# A Fully Customizable Textbook for Introductory Statistics/Data Science Courses

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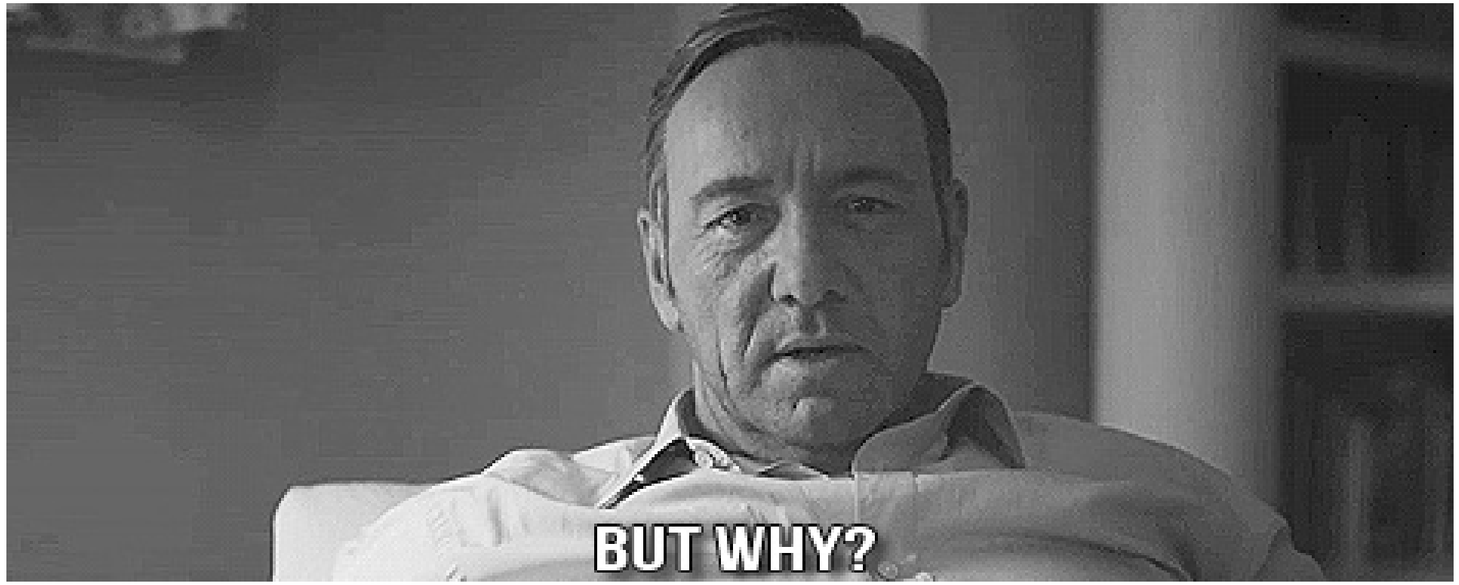
Slides available at http://bit.ly/moderndive-causeweb

# Why is this needed?



# Guiding Principles of ModernDive

# 1. Blur the lines between lecture and lab

While in lab section...

# Then and Now

- Segregated lecture/lab is a legacy of when:
  - Desktops reigned
  - Proprietary statistical software was usually the best/only option

