Basic elements of file management

ME 447/547 Visualizing Data

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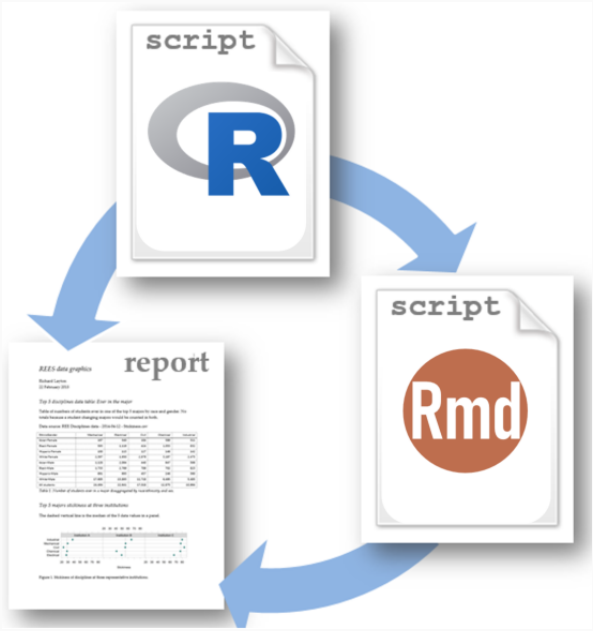
Effective file management begins when the project begins

Plan your directory structure

- carpentry
- data
- data-raw
- design
- figures
- reports
- README.Rmd
- portfolio.Rproj

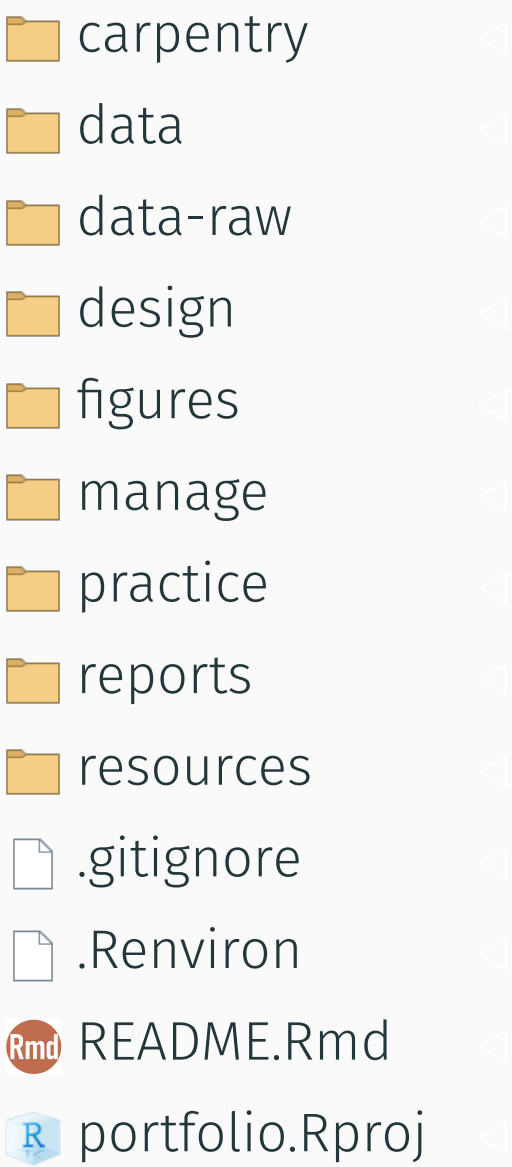
Adopt a scheme to consistently name your files

