

Reproducible Data Availability Visualization with GitHub Pages

University of Basel: February 11th-12th 2021

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 @lisa_reiber



Heap of lego





Heap of datasets

📁 mietbelastung	▶	📄 bioagel.dta
📁 pre_2007_muki_a	▶	📄 biobirth.dta
📁 pre_2008_muki_b	▶	📄 biol.dta
📁 pre_2008_muki_c	▶	📄 hgen.dta
📁 SOEP_CORE...ationalData	▶	📄 hpfadl.dta
📄 SOEPlong-doku-v32.xlsx	▶	📄 jugendl.dta
📁 v33_l	▶	📄 kidl.dta
📄 v33_l.zip	▶	📄 p_long_raw.dta
📁 v34	▶	📄 pequiv.dta
		📄 pl.dta
		📄 ppfadl.dta

Data Availability Challenge

- Get a fast overview of data availability (data-viz)
- Share it with many people
- Allow them to reproduce it for their own needs

Solution?

Our Mission



Build a reproducible research report like
[this](#)

Reproducible Research Reports

Environment:
RStudio

Editor:
R Markdown

Meta-Viz:
ggplot2

Sharing:
GitHubPages

Output:
Website-Stack

Reproducible Research Reports



Workshop Overview

1. RStudio

Our computational
environment

Reproducible Research Reports

1. RStudio

2. R Markdown

Controls

Text + Code + Output

Reproducible Research Reports

1. RStudio

2. R Markdown

3. Meta-Viz

Visualizing
Data Availability

Reproducible Research Reports

1. RStudio

2. R Markdown

3. Meta-Viz

4. Websites

Creating websites
with R Markdown

Reproducible Research Reports

1. RStudio

2. R Markdown

3. Meta-Viz

4. Websites

5. Git + GitHub Pages

Sharing websites
with many people

Schedule

Thursday

09:00 - 10:30 Welcome & RStudio Intro

10:30 - 11:00 Break

11:00 - 12:30 R Markdown Intro

12:30 - 13:30 Lunch

13:30 - 15:00 Meta-Viz and ggplot2

15:00 - 15:30 Break

15:30 - 17:00 R Markdown: website features

Friday (half-day)

09:00 - 10:30 Git + GitHubPages

10:30 - 11:00 Break

11:00 - 12:30 Putting all the pieces together

12:30 - 13:00 Wrap-up

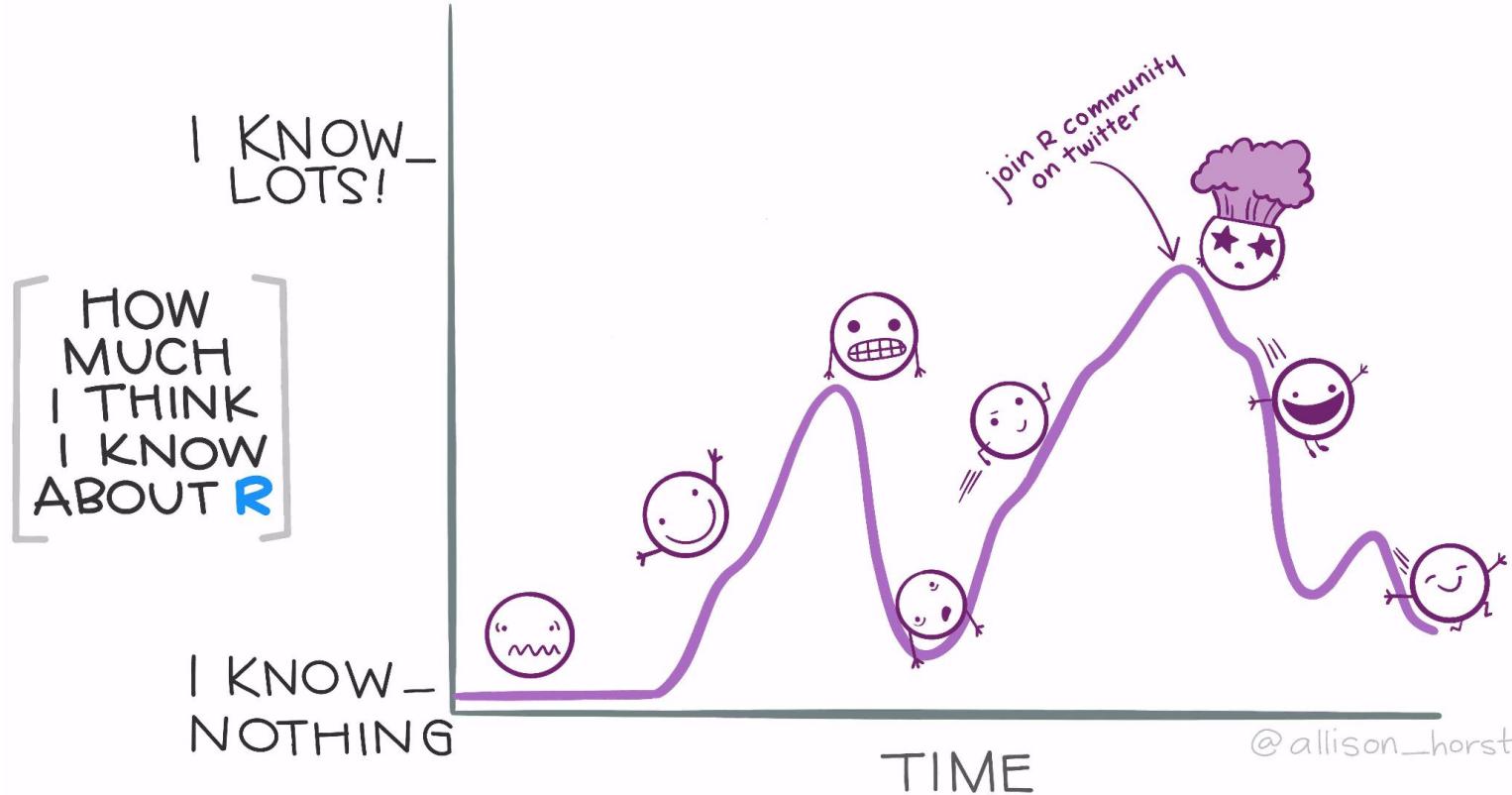
Workshop features

- Communication & Questions → Gather.town and GitHub



Workshop features

- Communication & Questions → Gather.town and GitHub
- Coding → RStudio Cloud
- Kids are welcome 😍
- Having trouble? It's not you, this is complicated stuff



Workshop features

- Communication & Questions → Gather.town and GitHub
- Coding → RStudio Cloud
- Kids are welcome 😍
- Leave the room anytime
- Having trouble? It's not you, this is complicated stuff

Workshop features

- Communication & Questions → Gather.town and GitHub
- Coding → RStudio Cloud
- Kids are welcome 😍
- Leave the room anytime
- Having trouble? It's not you, this is complicated stuff
- Be excellent to each other

Workshop features

- Communication & Questions → Gather.town and GitHub
- Coding → RStudio Cloud
- Kids are welcome 😍
- Leave the room anytime
- Having trouble? It's not you, this is complicated stuff
- Be excellent to each other
- Stay healthy → breaks, drinks and food/snacks

Virtual Environments

Gather.Town

- Group spaces
- Workshop space
- Games 😊
- Press x to interact with things
- Press ? for ghost mode

R-Studio Cloud

05:00

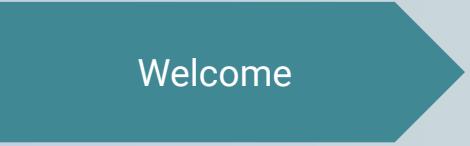
Your Turn: Explore

- ❖ Find a group at the group section
- ❖ Try out how far you can stand apart until video goes off (outside group areas)
- ❖ Share your screen to someone
- ❖ Interact with the elements at the reception

About me



- R enthusiast (R-Ladies Berlin, [Correlaid](#))
- Social Scientist (MA Humboldt University of Berlin)
- from PhD student at [MPIB](#) studying risk preferences
- to data scientist at [Citizens for Europe](#) working with equality data



Welcome

About you

- ❖ One thing you want to learn
- ❖ Which of your favourite foods did you bring today?
- ❖ What was the last thing you remember looking up online when you got stuck in R?
- ❖ What is the thing you have to looked up at least three times?

1

RStudio

Goal



Get familiar with the environment



RStudio and RStudio Cloud

Virtual Environments

Gather.Town

- Group spaces
- Workshop space
- Games 😊
- Press x to interact with things
- Press ? for ghost mode

R-Studio Cloud



The image shows a computer monitor displaying the R-Studio IDE interface. The interface includes a code editor, file browser, and various data visualization tools like graphs and charts. A large blue arrow points from the left towards the monitor, indicating the flow or connection to the cloud service.

R Studio® IDE

- Data analysis scripts
- Interactive web applications
- Documents
- Reports
- Graphs
- More

Virtual Environments

Gather.Town

- Group spaces
- Workshop space
- Games 
- Press x to interact with things
- Press ? for ghost mode

R-Studio Cloud

- Already set-up RStudio environment
- [Here](#)

Explore

- ❖ Copy the [R-Workshop project](#) into your own space
- ❖ Open the welcome.R Script in the 01_RStudio folder
- ❖ Find a hidden message in one of the project folders

Lunch Time

Thursday

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Rmarkdown

TEXT. CODE. OUTPUT.
(GET IT TOGETHER, PEOPLE.)



@lisa_reiber

art by @allison_horst

2.

R-Markdown

Goal

- 👀 What is R Markdown (useful for)?
- 🌱 Learning the basic features
- 🧩 Building the first part of our website

What is R Markdown ?

1. An authoring framework for data science.
2. A document format ([.Rmd](#)).
3. An R package named [rmarkdown](#).
4. A file format for making dynamic documents with R.
5. A tool for integrating prose, code, and results.
6. Wizardry.



What is R Markdown ?

1. "An authoring framework for data science." (✓)
2. A document format (.Rmd). (✓)
3. An R package named rmarkdown. (✓)
4. "A file format for making dynamic documents with R." (✓)
5. "A tool for integrating text, code, and results." (✓)
6. Wizardry. (🧙)



Wouldn't it be great if

- You could have code, results, and text in the same document?
- Your results and plots were automatically generated from your data, so your documents were updated if your data changed?
- The file format of your documents was future-proof?
- The syntax for this was easy?

R Markdown file = plain text file with extension `.Rmd`



Useful for what?

