Paired Samples t Test

Paired Samples Statistics

CI % : 95

Group	N	M	SD	SE	Lower	Upper
Time 1	4	2.000	2.449	1.225	-1.898	5.898
Time 2	4	6.000	2.449	1.225	2.102	9.898

These statistics were obtained using same formulas as in the previous section on Frequencies and Descriptives. Note that they are calculated separately for each variable.

Paired Samples Correlations

Var	N	r	t	df	p
Diff	4	0.500	0.816	2.000	0.500

The Mean Difference ("Diff") is simply the difference between the two means listed above. However, the "SE" is not determinable from the summary statistics presented here but rather the raw data.

The Std. Deviation of the differences can be determined from this information:

$$SD_D = (SE_D)(\sqrt{N})$$
$$SD_D = (1.225)(\sqrt{4}) = 2.449$$

Paired Samples T Test

t	df	p	Diff.	SE	Lower	Upper
-3.266	3	0.047	-4.000	1.225	-7.898	-0.102

This confidence interval is centered on the Mean Difference ("Diff") of the two variables. Calculation requires the appropriate critical value. Specifically, the *t* statistic (with 3 *df*) that has a probability of .05 equals 3.182. As a result:

$$CI_D = M_D \pm (t_{CRITICAL})(SE_D)$$
$$CI_D = 4.00 \pm (3.182)(1.225)$$

Thus, the researcher estimates that the true population mean difference is somewhere between 0.1.02 to 7.898 (knowing that the estimate could be incorrect).

The "t", "df", and "p" columns provide the results of the statistical significance test. First, *t* provides the standardized statistic for the mean difference:

$$t = \frac{M_D}{SE_D} = \frac{4.000}{1.225} = 3.226$$

The *t* statistic follows a non-normal (studentized or *t*) distribution that depends on degrees of freedom. Here, $df = N - 1 = 4 - 1 = 3$. A *t* with 3 *df* that equals 3.226 has a two-tailed probability (*p*) of .047, a statistically significant finding.