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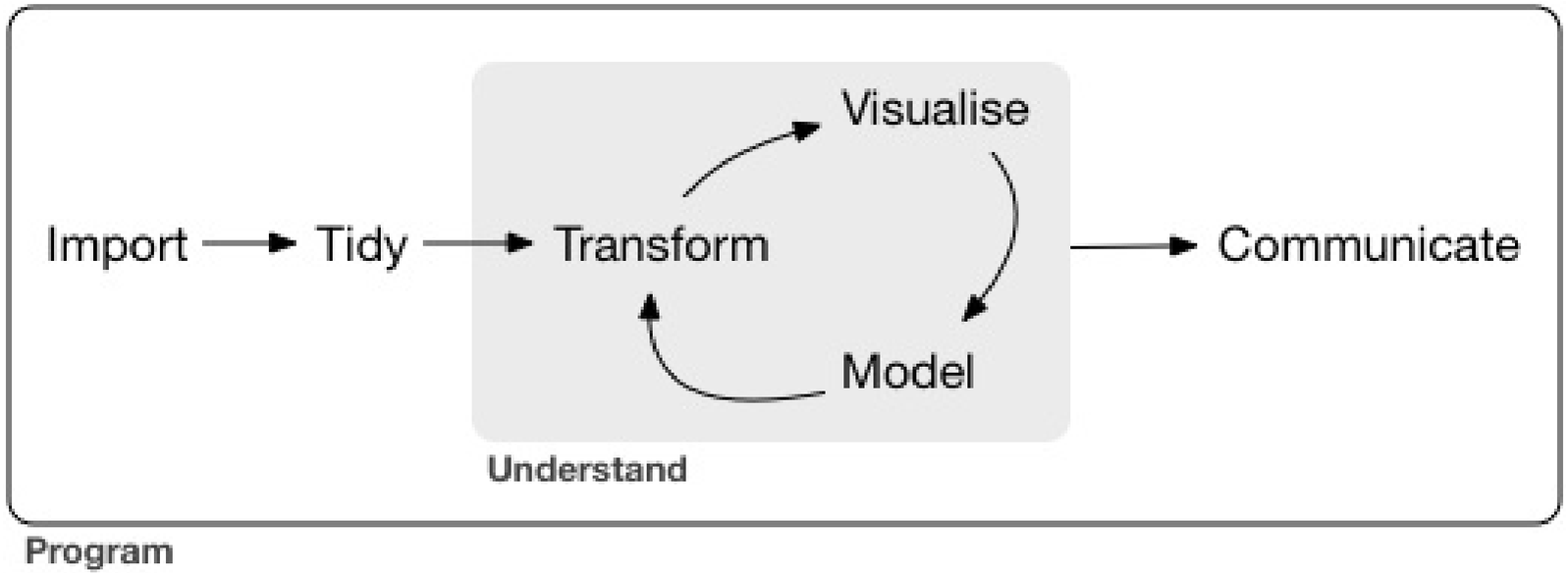
  - Proprietary statistical software was usually the best/only option
- Today
  - Almost all students have access to laptops
  - Open source software options are more palatable

# A new classroom environment

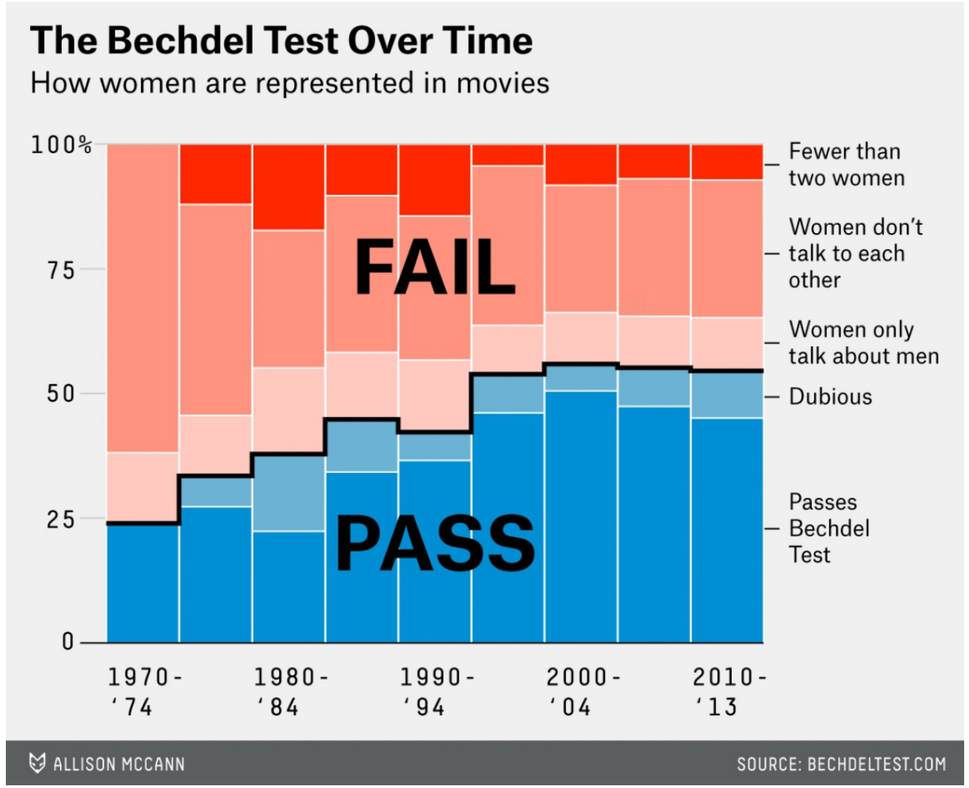
# Working like data scientists/statisticians work

