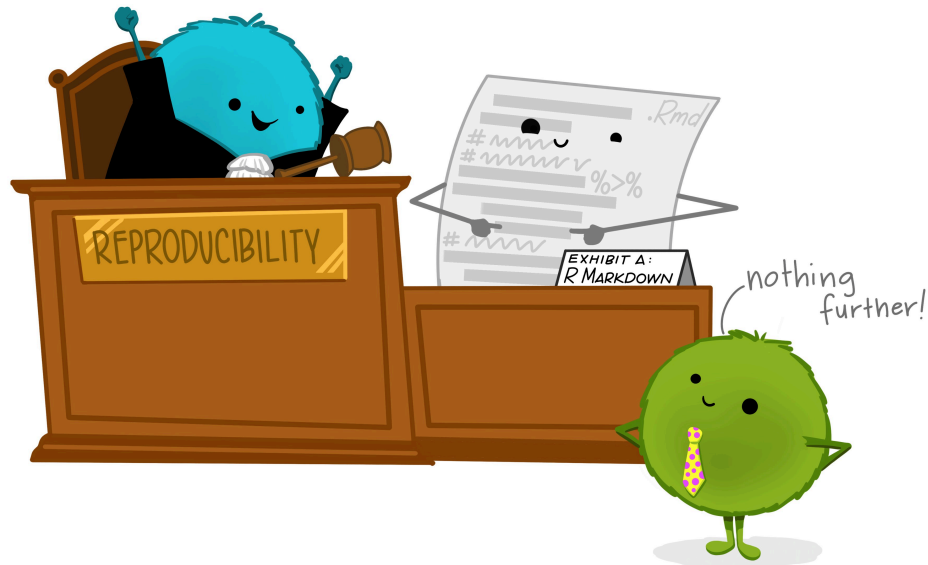


RMarkdown Basics

Recap

- Reproducibility across all sciences is a **huge** issue!
- We need to be able to reproduce scientific findings
 - This means the data & code from a given paper must be easy to access and **human readable**
- When it comes to programming in **R**, using **RMarkdown** can help us make sure that other humans can understand our analyses



Anatomy of RNotebook

The anatomy of all `.Rmd` files (RNotebook or RMarkdown):

1. Document Information

2. Formatted Text

3. Code Chunks

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Document Information

- Title
- Subtitle
- Date
- Author
- Output type

```
---  
title: "Making Pretty Code"  
subtitle: "with RMarkdown"  
author: "Shelly Cooper"  
output: html_document  
---
```

This is sometimes called a YAML header.

Document Information

- Title
- Subtitle
- Date
- Author
- Output type

```
---  
title: "Making Pretty Code"  
author: "Shelly Cooper"  
subtitle: with RMarkdown  
output:  
  pdf_document: default  
  html_document: default  
---
```

IMPORTANT: Do NOT change any of the tabs/indents in the YAML header. If you copy something from the internet, pay attention to this!

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Formatted Text

You need to tell R how you want your text to be formatted:

- Headers
- Bolded text
- Italicized text
- Hyperlinks
- Bullet/numbered lists

Headers

The number of # indicates what size and level your header should be.

Header 1

Header 1

Header 2

Header 2

Header 3

Header 3

Header 4

Header 4

Header 5

Header 5

Headers

Introduction

Background information goes here.

Methods

Participant Demographics

The current study looked at a sample of healthy adults (ages 18-80) across the lifespan.

Statistical Analyses

We first looked at descriptive statistics. Then we ran a multiple regression to look at how three independent variables impacted a dependent variable.

Results

Descriptive Results

Go here

Multiple Regression Results

Go here

Discussion

Our study was better than yours. This paper has been accepted without needing any revisions!

Headers

Introduction

Background information goes here.

Methods

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The current study looked at a sample of healthy adults (ages 18-80) across the lifespan.

Statistical Analyses

We first looked at descriptive statistics. Then we ran a multiple regression to look at how three independent variables impacted a dependent variable.

Results

Descriptive Results

[Go here](#)

Multiple Regression Results

[Go here](#)

Discussion

Our study was better than yours. This paper has been accepted without needing any revisions!

Bold & Italics

Bold text

- ****bold text ****
- **__bold text __** (2 underscores)

Italicized text

- ** italicized text **
- *_ italicized text _*

To **combine**, pick ***** for one and **_** for the other

- ****_combine_****
- **__**combine**__**
- ***__combine__***
- **__*combine*__**

Hyperlinks

- The word(s) you want to be the link go inside square brackets []
- Immediately after, it's a pair of parentheses () that contains the actual link.

[Google](www.google.com) is my friend!

Google is my friend!

Bullet Lists - Unordered

- First line must end with a : (colon)
- Must have an empty line
- Must have a space after the bullet

Unformatted

Brazilian States:

- Rio Grande do Sul
- Parana
- Rio de Janeiro

Formatted

Brazilian States:

- Rio Grande do Sul
- Parana
- Rio de Janeiro

Bullets can be - (dashes), + (plus), or * (asterisk), but all come out looking like what you see here.