- Avoid copy & paste mistakes
- Avoid copy & pasting in general
- Sharing insights with non-tech people

```
33 # 2016
34 elic_2016_1 <- read.xlsx(file = "input/elic_2016_1.xlsx", sheetIndex = 1, colClasses = "character", stringsAsFactors = F)
35 elic_2016_1 <- elic_2016_1 %>%
36   mutate(Datum = as.Date("2016-01-01 00:00:01")) %>%
37   mutate(Quartal = paste(format(Datum, "%y"), sprintf("%02i", (as.POSIXlt(Datum)$mon) %% 3L + 1L), sep="/")) %>%
38   select(GN = Geschäftsnummer, Datum, Quartal, Land = Bestimmungsland, Wert = Wert..CHF., Position...Güterart = Güterart, Position...EKN = Exportkontrollnummer..EKN., Art =
39   Richtung) %>%
40   filter(Art == "Ausfuhr") %>%
41   select(-Art)
42
43 elic_2016_2 <- read.xlsx(file = "input/elic_2016_2.xlsx", sheetIndex = 1, colClasses = "character", stringsAsFactors = F)
44 elic_2016_2 <- elic_2016_2 %>%
45   mutate(Datum = as.Date("2016-04-01 00:00:01")) %>%
46   mutate(Quartal = paste(format(Datum, "%y"), sprintf("%02i", (as.POSIXlt(Datum)$mon) %% 3L + 1L), sep="/")) %>%
47   select(GN = Geschäftsnummer, Datum, Quartal, Land = Bestimmungsland, Wert = Wert..CHF., Position...Güterart = Güterart, Position...EKN = Exportkontrollnummer..EKN., Art =
48   Richtung) %>%
49   filter(Art == "Ausfuhr") %>%
50   select(-Art)
51
52 elic_2016_3 <- read.xlsx(file = "input/elic_2016_3.xlsx", sheetIndex = 1, colClasses = "character", stringsAsFactors = F)
53 elic_2016_3 <- elic_2016_3 %>%
54   mutate(Datum = as.Date("2016-07-01 00:00:01")) %>%
```

< versus >

Wie viele Einträge haben in der Tracker-Applikation zwei Signaturen?

```
dim(filter(tracker_summarized, NSGII..GKV. != "", WA..GKV. != ""))[1]
```

Wie viele davon sind solche, die mit der gleichen Obersignatur (sprich: dem gleichen Haupt- und Untertyp, siehe unten) beginnen?

```
dim(filter(tracker_summarized, NSGII..GKV. != "", WA..GKV. != "", substr(NSGII..GKV.,1,2) == substr(WA..GKV.,1,2)))[1]
```

Useful for what?

- Avoid copy & paste mistakes
- Avoid copy & pasting in general
- Sharing insights with non-tech people
- Keeping text, code and output in one place (future you)

Useful for what?

- Avoid copy & paste mistakes
- Avoid copy & pasting in general
- Sharing insights with non-tech people
- Keeping text, code and output in one place (future you)
- Exporting it to share the information with others

1. R-Studio

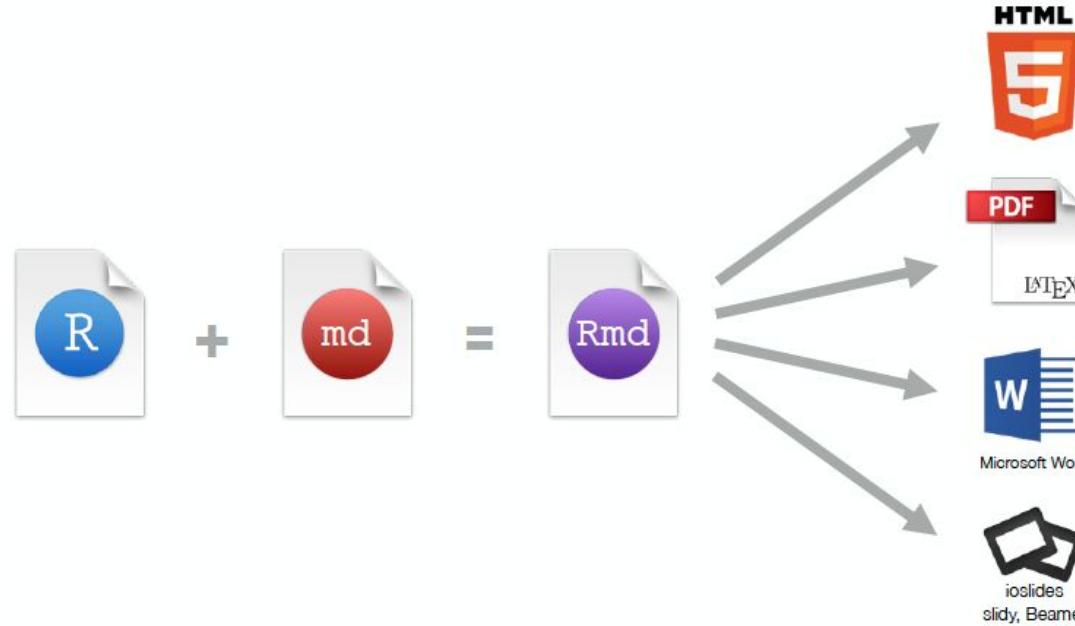
2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

R Markdown Workflow



Intro Video: [Introduction RMarkdown](#)

Group Exercise

15:00

Explore Gallery

- ❖ Browse through some examples
- ❖ Show each other which examples you liked
- ❖ <https://rmarkdown.rstudio.com/gallery.html>

1. R-Studio

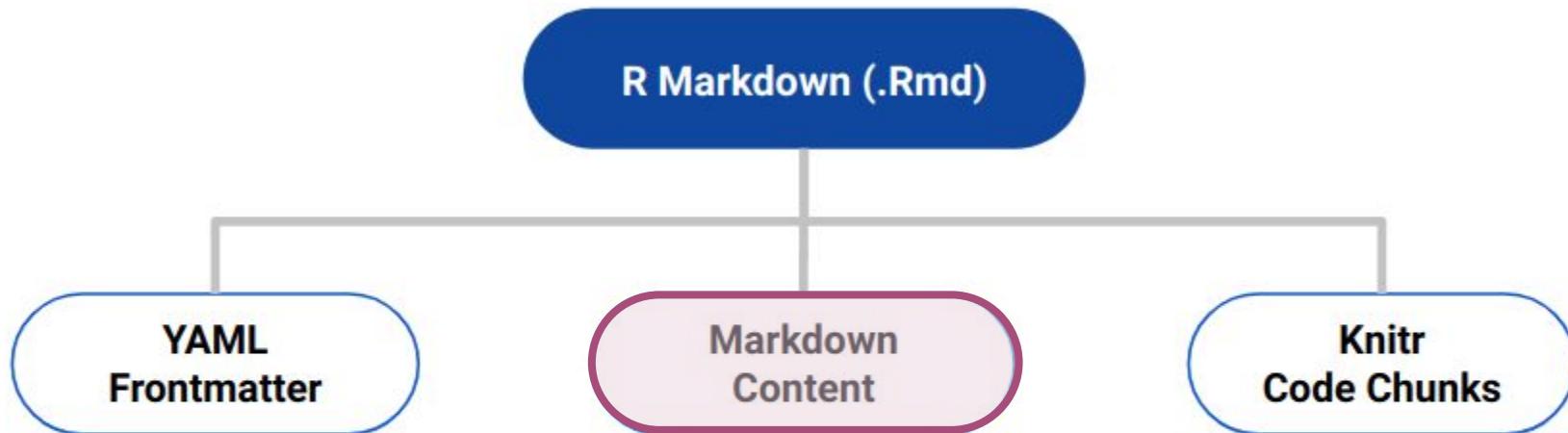
2. R-Markdown

3. Meta-Viz

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5. GitHubPages

Structure of an R Markdown Document



R-Studio Cloud

Add fade in

Explore

- ❖ Go to RStudio Cloud
- ❖ Create a new .Rmd file
- ❖ Identify 3 components (frontmatter, content, chunks)

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function Knit Run Addins

Untitled1*

```
1 ----
2 title: "Untitled"
3 author: "Lisa Reiber"
4 Date: "11.02.2021"
5 output: html_document
6 ----
7
8 ```{r setup, include=FALSE}
9 knitr::opts_chunk$set(echo = TRUE)
10 ```
11
12 ## R Markdown
13
14 This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.
15
16 When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:
17
18 ```{r cars}
19 summary(cars)
20 ```
21
22 ## Including Plots
23
24 You can also embed plots, for example:
25
```

The screenshot shows an RStudio interface with an R Markdown file named "Untitled1". The code editor displays the following content:

```
1 ----  
2 title: "Untitled"  
3 author: "Lisa Reiber"  
4 Date: "11.02.2021"  
5 output: html_document  
6 ----  
7  
8 ```{r setup, include=FALSE}  
9 knitr::opts_chunk$set(echo = TRUE)  
10 ``-  
11  
12 ## R Markdown  
13  
14 This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see  
<http://rmarkdown.rstudio.com>.  
15  
16 When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:  
17  
18 ```{r cars}  
19 summary(cars)  
20 ``-  
21  
22 ## Including Plots  
23  
24 You can also embed plots, for example:  
25
```

The code is organized into three main sections: "Front matter" (lines 1-6), "Content" (lines 14-25), and "Chunk" (lines 18-20). The "Front matter" section contains metadata and setup code. The "Content" section contains a general introduction and a code chunk that prints the summary of the "cars" dataset. The "Chunk" section is a placeholder for embedded plots.

1. R-Studio

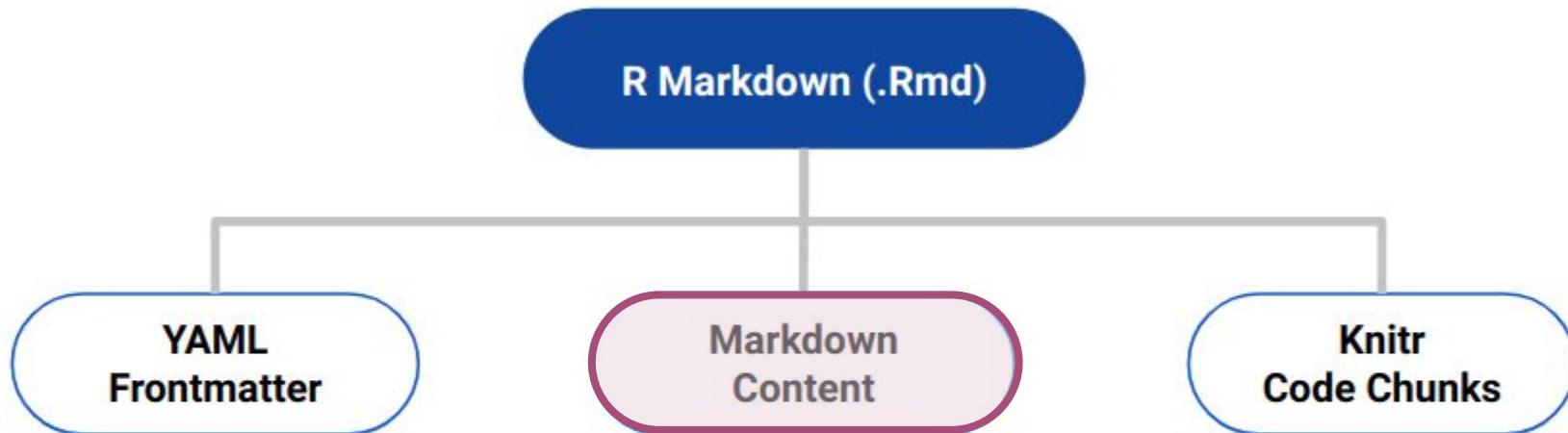
2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Structure of an R Markdown Document



