

Basic Data Vizualization

Joshua F. Allen

June 10, 2022

Why This is Important

Why Can't I Just use Summary Stats?

- Measures of central tendency are vital for exploratory analysis
- They tell you a lot about your data

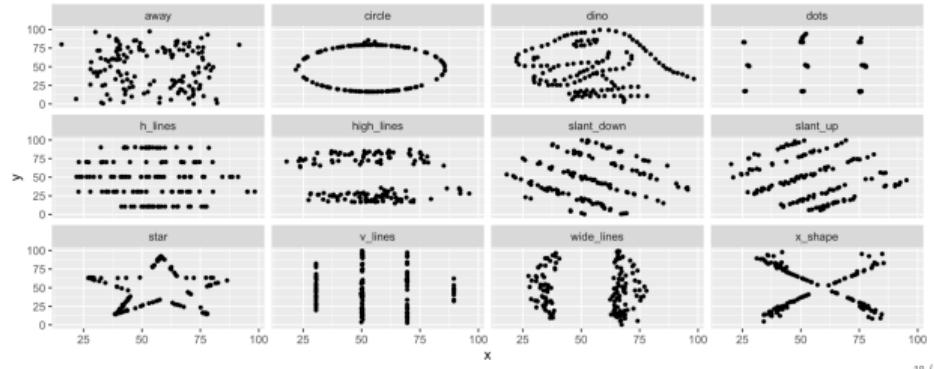
Why Can't I Just use Summary Stats?

- Measures of central tendency are vital for exploratory analysis
- They tell you a lot about your data
- However, they can not reveal patterns