# 2. Focus on Hadley Wickham's data/science research pipeline



# Creating effective data stories is the key

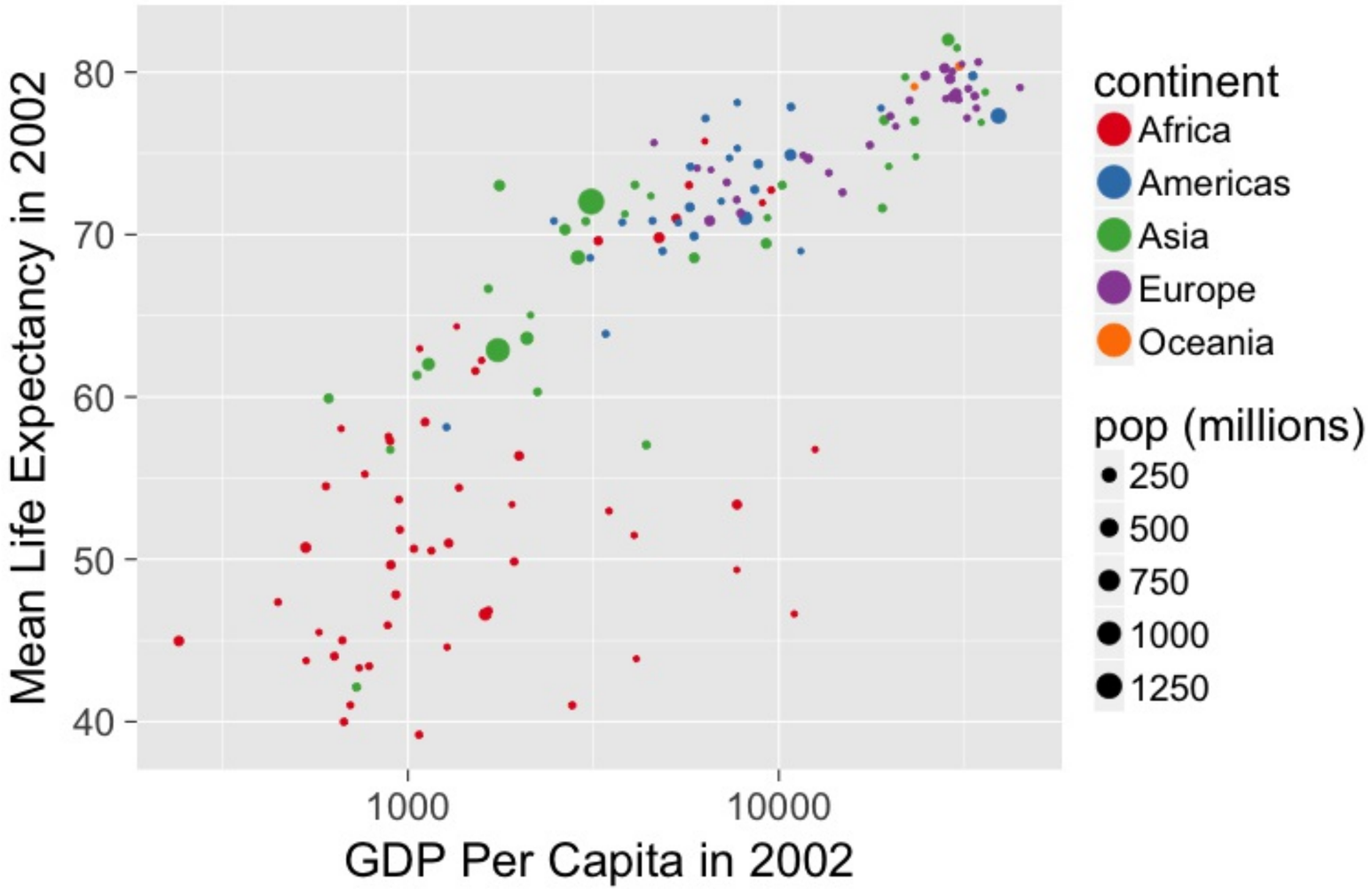
- Each topic builds on previous topics towards improving communication using data