Headers

```
# Header 1  
## Header 2  
### Header 3  
#### Header 4  
##### Header 5  
###### Header 6
```



Header 1
Header 2
Header 3
Header 4
Header 5
Header 6

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Text

Add two spaces at
the end of a line to
start a new line

Text
italics
bold
'code'



Text
italics
bold
`code`

1. R-Studio

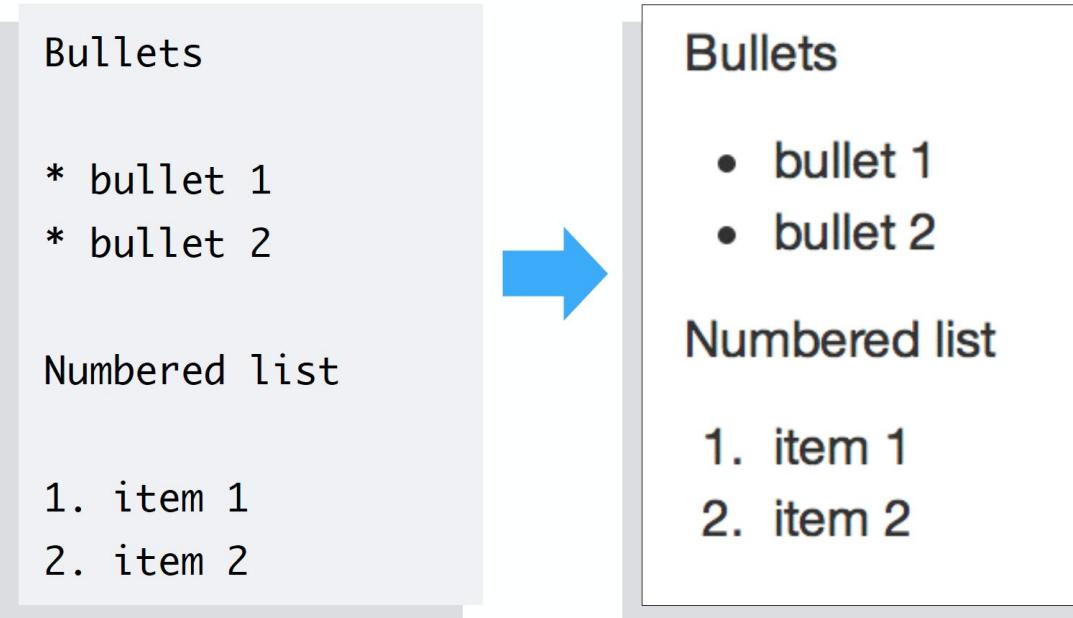
2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Lists



1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Links

This is a
[link](www.git.com).

This is a link.



Images

The RStudio logo.



R Markdown Reference Guide



R **Markdown** Reference Guide

Learn more about R Markdown at rmarkdown.rstudio.com

Learn more about Interactive Docs at shiny.rstudio.com/articles

Contents:

- 1. Markdown Syntax**
2. Knitr chunk options
3. Pandoc options

Syntax

Plain text

End a line with two spaces
to start a new paragraph.

italics and _italics_

bold and __bold__

superscript^{^2}

~~strikethrough~~

[link] (www.rstudio.com)

Header 1

Header 2

Becomes

Plain text

End a line with two spaces to start a new paragraph.

italics and *italics*

bold and **bold**

superscript²

strikethrough

link

Header 1

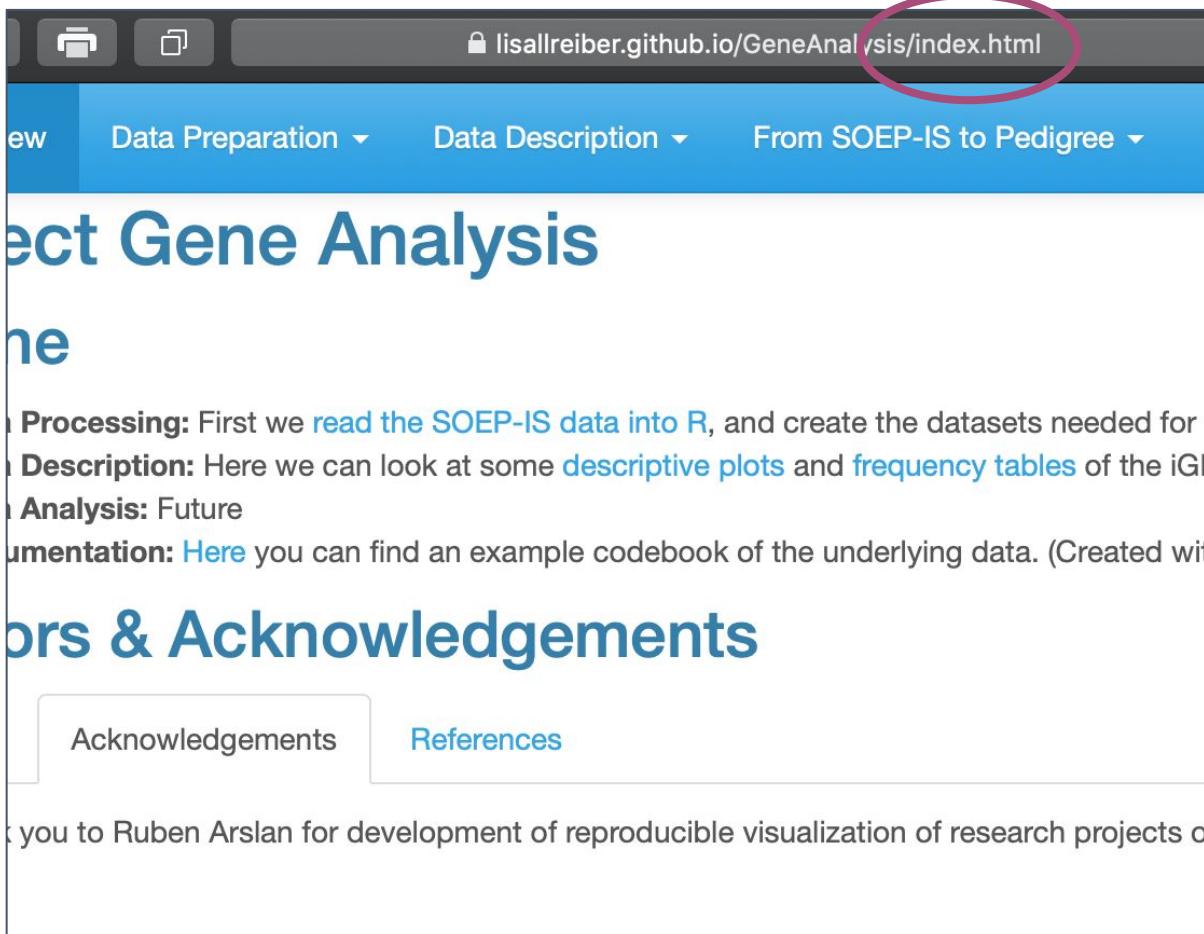
Header 2

Hands-on

15:00

Your Turn

- ❖ Find the reference guide in the workshop references
- ❖ Try yourself out with this [tutorial](#)



The screenshot shows a web browser window with the following details:

- Address Bar:** The URL `lisallreiber.github.io/GeneAnalysis/index.html` is displayed, with the entire URL highlighted by a red oval.
- Header:** A blue navigation bar with dropdown menus:
 - New
 - Data Preparation ▾
 - Data Description ▾
 - From SOEP-IS to Pedigree ▾
 - D
- Main Content:**
 - # Project Gene Analysis
 - ## Home
 - Data Processing:** First we [read the SOEP-IS data into R](#), and create the datasets needed for further analysis.
 - Data Description:** Here we can look at some [descriptive plots](#) and [frequency tables](#) of the iGEI dataset.
 - Future Analysis:** Future
 - Documentation:** [Here](#) you can find an example codebook of the underlying data. (Created with R)
- Acknowledgements & References:**
 - Acknowledgements** (button)
 - References** (link)
- Footnote:** A note at the bottom left credits Ruben Arslan for development of reproducible visualization of research projects on GitHub.

Hands-on

15:00

Your Turn

- ❖ Find the reference guide in the workshop references
- ❖ Try to recreate the index.html

2.

R-Markdown

Recap

-  R-Markdown can combine text, code and outputs
-  We know how to use basic features
-  We build the first part of our website

Lunch Time

Thursday

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Friday (half-day)

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11:00 - 12:30 Putting all the pieces together

12:30 - 13:00 Wrap-up

3.1

Why Meta-Viz

Goal



Illustrate the problem with a story

EXPECTATION



- About 30.000 individuals
- From 1998 to 2017 (19 waves)
- Children and Adults

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

EXPECTATION



- About 30.000 individuals
- From 1998 to 2017 (19 waves)
- Children and Adults

REALITY



- Some people didn't answer
- Just a few waves available
- Only adults

3.1

Why Meta-Viz

Recap



The devil is in the detail



Data Viz can help to get a quick overview
on data availability

3.2

R Markdown Code

Goal



How to code in R Markdown ?