Explicitly link files using relative file paths

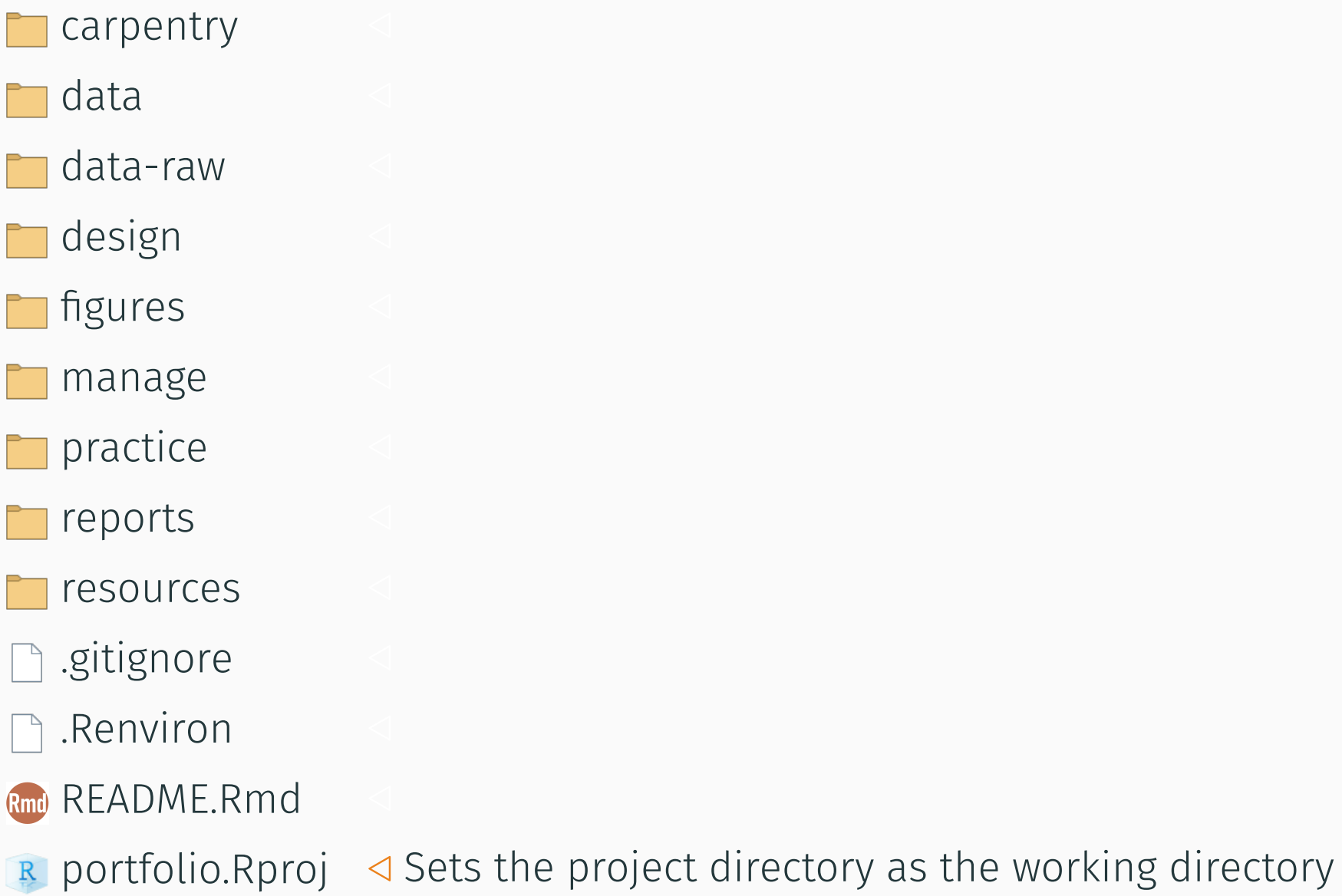


Planning the structure

The portfolio project has a mandatory structure



Open portfolio.Rproj to start every work session



README introduces your portfolio to the reader

- carpentry
- data
- data-raw
- design
- figures
- manage
- practice
- reports
- resources
- .gitignore
- .Renviron
- README.Rmd ◁ Creates the main page of your portfolio website
- portfolio.Rproj

Other top-level files perform administrative duties

- carpentry
- data
- data-raw
- design
- figures
- manage
- practice
- reports
- resources
- .gitignore ◁ Directs Git to ignore specific files
- .Renviron ◁ Stores packages in a library separate from base R
- README.Rmd
- portfolio.Rproj