# 3. It's all about the data

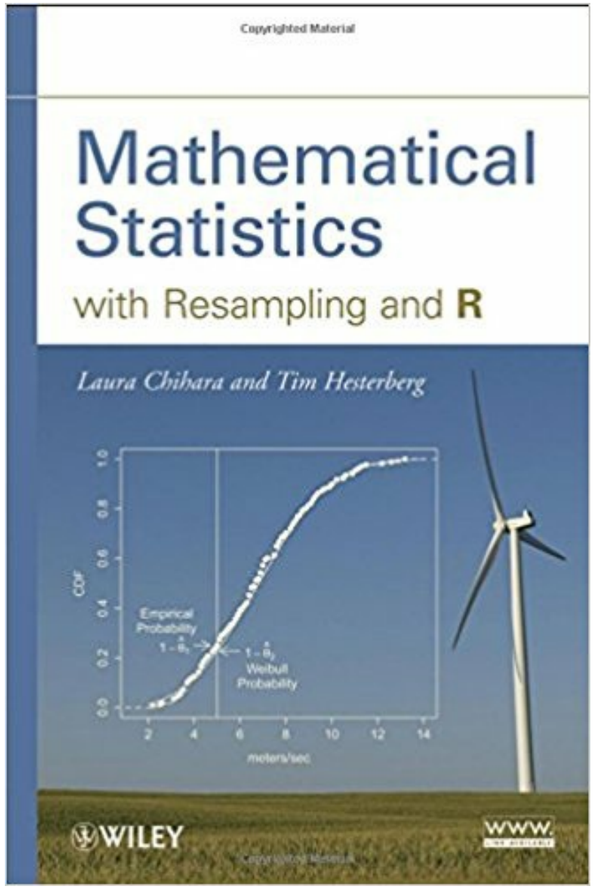
- Use modern R packages with rich, interesting, open data

# Have data visualization be the driver



# 4. Use simulation/resampling instead of probability

From Albert's 300-level ~~Mathematical Statistics~~ Theory of Statistics:



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- Build the ideas behind the Central Limit Theorem using computation

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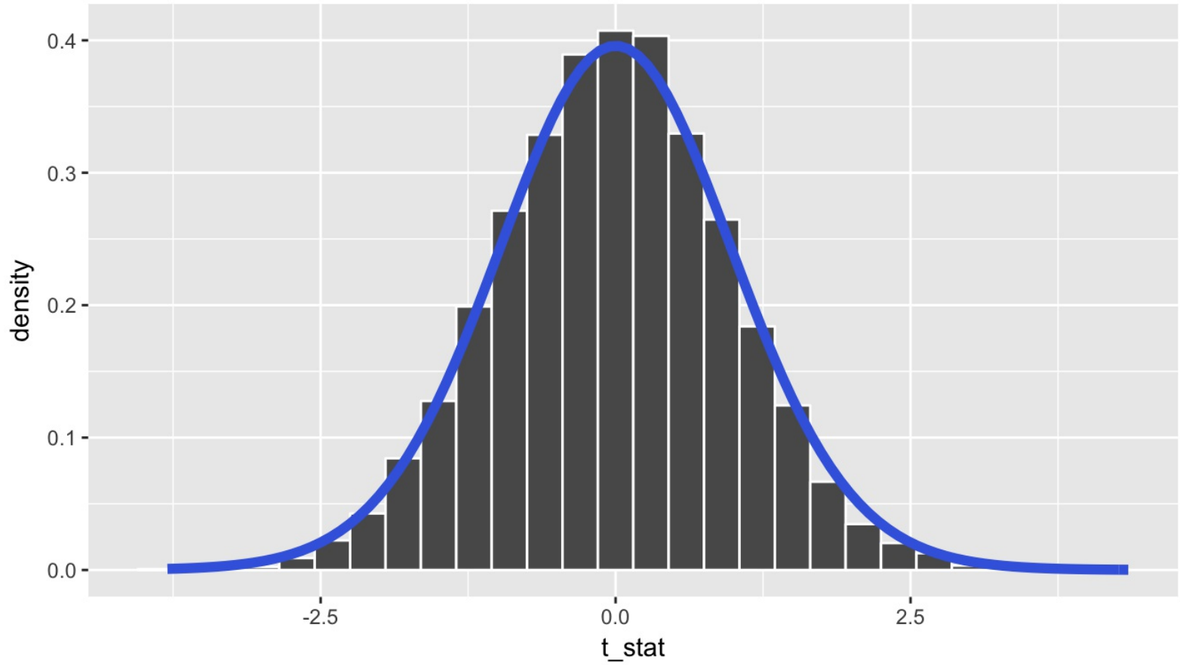
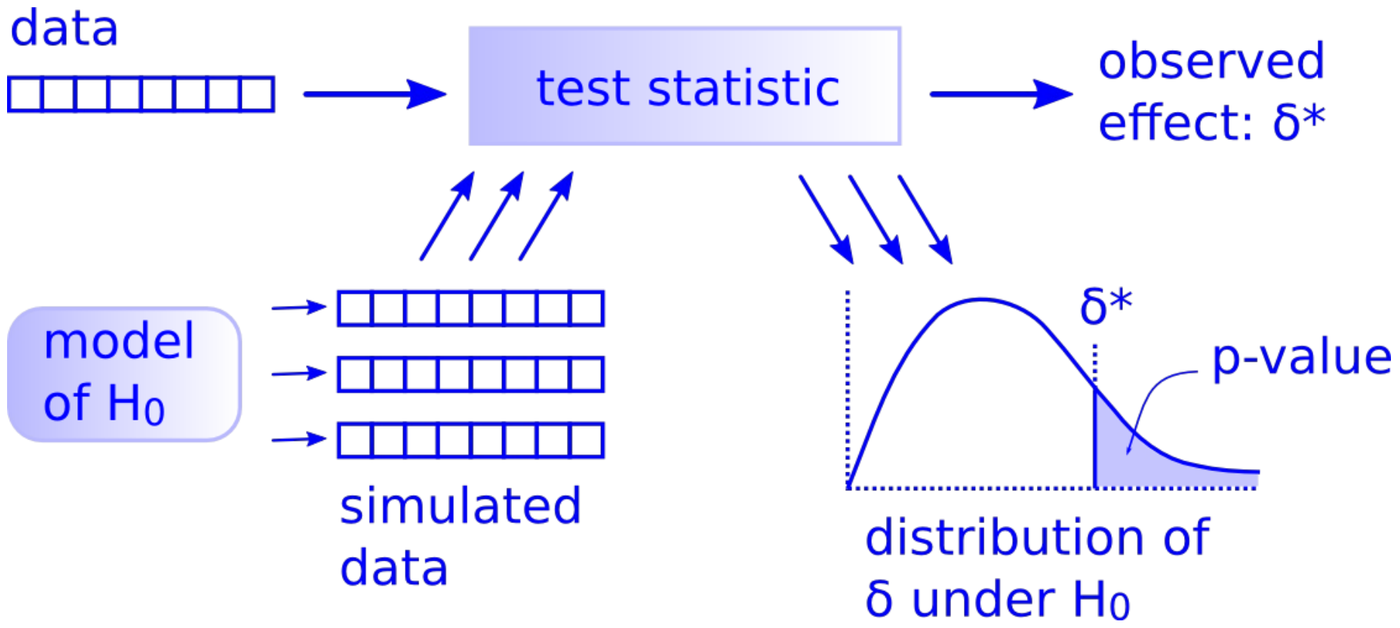