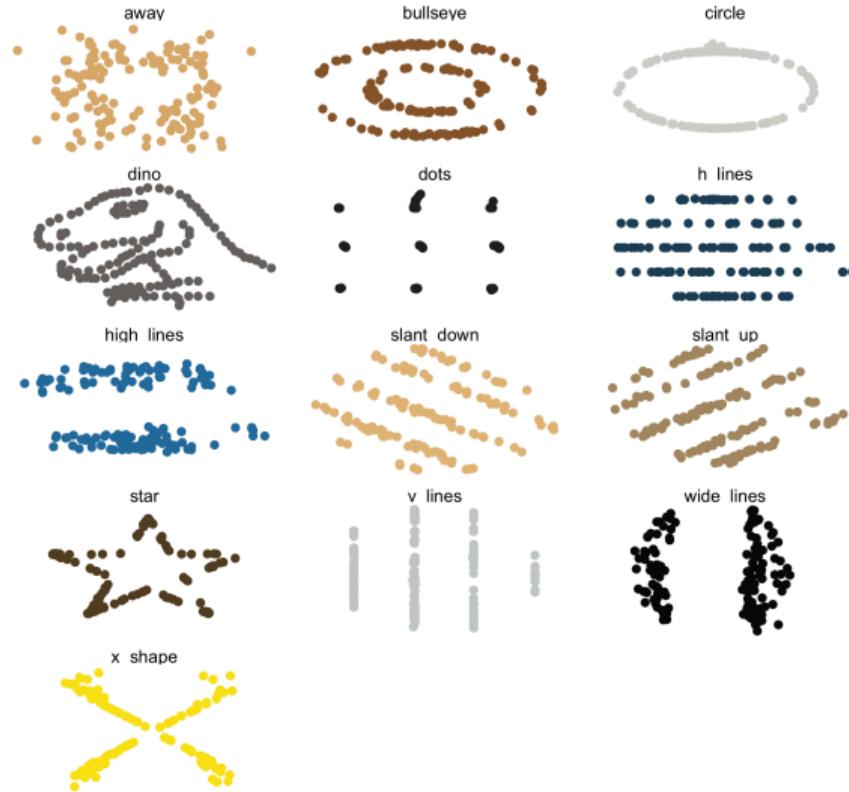
Going Beyond Summary stats

Raw data is not enough

Each of these has the same mean, standard deviation, variance, and correlation



Going Beyond Summary stats



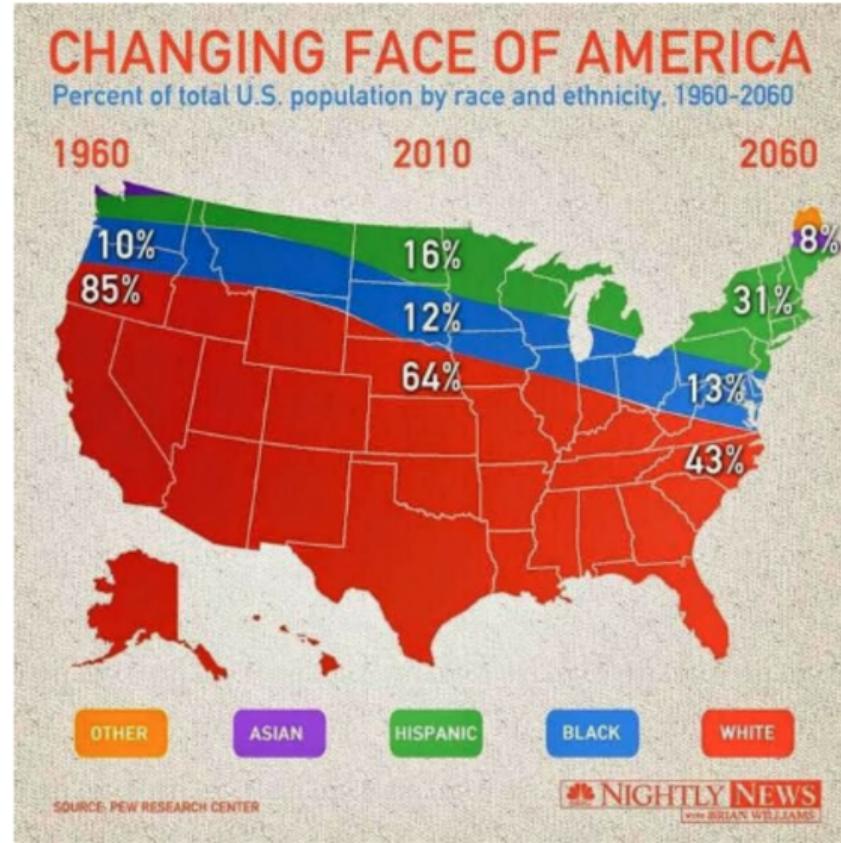
What Makes a Good Vizualization?

- People have lots of opinions
- Books are dedicated to this
- This is a legit topic scholars debate

The Basics

- Faithful representation of the data
- Good Aesthetics
- No perceptual issues
- Insightful

