Developing a Workflow to Maximize Reproducibility and Research Impact: Managing Data, Computer Code, and Projects for Success

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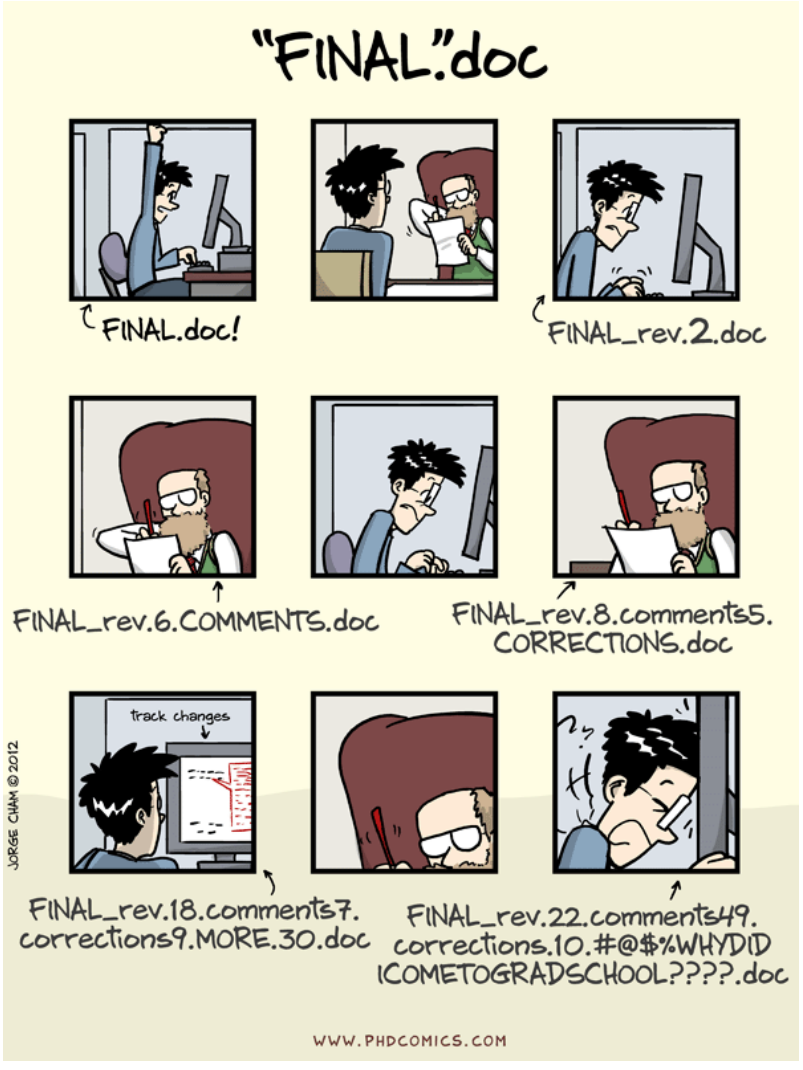
Why worry about reproducibility?

Working towards future reproducibility makes my code easier
for my collaborators (and me) to read, run, and debug
today,
and that's why I think reproducibility is a
win-win for all researchers."
-Althea



Why worry about reproducibility?

"[Reproducibility] provides security, saves time, and forces me to be more thoughtful about my workflow." - Ethan Young

- make your life easier!
- collaborations
- broader research impact
- increased citations
- transparency
- grant and journal requirements

Is my research reproducible?

- Are your research documents stored in these formats?
  - .csv
  - .txt
  - .pdf
  - .html
  - .R
    - YES!
  - .doc/.docx
  - .sas
  - .xls/.xlsx
  - any other proprietary file format
    - NO!

Is my research reproducible?

- Is your code linear?
  - Clear environment often and at beginning of script
  - Don't save .Rdata or history
  - Each program should focus on one main task or analysis
  - Don't rely on manual commenting/uncommenting

```
# What variables are significant?
lm.out <- lm(weight ~ height, data = trial.data)
remove(lm.out) # clear previous lm.out for each
               #   new lm() definition above

# Is the relationship significant?
#     (If not, clear and try a new regressor)
summary(lm.out)
```

Is my research reproducible?

- Are your files easily shared with others?
  - Organized directory structure
  - Files relatively linked
  - Well-documented & commented
  - Consistency in coding practices

"The point of having style guidelines is to have a common vocabulary of coding so people can concentrate on *what* you are saying, rather than on *how* you are saying it." - Google's R Style Guide

Workshop Outline

The goal for this workshop is to help you develop the tools to develop a workflow to maximize reproducibility, collaborations, and research impact.

- Rstudio Projects for organizing data, code, and output
- R-Markdown and R-Oxygen for documenting your code
- GitHub for version-control, collaborating and archiving