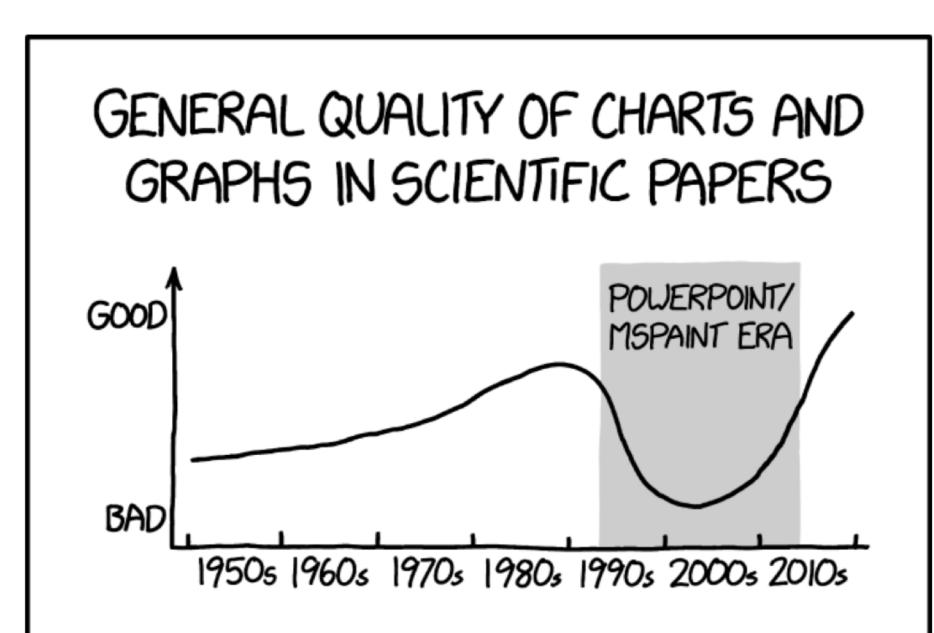


# Experimental Design

## Biology 683

### Problematic plots

Heath Blackmon