Bad Data Vizualization



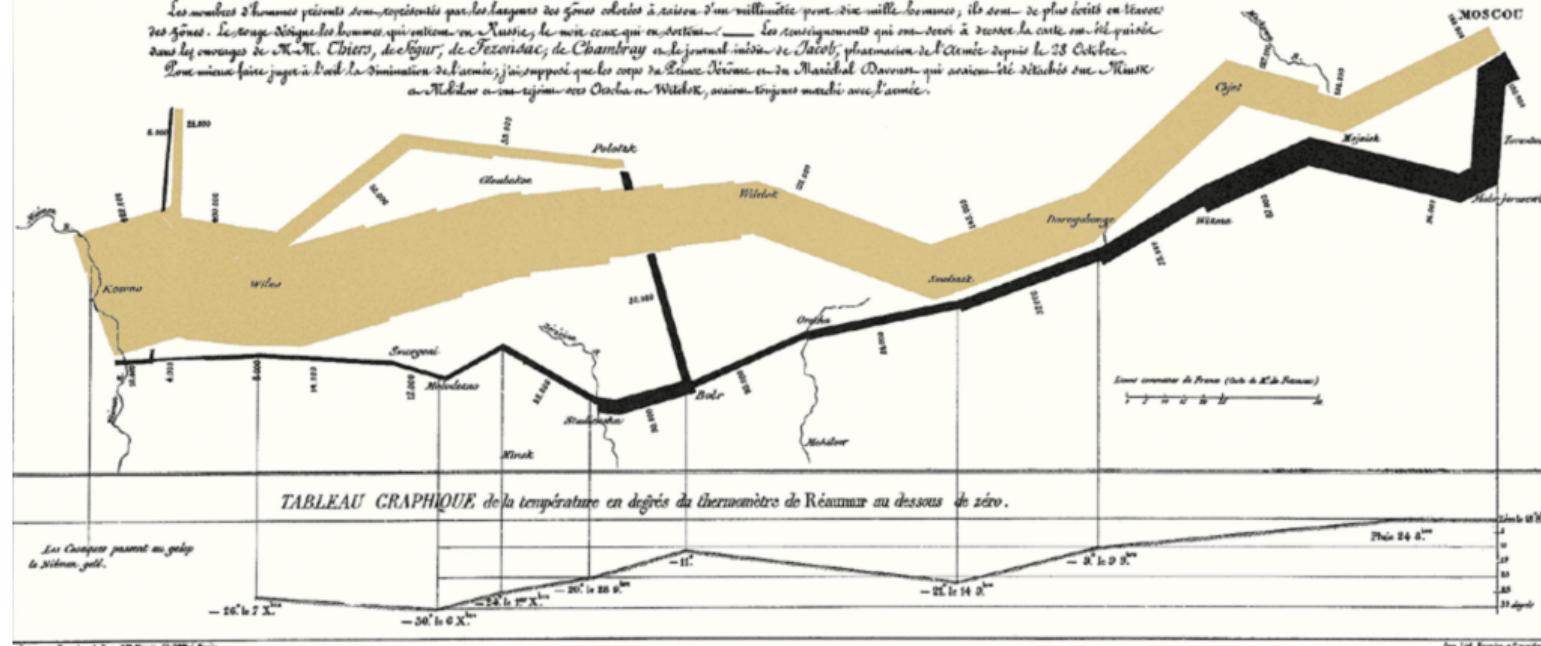
Minard's Map

Carte Figurative des pertes successives en hommes de l'Armée Française dans la Campagne de Russie 1812-1813.
Dessiné par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite.

Paris, le 20 Novembre 1869

Les nombres d'hommes présentés sont, représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en haut des zones. Le rouge désigne les hommes qui reviennent en Russie, le noir ceux qui meurent. — Les renseignements qui ont servi à dresser la carte sont tirés du tableau des carnets de M. M. Obier, de Segur, de Tocqueville, de Chambray et le journal intime de Jacob, planificateur de l'Armée depuis le 22 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai superposé que les corps de l'Armée Nécessaire du Maréchal Davout, qui avaient été détachés sur Minsk au début de la campagne avec Oudiné et Wrede, avaient toujours marché avec l'armée.



Coding

Should I Learn to Code?

- STATA, SAS, Excel, and SPSS have dropdown menus

Should I Learn to Code?

- STATA, SAS, Excel, and SPSS have dropdown menus
- You can get away with never learning the basics

Should I Learn to Code?

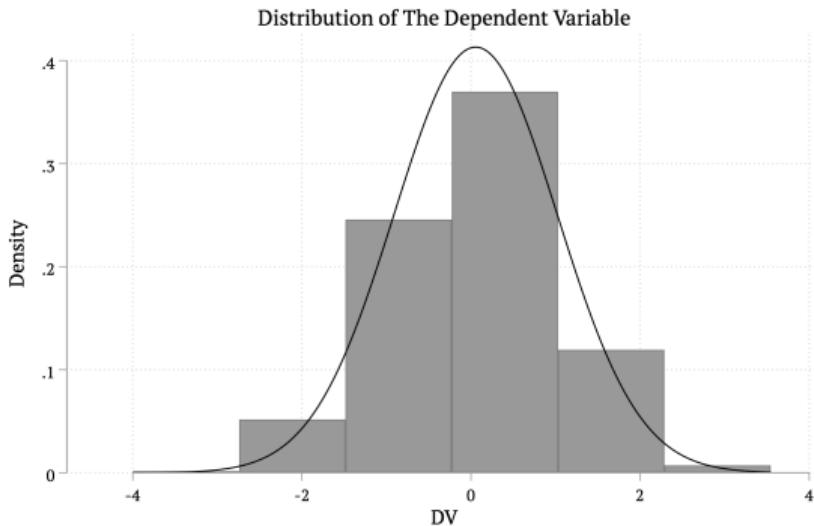
- STATA, SAS, Excel, and SPSS have dropdown menus
- You can get away with never learning the basics
- It's really easy to do it that way..Kind of

Coding Continued

The big news in economics last week was the paper by a UMASS Grad Student showing that economists Kenneth Rogoff and Carmen Reinhart had made an Excel spreadsheet blunder in their famous paper arguing that as debt-to-GDP goes above 90%, growth slows dramatically.