Raw data are never edited manually

- carpentry
- data
- data-raw ◁ Data in its original form
- design
- figures
- manage
- practice
- reports
- resources
- .gitignore
- .Renviron
- README.Rmd
- portfolio.Rproj

Data carpentry converts raw data to tidy data

- carpentry ◁ R scripts that turn raw data into tidy data
- data ◁
- data-raw ◁ Data in its original form
- design ◁
- figures ◁
- manage ◁
- practice ◁
- reports ◁
- resources ◁
- .gitignore ◁
- .Renviron ◁
- README.Rmd ◁
- portfolio.Rproj ◁

Data carpentry converts raw data to tidy data

- carpentry
- data
- data-raw
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- .gitignore
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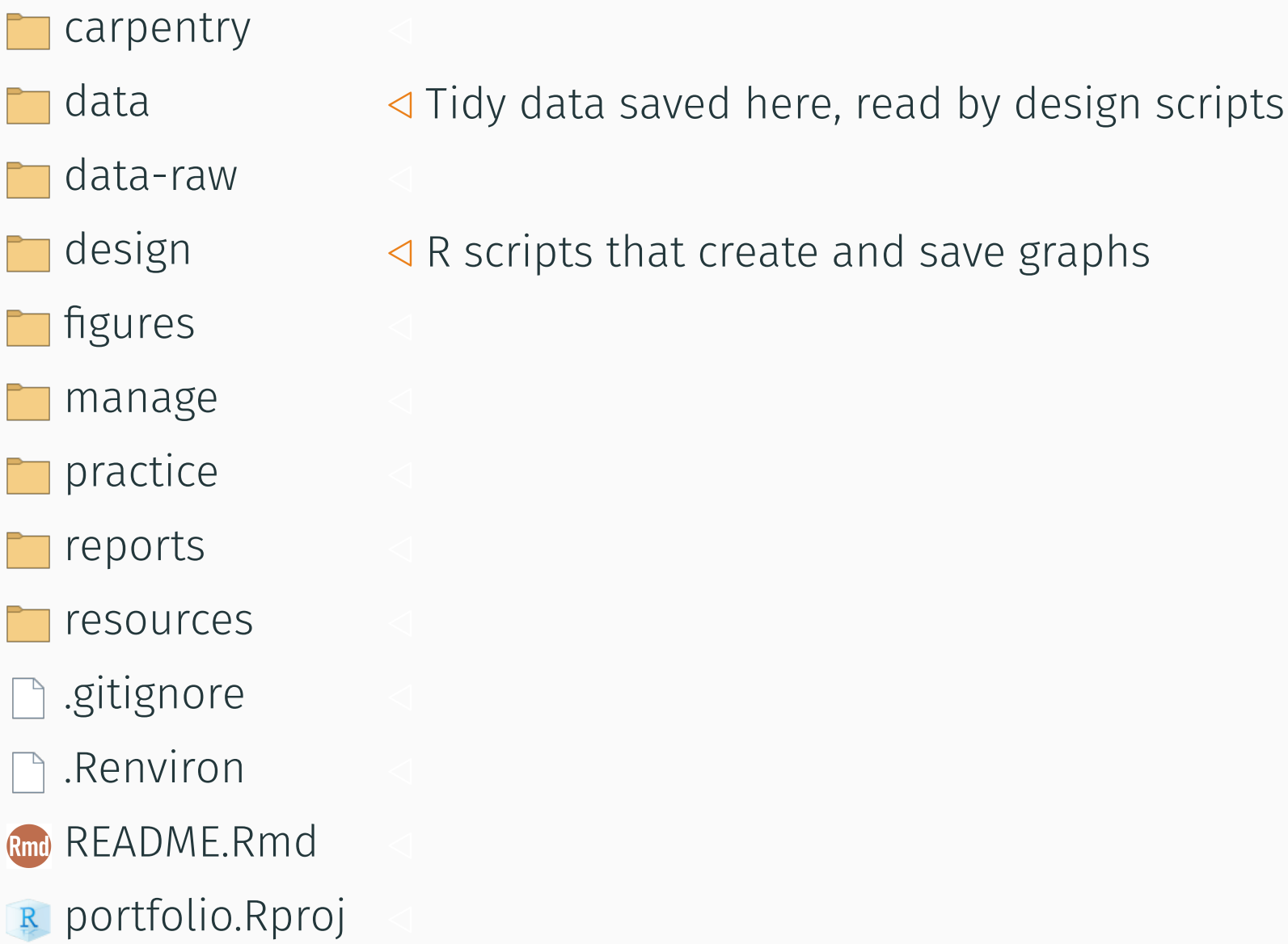
- R scripts that turn raw data into tidy data
- Tidy data saved here, read by design scripts