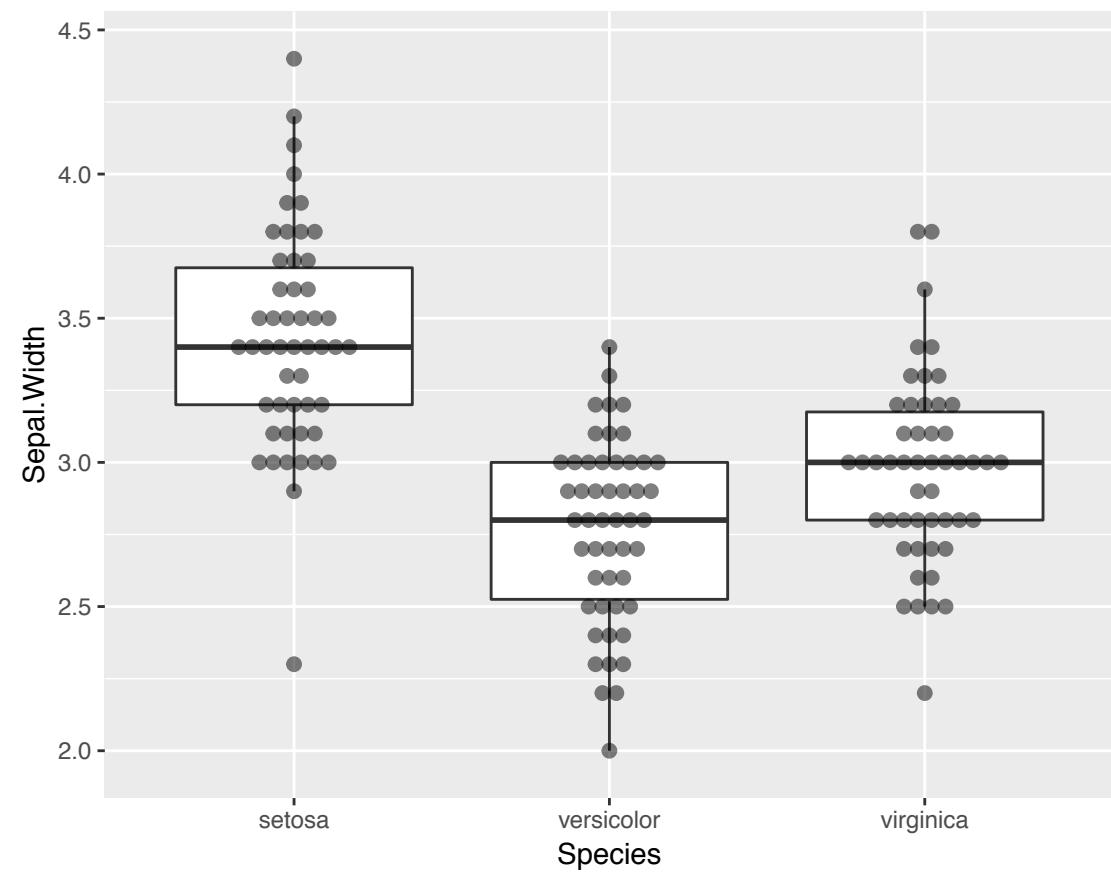
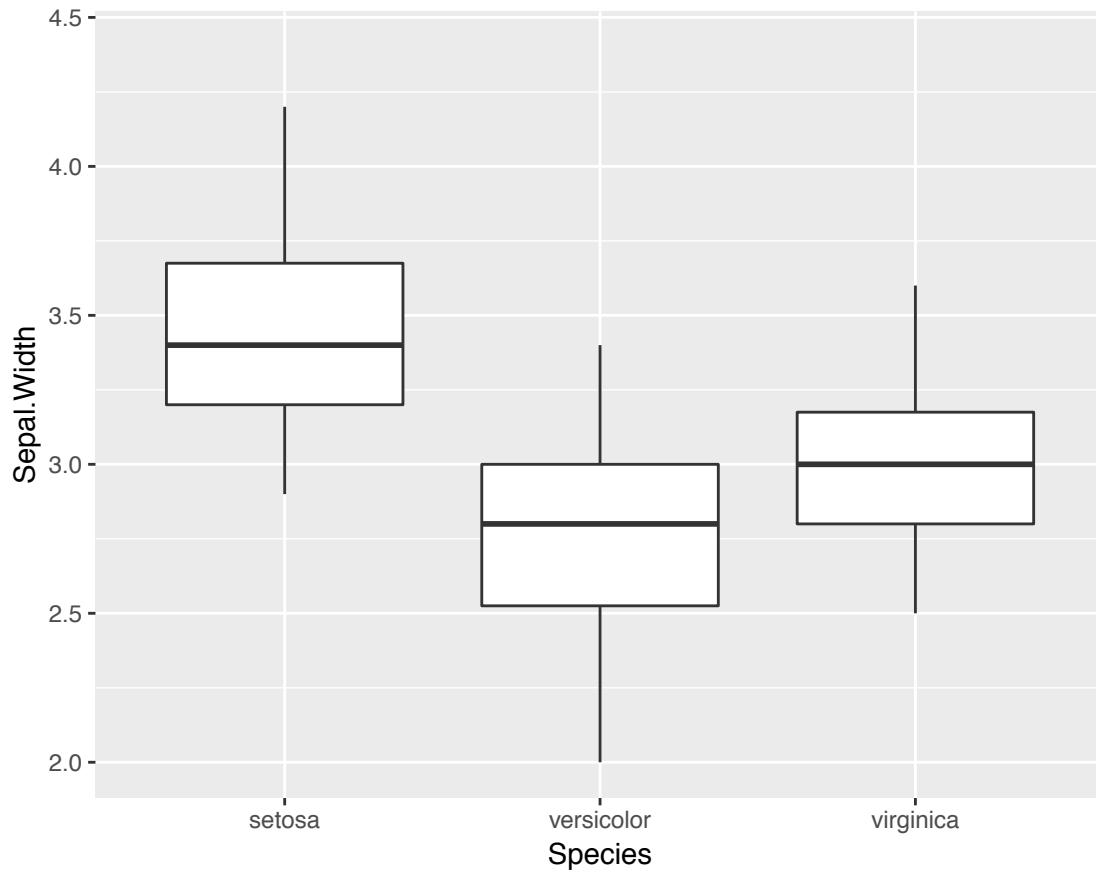
# Plan for today