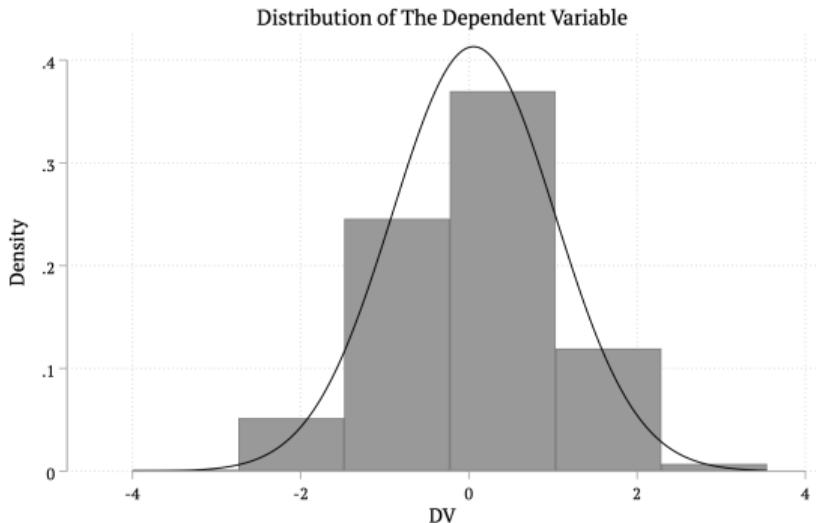
- It is **bad** practice to do stuff in the console or by drop downs
- It leads to mistakes
- And you won't ever really remember how to do things

Try Recreating this Figure



```
clear  
*this will generate fake data  
set seed 1994  
  
set obs 1000  
  
g y = rnormal(0,1) /* mean = 0, sd
```

How I created this figure



```
hist y, graphregion(color(white))  
bin(6) bcolor(gs8 start(-4)  
normal /// xtitle("DV")  
title("Distribution of The  
Dependent Variable") ///  
normopts(lcolor(black))
```

Learning To Code

- It is hard and often frustrating at first.

Learning To Code

- It is hard and often frustrating at first.
- You got this
- Understanding the fundamentals will let you do a lot of things.

Resources

Cutting corners to meet arbitrary management deadlines



Essential

Copying and Pasting
from Stack Overflow

O'REILLY®

The Practical Developer
@ThePracticalDev

Resources

Cutting corners to meet arbitrary management deadlines



Essential

Copying and Pasting
from Stack Overflow

O'REILLY®

The Practical Developer
@ThePracticalDev

How to actually learn any new programming concept



Essential

Changing Stuff and
Seeing What Happens

O RLY?

@ThePracticalDev

Stata Basics

Things to Keep in Mind When Making Graphs

- Stata has notoriously ugly defaults
- Stata® has lots of opinions about what you should not do
- All the graphing commands have similar syntax, but with slight tweaks
- These tweaks can cause you to get grumpy

Things to Keep in Mind When Making Graphs

- Stata has notoriously ugly defaults
- Stata® has lots of opinions about what you should not do
- All the graphing commands have similar syntax, but with slight tweaks
- These tweaks can cause you to get grumpy
- Like really grumpy

