

Introduction to R

Andrew Jaffe

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Welcome to class!

1. Introductions
2. Class overview
3. Getting R up and running

About Me

Investigator, Lieber Institute for Brain Development Assistant
Professor, Department of Mental Health, JHSPH

PhD in Epidemiology, MHS in Bioinformatics

Email: ajaffe@jhu.edu

Other Instructor

John Muschelli

5th year PhD student in Biostatistics

Email: jmusche1@jhu.edu

Introductions

What do you hope to get out of the class?

Why R?

Course Website

http://www.aejaffe.com/winterR_2016/

Materials will be uploaded the night before class

Learning Objectives

- ▶ Reading data into R
- ▶ Recoding and manipulating data
- ▶ Writing R functions and using add-on packages
- ▶ Making exploratory plots
- ▶ Understanding basic programming syntax
- ▶ Performing basic statistical tests

Course Format

- ▶ 3 modules per class session, each approximately 1 hour
 - ▶ “Interactive” Lecture with RStudio + slides
 - ▶ Lab/Practical experience

Grading

1. Attendance/Participation: 20%
2. Nightly Homework: $3 \times 15\%$
3. Final “Project”: 35%

Grading

- ▶ **Homework 1:** Due Monday 1/4 by midnight
- ▶ **Homework 2:** Due Wednesday 1/6 by class
- ▶ **Homework 3:** Due Thursday 1/7 by class
- ▶ **Project:** Due Friday 1/22 by 5pm

What is R?

- ▶ R is a language and environment for statistical computing and graphics
- ▶ R is the open source implementation of the S language, which was developed by Bell laboratories
- ▶ R is both open source and open development

(source: <http://www.r-project.org/>)

Why R?

- ▶ Powerful and flexible
- ▶ Free (open source)
- ▶ Extensive add-on software (packages)
- ▶ Designed for statistical computing
- ▶ High level language

Why not R?

- ▶ Fairly steep learning curve
 - ▶ “Programming” oriented
 - ▶ Minimal interface
- ▶ Little centralized support, relies on online community and package developers
- ▶ Annoying to update
- ▶ Slower, and more memory intensive, than the more traditional programming languages (C, Java, Perl, Python)

Installing R

Install the latest version from: <http://cran.r-project.org/>

If you have an older version of R, you may not need to update. If you do want to update, re-install and run

```
update.packages(ask=FALSE)
```

R Studio

(Makes R easier)

- ▶ Integrated Development Environment (IDE) for R
 - ▶ Syntax highlighting, code completion, and smart indentation
 - ▶ Execute R code directly from the source editor
 - ▶ Easily manage multiple working directories using projects
 - ▶ Workspace browser and data viewer
 - ▶ Plot history, zooming, and flexible image and PDF export
 - ▶ Integrated R help and documentation
 - ▶ Searchable command history
- ▶ <http://www.rstudio.com/>

Working with R

- ▶ The R Console “interprets” whatever you type
 - ▶ Calculator
 - ▶ Creating variables
 - ▶ Applying functions
- ▶ “Analysis” Script + Interactive Exploration
 - ▶ Static copy of what you did (reproducibility)
 - ▶ Try things out interactively, then add to your script
- ▶ R revolves around functions
 - ▶ Commands that take input, performs computations, and returns results
 - ▶ Many come with R, but people write external functions you can download and use

Useful R Studio Shortcuts

- ▶ `Ctrl + Enter` (`Cmd + Enter` on OS X) in your script evaluates that line of code
 - ▶ It's like copying and pasting the code into the console for it to run.
- ▶ `Ctrl+1` takes you to the script page
- ▶ `Ctrl+2` takes you to the console
- ▶ http://www.rstudio.com/ide/docs/using/keyboard_shortcuts

Useful (+Free) Resources

- ▶ Homework will involve working through:
<http://tryr.codeschool.com/>
- ▶ DataCamp <http://www.datacamp.com>
- ▶ UCLA Institute for Digital Research and Education:
<http://www.ats.ucla.edu/stat/r/>
- ▶ R reference card: <http://cran.r-project.org/doc/contrib/Short-refcard.pdf>
- ▶ Undergrad Guide to R: <https://sites.google.com/site/undergraduateguidetor/>
- ▶ Quick R: <http://statmethods.net/>