

Answer on Question #49818 – Math – Statistics and Probability

Five people who were convicted of speeding were ordered by the court to attend a workshop. A special device placed in their cars kept a record of their speeds for 2 weeks before and after the workshop. The maximum speeds for each person during the 2 weeks before and the 2 weeks after the workshop follow:

Participant Before After

L. B.	65	58
J. K.	62	65
R. C.	60	56
R. T.	70	66
J. M.	68	60

Using the .05 significance level, should we conclude that people are likely to drive more slowly after this workshop? Use hypothesis testing.

Solution

$$n = n_1 = n_2 = 5.$$

The mean difference is

$$\bar{d} = \overline{(x_a - x_b)} = \frac{\sum(x_a - x_b)}{n} = \frac{(58 - 65) + (65 - 62) + (56 - 60) + (66 - 70) + (60 - 68)}{5} = -4.$$

Sample standard deviation of difference is

$$\sum(x_a - x_b)^2 = (58 - 65)^2 + (65 - 62)^2 + (56 - 60)^2 + (66 - 70)^2 + (60 - 68)^2 = 154$$

$$s_d = \sqrt{\frac{\sum(x_a - x_b)^2 - n\bar{d}^2}{n - 1}} = \sqrt{\frac{154 - 5 \cdot (-4)^2}{5 - 1}} = 4.3.$$

Hypotheses:

$$H_0: \bar{d} \geq 0; H_a: \bar{d} < 0.$$

Decision Rule:

$$\alpha = 0.05$$

$$\text{Degrees of freedom } n - 1 = 5 - 1 = 4$$

$$\text{Critical t-score from t-table } t^* = 2.132.$$

Reject H_0 if $t < -2.132$.

Test Statistic:

$$t = \frac{\bar{d}}{\frac{s}{\sqrt{n}}} = \frac{-4}{\frac{4.3}{\sqrt{5}}} = -2.08.$$

Decision (in terms of the hypotheses):

Since $t = -2.08 > -t^* = -2.132$ we fail to reject H_0 .

Conclusion (in terms of the problem):

There is no sufficient evidence at 0.05 significance level that people are likely to drive more slowly after such a workshop.