Narrator: Using Excel 2007 or newer to analyze data. Let’s return to our example to make this easier to understand. Suppose that you, the researcher, are interested in the effects of an experimental drug versus placebo on memory for a list of words. You hypothesize that those taking the experimental drug will exhibit better memory after eight weeks than those taking the placebo. So you randomly assign people to one of two groups:

The first group is the Experimental Drug Group. This group of four people takes the experimental drug for eight weeks.

Or, you assign them to the Placebo Group. This group of four people takes a placebo drug for eight weeks.

Number of Words Recalled: Experimental Drug:
8
7
6
8
Average: 7.25
Number of Words Recalled: Placebo:

3
4
5
2
Average: 3.50

Average # of Words Recalled:
Experimental Drug: 7.25
Placebo: 3.50

**Narrator:** At the end of the eight weeks, you give them a list of words to study and then measure how many words they recall in ninety seconds and enter the data into Excel as shown.

**Slide 3**

**Title:** Determine the Independent Variable and the Dependent Variable

**Slide Content:** Content repeated verbatim from narrative.

**Narrator:** Step one; To analyze the data, we must first determine the independent variable and the dependent variable. The independent variable, or IV, is what the experimenter manipulates. In this example, the independent variable is the experimental condition, and it has two levels; the experimental drug versus the placebo.

Here the IV is manipulated between subjects, or independent samples, because one group only received the experimental drug and the other group only received the placebo.

The dependent variable, or DV, is what the experimenter measures as a result of the manipulation of the IV. In this example, the dependent variable is the number of words recalled.

**Slide 4**

**Title:** Determine what statistical test you need to use

**Slide Content:** Content repeated verbatim from narrative.

**Narrator:** Step two. Next we need to determine what statistical tests you need to use. When we used Excel to compute the descriptive statistics, we discovered that the experimental drug group recalled more words on average than the placebo group. Thus it would appear that our drug was effective at improving memory.
But wait! You cannot just look at the averages and say “there is a difference between 7.25 and 3.50”! Instead, you must conduct a statistical analysis to determine if there is a significant difference.

Slide 5

**Title:** Significance Level

**Slide Content:** Content repeated verbatim from narrative.

**Narrator:** In psychology, we accept a significance level, or p-value, of .05 or less in order to conclude that the means are statistically, significantly different. If the statistical test reveals that the significance level, or p-value, is less than .05, this means that there is less than a 5% chance that the differences occurred by chance.

Because the independent variable is manipulated between subjects, you will need to calculate an inferential statistic, called the independent samples t-test, or, it’s also called the two-sample t-test in order to determine if the significance level is .05 or less. If the significance level is .05 or less, then we can conclude that there is a significant difference between the experimental drug group average word recall of 7.25 and the placebo group average word recall of 3.50.

Slide 6

**Title:** Conduct the Analysis

**Slide Content:** Screenshot of an Excel spreadsheet indicating a formula and the Statistical function dropdown arrow.

**Narrator:** Step 3. Now we are ready to conduct the analysis. First, click in a cell where you want the results of the statistical analysis to appear. In this example, the cell D7 was chosen. Then click on the Formula tab at the top of the Excel window.

Slide 7

**Title:** Conduct the Analysis, cont’d

**Slide Content:** Screenshot of an Excel spreadsheet indicating the More Functions dropdown arrow, the Statistical option and the TTEST option.

**Narrator:** Select More Functions and you will see a drop down menu. Select Statistical TTEST.

Slide 8

**Title:** Conduct the Analysis, cont’d
**Slide Content:** Screenshot of a popup window indicating the fields Array1, Array2, Tails, and Type. The Array1 text box is highlighted.

**Narrator:** A Functions Arguments window will appear. In the Functions Argument window, first enter the data for the first level of the IV. This is the data for the experimental drug group, and is located in cells B3, B4, B5, and B6. Enter these values into the text box called Array1. Entering “B3:B6” into the Array1 text box tells Excel to use the constant values found in cells B3, B4, B5, and B6.

**Slide 9**

**Title:** Conduct the Analysis, cont’d

**Slide Content:** Screenshot of a popup window indicating the fields Array1, Array2, Tails, and Type. The Array2 text box is highlighted.

**Narrator:** Second, enter the data for the second level of the independent variable. This is the data for the placebo group, and is located in cells C3, C4, C5, and C6. You enter these into the text box called Array2. Entering “C3:C6” into the Array2 textbox tells Excel to use the constant values found in cells C3, C4, C5, and C6.

**Slide 10**

**Title:** Conduct the Analysis, cont’d

**Slide Content:** Screenshot of a popup window indicating the fields Array1, Array2, Tails, and Type. The Tails text box is highlighted.

**Narrator:** Next enter the number “1” into the textbox called Tails. This tells Excel to conduct a one-tailed test. You use a one-tailed test when you have a directional hypothesis. In this case, you have a directional hypothesis because you expect the results to go in a specific direction – that is you expect that the experimental drug group will remember more words than the placebo group.

**Slide 11**

**Title:** For Future Reference

**Slide Content:** Content repeated verbatim from narrative.

**Narrator:** For future reference, you use a two-tailed test when you have a non-directional hypothesis.

If you expect memory differences between the groups, but make no predictions about which group will show enhanced memory performance, then you have a non-directional hypothesis.
To conduct a two-tailed test, enter the number “2” into the textbox called Tails.

**Slide 12**

**Title:** Conduct the Analysis, cont’d

**Slide Content:** Screenshot of a popup window indicating the fields Array1, Array2, Tails, and Type. The Type text box is highlighted.

**Narrator:** Finally, enter the number “2” into the textbox called Type. This tells Excel what kind of t-test to conduct. In this case we have a between-subjects manipulation of our independent variable, so we need to conduct an independent samples, also called two-samples, t-test. We are going to assume that we have equal variances

**Slide 13**

**Title:** For Future Reference

**Slide Content:** Content repeated verbatim from narrative.

**Narrator:** For future reference, you use a paired samples t-test when you have a within-subjects manipulation of the IV.

If you had a group of participants take the placebo for eight weeks, then test their memory, and then had the same group take the experimental drug for eight weeks, and then test their memory again, you would have two memory scores per participant; one score after taking the placebo and one score after taking the experimental drug.

This is a within-subjects manipulation because all of the participants are exposed to all levels of the independent variable.

To conduct a paired samples t-test, enter the number “1” into the textbox called Type.

**Slide 14**

**Title:** Conduct the Analysis, cont’d

**Slide Content:** Screenshot of a popup window indicating the fields Array1, Array2, Tails, and Type. The Formula Result section is highlighted.

**Narrator:** Once you’ve filled out all four textboxes, the “formula result = .001722369” appears in the window. This is the significance level. Click OK to finish.

**Slide 15**

**Title:** Conduct the Analysis, cont’d
Interpret the Results

The final step in the analysis is to interpret the result. The one-tailed, two samples t-test revealed a significance level of 0.0017. Remember the significance cutoff or alpha level that we use in the field of psychology is 0.05. Because 0.0017 is less than 0.05, there is less than a 5% chance that the differences in memory performance that we observed between the two groups occurred by chance. Therefore we can conclude that there is a difference between the word recall average by the experimental group of 7.25 and the word recall average by the placebo group of 3.50.

End of presentation