Basic Grammar

command varlist [if] [in], options

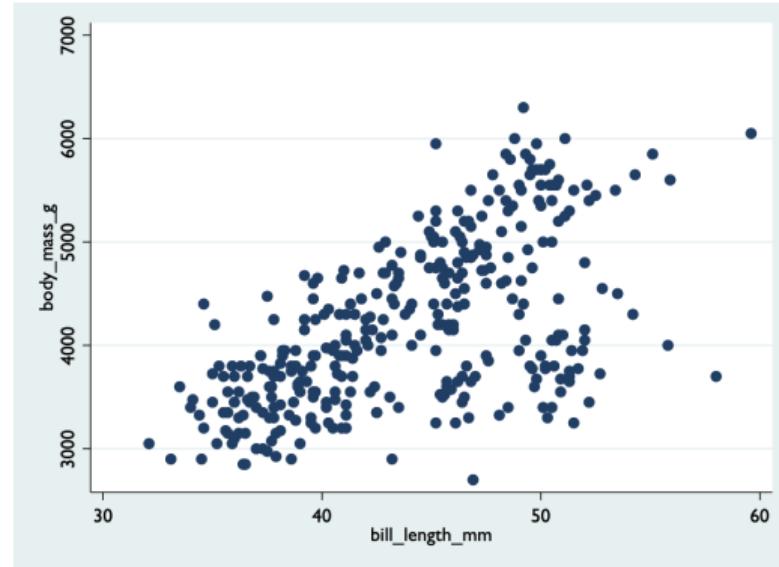
- "varlist" is a column in your dataset
- "if" is a set of conditional statements
- "in" is usually a some rows in your dataset or used for weights

Coding Time!

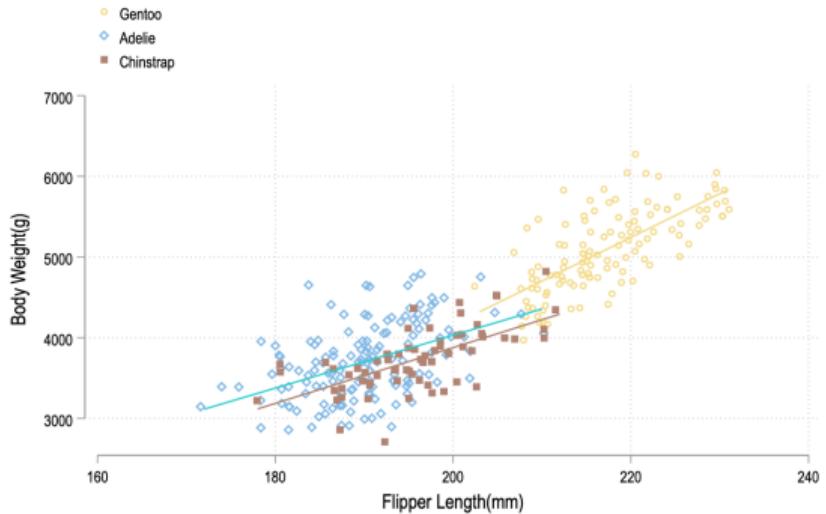
Very Basics

- The best practice is to have an individual folder for each project
- you should have Stata pointed at that folder
- this is done by `cd "path/to/your/file"` on Mac

Default Stata Graph vs Highly Customized



Default Stata Graph vs Highly Customized



Why is it == and not =?

- Stata uses what are called booleans
- "&" is and
- "|" is or
- "!" is not.
- "==" is equal to
- "=" in most software languages is used for assignment