1. General rules for making plots
2. Programs for plotting
3. Resources for plotting

# Rules for plots

1. Show the data

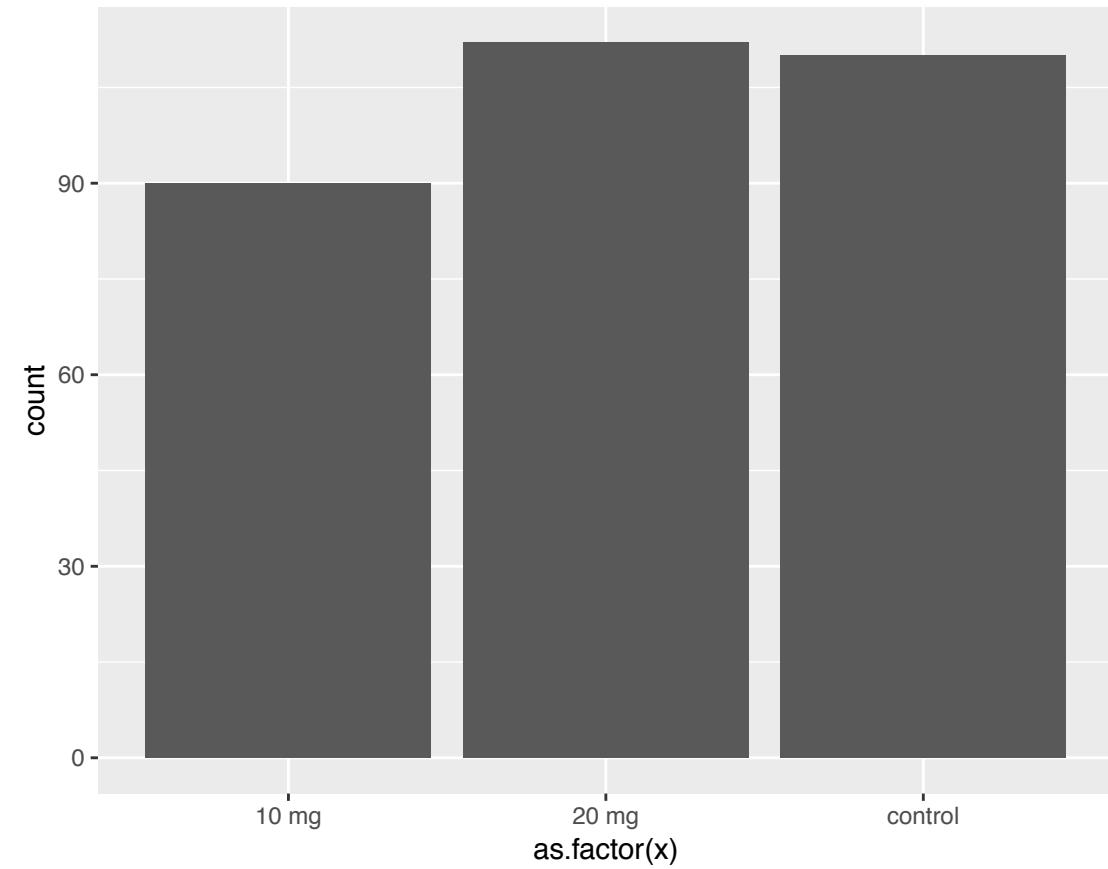
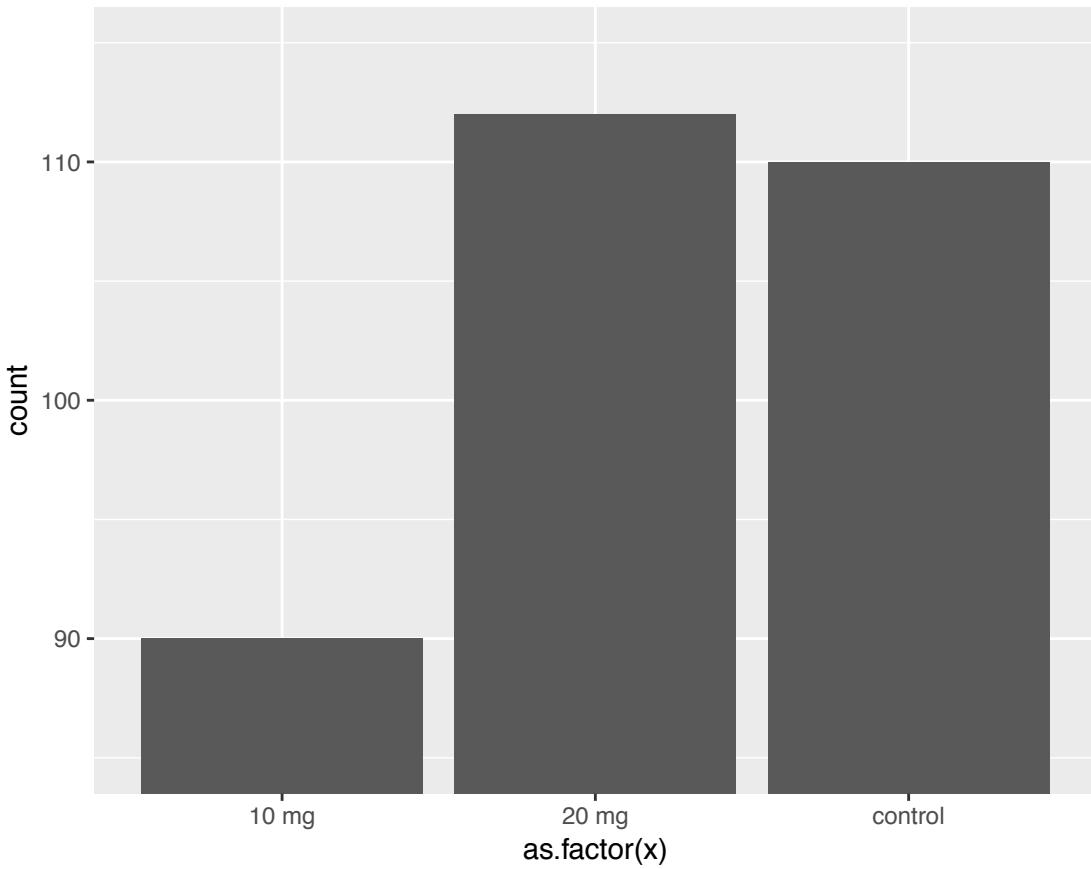
# Show the data



