

13: Summary + Extras

bit.ly/SISBID3

The most important tool is the **mindset**,
when starting, that the end product
will be reproducible.

– Keith Baggerly

Steps toward reproducible research

- ▶ Slow down
- ▶ Organize; document
- ▶ Everything with code
- ▶ Scripts → RMarkdown
- ▶ Code → functions → packages
- ▶ Version control with Git
- ▶ Automation with Make
- ▶ Choose a license
- ▶ Share your work with others

Challenges

- ▶ Daily maintenance
 - READMEs up to date?
 - Documentation matches code?
- ▶ Cleaning up the junk
 - Move defunct stuff into an old/ subdirectory?
- ▶ Start over from the beginning, nicely?

Sharing your work

- ▶ Why share?
 - Funding agency or journal requirement
 - Increased visibility
 - So that others can build on your work
- ▶ When?
 - Continuously and instantaneously
 - When you submit a paper
 - When your paper appears
- ▶ Risks?

bit.ly/rr_sharing_slides

I'm not worried about being scooped,
I'm worried about being ignored.

— Magnus Nordborg

- ▶ Share more
- ▶ Share sooner
- ▶ Share in a way that it's easy for others to learn from and build upon

What to share?

- ▶ For sure
 - Primary dataset
 - Metadata
 - Data cleaning scripts
 - Analysis scripts
- ▶ It could help
 - Very-raw data
 - Processed/clean data
 - Intermediate results
- ▶ No
 - Confidential data (e.g. HIPAA data)
 - Passwords, private keys

Where to share?

- ▶ Domain-specific repository
 - Genbank, dbGaP, etc.
 - See re3data.org
- ▶ Figshare, Dryad, Zenodo
- ▶ Institutional repository
- ▶ GitHub, BitBucket

Resources

- ▶ R Markdown

- rmarkdown.rstudio.com

- ▶ R Packages

- Releasing to CRAN: r-pkgs.had.co.nz/release.html
 - Leek group: github.com/jtleek/rpackages
 - When to trust an R package: bit.ly/trust_r_pkg

- ▶ Make

- kbroman.org/minimal_make
 - remake R package, github.com/richfitz/remake

- ▶ Git

- Git branches: nicercode.github.io/git/branches.html
 - Hadley on Git/GitHub: r-pkgs.had.co.nz/git.html
 - Git subtrees: bit.ly/git_subtree

- ▶ Also see bit.ly/sisbid3_resources

Some of the things we didn't cover

R CMD BATCH

Why is it cool?

- Scripting lets you run everything in the background
- Increases the odds you've got *everything* reproducible

Why didn't we cover it?

- A bit geek-heavy

Where would we point you?

- Stackoverflow discussion: bit.ly/so_rscript
- Codecademy Learn the Command Line lesson: bit.ly/learn_command_line

Coding conventions

Why are they cool?

- They help you keep things consistent between team members
- They make code easier to read, and more likely to be used

Why didn't we cover them?

- Not enough time

Where would we point you?

- Hadley's recommendations adv-r.had.co.nz/Style.html
- Google's recommendations google.github.io/styleguide/Rguide.xml

Code review

Why is it cool?

- Helps to find bugs and clean up confusing bits
- Potentially a test of the reproducibility of your work

Why didn't we cover it?

- Not enough time

Where would we point you?

- Software Carpentry blog post, bit.ly/swc_codereview
- Titus Brown's blog post,
http://bit.ly/titus_codereview

Software testing

Why is it cool?

- Explicit tests help you to avoid bugs, and to find bugs sooner

Why didn't we cover it?

- Not enough time

Where would we point you?

- testthat package, github.com/hadley/testthat
- [Testing R Code](#) book

Continuous integration (eg Travis)

Why is it cool?

- Automatically build and run tests when you push to GitHub

Why didn't we cover it?

- Not enough time

Where would we point you?

- Julia Silge blog post,
juliasilge.com/blog/beginners-guide-to-travis
- Hadley's R packages book,
r-pkgs.had.co.nz/check.html#travis

Capturing dependencies

Why is it cool?

- Ensure that your carefully constructed reproducible project doesn't fail due to a change in one of the packages you use

Why didn't we cover it?

- Not enough time

Where would we point you?

- packrat package, github.com/rstudio/packrat
- checkpoint package,
github.com/RevolutionAnalytics/checkpoint

Containers (e.g. docker)

Why are they cool?

- Capture your entire environment, so your project is *for sure* fully reproducible.

Why didn't we cover them?

- A bit technical

Where would we point you?

- [Rocker: Docker for R](#)
- [R Docker tutorial](#)

R Markdown templates

Why are they cool?

- More complete control over the appearance of your document

Why didn't we cover them?

- A bit technical

Where would we point you?

- [R Markdown documentation](#)

knitr Bootstrap

Why is it cool?

- Allows for generation of slicker reports

Why didn't we cover it?

- A bit technical

Where would we point you?

- github.com/jimhester/knitrBootstrap

GitHub pages

Why are they cool?

- Webpages built entirely in Markdown, providing nicer interfaces to your content

Why didn't we cover them?

- Tangential to *reproducible research*?

Where would we point you?

- pages.github.com
- kbroman.org/simple_site
- bookdown.org/yihuit/blogdown

Bookdown

Why is it cool?

- Write a book (or book-like object) entirely in R Markdown

Why didn't we cover it?

- Not enough time

Where would we point you?

- bookdown.org/yihui/bookdown

Shiny!

Why is it cool?

- Interactive pictures have pizzazz.

Why didn't we cover it?

- Tangential to *reproducible research*?

Where would we point you?

- shiny.rstudio.com
- shiny.rstudio.com/tutorial

Feedback we'd like from you (1)

What motivated us to teach this course?

What would we see as a positive outcome?

- ▶ Given this motivation, are we doing things right?
- ▶ What motivated you to take this course?
- ▶ Were there specific sessions you found really useful/really useless?
- ▶ Points you'd like us to expand on?
- ▶ Were there points you were hoping we'd cover that we didn't?

Feedback we'd like from you (2)

- ▶ Do you have examples/anecdotes you think we might be able to use that you'd be willing to share?
- ▶ Were there ways we could've used time more effectively?
- ▶ Were there ways we could've used our TAs more effectively?
- ▶ Can you see things you learned in this course changing how you do things day to day?
 - Why or why not?
 - Can we ask you again in 6 months?
 - Can we ask you again in a year?
- ▶ Could you write this down now? (anonymous is fine)