1. R-Studio

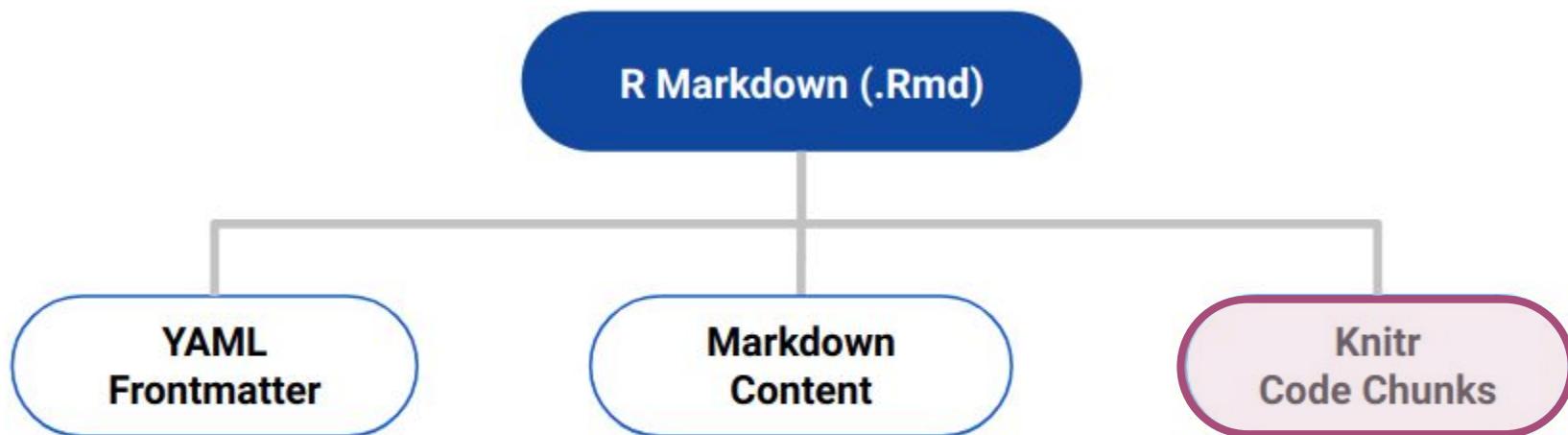
2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Writing Code with R Markdown



Writing Code with R Markdown

- Insert chunk of R code
- R Markdown runs code and includes results.

```
```{r}
some code
```

```
...
```

# Code Chunks

programming  
language  
(could be R, python, stata,  
haskell, stan, go, etc)

label

comma-separated  
chunk options

(used for settings like whether code should  
be shown, adding captions, and much more)

starts and ends  
with three backticks

```
```{r my-test-chunk, echo=TRUE, eval=FALSE}
```

```
# this is a test chunk  
library(ggplot2)
```

}

code here

Inline Code

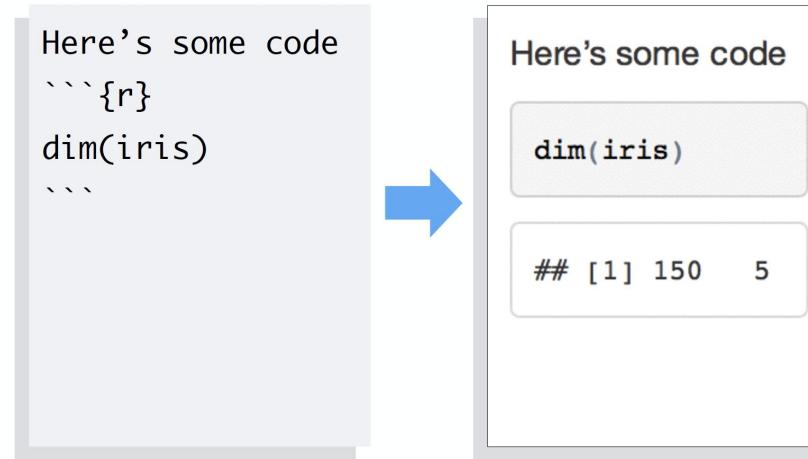
- Place code in a sentence with
- R Markdown replaces code with results

```
Today is  
`r Sys.Date()`.
```

Today is 2015-04-16.

Writing Code with R Markdown

- By default, R markdown includes both code and results



Chunk Options: echo

- Add options between brackets after r.
- echo = FALSE hides code.

```
Here's some code  
```{r echo=FALSE}  
dim(iris)
```
```

Here's some code

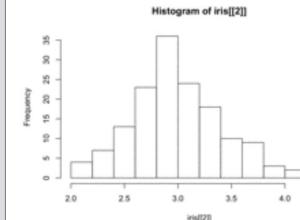
```
## [1] 150    5
```

Chunk Options: echo

- Add options between brackets after r.
- echo = FALSE hides code.

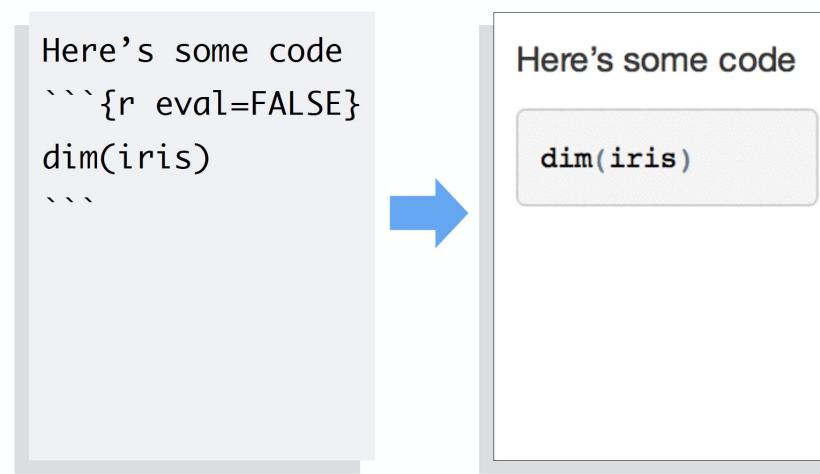
```
Here's a plot  
```{r echo=FALSE}  
hist(iris[[2]])
```
```

Here's a plot



Chunk Options: eval

- eval = FALSE prevents code from being run
- No results is displayed, only code



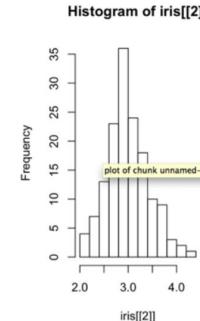
Chunk Options: `fig.height`, `fig.width`

- Specify dimension of plots (in inches) with `fig.width` and `fig.height`
- Separate multiple arguments with commas.

Here's a plot

```
```{r echo=FALSE, fig.width=3, fig.height=5}
hist(iris[[2]])
````
```

Here's a plot



Default Chunk Options

- Repeating chunk options can be painful
- If you have echo = FALSE in every single chunk, how to set the default chunk option to echo = FALSE ?
- Use `knitr::opts_chunk$set(echo = FALSE)`
- You may overwrite the default for each chunk
- For chunk options, check out

[More options](#)

Including Tables

```
# cars is a built-in-to-R data set of cars  
# and their stopping distances  
cars %>%  
  head(5) %>%  
  knitr::kable(format = "html", caption = "A kable table")
```

- The **kable** package is often used with the **kableExtra** package
- A number of other packages are available for making pretty tables, see rmarkdown.rstudio.com

| A kable table | |
|---------------|-------------|
| speed | dist |
| 4 | 2 |
| 4 | 10 |
| 7 | 4 |
| 7 | 22 |
| 8 | 16 |

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Including Plots

```
```{r}
my_plot <- metaviz_long %>%
 drop_na(value) %>%
 count(key_category) %>%
 mutate(key_category = fct_reorder(key_category, n)) %>%
 ggplot(aes(x = key_category, y = n, fill = key_category)) +
 geom_col() +
 coord_flip() +
 labs(x = "", y = "")
```
```

Output?

1. R-Studio

2. R-Markdown

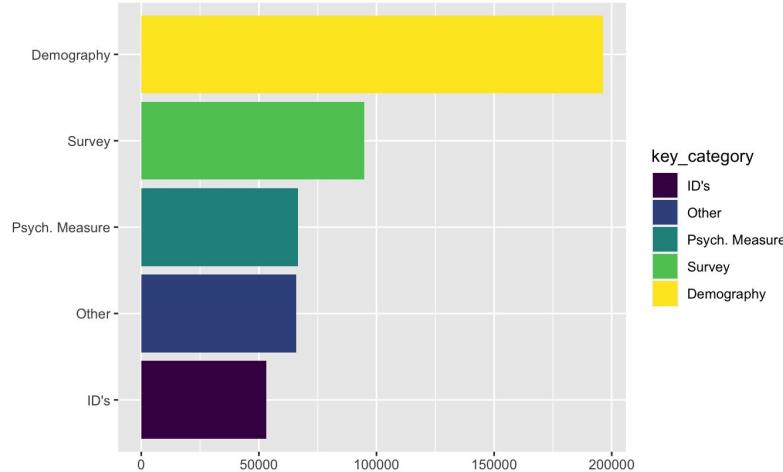
3. Meta-Viz

4. Websites

5. GitHubPages

Including Plots

```
```{r}
metaviz_long %>%
 drop_na(value) %>%
 count(key_category) %>%
 mutate(key_category = fct_reorder(key_category, n)) %>%
 ggplot(aes(x = key_category, y = n, fill = key_category)) +
 geom_col() +
 coord_flip() +
 labs(x = "", y = "")
````
```





R Markdown Reference Guide

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Contents:

1. Markdown Syntax
- 2. Knitr chunk options**
3. Pandoc options

| Syntax | Becomes |
|---|--|
| <p>Make a code chunk with three back ticks followed by an r in braces. End the chunk with three back ticks:</p> <pre>```{r} paste("Hello", "World!") ```</pre> | <p>Make a code chunk with three back ticks followed by an r in braces. End the chunk with three back ticks:</p> <pre>paste("Hello", "World!")</pre> <pre>## [1] "Hello World!"</pre> |
| <p>Place code inline with a single back ticks. The first back tick must be followed by an R, like this `r paste("Hello", "World!")`.</p> | <p>Place code inline with a single back ticks. The first back tick must be followed by an R, like this Hello World!.</p> |
| <p>Add chunk options within braces. For example, `echo=FALSE` will prevent source code from being displayed:</p> <pre>```{r eval=TRUE, echo=FALSE} paste("Hello", "World!") ```</pre> | <p>Add chunk options within braces. For example, <code>echo=FALSE</code> will prevent source code from being displayed:</p> <pre>## [1] "Hello World!"</pre> |

Hands-on

15:00

Your Turn

- ❖ Let's head over to RStudio Cloud to try this out

3.2

ggplot2

Recap



Knitr renders R code and output



We know how to write and execute code

3.3

Meta-Viz: ggplot2

Goal

👀 How to visualize data availability ?

🤓 Learning by doing

🧩 Building the next part of our website

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

RStudio Cloud Time



3.