Graph design converts to tidy data to graphs



Graph design converts to tidy data to graphs

- carpentry
- data
- data-raw
- design ◁ R scripts that create and save graphs
- figures ◁ Graphs saved here, imported by report scripts
- manage
- practice
- reports
- resources
- .gitignore
- .Renviron
- README.Rmd
- portfolio.Rproj

Reports commingle data, scripts, graphs, prose, and references

- carpentry
- data
- data-raw
- design
- figures ◁ Graphs saved here, imported by report scripts
- manage
- practice
- reports ◁ Reports draw from data, graphs and resources
- resources ◁ Image downloads and bibliography files
- .gitignore
- .Renviron
- README.Rmd
- portfolio.Rproj

README creates the main page of your portfolio website

- carpentry
- data
- data-raw
- design
- figures
- manage
- practice
- reports ◁ Reports draw from data, graphs and resources
- resources
- .gitignore
- .Renviron
- README.Rmd ◁ Provides explicit links to every report
- portfolio.Rproj

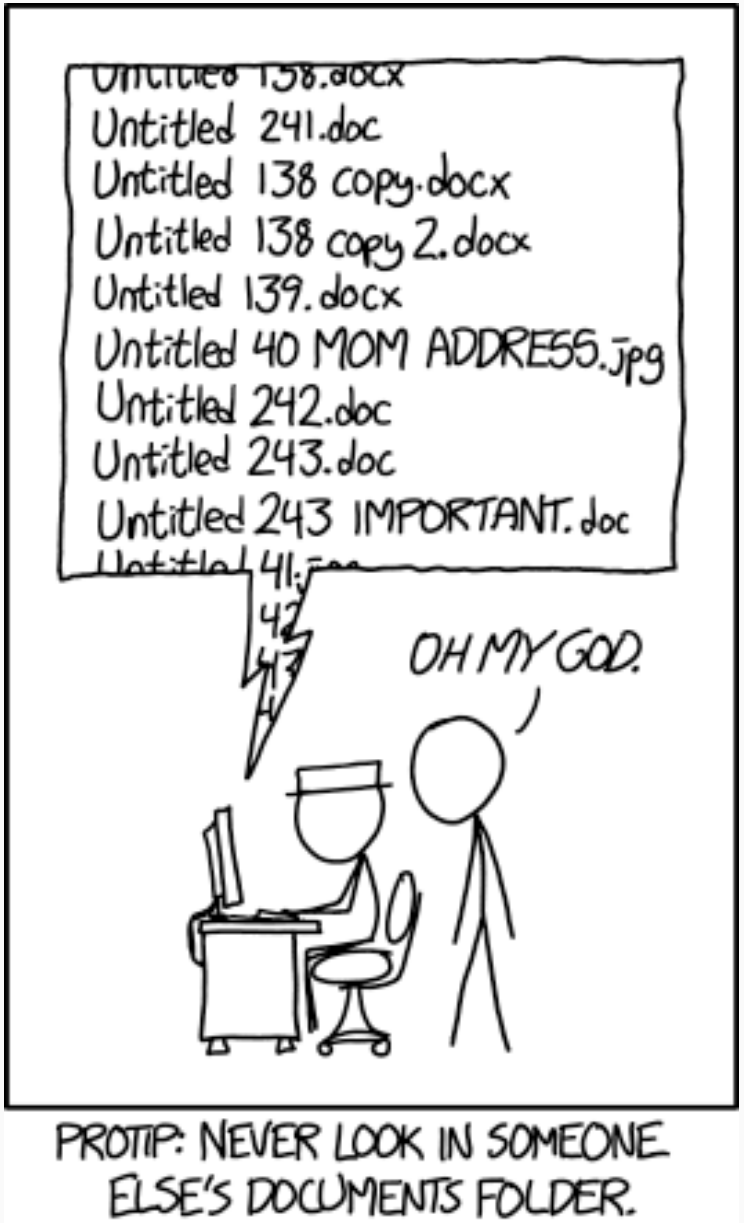
Reduce clutter by excusing some resources from version control

