## 2017-01-30

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#### Today's topics

- Pregistration and registered reports
  - What, why, who, how?
- Introduction to RStudio
- Introduction to R Markdown

#### Registered reports

- What are they?
- Why are they a thing?
- Who's doing them?
- How they work and how to get involved

#### What are they?

• Peer review and provisional acceptance of methodologically sound study proposals

#### Why registered reports?

- Results (positive or null) don't determine publication (prevent publication bias)
- Reduce questionable practices
  - p-hacking
  - HARKing

#### Why not registered reports

- Restrict creativity in reporting "un-registered"/exploratory analyses?
  - Clearer communication about confirmatory vs. exploratory
- Mandatory vs. optional
- Clinical trials vs. fundamental research
- Exploration is not a dirty word

#### Who's doing them?

• Journals with Registered Reports from COS

- Cognition & Emotion
- $\bullet$  Cortex
- Nature Human Behavior

#### How do they work

 $\bullet \ \ Google \ sheet \ comparing \ features \ https://docs.google.com/spreadsheets/d/1D4\_k-8C\_UENTRtbPzXfhjEyu3BfLxdOsn9jedit\#gid=0$ 

#### Preregistration separate from publication

#### Center for Open Science (COS) Preregistration Challenge

- 1,000 \$1K awards, July 1, 2017 (100), January 1, 2018 (100), July 1, 2018 (250), December 31, 2018 (500)
- Preregister hypothesis, sampling, analysis plans with OSF

#### AsPredicted.org

- Standardized preregistration tool
- Separate confirmatory from exploratory analyses
- One author completes checklist, others receive email to approve
- Unique (private) URL to pdf
- Share when you like or never

#### Your thoughts on preregistration, registered reports?

### Tools for reproducible workflows

#### **RStudio**

• An integrated development environment (IDE) for R

#### Components of RStudio

- Code editor
- R console
- Integrated help
- Image viewer
- Integration with git and other version-control packages
- Project management

#### RStudio in the cloud

- RStudio can be run in a browser from a server running RStudio Server
- Demo
  - Running this under Amazon Web Services (AWS) free tier
- Instructions for doing this yourself can be found here

#### R Markdown

- Markdown
  - Mark-up language to make it easy to write HTML
- R Markdown special type of Markdown
  - Allows for "literate" programming, mixing text, analysis, figures
  - Adds to Markdown syntax

#### Markdown syntax

- Text formatting
  - italics by surrounding text with single asterisks or underscores: \*italics\* or \_italics\_
  - boldface by surrounding text with double asterisks or underscores: \*\*boldface\*\* or boldface
  - strikethrough by surrounding text with double tildes: ~~strikethrough~~
  - Clickable URLs by surrounding link text with square brackets and URL with parentheses: [Clickable URLs](http://www.psu.edu)

#### Markdown syntax

- Paragraph formatting
  - Headings with level specified by the number of hash (#) marks
  - Lists (bullet and enumerated)
  - Block quotes
  - Code blocks

# This is a Heading 1
## This is a Heading 2
### This is a Heading 3

- An item
  - A nested item
    - \* A doubly-nested item
- Another item

#### Code:

- An item
  - A nested item
    - A doubly-nested item
- Another item
  - 1. An enumerated item
    - A nested item
  - 2. A second enumerated item

#### Code:

- 1. An enumerated item
  - A nested item
- 1. A second enumerated item

Notice how the numbers are incremented automatically!

Four score and seven years ago, some famous President spoke infamous words that would live on throughout history. These words are famous enough that I want to highlight them with a block quote.

- > Four score and seven years ago, some famous President
- > spoke infamous words that would live on throughout history.
- > These words are famous enough that I want to highlight them with a block quote.

#### More on Markdown syntax

- Images can be inserted using this syntax ![Alt text](/path/to/img.jpg)
- Comments won't print in rendered output <!- This is a comment ->

#### R Markdown additions

- .Rmd extension
- Combine text, code, images, figures, video
- "Computable" reports, documents, slide shows, notebooks
- Output in multiple formats from the same file

#### Make some data

```
x = rnorm(n = 100, mean = 0, sd = 1) # N(0,1)

y = rnorm(n = 100, mean = 2, sd = 0.5) # N(2, 0.5)
```

#### Summary of x, y

```
summary(x)

## Min. 1st Qu. Median Mean 3rd Qu. Max.
## -2.86500 -0.70640 -0.08281 0.03207 0.67380 2.96000

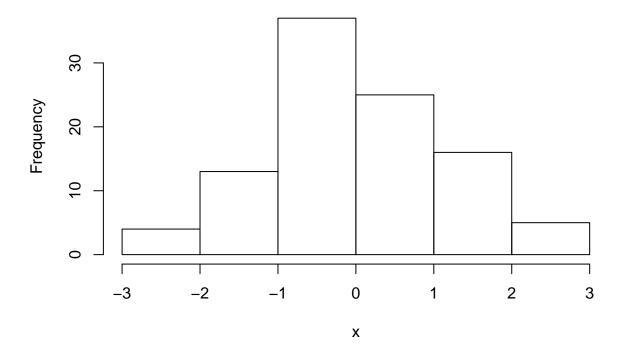
summary(y)

## Min. 1st Qu. Median Mean 3rd Qu. Max.
## 0.9152 1.5970 1.9530 1.9770 2.3260 3.7610
```

#### Histogram of x

```
hist(x)
```

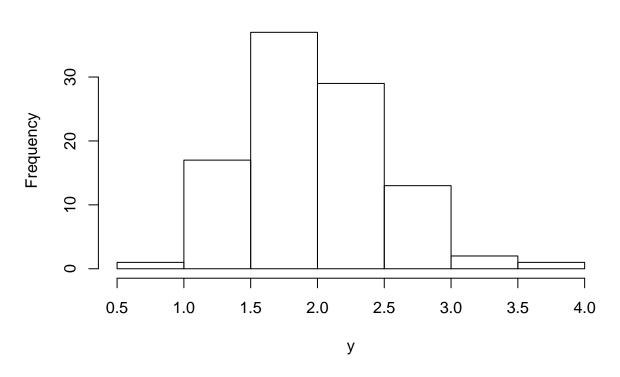
# Histogram of x



### Histogram of y

hist(y)

# Histogram of y



#### Embed figure saved locally using HTML

```
<img src="../img/my-img.jpg" height=500px>
Height parameter (or, e.g. width=800px) is optional, but useful. Remember Markdown -> HTML.
```

#### Embed figure from the web

```
<img src="http://cdn.abclocal.go.com/content/wpvi/images/cms/280434_1280x720.jpg" width=900px>
```

#### Embed YouTube video

• YouTube gives you code to cut and paste.

#### Printing computed variables

```
summ.x = summary(x)
summ.y = summary(y)
names(summ.x) # Figure out variable names for indexing
## [1] "Min." "1st Qu." "Median" "Mean" "3rd Qu." "Max."
```

Index by variable name: X lies within the range of [-2.865, 2.96].

Index by numeric index: The (y-x) difference in means is 1.94493.

Calculate and report: The correlation between x and y is 0.0356564.

#### Questions?