Meta-Viz

Recap

- 😈 The devil is in the detail (codebook)
- 🎨 Meta-viz can give you a quick overview
- 💡 We know how to code in R Markdown
- 🧩 We build the data-viz part of our website

Lunch Time

Thursday

09:00 - 10:30 Welcome & RStudio Intro

10:30 - 11:00 Break

11:00 - 12:30 R Markdown Intro

12:30 - 13:30 Lunch

13:30 - 15:00 Meta-Viz and ggplot2

15:00 - 15:30 Break

15:30 - 17:00 R Markdown: website features

Friday (half-day)

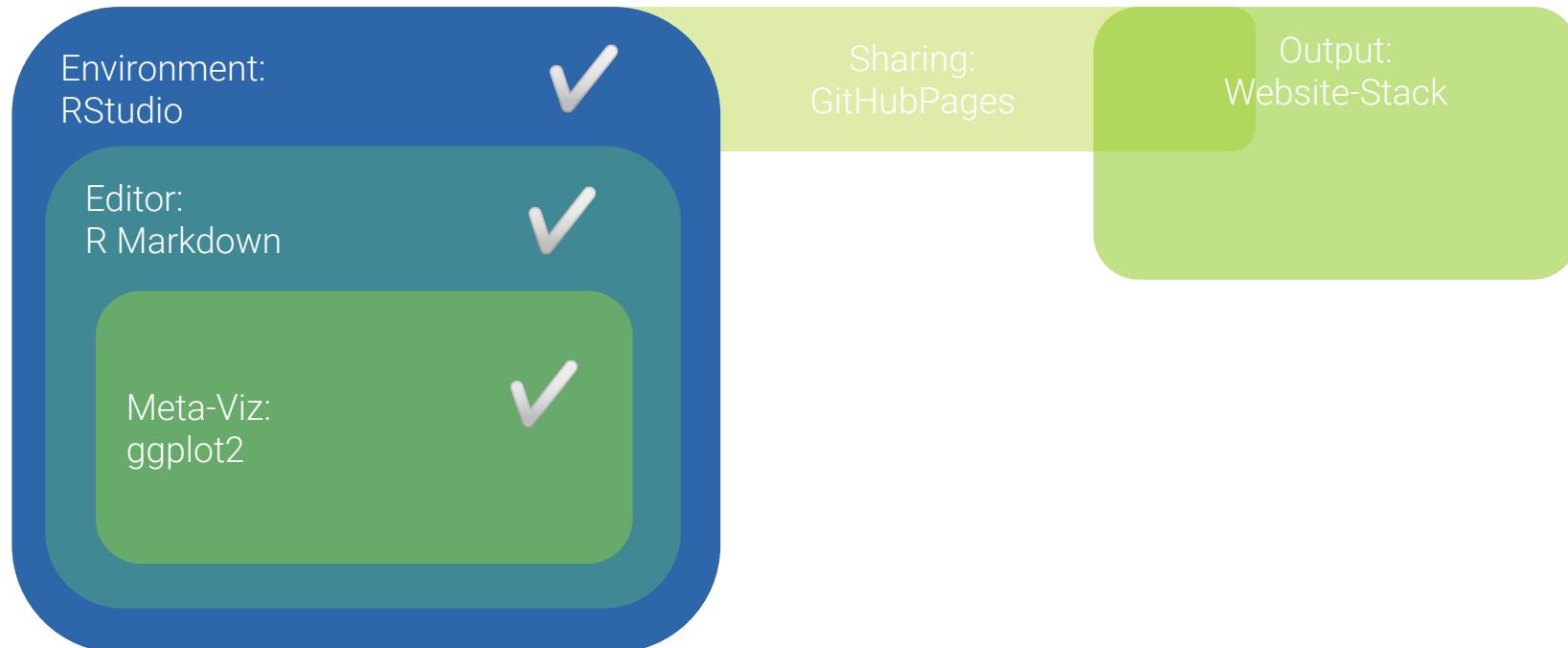
09:00 - 10:30 Git + GitHubPages

10:30 - 11:00 Break

11:00 - 12:30 Putting all the pieces together

12:30 - 13:00 Wrap-up

Review: Reproducible Research Reports



4

Websites

Goal



How to layout and style websites



Linking multiple websites together

1. R-Studio

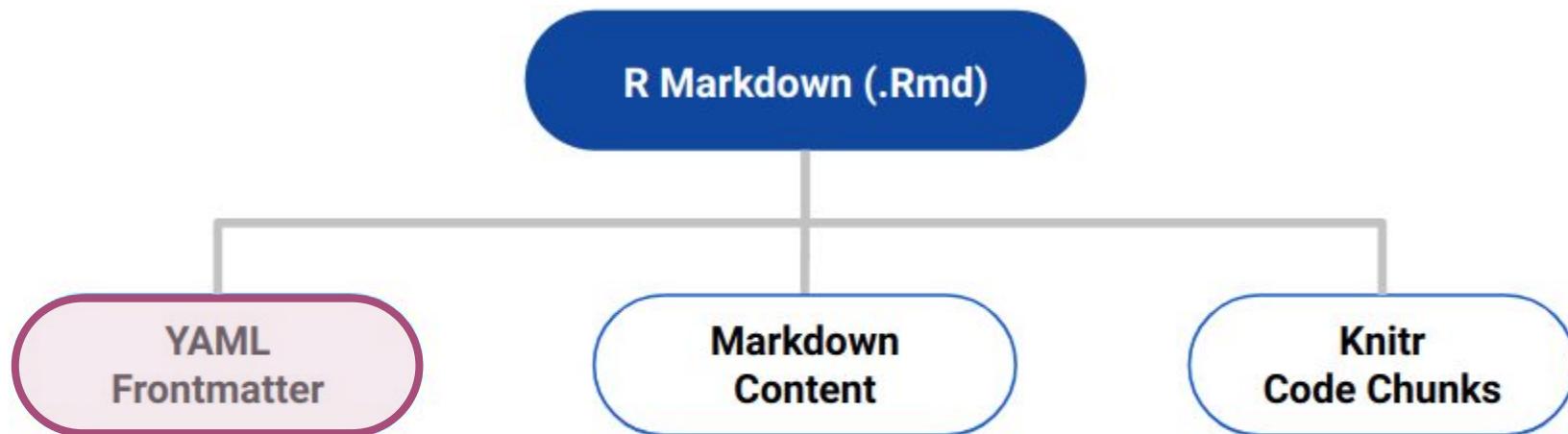
2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

YAML: Yet Another Markup Language



1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

YAML in brief

- Contains the metadata of the document
- Starts and ends by three dashes
- Comes first in the document

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Simplest Example

≡ R-Workshop / R-Workshop

The screenshot shows the R-Studio interface. The menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. The toolbar features icons for file operations like Open, Save, Print, and a Go to file/function search bar. Below the toolbar is a tab bar with 'Untitled1*' selected. The main workspace displays the following R Markdown code:

```
1 ----  
2 title: "Untitled"  
3 author: "Lisa Reiber"  
4 Date: "11.02.2021"  
5 output: html_document  
6 ----  
7 _
```

The 'Knit' button in the toolbar is highlighted with a green checkmark, indicating the document is ready to be converted.

@lisa_reiber

1. R-Studio

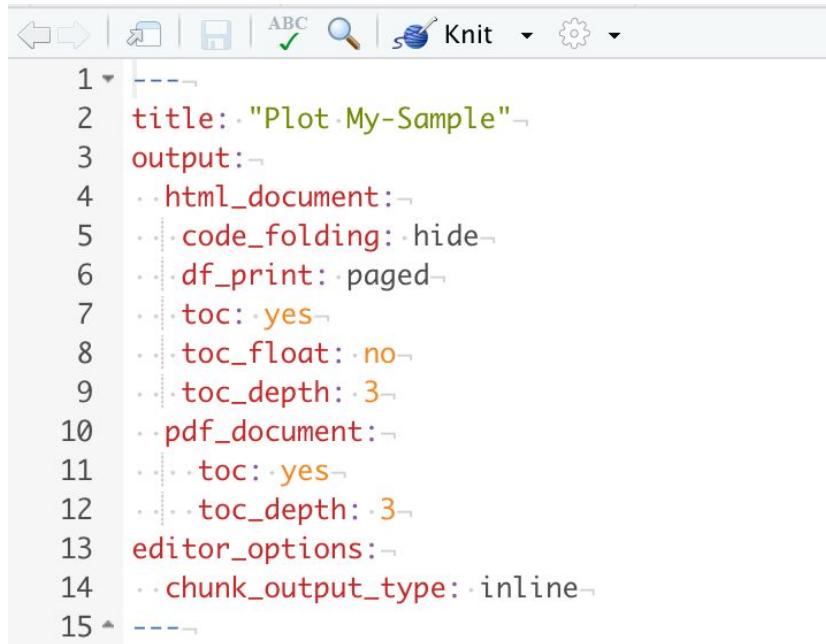
2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

But it can also look like



The screenshot shows the RStudio interface with a code editor window. The top bar includes standard file operations (New, Open, Save, Print) and a search icon. To the right of the search is a blue 'Knit' button with a knitting needle icon, followed by a dropdown menu. Below the editor, the code is displayed with color-coded syntax:

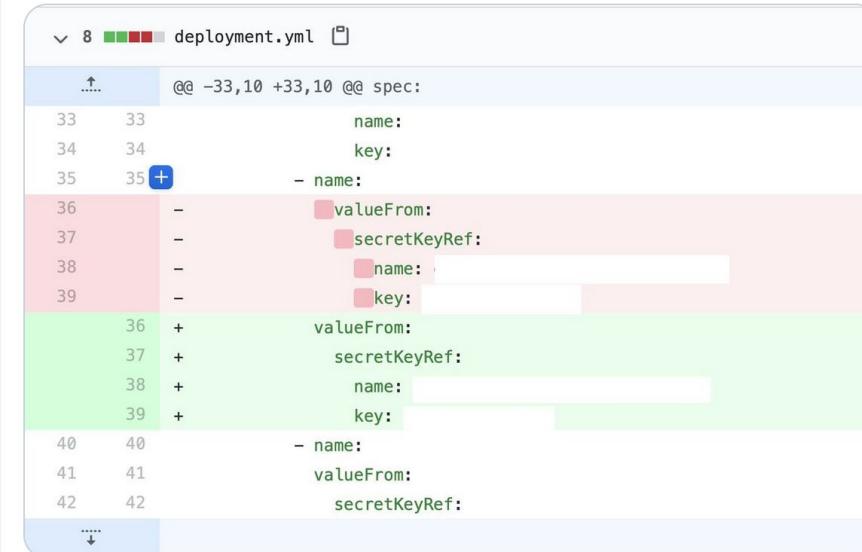
```
1 ---  
2 title: "Plot My-Sample"  
3 output:  
4   html_document:  
5     code_folding: hide  
6     df_print: paged  
7     toc: yes  
8     toc_float: no  
9     toc_depth: 3  
10    pdf_document:  
11      toc: yes  
12      toc_depth: 3  
13    editor_options:  
14      chunk_output_type: inline  
15 ---
```

YAML: be careful



Well there's two hours of my life I'll never get back 🧠
#justyamlthings

Tweet übersetzen



```
8 deployment.yml
@@ -33,10 +33,10 @@ spec:
  name:
  key:
- name:
- valueFrom:
- secretKeyRef:
- name:
- key:
+ valueFrom:
+ secretKeyRef:
+ name:
+ key:
- name:
- valueFrom:
- secretKeyRef:
```

