_2} = \sqrt{\frac{1}{2}\left(S_{X_1}^2 + S_{X_2}^2\right)}$$

$$S_{X_1}^2 = \frac{\sum_{i=1}^{6}(X_1 - \bar{X}_1)^2}{n}$$

$$S_{X_2}^2 = \frac{\sum_{i=1}^{6}(X_2 - \bar{X}_2)^2}{n}$$

For this example:

$$t = 1.817424$$

The degrees of freedom:

$$k = 14 + 14 - 2 = 26$$

For these degrees of freedom the t-criteria value is:

2.059 – for p=0.95

We can make a conclusion, that with probability 95% there is no difference between 2 groups. H0 is approved