

Paired t-test

Very often the two samples to be compared are not randomly selected—they are paired.

To find out whether (and how much) pawpaws inhibit tree regeneration, we are comparing the tree seedling density of plots with pawpaws to plots without pawpaws. Because other factors like slope, soils, etc. also influence tree seedling density, it's important to hold these other factors constant. We are doing this by comparing the plots with pawpaws to *adjacent* plots without pawpaws. Thus the plots are paired by location.

In SPSS, make a bar chart of tree seedling density with and without pawpaws (Graphs; Legacy Dialogs; Bar). Display the descriptive statistics (Analyze; Descriptive Statistics; Descriptives). Make a histogram of each variable to see its distribution (Graphs; Legacy Dialogs; Histogram).

Examine the means and standard deviations. Do the means look similar or different? How much variability is there in the data used to calculate the means? Make an educated guess as to whether the two means are significantly different (i.e., more different than you would expect by chance if they came from populations having the same mean and variability). Write down your expectation:

Now perform a paired t-test. What is the null hypothesis for the test? The alternative hypothesis?

Ho: _____

Ha: _____

Click Analyze; Compare Means; Paired Samples T Test.

Examine the results: $t=$ _____, $df=$ _____, $P=$ _____.

Do we reject the null hypothesis? Yes or No

What does the outcome of the paired t-test tell us about the answer to our original ecological question about pawpaws? Write a results statement in the format: Result ($t=$ ____, $df=$ ____, $P=$ ____; Figure 1). (This statement refers to your bar chart as Figure 1).

Correlation

When we are interested in the relationship between two continuous variables, we use correlation.

Here, we want to test whether, within plots with pawpaws, the density of pawpaw stems is related to the density of tree seedlings. If pawpaws inhibit tree regeneration, then we expect a negative correlation.

In SPSS, make a scatterplot of pawpaw stem density vs. tree seedling density (Graphs; Legacy Dialogs; Scatter/Dot; Simple Scatter).

Does it look like there is a relationship between these two variables? What kind of relationship? Write down your expectation:

Now perform a correlation. What is the null hypothesis for the test? The alternative hypothesis?

Ho: _____

Ha: _____

Click Analyze; Correlate; Bivariate.

Examine the results: Pearson correlation coefficient=_____, P=_____,
N=_____.

Do we reject the null hypothesis? Yes or No

What does the outcome of the correlation tell us about the answer to our original ecological question about pawpaws? Write a results statement in the format: Result (Pearson correlation coefficient = ___, P=___, N=___; Figure 1). (This statement refers to your scatterplot as Figure 1).