

Example 6.4

Research Hypothesis : whether there is a significant reduction in the mean time for right-handed people using right-handed threads.

Hypotheses test : assume that the difference between paired right-handed and left-handed times is normally distributed, as we are comparing paired data we use paired t-test (one-tailed)

Hypotheses : M_d : the population mean of the difference in time taken to move the indicator

(assume that righthanded people find it easier to move right-handed thread so

$M_d = L - R$, so if R is quicker then $M_d < 0$)

$$H_0: M_d = 0$$

$$H_1: M_d > 0$$

Significance level α 5%

no. of pairs

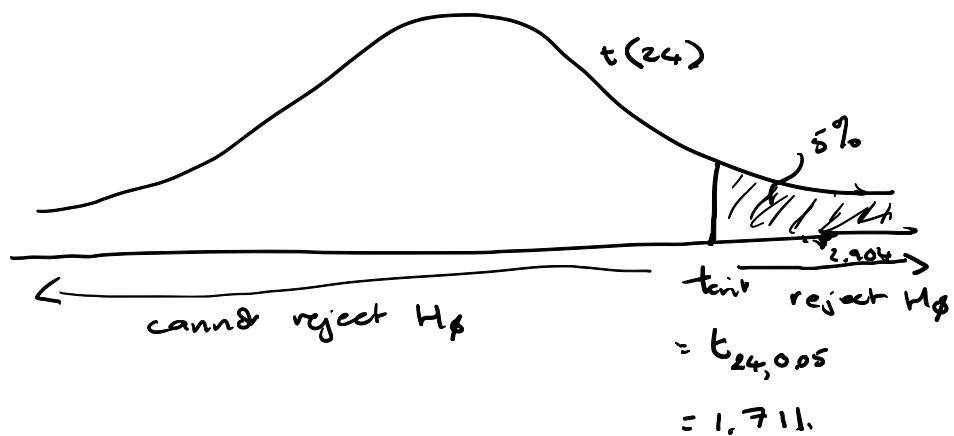
Test statistic : $T = \frac{\bar{d}}{S_d / \sqrt{n}} \sim t(n-1) \text{ under } H_0$

Observed test statistic: $n = 25 \quad \bar{d} = 13.32$

$$S_d = 22.936$$

$$t_{obs} = \frac{13.32}{22.936 / \sqrt{25}} = 2.904$$

Rejection Region



Test decision

$t_{obs} = 2.911 > t_{crit}$, and therefore lies in the rejection region, so we can reject H_0 in favour of H_1 .

Test conclusion:

We can conclude that there is sufficient evidence to suggest that there is a significant reduction in time taken for right-handed people using right-handed threads.

Confidence ^{Limit} Interval for the true mean value or the difference in the pairs

$$\left(\bar{d} - t(24; 0.05) \frac{s_d}{\sqrt{n}}, \infty \right)$$

$$= \left(13.32 - 1.711 \times \frac{22.936}{\sqrt{25}}, \infty \right)$$

$$= (5.471, \infty)$$

So, 0 is not a plausible value of this confidence limit, confirming result of H_0 hypothesis test.