# Rules for plots

1. Show the data
2. Avoid distorting data

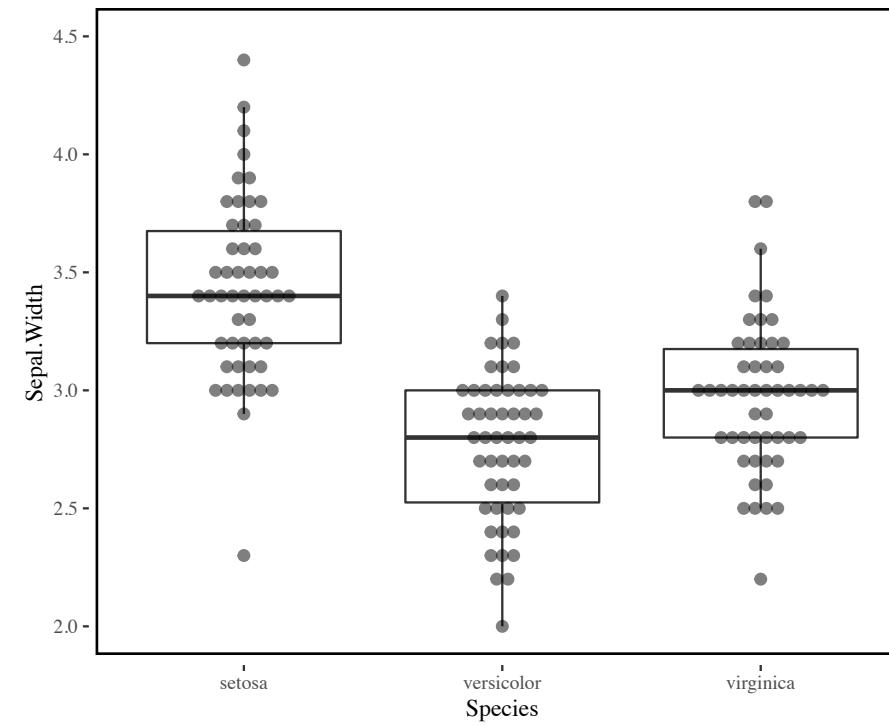
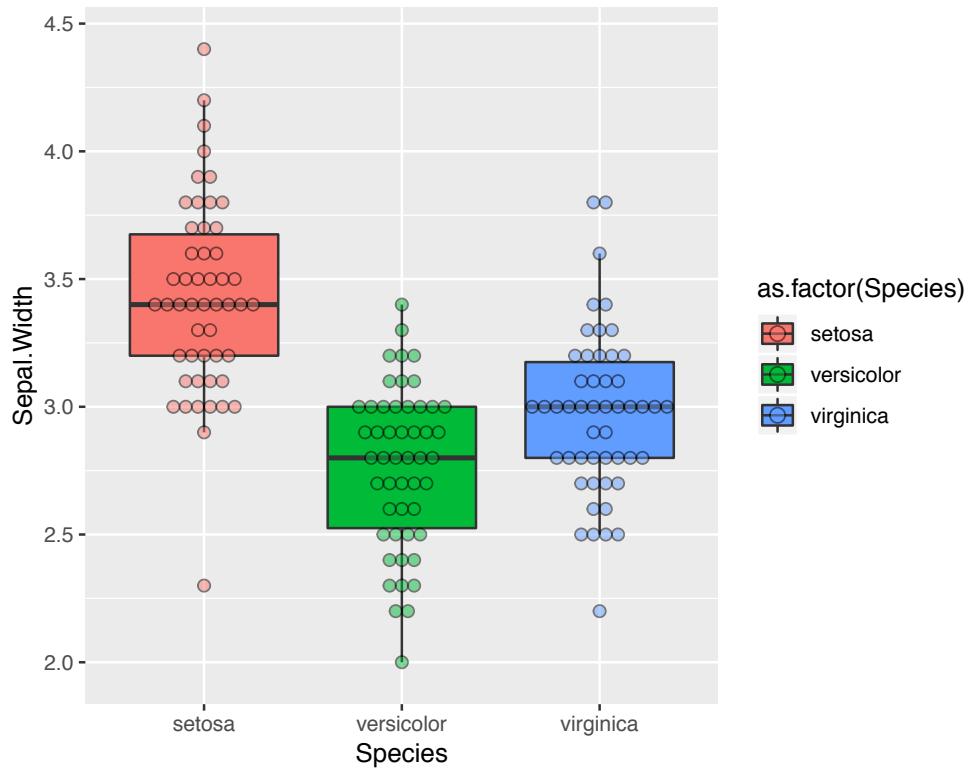
# Avoid distorting data