- carpentry
- data
- data-raw ◁ Version control optional
- design
- figures
- manage ◁ Correspondence and project management
- practice ◁ Scripts for practicing and learning R
- reports
- resources
- .gitignore ◁ Directs Git to ignore specific files
- .Renviron
- README.Rmd
- portfolio.Rproj

Summary: Use the given directory structure for the portfolio

carpentry	◁ R scripts that create and save tidy data
data	◁ Tidy data saved here, read by design scripts
data-raw	◁ Data in its original form (version control optional)
design	◁ R scripts that create and save graphs
figures	◁ Graphs saved here, imported by report scripts
manage	◁ Correspondence and project management
practice	◁ Scripts for practicing and learning R
reports	◁ One report per display type
resources	◁ Image downloads and bibliography files
.gitignore	◁ Directs Git to ignore specific files
.Renviron	◁ Stores packages in a library separate from base R
README.Rmd	◁ Creates the main page of your portfolio website
portfolio.Rproj	◁ Sets the project directory as the working directory

Naming files



Source: https://xkcd.com/1459/

Three basic principles should guide your choice of filenames

Filenames should be machine readable

- use delimiters “_” and “-” instead of spaces
- avoid symbols, punctuation marks, and case-sensitivity

Filenames should be human readable

- include information about the file content

Filenames should be friendly to default ordering

- start filenames with a numeric ID
- use leading zeros, e.g., 001, 002, ..., 999

A sample set of portfolio file names illustrates the principles

Numeric display ID starts every file name: d1, d2, ..., d7

Hyphenated content-information supports human readability

```
carpentry/ d7_extract-and-tidy.R
data/      d7_survey-data.csv
data-raw/  d7_survey-data-raw.csv
design/    d7_div-stack-bar.R
figures/   d7_div-stack-bar.png
reports/   d7_report.Rmd
```

