

NR140 Group Work t-tests

On blackboard you have two data sets to download from a former student's biology thesis (I LOVE it when students share their data!).

Butterfly pesticides.jmp reports the mean wing length for 80 butterflies (40 of which were treated with pesticides during the larval stage (labeled Group 2) and 40 that were not (control group labeled 1))

Butterfly Babies.jmp reports the mean wing length for 40 butterflies treated with pesticides as adults, and 40 of their offspring (offspring are matched to the appropriate parent).

Our task will be to examine how pesticides impact butterfly development directly, and indirectly through their offspring.

We will work in JMP so we can run our normality tests the easy way but keep in mind that you can run this exact same test in excel using the `=TTEST(array1,array2,tails,type)` function.

Let's start with the Butterfly Pesticides Data.

Assume that we want to **test to see if there is a difference between butterfly wing length for those treated with pesticides (group 2) and those not treated with pesticides (group 1).**

Use an alpha level of 0.05

1. Report the p-value for the **goodness of fit** test for the wing length data
2. Is your wing length **data normally distributed**?
3. Conduct the appropriate test and report the obtained value for this test
4. Report the appropriate p-value for this test
5. Is there a significant difference between the pesticide treated and control group wing length?
6. **Is this difference meaningful? How do you know?**
7. **Summarize: Write a concise one paragraph summary of this analysis.** Remember that any summary should include the following:
 - a. Statement of the research hypothesis or study objectives
 - b. Brief summary of methods (one sentence or less)
 - c. Statement of the statistical results (including type of test and shorthand: $t(df) = \text{obtained value}$, $p = 0.xxx$)
 - d. Description of any differences, if meaningful, along with an interpretation of why these results make sense (or don't make sense).

Now we will move on to the Butterfly Babies Data.

Assume that we want to test to see if there is a difference between butterfly wing length for the parents treated with pesticides (generation 1) and their offspring (generation 2).

Use an alpha level of 0.05

8. Write a concise one paragraph summary of this analysis.

Stick with this Butterfly Babies Data.

In the above question we were able to see if the baby butterflies differ significantly from their parents.

But assume that we want to test to see if these babies (generation 2) are smaller when compared to the larger population of butterflies in the wild. From the literature we know that the typical wing length for this species (population mean = 640 and population stdev = 30).

Do these new babies have significantly smaller wing length compared to the larger population?

Use an alpha level of 0.05

9. Write a concise one paragraph summary of this analysis.

ALL DONE...congrats on your foray into even more inferential analyses.