# Rules for plots

1. Show the data
2. Avoid distorting data
3. Avoid chart junk

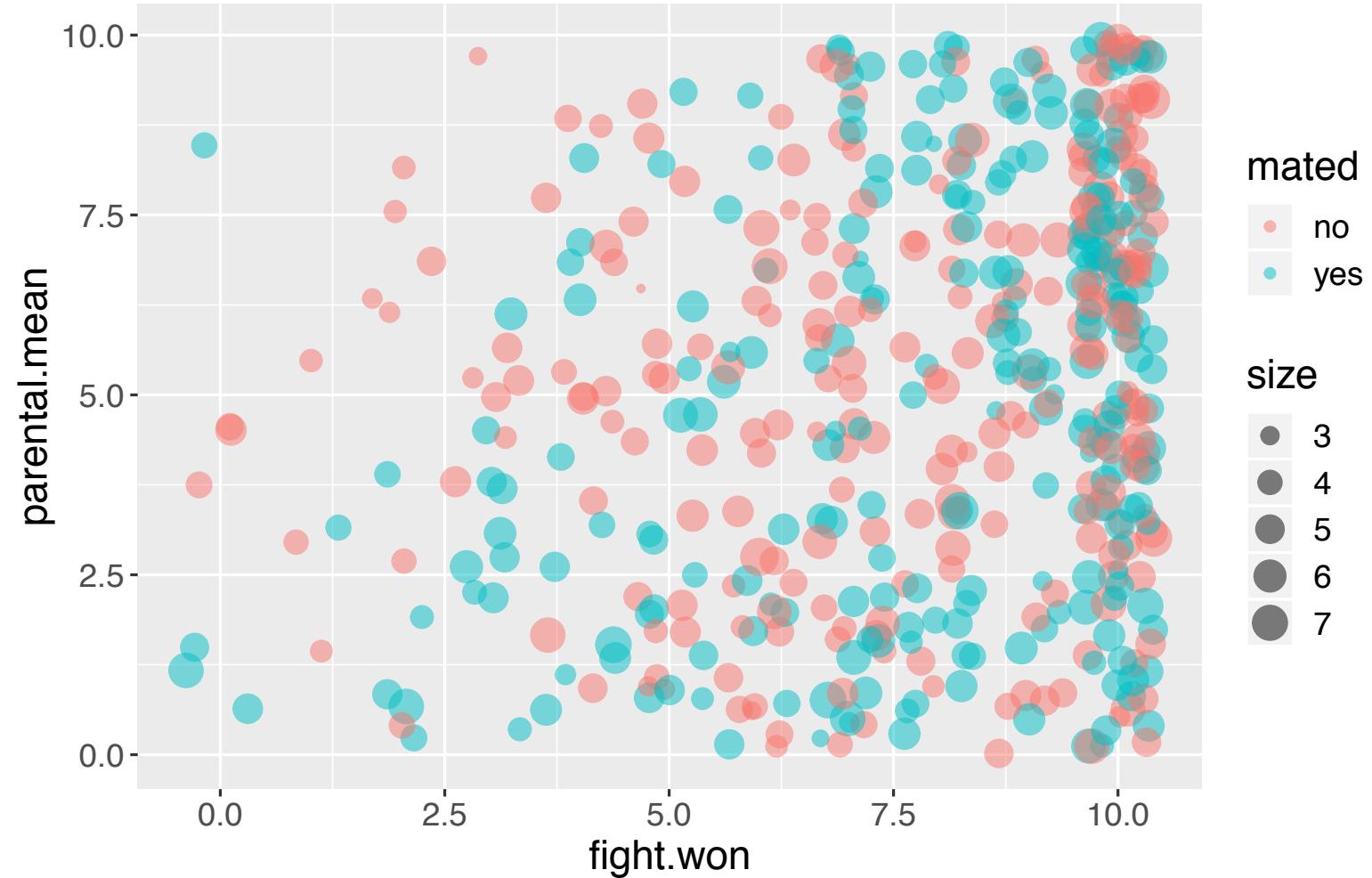
# Avoid chart junk



# Rules for plots

1. Show the data
2. Avoid distorting data
3. Avoid chart junk
4. Maximize data:ink ratio maximize information

# Maximize data:ink ratio maximize information

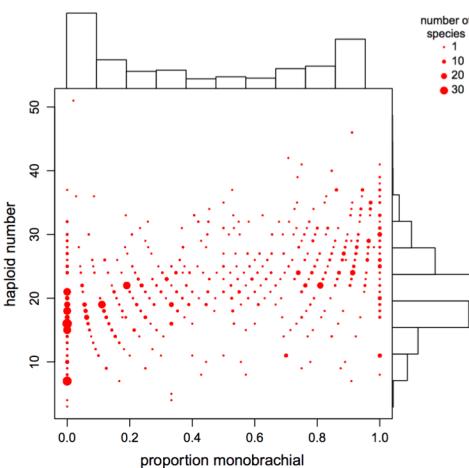


# Rules for plots

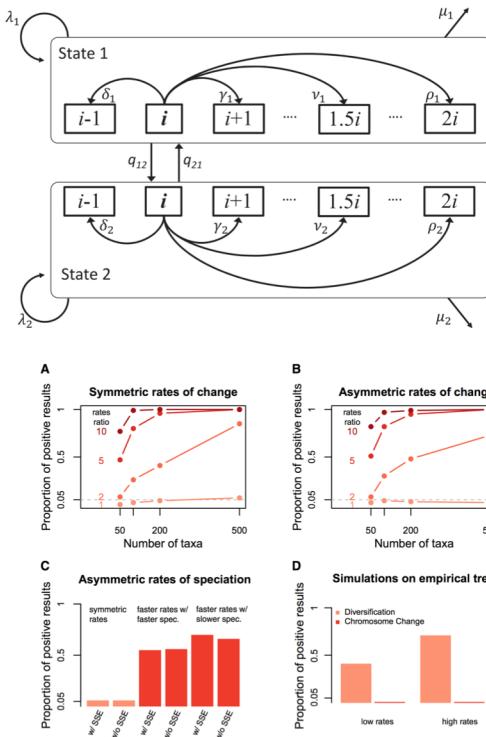
1. Show the data
2. Avoid distorting data
3. Avoid chart junk
4. Maximize data:ink ratio maximize information
5. Serve a purpose