# Inspiration and common theme

## There is only ONE (hypothesis) test!

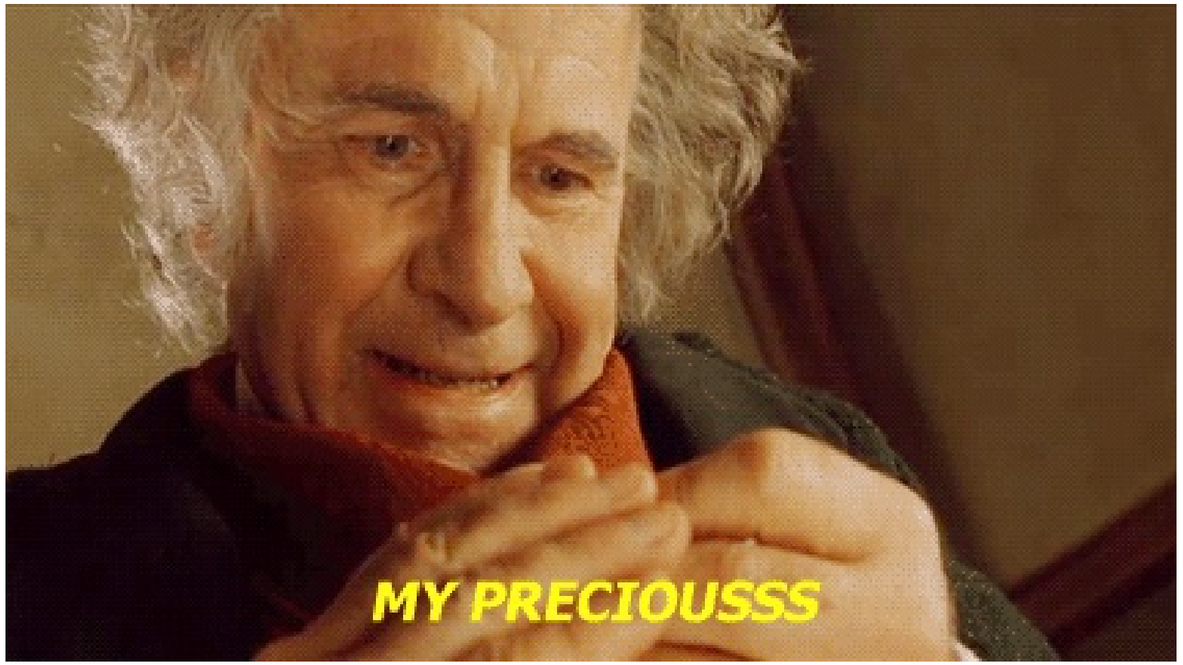


# 5. Don’t fence off students from the computation pool, throw them in!

- Scaffold & support as a good foreign language professor would
- Coding will soon be a basic skill on par with reading and writing

# 6. Complete reproducibility via bookdown

- Put it all out there
- Ultimately the best textbook is one you've written yourself



# The bookdown R package

- Write an entire book using R and Markdown
- Rapid iteration and easily-updateable
- Exports book to multiple formats
- Slick cross-references
- Textbook has versions not editions
- Wikipedia model for intro stats/data science

- A bookdown book about writing with bookdown

# ModernDive

## An Introduction to Statistical and Data Sciences via R

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Authors: Chester Ismay, Albert Y. Kim and you?

ModernDive.com

OR

ModernDive.org

# Tips from us

- We think the model for teaching intro stats is evolving rapidly in an exciting way.
  - We want to encourage you to stay ahead of the curve and to help you stay on the cutting edge as well with your courses.

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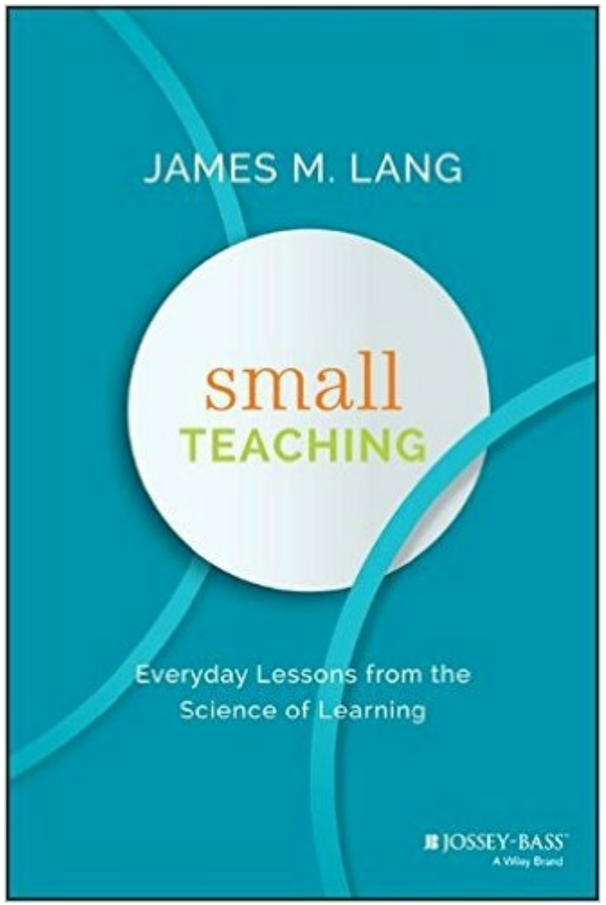
- We think the model for teaching intro stats is evolving rapidly in an exciting way.
  - We want to encourage you to stay ahead of the curve and to help you stay on the cutting edge as well with your courses.
- We use the chalkboard/whiteboard for writing code, for coloring plots, and for better engaging with our students.
  - We also demo R code in class and ask students to engineer/reverse engineer.

# Start small

Adding just a few of our ideas and materials into your course can go a long way



# ModernDive.com

- Join us for a workshop with many more details at USCOTS at Penn State on May 17-18
- Fill out our form to receive updates regarding the textbook
- Email us
  - chester@moderndive.com
  - albert@moderndive.com
- Follow us on Twitter
  - @old_man_chester
  - @rudeboybert

# Supplementary materials

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`fivethirtyeight` R package

DataCamp course

Chester's course webpage

Albert's course webpage

What's to come

Source code

# The `fivethirtyeight` R package

- Data sets that balance being
  - rich enough to answer meaningful questions with,
  - real enough to ensure that there is context, and
  - realistic enough to convey to students that data as it exists "in the wild" often needs processing.

