

# Exercise 3

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*October 23, 2015*

This time around we're going to make things a bit easier, and focus on grouping and plotting. We haven't quite gotten to ggplot yet, so here's a quick how-to on [basic plotting](#). Honestly if you need to do more complicated things than this, dive right into learning ggplot instead. The hard section is going to require techniques that aren't covered on that introduction page, so have fun and good luck!

Say I am an entomologist who is studying the relationship between tree's and insect abundance. I have 4 sites, each with 3 different tree species at them. I've randomly chosen 20 trees at each site and recorded species of tree, tree height, and abundance. I sampled these sites 5 times.

```
data <- data.frame( day = rep(c(270,290, 299 ,310,315), each=20),
                    site = rep(rep(1:4,each=5), 20),
                    tree.height = rgamma(100,shape=100) + sample(seq(-10,10,1),100,replace=T),
                    tree.type = sample(c('white_oak','ash','garry_oak'), 100, replace=T),
                    abundance = round(rlnorm(100,5,.9)))

head(data)
```

```
##   day site tree.height tree.type abundance
## 1 270    1   95.47212 garry_oak      148
## 2 270    1   95.42667 white_oak      214
## 3 270    1  112.84194 white_oak      512
## 4 270    1  112.87125 garry_oak       40
## 5 270    1   92.61978 garry_oak       56
## 6 270    2  102.70954 white_oak     391
```

## Easy

I want to plot a histogram of the abundance of insects on White Oak. How do I only select the white oak species and create a histogram of abundance?

## Medium

Before I do anything, I need to know if there is any biases in my sampling. Calculate the mean abundance and tree.height for each site and tree.type sampled. Do you see any consistent trends?

## Hard

I want to graph these relationships. I want a bar plot of how average insect abundances vary across site and species with blue bars representing white oaks, green representing garry oaks, and red representing ashes.

## Bonus

I then want to calculate standard error of each of these graphs and add the error bars to my graph. What's the shortest amount of code you can do this in?