5:06 vorm. · 10. Feb. 2021 · Twitter Web App

Some Output Formats

Untitled

Olivier Gimenez
10/25/2020

R Markdown

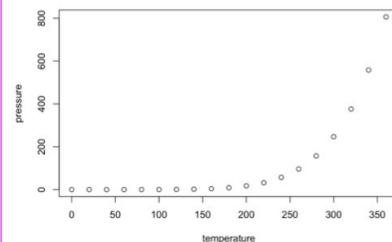
This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##   speed      dist
## Min. : 4.0  Min. :  2.00
## 1st Qu.:12.0 1st Qu.: 28.00
## Median :15.0  Median : 36.00
## Mean   :15.4  Mean   : 42.98
## 3rd Qu.:19.0 3rd Qu.: 54.00
## Max.  :25.0  Max.  :120.00
```

Including Plots



html

Untitled

Olivier Gimenez
10/25/2020

R Markdown

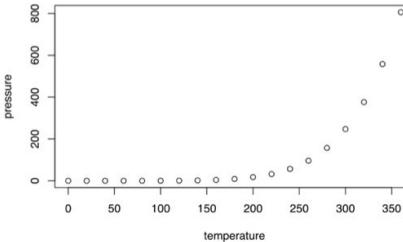
This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##   speed      dist
## Min. : 4.0  Min. :  2.00
## 1st Qu.:12.0 1st Qu.: 28.00
## Median :15.0  Median : 36.00
## Mean   :15.4  Mean   : 42.98
## 3rd Qu.:19.0 3rd Qu.: 54.00
## Max.  :25.0  Max.  :120.00
```

Including Plots



pdf

Untitled

Olivier Gimenez
10/25/2020

R Markdown

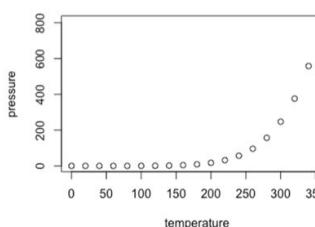
This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##   speed      dist
## Min. : 4.0  Min. :  2.00
## 1st Qu.:12.0 1st Qu.: 26.00
## Median :15.0  Median : 34.00
## Mean   :15.4  Mean   : 42.98
## 3rd Qu.:19.0 3rd Qu.: 56.00
## Max.  :25.0  Max.  :120.00
```

Including Plots



docx

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Knit



Style features (html only): Theme

- In HTML output, you can use theme or a custom .css style sheet
- theme options (see them at bootswatch.com) : "cerulean", "journal", "flatly", "darkly", "readable", "spacelab", "united", "cosmo", "lumen", "paper", "sandstone", "simplex", "yeti"

```
---
```

```
title: "Output customisation"
output:
  bookdown::html_document2:
    toc: true
    toc_float: true
    theme: darkly
  ---
```

| |
|------------------|
| 1 Test header |
| 2 Another header |
| 3 Discussion |
| 4 Conclusion |
| 5 References |

Output customisation

1 Test header

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the Knit button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

1.1 Including tables

1.2 Including plots

Layout Features: {.tabset}

- Adding `{.tabset}` after a header makes its sub-headers appear in tabs instead of standalone sections.

```
# Test header {.tabset}  
  
## Including tables  
  
(tab content)  
  
## Including plots  
  
(tab content)
```

1 Test header

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

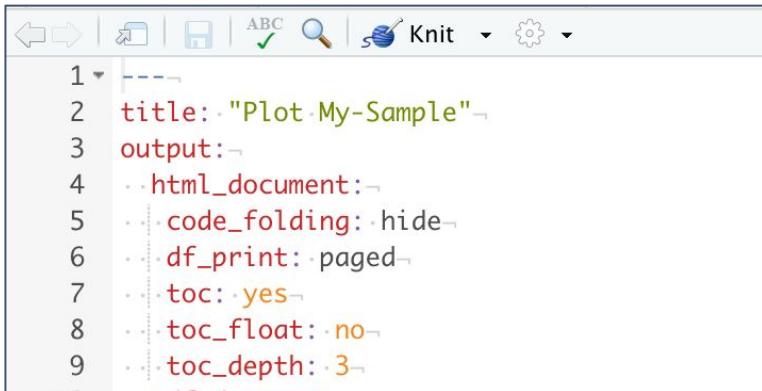
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

1.1 Including tables 1.2 Including plots

```
knitr::kable(summary(cars))
```

| speed | dist |
|------------|-------------|
| Min. : 4.0 | Min. : 2.00 |

Layout Features: Table of Contents (toc)



```
1
2 title: "Plot My Sample"
3 output:
4   html_document:
5     code_folding: hide
6     df_print: paged
7     toc: yes
8     toc_float: no
9     toc_depth: 3
```

| |
|------------------|
| 1 Test header |
| 2 Another header |
| 3 Discussion |
| 4 Conclusion |
| 5 References |

Output customisation

1 Test header

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed         dist
##  Min.   :4.0   Min.   : 2.00
##  1st Qu.:12.0  1st Qu.:26.00
##  Median :15.0  Median :36.00
##  Mean   :15.4  Mean   :42.98
##  3rd Qu.:19.0  3rd Qu.:56.00
##  Max.   :25.0  Max.   :120.00
```

1.1 Including Plots

R Markdown Reference Guide



R Markdown Reference Guide

Learn more about R Markdown at rmarkdown.rstudio.com

Learn more about Interactive Docs at shiny.rstudio.com/articles

Contents:

1. Markdown Syntax
2. Knitr chunk options
- 3. Pandoc options**

| Templates | Basic YAML | Template options | Latex options | Interactive Docs |
|-----------------------|----------------------------|-----------------------|-----------------------------|----------------------------|
| html_document | --- | --- | --- | --- |
| pdf_document | title: "A Web Doc" | title: "Chapters" | title: "My PDF" | title: "Slides" |
| word_document | author: "John Doe" | output: | output: pdf_document | output: |
| md_document | date: "May 1, 2015" | html_document: | fontsize: 11pt | slidy_presentation: |
| ioslides_presentation | output: md_document | toc: true | geometry: margin=1in | incremental: true |
| slidy_presentation | --- | toc_depth: 2 | --- | runtime: shiny |
| beamer_presentation | --- | --- | --- | --- |

Hands-on

20:00

Your Turn

- ❖ Head over to RStudio Cloud
- ❖ Let's add website features and style them

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Linking Websites

- When the YAML header becomes too long
- Turn it into its own file: make a _site.yml

Hands-on

20:00

Our Turn



Head over to RStudio Cloud



Let's add our websites together

4

Websites

Recap

- ✨ Our websites are layouted and styled
- 🧩 Our websites are linked together

Lunch Time

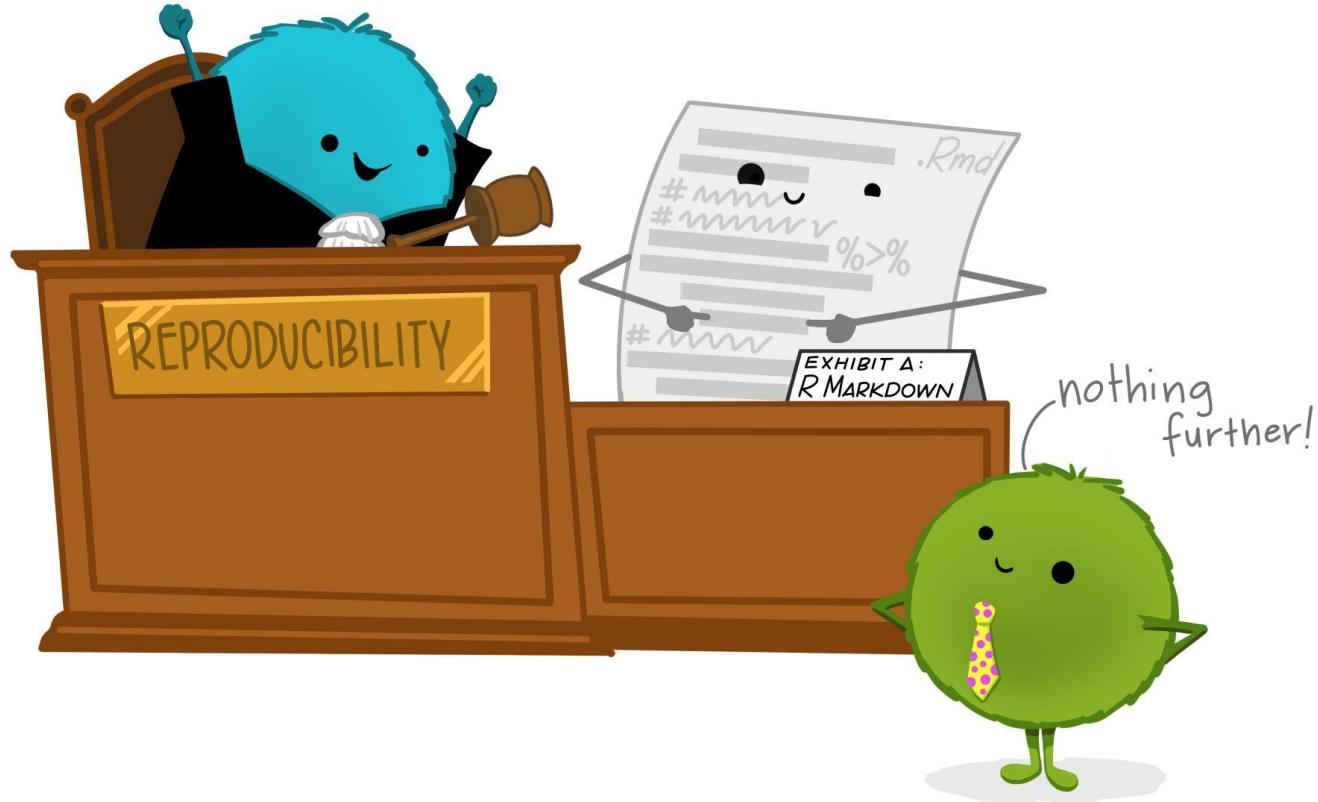
Thursday

09:00 - 10:30 Welcome & RStudio Intro
10:30 - 11:00 Break
11:00 - 12:30 R Markdown Intro
12:30 - 13:30 Lunch
13:30 - 15:00 Meta-Viz and ggplot2
15:00 - 15:30 Break
15:30 - 17:00 R Markdown: website features

Friday (half-day)

09:00 - 10:30 Git + GitHubPages
10:30 - 11:00 Break
11:00 - 12:30 Putting all the pieces together
12:30 - 13:00 Wrap-up