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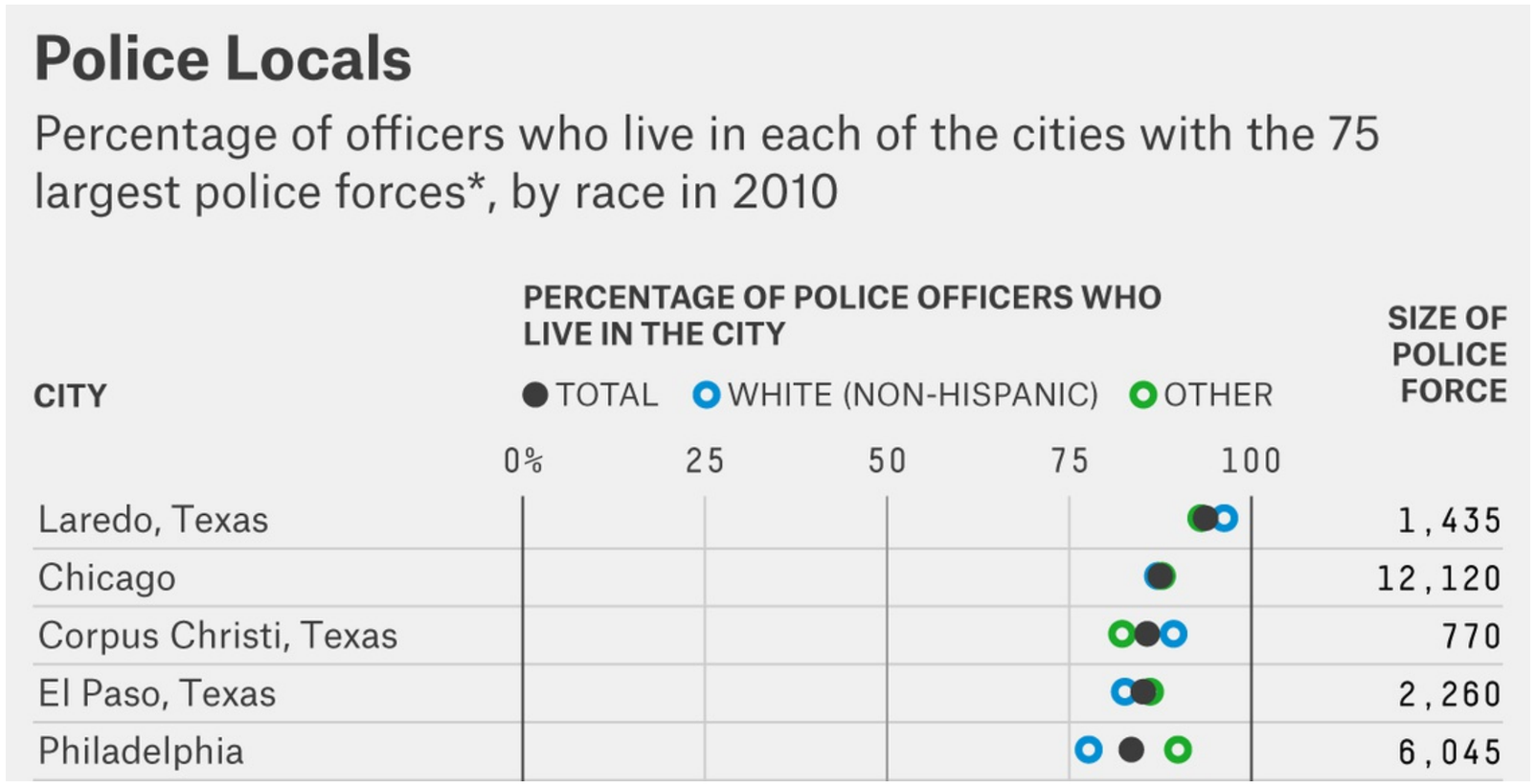
- Data sets that balance being
  - rich enough to answer meaningful questions with,
  - real enough to ensure that there is context, and
  - realistic enough to convey to students that data as it exists "in the wild" often needs processing.
- Easily and quickly accessible to novices, so that we minimize the prerequisites to research.