All lowercase, no special symbols, no spaces

Underscores support machine readability

Add a sequence number `01`, `02`, etc., for related files

When related files are run in order

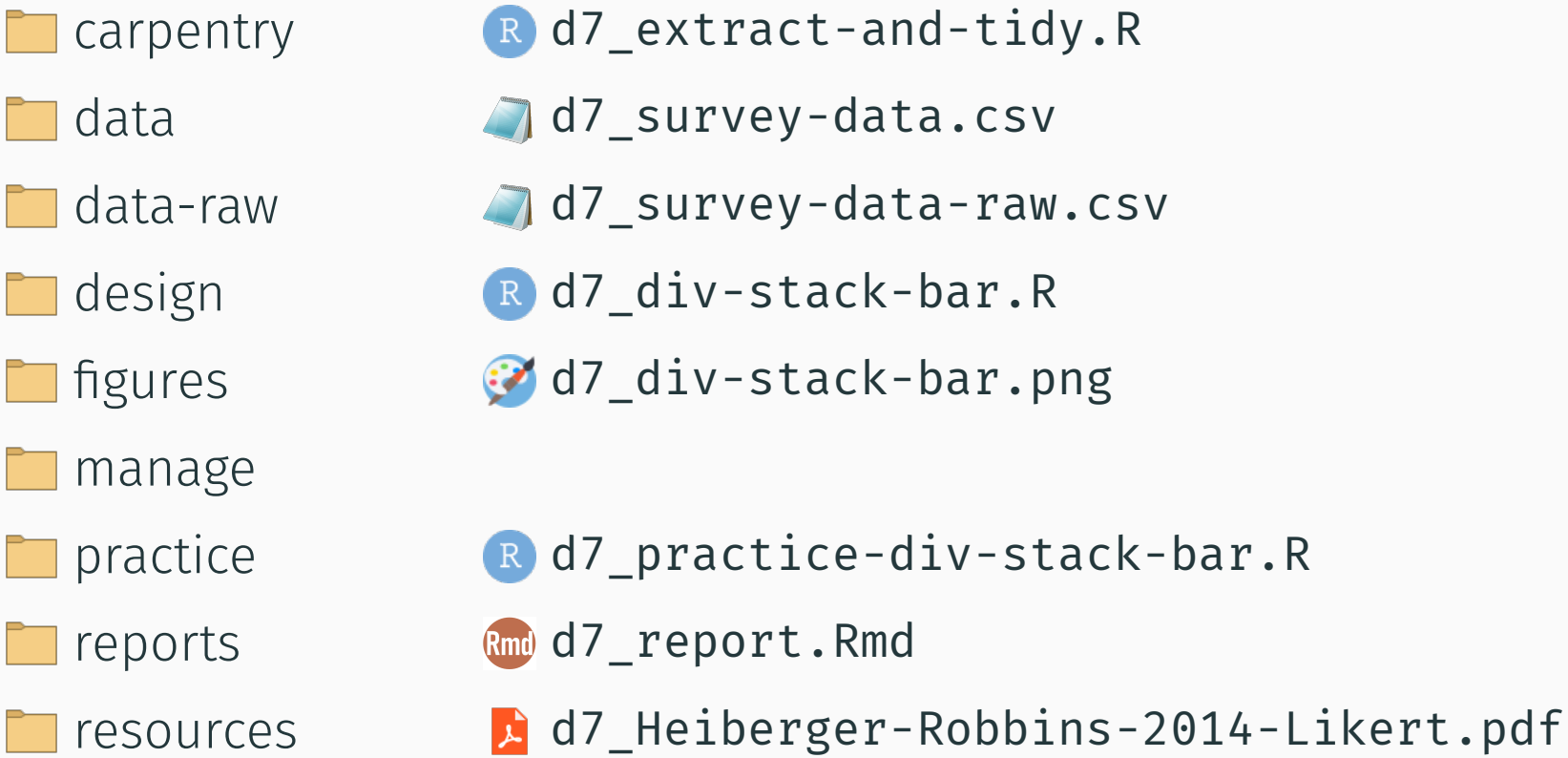
```
carpentry/ d7_01-extract-financials.R
           d7_02-extract-mortality.R
           d7_03-tidy-inequality-data.R
```

When content is saved in different forms

```
data/      d7_01-survey-data.csv
           d7_02-survey-data-wide.csv
```

