

# Visualizing Experimental Results

Introduction to Evolution and Scientific Inquiry, Fall 2018

Written by Stephanie J. Spielman, PhD

Read each experimental scenario and create a graph to visualize the results, as described, using the browser tool “Shiny Plot.” This tool can be found here: <https://sjspielman.shinyapps.io/shinyplot/>.

## Scenario 1

A study was conducted to determine whether Vitamin C intake influenced tooth growth using guinea pigs. The researchers’ alternative hypothesis is that “Individuals receiving higher doses of vitamin C will experience increased tooth growth”. Researchers randomly placed 40 guinea pigs into four groups receiving different doses of Vitamin C (here, ascorbic acid): 0.0, 0.5, 1, and 2 mg/day. The researchers then measured tooth length after two weeks of supplementation. All other aspects of the guinea pigs’ lives aside from supplementation were identical.

Using the data found in **tooth\_growth.csv**, visualize the primary results from this study and determine whether the results support the alternative hypothesis or not. Create several different types of visualizations and think about which type of figure is the most informative.

## Scenario 2

A study was conducted to determine whether chicken weight is influenced by their food source. The researchers’ alternative hypothesis is that “Chickens eating food with higher protein content will gain more weight.” They randomly assign 36 chickens to three diets: low protein, medium protein, and high protein (note, we cannot include a “no protein” control as chickens will simply die without any source of protein intake). Aside from protein content, all diets are otherwise identical. Researchers measured the weight of each chicken in grams after six months. Assume that all chickens started out at the same weight.

Using the data found in **chicken\_feed.csv**, visualize the primary results from this study and determine whether the results support the alternative hypothesis or not. In addition, create a second visualization to determine if this study is *balanced*, meaning there are the same number of individuals in each treatment group.

## Scenario 3

A study was conducted to determine the influence thyroid hormone thyroxine on amphibian metamorphosis. The researchers’ alternative hypothesis is that “Increased levels of thyroxine will cause tadpoles to metamorphose more readily than low levels.” Researchers randomly placed 25 each tadpoles into several tanks with different concentrations of thyroxine: No thyroxine, Low thyroxine, Medium thyroxine, and High thyroxine. (Each tank has 25 tadpoles). The researchers then allowed the tadpoles to live in these tanks for a week, and they asked how many tadpoles underwent metamorphosis in each tank set.

Using the data found in **tadpoles.csv**, visualize the primary results from this study and determine whether the results support the alternative hypothesis or not.

## Scenario 4

A study was conducted to characterize certain characteristics of mammalian species, including diet (“vore” type), amount of sleep per day (hours), brain weight (kg), and body weight (kg). Researchers compiled data for 59 different mammals with these recorded characteristics. Create figures to help address these alternative hypotheses the researchers want to investigate, and use your visualization to determine if the data, found in **mammals.csv**, support the hypothesis or not.

- Carnivores are heavier (i.e., body weight) than other “vores” (herbivores, omnivores, and insectivores).
- Herbivores sleep the least amount of time compared to other “vores”.
- There is a strong, positive relationship between body weight and brain weight in mammals.