Example of Assignment in Stata

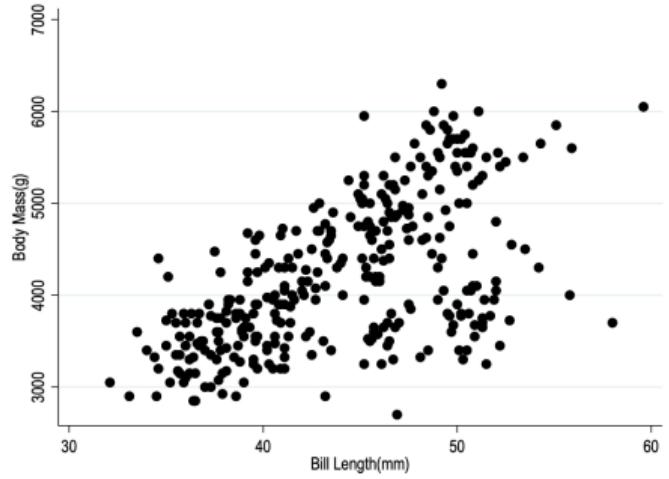
```
egen toy_var = mean(other_var)
```

Appendix

Resources

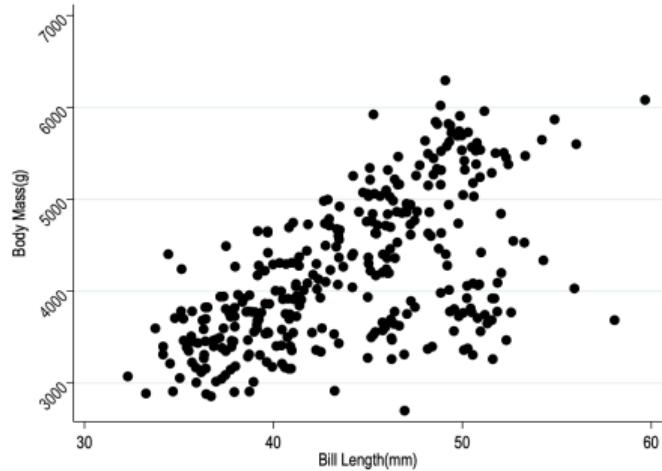
- Open Source Course in R
- Stata Cheat Sheet
- Open Source Course for learning Stata

Manually Cleaning Up Stata Plots



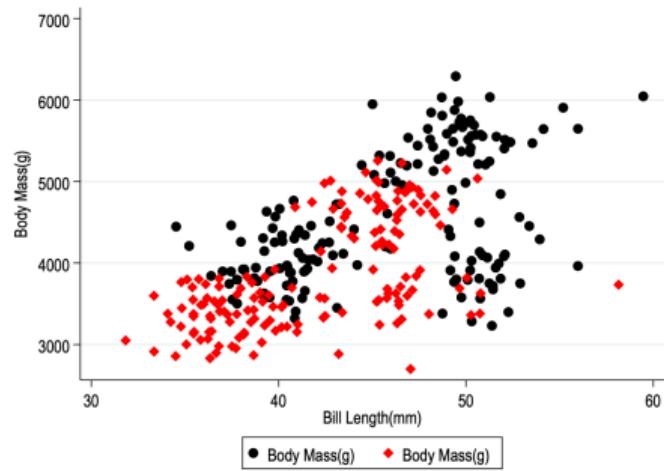
```
tw scatter body_mass_g  
bill_length_mm,  
graphregion(color(white)) ///  
xtitle("Bill Length(mm)")  
ytitle("Body Mass(g)")  
mcolor(black)
```

Notice How the Points Overlap?



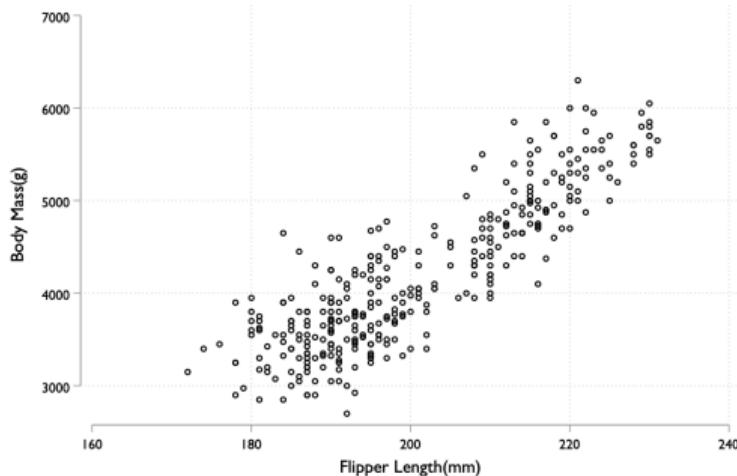
```
tw scatter body_mass_g  
bill_length_mm,  
graphregion(color(white)) ///  
ylabel(,angle(45)) /// jitter(2)  
jitterseed(1994) xtitle("Bill  
Length(mm)") mcolor(black)
```

Conditional Statements



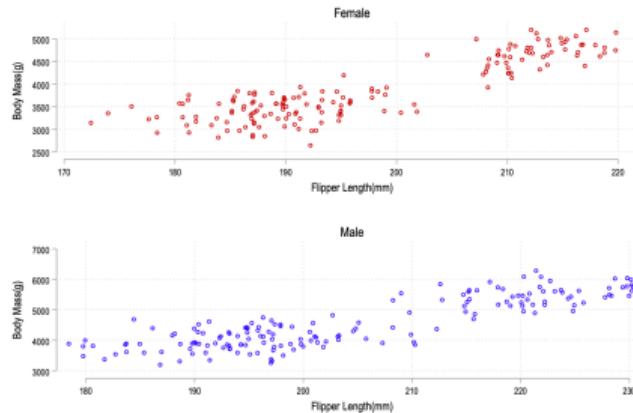
```
tw (scatter body_mass_g  
bill_length_mm if  
sex=="male",mcolor(black) ///  
jitter(2) jitterseed(1994)) ///  
(scatter body_mass_g bill_length_mm  
if sex=="female", msymbol(d)  
mcolor(red) /// jitter(2)  
jitterseed(1994)), ///  
graphregion(color(white)) ///  
ylabel(,angle(360))
```