# Serve a purpose

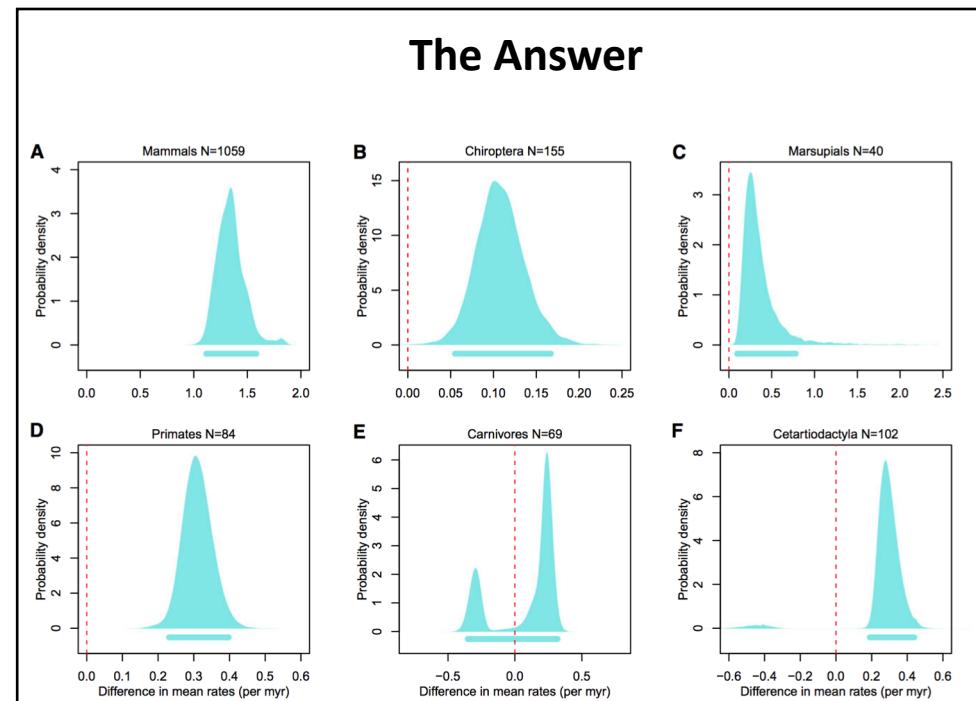
## The Problem/Question



## New tool and it works



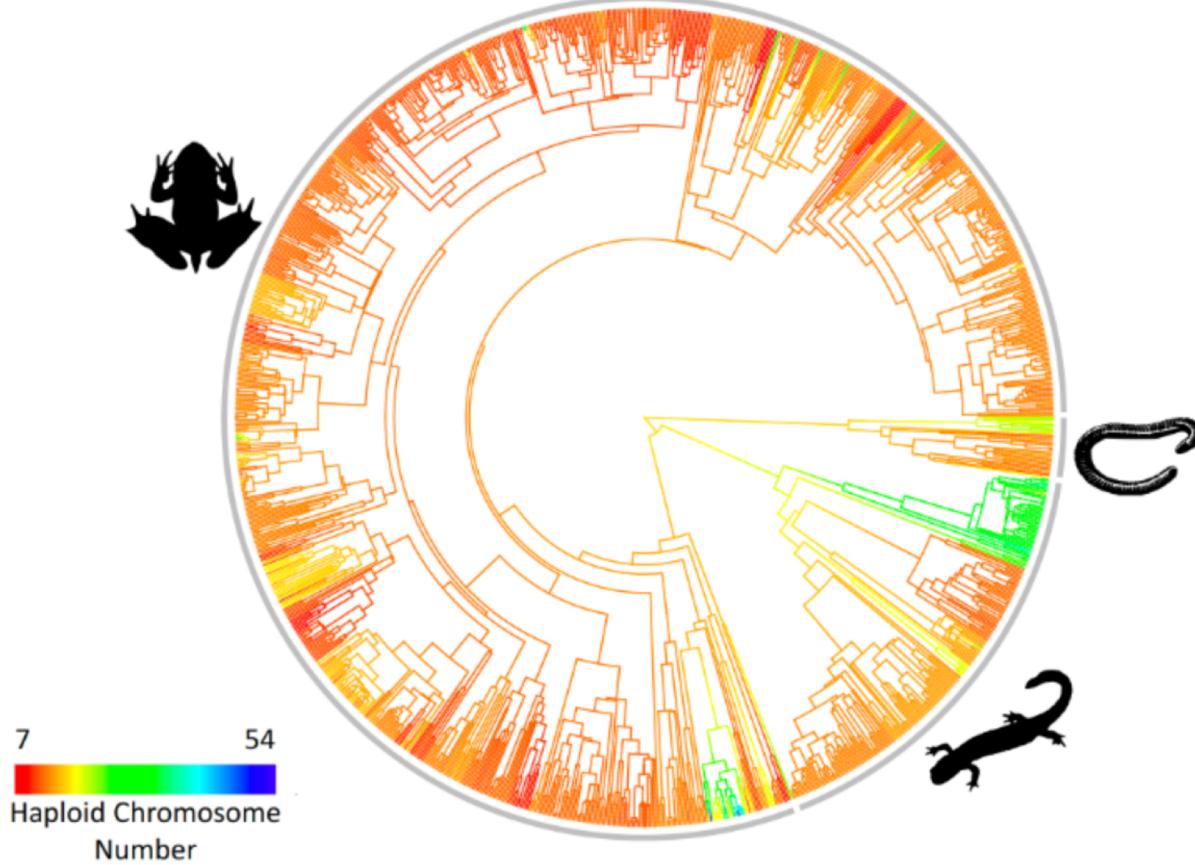
## The Answer



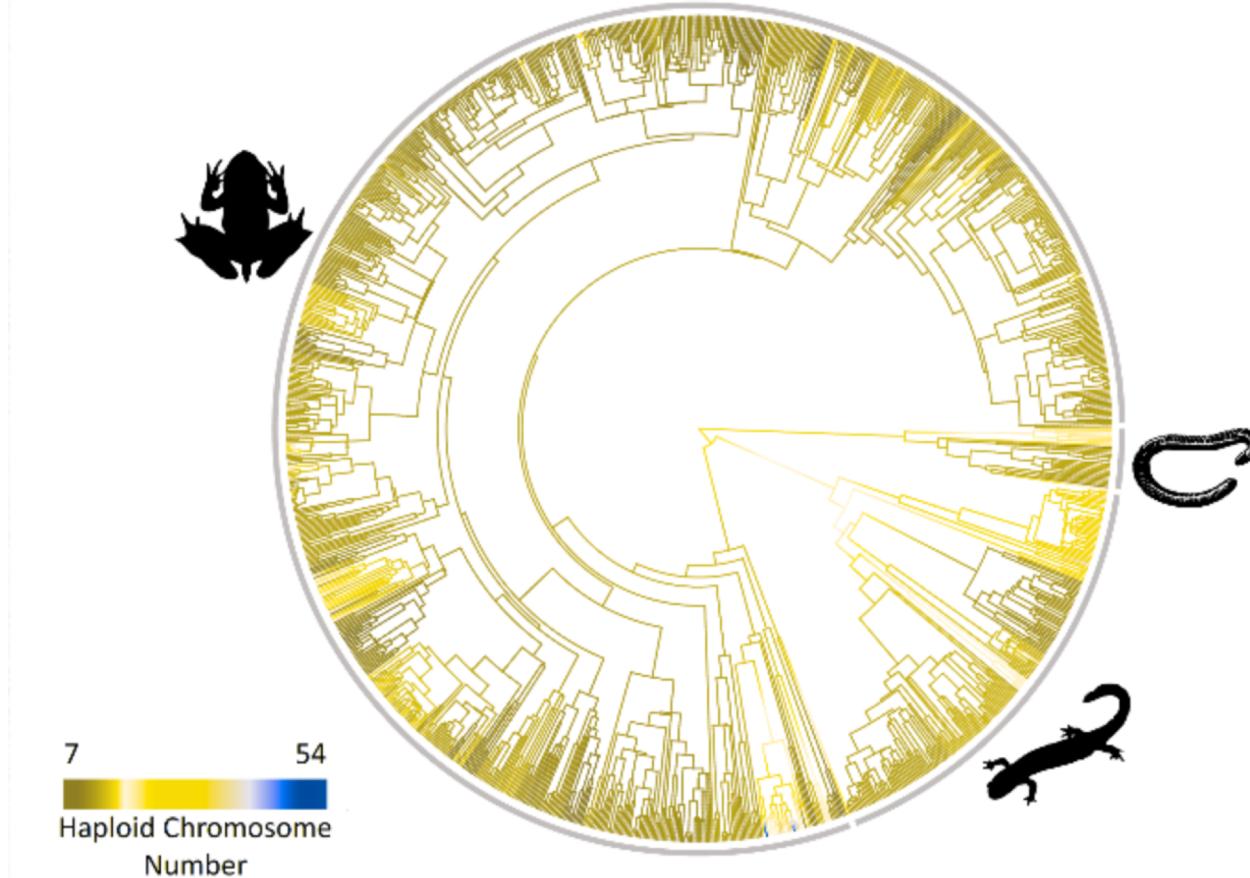
# Rules for plots

1. Show the data
2. Avoid distorting data
3. Avoid chart junk
4. Maximize data:ink ratio maximize information
5. Serve a purpose
6. Make it accessible to all (5% color blind + BW prints).

