

Practice Problem:

A researcher wants to test if people are faster at texting using one hand or two hands. The researcher measures the speed it takes to type a particular phrase, and times it in seconds. Two-tailed test at 95% confidence.

(1) Calculate the difference scores and the squares of the difference scores. Then, calculate the Mean Difference and Sum of Squares

Participant	One hand	Two Hands	D	$(\bar{x}_D - D)$	$(\bar{x}_D - D)^2$
1	15	12			
2	20	16			
3	10	7			
4	7	7			
5	25	15			
		\bar{x}_D (Mean of Differences) =			SS (Sum of Squares) =

(2) Hypotheses

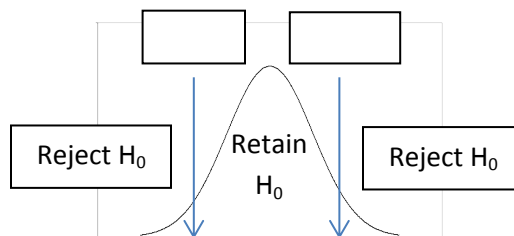
<p align="center"><u>Two-tailed / Non-directional:</u></p> <p>H₀: _____</p> <p>H₁: _____</p>
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(3) Get T-critical Value & Define Rejection Regions on Distribution

$\alpha = .05$

$d.f. = N - 1 = \underline{\hspace{2cm}}$

Two-tailed t-critical value: _____



(4) Calculate

(a) $SD = \sqrt{\frac{SS}{N-1}}$

SD =

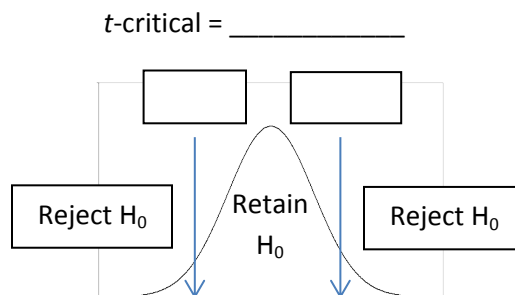
(b) $SEM = \frac{SD}{\sqrt{N}}$

SEM =

(c) $t\text{-obtained} = \frac{\bar{X}_D - \mu_D}{SEM}$

t-obtained =

(5) Conclude. Draw arrow where t-obtained falls.



t-obtained = _____

Decision: Reject or Retain the null hypothesis.

Conclusion Sentence:

Practice Problem Key:

A researcher wants to test if people are faster at texting using one hand or two hands. The researcher measures the speed it takes to type a particular phrase, and times it in seconds. Two-tailed test at 95% confidence.

(1) Calculate the difference scores and the squares of the difference scores. Then, calculate the Mean Difference and Sum of Squares

Participant	One hand	Two Hands	D	$(\bar{x}_D - D)$	$(\bar{x}_D - D)^2$
1	15	12	3	1	1
2	20	16	4	0	0
3	10	7	3	1	1
4	7	7	0	4	16
5	25	15	10	-6	36
			\bar{x}_D (Mean of Differences) = 20/5 = 4	SS (Sum of Squares) = 54	

(2) Hypotheses

Two-tailed:

$$H_0: \mu_D: \mu_1 - \mu_2 = 0$$

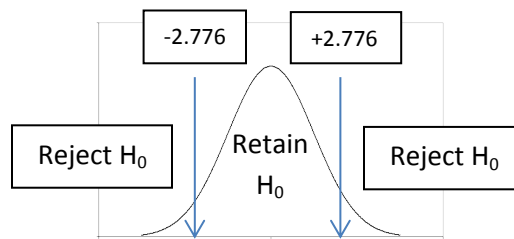
$$H_1: \mu_D: \mu_1 - \mu_2 \neq 0$$

(3) Get t-critical value & Define Rejection Region

$$\alpha = .05$$

$$d.f. = N - 1 \quad 5 - 1 = 4$$

Two-tailed t-critical value: 2.776



(4) Calculate

(a) $SD = \sqrt{\frac{SS}{N-1}}$

$SD = \sqrt{\frac{54}{5-1}} = 3.67$

(b) $SEM = \frac{SD}{\sqrt{N}}$

$SEM = \frac{3.67}{\sqrt{5}} = \frac{3.67}{2.23} = 1.64$

(c) $t\text{-obtained} = \frac{\bar{X}_D - \mu_D}{SEM}$

$t\text{-obtained} = \frac{4 - 0}{1.64} = 2.45$

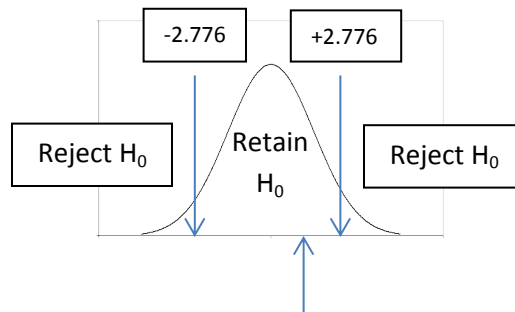
**NOTE: You can do this entire problem in SPSS in 10 seconds.
Place data in 2 columns. Make sure both variables are "Type: NUMERIC".
Analyze → Compare Means → Paired Samples Test:**

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 OneHand - TwoHands	4.000	3.674	1.643	-.562	8.562	2.434	4	.072

(5) Conclude

$t\text{-critical} = +/- 2.776$



$t\text{-obtained} = +2.434$

Decision: Retain the null hypothesis: $H_0: \mu_D = 0$

Conclusion Sentence: There is no significant difference between the one handed and the two handed condition.