Bullet Lists - Ordered

Same thing, but now with numbers

Unformatted

Brazilian States:

1. Rio Grande do Sul
2. Parana
3. Rio de Janeiro

Formatted

Brazilian States:

1. Rio Grande do Sul
2. Parana
3. Rio de Janeiro

Bullet Lists - Nested

You can have organized, nested lists. Go to the next line, and press **2 spaces**. Then put your new bullet symbol.

- Do NOT press tab. For whatever reason, R doesn't like it for Markdown.
- If you still are stuck, try 4 spaces -- that should work

Unformatted

Brazilian States & Capitals:

1. Rio Grande do Sul
 - * Porto Alegre
 - This is the best!
2. Parana
 - * Curitiba
3. Rio de Janeiro
 - * Rio de Janeiro

Formatted

Brazilian States & Capitals:

1. Rio Grande do Sul
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Anatomy of RNotebook

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Code Chunks

- This is what makes RMarkdown so cool!
- Type your code directly into a code chunk and work with it just like you would a `.R` script file
- When you're done, click `knit` at the top to generate your pretty report
 - All code chunks will be executed (unless you say otherwise...see next lecture)

Code Chunks

```
```${r}  
code goes here
answer <- 1 + 2
```
```

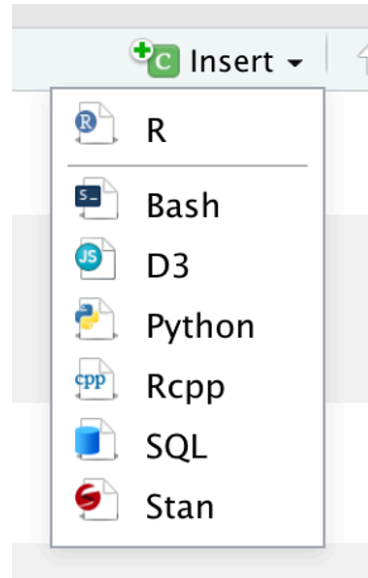
Each code chunk:

- **Starts and ends** with three backticks
 - if you don't have the ending 3, you're gonna have a bad time
- Has `{r}` at top next to the first 3 backticks
- Has gray background
- Looks like normal code
- Runs like normal code

Making Code Chunks

To make a code chunk:

- Use the `insert` button
- Manually type the backticks & `{r}`
- Keyboard shortcuts
 - PCs: `ctrl + alt + i`
 - Macs: `cmd + opt + i`



A finished product

Step 1: Data Preparation

Let's first get our data ready for an analysis

```
``{r}
# load the packages
library(knitr)
library(psych)
library(ggplot2)

# set the working directory
setwd("~/Desktop/rSkillLab/")

# import data
midus <- read.csv("midus.csv")
````
```

## # Step 2: Analysis

Now let's get the mean of the age variable.

```
``{r}
mean_age <- mean(midus$age, na.rm = TRUE)
````
```

Step 1: Data Preparation

Let's first get our data ready for an analysis

```
# load the packages
library(knitr)
library(psych)
library(ggplot2)
```

```
##
## Attaching package: 'ggplot2'
```

```
## The following objects are masked from 'package:psych':
##
##      %+%, alpha
```

```
# set the working directory
setwd("~/Desktop/rSkillLab/")

# import data
midus <- read.csv("midus.csv")
```

Step 2: Analysis

Now let's get the mean of the age variable.

```
mean_age <- mean(midus$age, na.rm = TRUE)
```

Code Chunks

All code will run in a code chunk

- It's very literal!
- We can't see `midus` or `mean_age`
 - These are stored as objects
 - If you want to see them, you need to tell R to show them to you
- We needed to import `midus`
 - If it was in your Environment *before* knitting the file AND you did *not* import your data, it would fail
 - Whatever data you use, you need to import it!

Viewing data.frames

To help make data.frames readable for humans, use the `kable()` function

- comes from the `knitr` package, although surprisingly, you don't need to manually load this one

1. Data Preparation

Let's first get our data ready for an analysis

```
# load the packages
library(knitr)
library(psych)
library(ggplot2)

# set working directory
setwd("~/Box Sync/Brazil 2019/")

# import data
midus <- read.csv("midus.csv")

# view the first 6 rows of the midus dataset
# head(midus) gets the first 6 rows
# kable() makes the output pretty
kable(x = head(midus), caption = "Midus Dataset")
```

Midus Dataset

| ID | sex | age | BMI | physical_health_self | mental_health_self | self_esteem | life_satisfaction | hostility | heart_self | heart_father |
|-------|--------|-----|--------|----------------------|--------------------|-------------|-------------------|-----------|------------|--------------|
| 10001 | Male | 61 | 26.263 | 2 | 4 | 42 | 7.750 | 5.5 | No | No |
| 10002 | Male | 69 | 24.077 | 5 | 5 | 34 | 8.250 | 6.0 | No | Yes |
| 10005 | Female | 80 | NA | 4 | 4 | 49 | 9.333 | 4.0 | No | No |
| 10006 | Female | 60 | NA | 3 | 3 | NA | NA | NA | No | Yes |
| 10010 | Male | 55 | NA | 4 | 3 | 28 | 8.250 | 8.0 | No | Yes |
| 10011 | Female | 52 | 25.991 | 5 | 4 | 41 | 7.000 | 5.5 | No | No |

Next up

Changing parameters in the YAML header and in code chunks to make the output just right.

