

Data Analysis in Evol/Evol - HW Week5

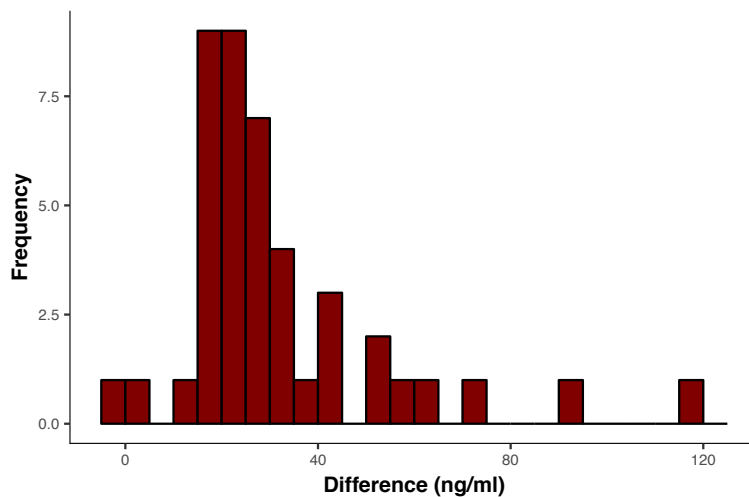
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Reference R code see: github.com/jingyilu/Data-analysis-ecoevo

1. Make a phylogeny of your favorite group (warbler, mammal, plant, parrot), with a minimum of 15 species. Read it into R using the ape library.
2. For each species in the phylogeny find also some data that is continuous (e.g. body size, leaf thickness), but we really need at least two traits. Make an excel file of the data and read it into R as a data.frame.

3. P.409 q.21

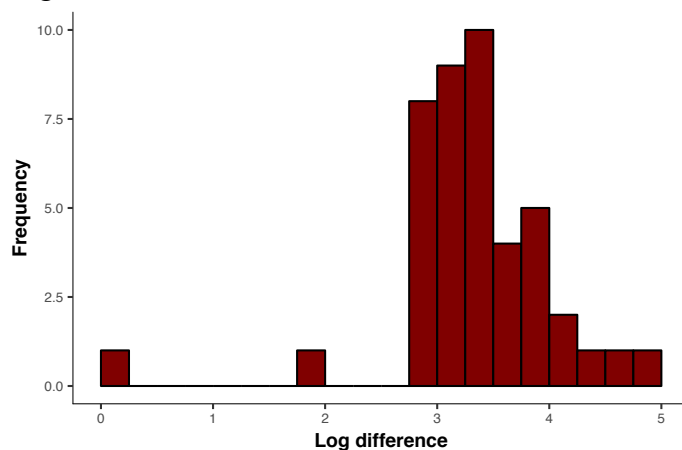
- a. Histograms of the differences (incompatible male – compatible male) in stress levels.



Most of the finches have higher stress when pairing with incompatible male.

- b. No. The difference in stress levels between pairing with incompatible male and compatible male do not follow a normal distribution (from the histogram), two-paired t-test, therefore, will not be suitable for testing the difference.

- c. Still not appropriate. As shown in the histogram below (log transformation of difference value + 2), the log transformed differences still do not follow normal distribution.



d. Yes. Sign test is a nonparametric test for one-sample or paired t-test without the assumption of normality.

e. H_0 : The stress levels are the same between females with compatible and incompatible mates.

H_1 : The stress levels are not the same between females with compatible and incompatible mates.

Sign test with binomial distribution:

$P\text{-value} = 1.955 \times 10^{-11} < 0.05$.

We can reject the null hypothesis that the stress levels are the same, and the female has different stress levels with compatible and incompatible mates.

4. P.411, q.26

* I re-checked the original article and found out the “65” in the dataset is actually “-65”, therefore I made the change here. Otherwise, I did not really know what the question was asking for as all the pairs showed positive preference.

I chose sign test to test the paired data as the data do not follow normal distribution and is not symmetrical around the median (for Wilcoxon sign-ranked test).

H_0 : The female has no preference between paired male brothers.

H_1 : The female has preference between paired male brothers.

Sign test with binomial distribution:

$P\text{-value} = 0.021 < 0.05$.

We can reject the null hypothesis that the female has no preference, and the female has different preference on paired male brothers with different treatments of carotenoids.