# Make it accessible to all



# Make it accessible to all



Use the viridis color palette

[Color blind simulator](#)

# Use the right tool

## Plotting continuous or discrete data

**Matplotlib:** is a python plotting library,

**R:** endless packages for plotting though base and ggplot2 are the most popular.

**Inkscape:** free vector graphics editor. Can read PDF and let you tweak things you couldn't quite fix in your script generated version.

**Circos:** created plots that compare genomes but can show connections between any large datasets.

Excel: it is possible but you have very limited options and control

Adobe Illustrator: Similar to inkscape particularly useful for building complex multipart figures

## Image Manipulation

**GIMP:** Think of it as free photoshop. Steep learning curve but can do just about whatever you want

**ImageJ:** Similar to GIMP but with many packages for analyses of specific image types.

Photoshop: Image manipulation steep learning curve very powerful and definitely worth learning if your research includes figures of FISH results.

## General Editing

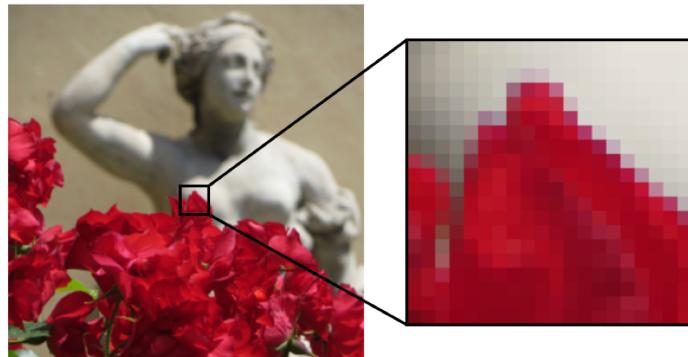
Adobe acrobat: often the easiest way to tweak something small you couldn't get exactly right in your script.

Powerpoint: not elegant but often the easiest way to combine different elements into a single plot.

**Bold = Free**

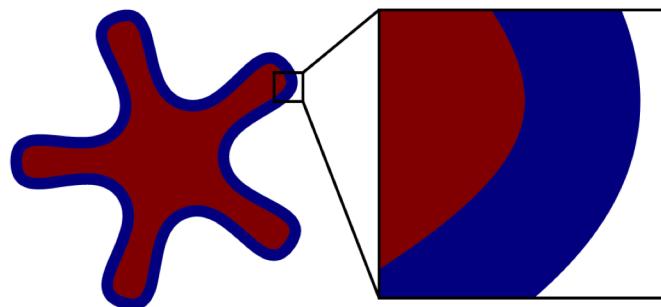
# Types of images

## Vector images



jpg, tiff, png, bmp, raw

## Raster images



eps, pdf, svg

# Resources

[R graph gallery](#)

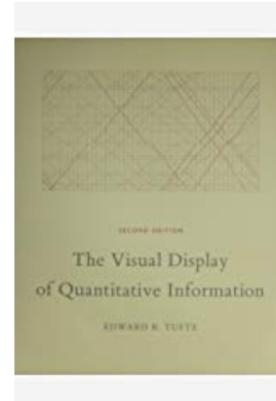
[Python graph gallery](#)

[Color Brewer](#)

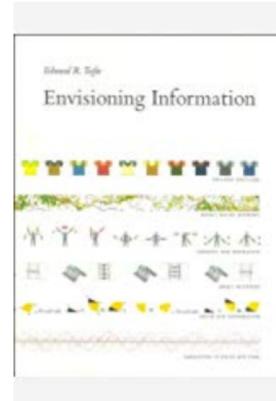
[Plotly](#)

[Data Visualization Catalog](#)

## Philosophy of Data Visualization



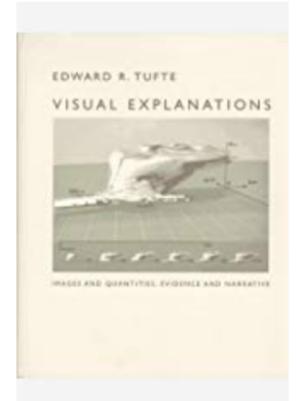
Hardcover  
**\$34.58**



Hardcover  
**\$36.13**



Hardcover  
**\$41.60**



Hardcover  
**\$35.11**

# Final

## **Everything we have already covered**

Using a linear models and interpreting the result thereof including adding in a random effect.

being able to manipulate data and get it ready for analysis

making plots that look good and are ready to be submitted for publication

# Homework

Find a plot that you think could be improved and take a screen shot and [upload to this folder](#). We will discuss them in class on Thursday. Name the file with your name.

This week:

Thursday (April 18): bad graphs and Dimensional reduction.

Next week:

Tuesday (April 23): species as data points

Thursday (April 25): R lab - with review sheet

Following week:

Tuesday (April 30) : last day of normal class – review and feedback

Options for final

1. Give you take home on Tuesday April 30
2. Come back on May 7 from 1-3pm