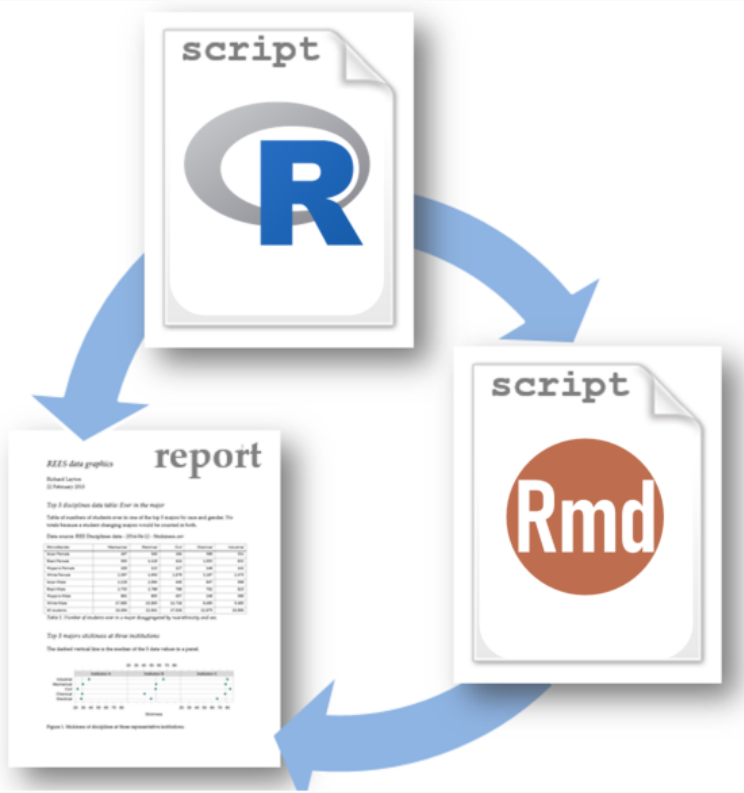
Not version numbers. For version control, use version control (git).

With a plan for managing files, we can start writing them



Linking files

Explicitly linking files supports reproducibility



Remove all ambiguity about what files are used to create a report

portfolio.Rproj sets the working directory and supports relative file paths

Relative file paths document the data tidying workflow

Write an R script for data tidying

carpentry/d7_extract-and-tidy.R

that reads the raw data, prepares it for graphing,

```
read_csv("data-raw/d7_survey-data-raw.csv")
```

and writes the tidy dataframe to the data directory.

```
write_csv(dataframe, "data/d7_survey-data.csv")
```

Relative file paths document the graph design workflow

Write an R script for graph design

design/d7_div-stack-bar.R

that reads the tidy data, creates the graph,

`read_csv("data/d7_survey-data.csv")`

and writes the image to the figures directory.

`ggsave("figures/d7_div-stack-bar.png")`

The report script runs all the files in order

Write an Rmd report script containing the report text

reports/d7_report.Rmd

interleaved with Rmd code chunks that run every R script,

- `source("carpentry/d7_extract-and-tidy.R")`
- `source("design/d7_div-stack-bar.R")`

import data to print a data table,

- `read_csv("data/d7_survey-data.csv")`

and import figures.