# The `fivethirtyeight` R package

```
library(fivethirtyeight)
police_locals
```



## Police Locals

Percentage of officers who live in each of the cities with the 75 largest police forces*, by race in 2010

| CITY | PERCENTAGE OF POLICE OFFICERS WHO LIVE IN THE CITY (● TOTAL ○ WHITE (NON-HISPANIC) ○ OTHER; 0% 25 50 75 100) | SIZE OF POLICE FORCE |
|---|---|---|
| Laredo, Texas | | 1,435 |
| Chicago | | 12,120 |
| Corpus Christi, Texas | | 770 |
| El Paso, Texas | | 2,260 |
| Philadelphia | | 6,045 |

# DataCamp course

FREE COURSE

## Effective Data Storytelling using the tidyverse

Continue Course

0 Videos · 30 Exercises · 15 hours · 30 Participants · 2550 XP

### Course Description

This course is designed to supplement and build on the content covered at http://moderndive.com . It assumes that you have completed the Introduction to R course on DataCamp at https://www.datacamp.com/courses/free-introduction-to-r .

### 1 Applying R Basics

20%

Exploring the basics of R on a data set based on the fivethirtyeight.com "Most Police Don't Live In The Cities They Serve" article.

Investigate the properties of a data frame — 70 xp

**Instructor(s):**

**Chester Ismay**

**Albert Y. Kim**

# Chester's Social Statistics course webpage

## Schedule

The references to **Chapters/Sections** here correspond to the **MODERN DIVE into Data with R** book. Be sure to check the **DataCamp** link above for more details on the DataCamp (DC) assignments. More details on the Problem Sets (PS) are available in the link above for Problem Sets.

Search:

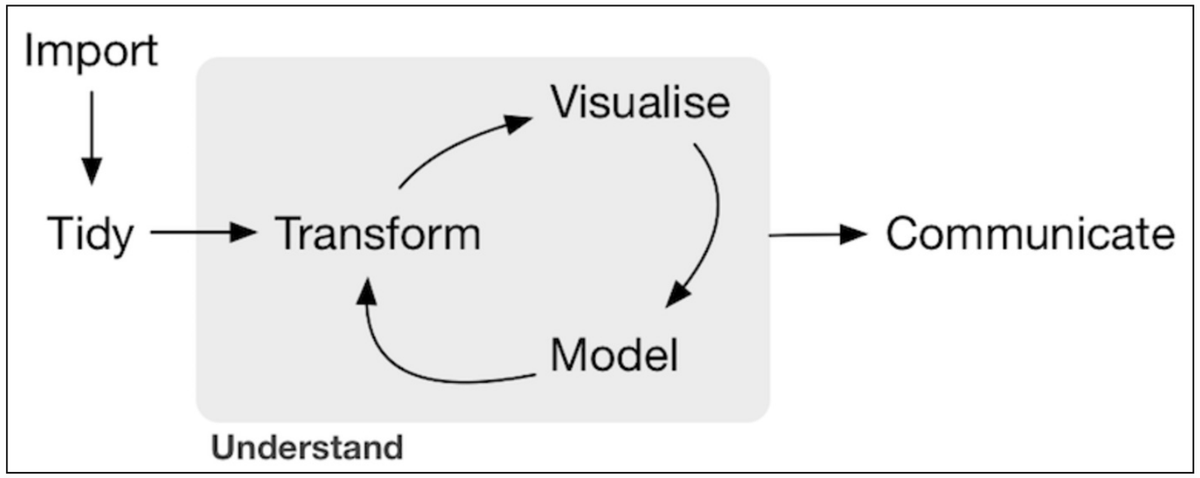
| Weekday | Date | Content / Assessment | Material Due |
|---|---|---|---|
| All | All | All | All |
| Tuesday | January 31 | Introduction (Chapters 1 and 2) | - |
| Thursday | February 2 | Introduction to R on DataCamp | - |
| Tuesday | February 7 | Review of Introduction to R on DataCamp | DC course: Introduction to R |

# Albert's Intro to Stat & Data Sciences course webpage

Intro to Stat & Data Sciences

Slack RStudio Server Problem Sets Syllabus

Fork me on GitHub




## Topics

- Slides. Also in HTML format.
- Learning checks.
- ModernDive textbook. Feedback form here.

# What's to come

- Add more interactive shiny apps into the book
- Create more Review Questions at chapter ends using `fivethirtyeight` and other open data sources
- Design and share instructor resources
- Finish DataCamp course to supplement and assist with more immediate feedback

# Source code

- Source code for ModernDive
  - Feel free to modify the book as you wish for your own needs! Just please list the authors as "Chester Ismay, Albert Y. Kim, and YOU!"
- These slides available at http://bit.ly/moderndive-causeweb
- Slides created via the R package xaringan by Yihui Xie
- Source code for these slides at https://github.com/ismayc/causeweb2017