Schemes



```
tw scatter body_mass_g  
flipper_length_mm, mcolor(black)  
scheme(cleanplots)  
set scheme cleanplots, perm /*sets  
schemes permanently */
```

Combining Two Plots

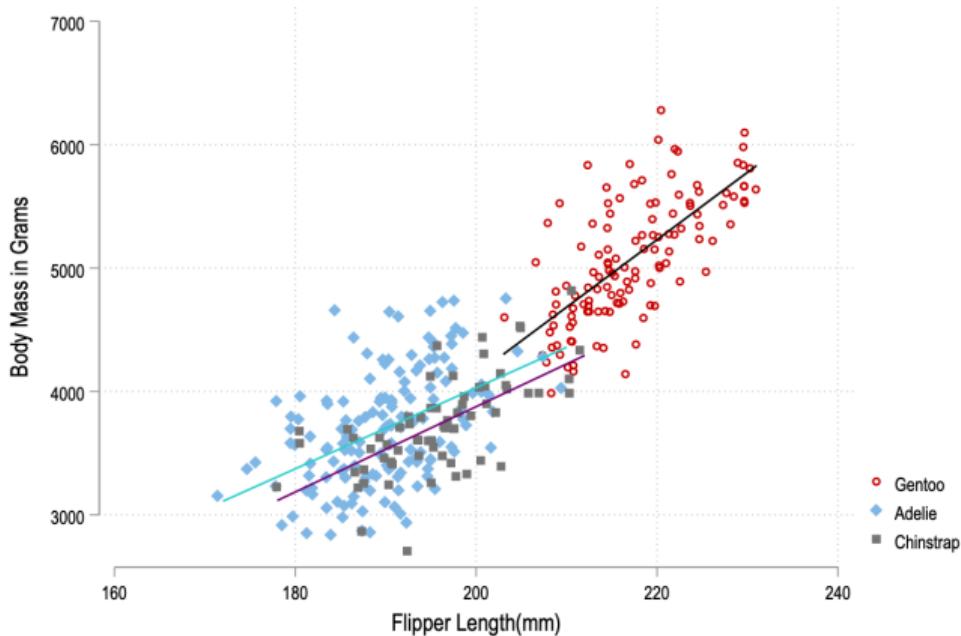


```
tw scatter body_mass_g  
flipper_length_mm if sex  
== "female", jitter(2)  
/// jitterseed(1994)  
name(female_scatter,replace)  
tw scatter body_mass_g  
flipper_length_mm if sex == "male",  
jitter(2) /// jitterseed(1994)  
name(male_scatter,replace)  
gr combine female_scatter  
male_scatter, col(1)
```

Combining Two Different Kinds of Plots

- We often want to convey other kinds of information
- You can add different kinds of plots to do this
- There are various ways to do this in Stata

Consider This Plot



Consider This Plot

```
tw (scatter body_mass_g flipper_length_mm if species== "Gentoo", ///
jitter(2) jitterseed(1994)) ///
(scatter body_mass_g flipper_length_mm if species== "Adelie", ///
jitter(2) jitterseed(1994) msymbol(d)) ///
(scatter body_mass_g flipper_length_mm if species== "Chinstrap", ///
jitter(2) jitterseed(1994) msymbol(s)) ///
(lfit body_mass_g flipper_length_mm if
species== "Gentoo") /// (lfit body_mass_g flipper_length_mm if
species== "Adelie") ///
(lfit body_mass_g flipper_length_mm if
species== "Chinstrap" ), ///
legend(order(1 "Gentoo" 2 "Adelie" 3 "Chinstrap")) ///
ytitle("Body Mass in Grams")
```