- `include_graphics("figures/d7_div-stack-bar.png")`

The README script includes links to each report

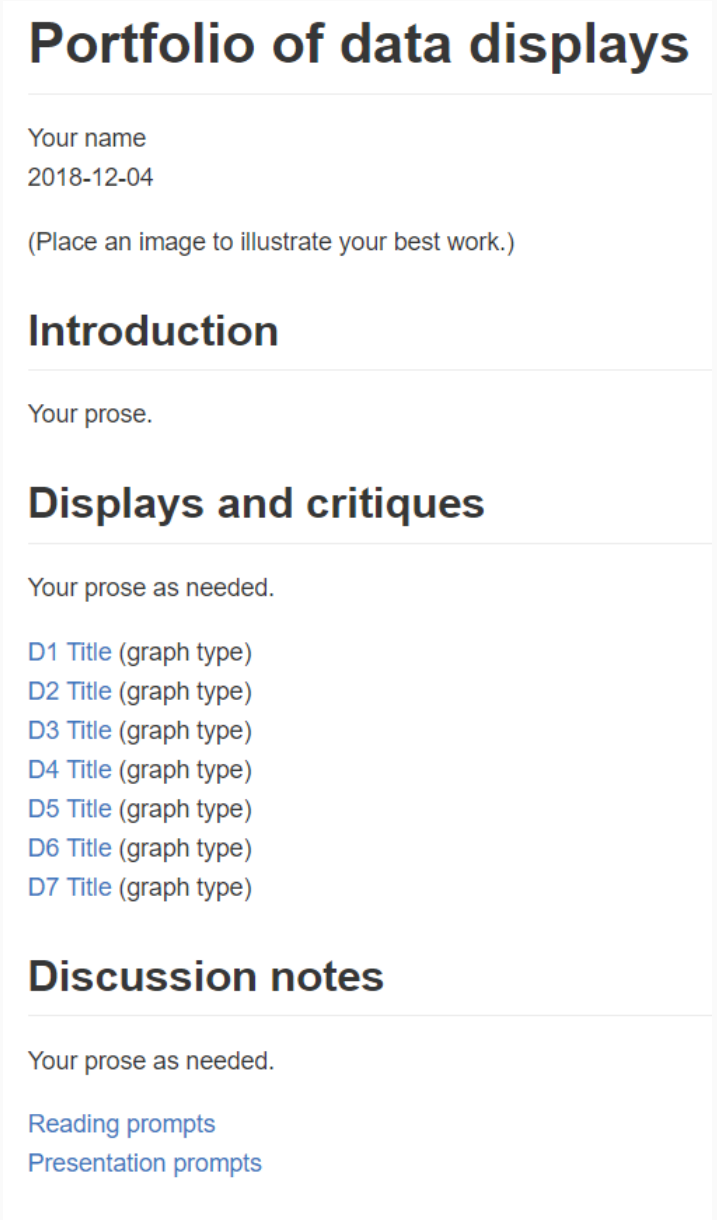
README.Rmd

creates the portfolio main webpage

```
## Displays and critiques

Your prose as needed.

[D1 Title](reports/d1_report.md)
[D2 Title](reports/d2_report.md)
[D3 Title](reports/d3_report.md)
[D4 Title](reports/d4_report.md)
[D5 Title](reports/d5_report.md)
[D6 Title](reports/d6_report.md)
[D7 Title](reports/d7_report.md)
```



Portfolio of data displays

Your name
2018-12-04

(Place an image to illustrate your best work.)

Introduction

Your prose.

Displays and critiques

Your prose as needed.

D1 Title (graph type)
D2 Title (graph type)
D3 Title (graph type)
D4 Title (graph type)
D5 Title (graph type)
D6 Title (graph type)
D7 Title (graph type)

Discussion notes

Your prose as needed.

Reading prompts
Presentation prompts

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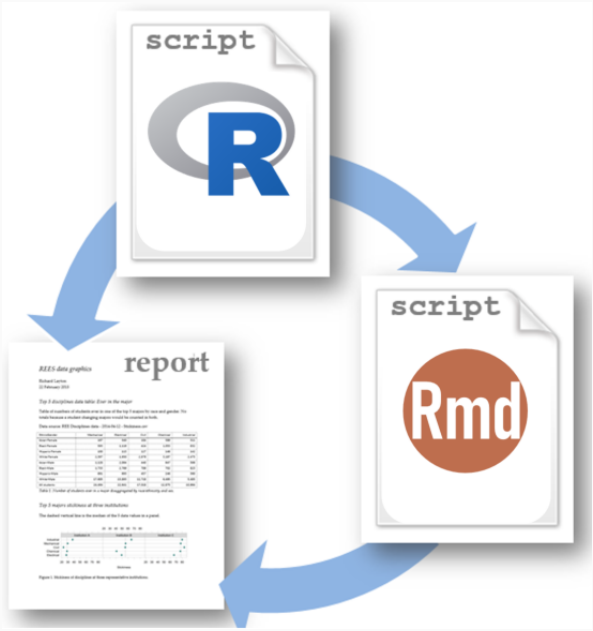

References

Bryan J (2015) Naming things. https://speakerdeck.com/jennybc/how-to-name-files

Bryan J (2018) Excuse me, do you have a moment to talk about version control? *The American Statistician* **72**(1), 20–27 (doi:10.1080/00031305.2017.1399928)

Wilson G, Bryan J, Cranston K, Kitzes J, Nederbragt L and Teal TK (2017) Good enough practices in scientific computing. *PLoS Computational Biology* **13**(6) (doi:10.1371/journal.pcbi.1005510)