# Relationships Among Key Components in a Test of Independence.

In this activity we consider hypothesis tests involving contingency (or two-way) tables. The hypothesis test has a null hypothesis that the row and column variables are INDEPENDENT.

The alternative hypothesis is that the row and column variables are DEPENDENT.

We will use the flowchart to focus on the relationships among the key components in the test of independence.

A key point is that the *P*-value is a measure of the amount of *AGREEMENT* between the observed and expected values.

The observed values, denoted by *O*, are those values that are listed in the contingency table.

The expected values, denoted by *E*, are the values that we would expect if the row and column variables are really independent.

The chi-square test statistic is built around the differences *O* minus *E*.

First, compare the observed values (*O*) to the corresponding expected values (*E*).

If the observed values *O* and the expected values *E* are close, then their differences are small.

The chi-square test statistic is small and the P-value is large.

The large P-value shows that we FAIL TO REJECT independence between the row variable and the column variable.

This indicates agreement between what we observed and what we expected.

In other words, a large *P*-value indicates independence between the row and column variables.

On the other hand, if the observed values *O* and the expected values *E* are far apart, then their differences are large.

The chi-square test statistic is large and the P-value is small.

The small *P*-value shows that we REJECT independence between the row variable and the column variable.

Now, it is time to test your knowledge.

Let’s try another one.

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This animated flowchart described the relationships among key components in a test for independence.

Remember, observed and expected values that are close indicate independence. When observed and expected values are far apart, we reject independence.

Congratulations, you have mastered an important concept of Statistics!

Remember, if the observed frequencies are close to the expected frequencies, you can make your own declaration of independence.