@allison_horst

Reproducible Research Reports

1. RStudio

2. R Markdown

Controls

Text + Code + Output

Bullets

- * bullet 1
- * bullet 2

Numbered list

1. item 1
2. item 2



Bullets

- bullet 1
- bullet 2

Numbered list

1. item 1
2. item 2

Reproducible Research Reports

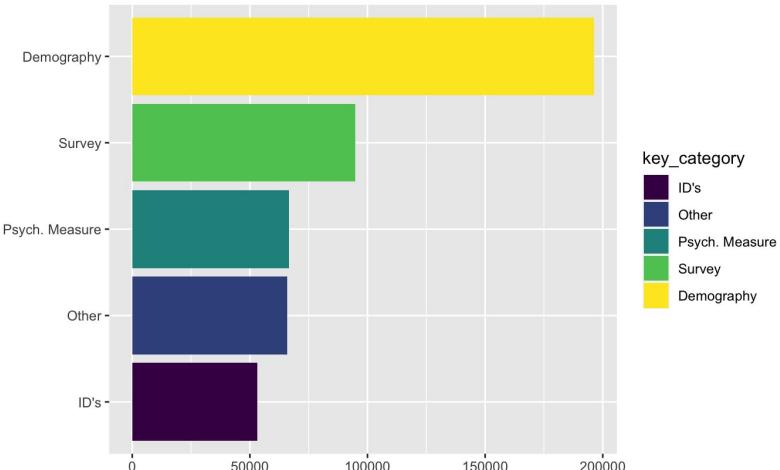
1. RStudio

2. R Markdown

3. Meta-Viz

Visualizing
Data Availability

```
```{r}
metaviz_long %>%
 drop_na(value) %>%
 count(key_category) %>%
 mutate(key_category = fct_reorder(key_category, n)) %>%
 ggplot(aes(x = key_category, y = n, fill = key_category)) +
 geom_col() +
 coord_flip() +
 labs(x = "", y = "")
````
```



Reproducible Research Reports

1. RStudio

2. R Markdown

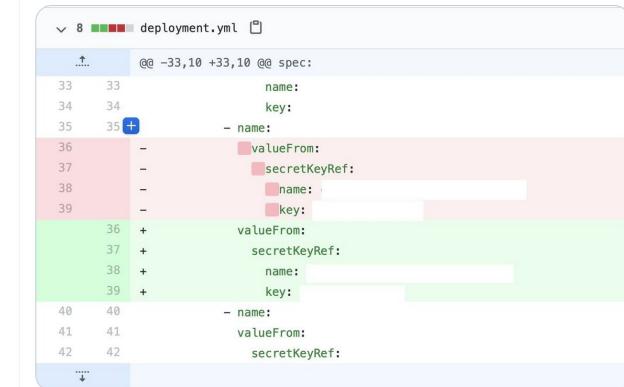
3. Meta-Viz

4. Websites

Creating websites
with R Markdown



A screenshot of a Twitter post from user **robwormald** (@robwormald). The post contains the following text:
Well there's two hours of my life I'll never get back 🤦
#justyamlthings
A blue link labeled "Tweet übersetzen" is visible at the bottom.



A screenshot of a code editor showing a YAML file named `deployment.yml`. The file contains configuration for deployment, including sections for `name:`, `key:`, and `valueFrom:` and `secretKeyRef:` fields. Lines 36 through 42 are highlighted in green, indicating additions to the file.

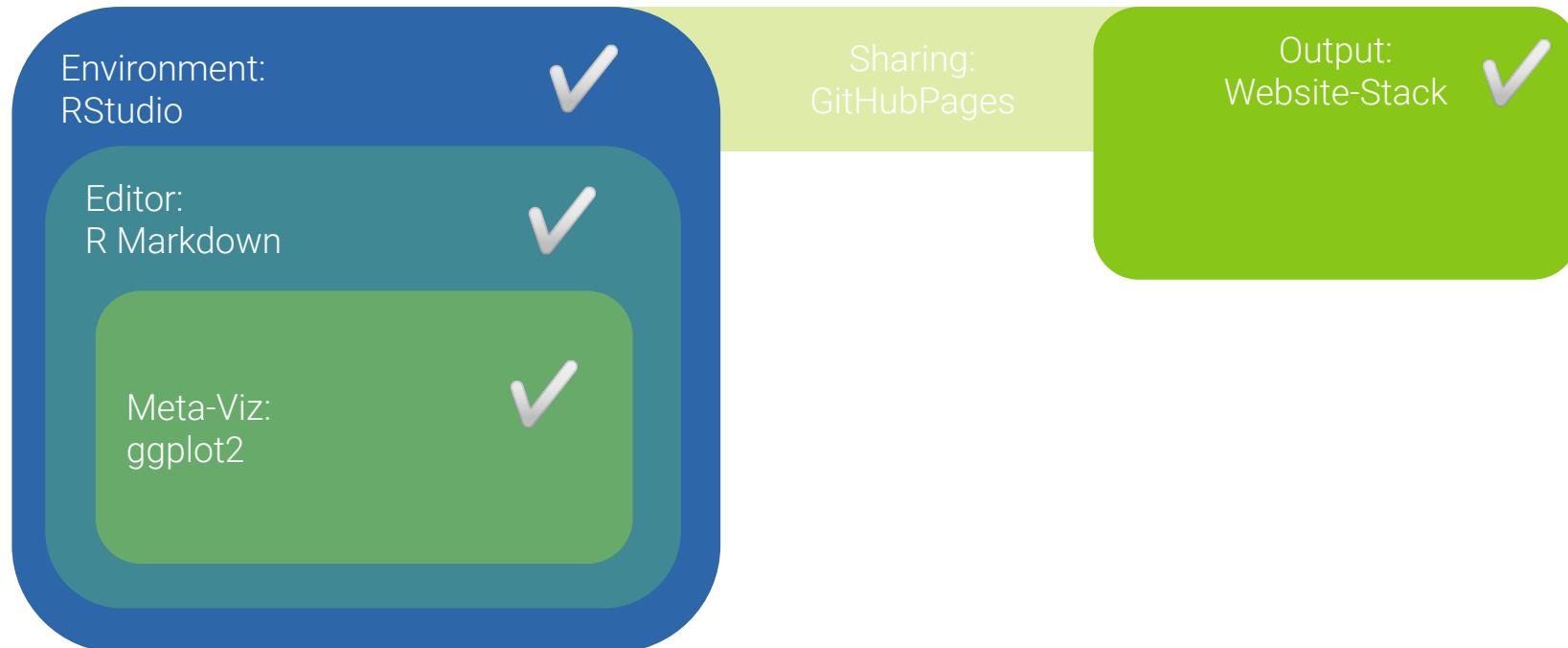
```
 8 deployment.yml
...
33 33
34 34
35 35 +
36 - name:
37 - valueFrom:
38 - secretKeyRef:
39 - name:
39 - key:
39 + valueFrom:
40 40 - name:
41 41 + secretKeyRef:
42 42 + name:
42 + key:
42 + valueFrom:
42 + secretKeyRef:
...
```

5:06 vorm. · 10. Feb. 2021 · Twitter Web App

Reproducible Research Reports



Review: Reproducible Research Reports



Lunch Time

Thursday



09:00 - 10:30 Welcome & RStudio Intro

10:30 - 11:00 Break

11:00 - 12:30 R Markdown Intro

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15:00 - 15:30 Break

15:30 - 17:00 R Markdown: website features

Friday (half-day)

09:00 - 10:30 Git + GitHubPages

10:30 - 11:00 Break

11:00 - 12:30 Putting all the pieces together

12:30 - 13:00 Wrap-up

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

In case of fire 🔥



1. git commit



2. git push



3. leave building

5

GitHubPages

Goal



Learn Git Basics & Vocabulary



Share a website via GitHubPages

Hands-on

GitHub Time



Head over to GitHub and create repositories

Git

- One version control system

GitHub

- many hosting services (e.g. BitBucket, GitLab, GitHub)
- they provide a home for your Git based projects on the internet

Git & GitHub

- Track changes on steroids
- Think Google Docs

1. R-Studio

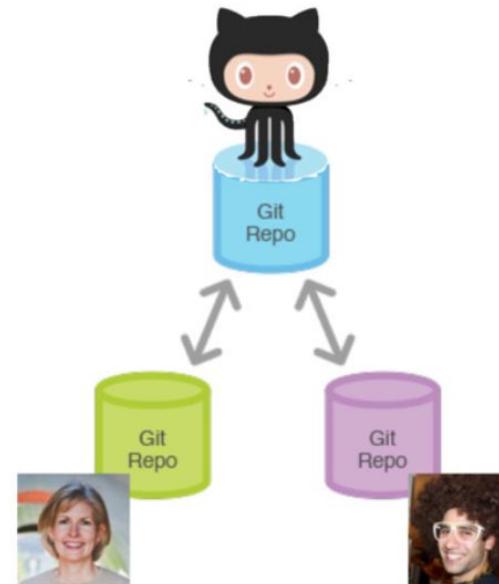
2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Git + GitHub



Why Git & GitHub?

- Exposure (Sharing Code and Analyses)
- Tracking Progress
- Collaboration

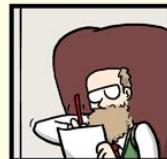
"FINAL".doc



↑ FINAL.doc!



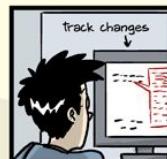
↑ FINAL_rev.2.doc



↑ FINAL_rev.6.COMMENTS.doc



↑ FINAL_rev.8.comments5.CORRECTIONS.doc



↑ FINAL_rev.18.comments7.corrections9.MORE.30.doc



↑ FINAL_rev.22.comments49.corrections.10.#@\$%WHYDID
ICOMETOGRAD SCHOOL?????.doc



WWW.PHDCOMICS.COM

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Git vocabulary: repo(sitory)

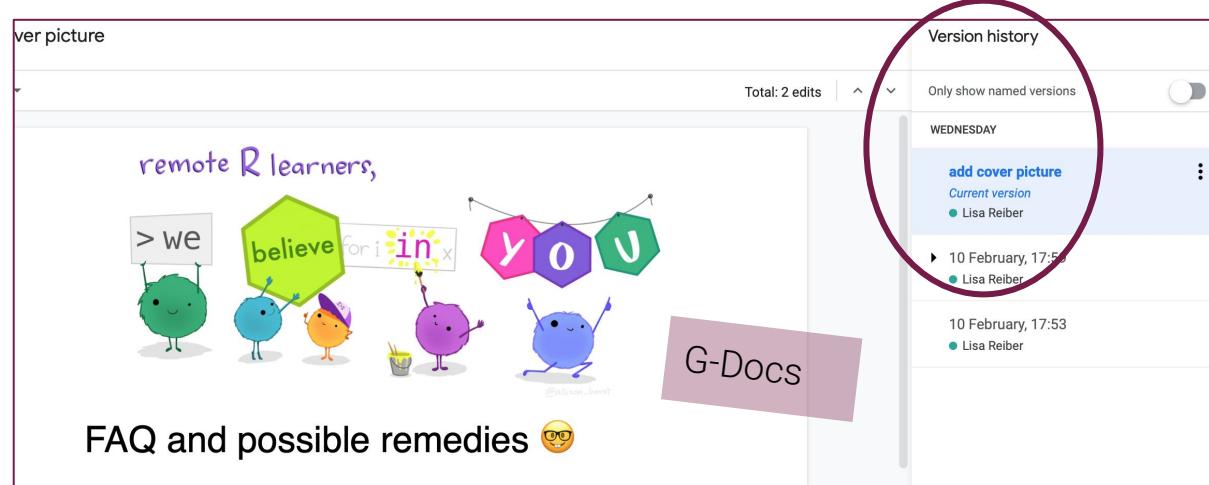
The screenshot shows a GitHub repository page for 'lisallreiber / R-workshop-git'. The repository is labeled as a 'Template'. The main navigation bar includes links for Code, Issues, Pull requests, Actions, Projects, Wiki, Security, Insights, and Settings. Below the navigation bar, there are buttons for 'main' (with a dropdown arrow), '1 branch', '0 tags', 'Go to file', 'Add file', 'Code', and 'Use this template'. The 'About' section on the right describes the repository as a template for learning git within an R-Workshop, containing files for building a website with two pages (index and template-analysis). It also lists a 'Readme' and an 'MIT License'. A large table below the navigation bar lists the commit history:

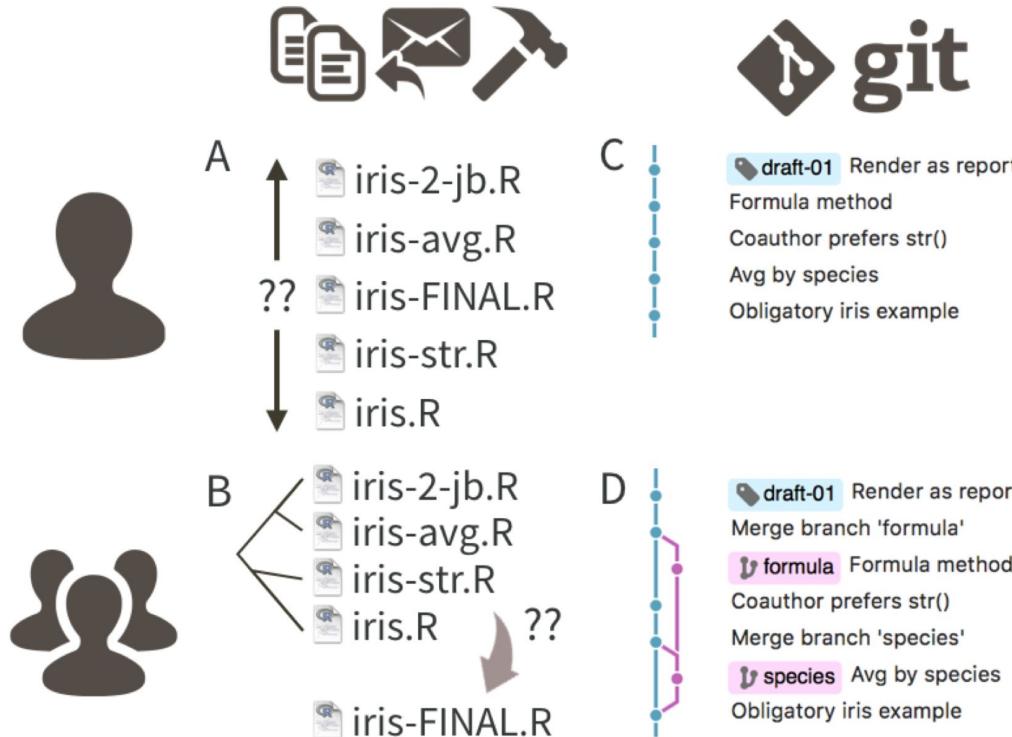
| Commit | Message | Date | Time Ago |
|------------------------------------|-----------------------|---------|-------------|
| lisallreiber adjust template files | add template content | 06e0b66 | 4 hours ago |
| data | adjust template files | | 5 hours ago |
| docs | Initial commit | | 4 hours ago |
| .gitignore | Initial commit | | 5 hours ago |
| 00_packages.R | adjust template files | | 4 hours ago |
| LICENSE | Initial commit | | 5 hours ago |
| README.md | Initial commit | | 5 hours ago |

@lisa_reiber

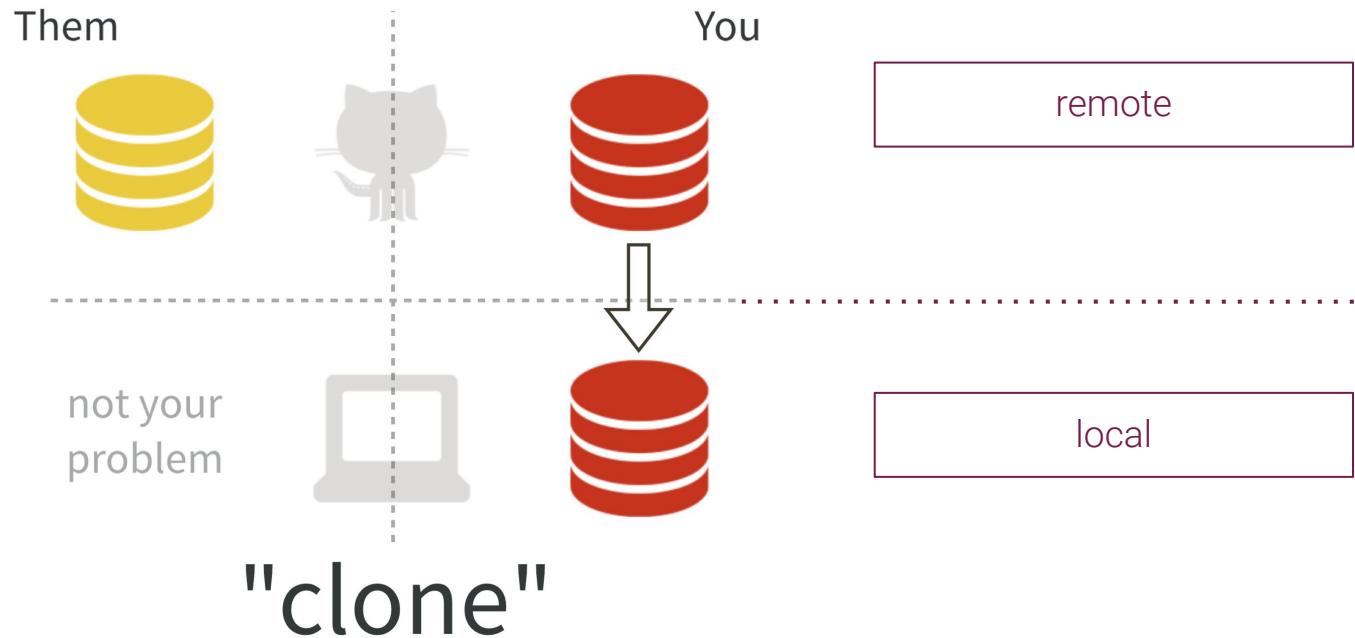
Git vocabulary: commits

- **Commits** are how files evolve
- **Commit messages** are short descriptions of what changed or why it changed





Git vocabulary: clone



1. R-Studio

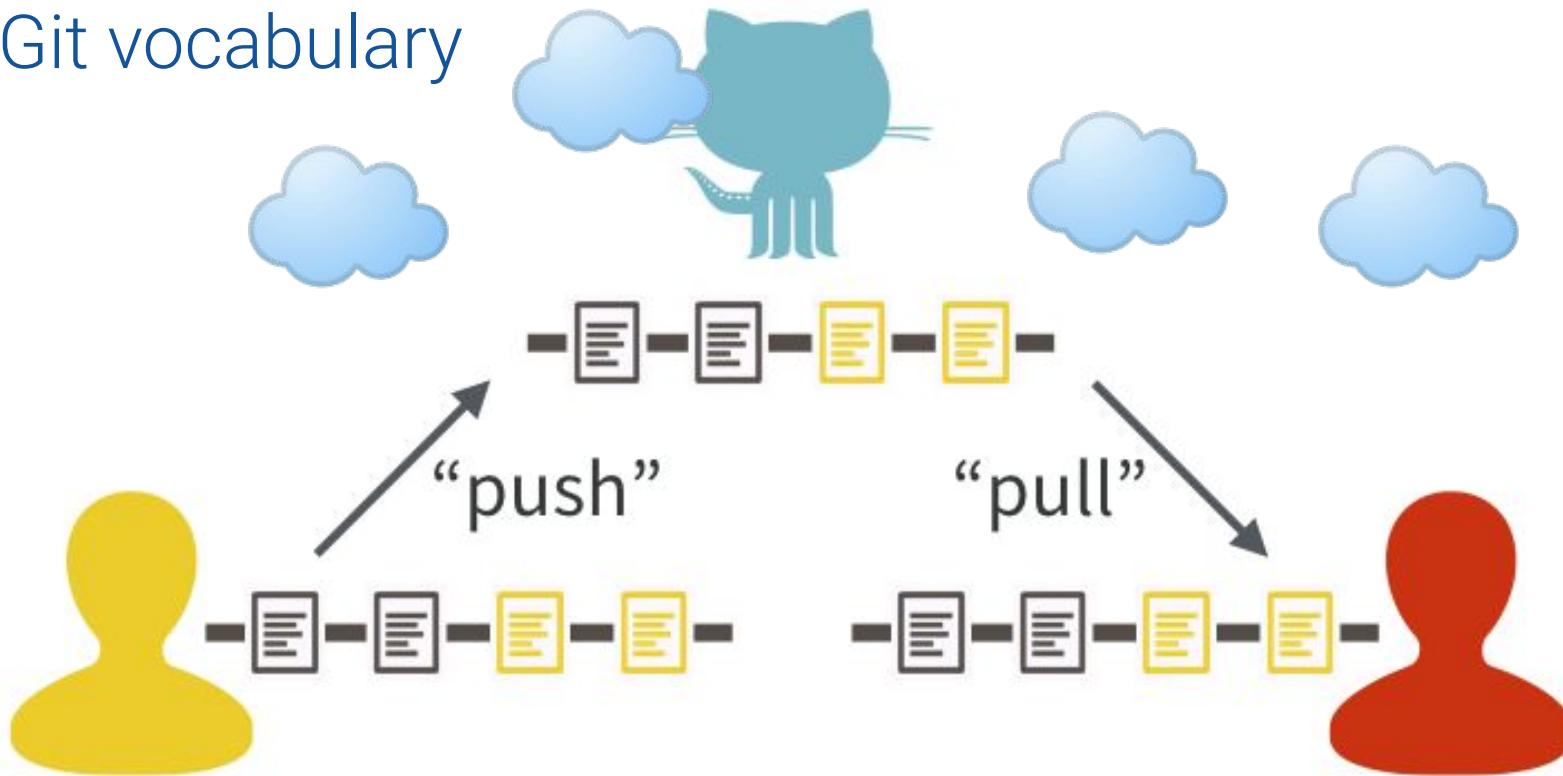
2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Git vocabulary



1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Diff's

Indicate
the change
from one commit
to the next

The screenshot shows a GitHub commit page for a repository named 'cshop'. The commit message is circled in red and reads: "✓ make dataset smaller // add resources". The commit was made by 'Jane Doe' 2 hours ago. It has 1 parent commit, b1e8199, with a commit hash of 9f65c82de3042ce2dbca244c8bdd1c1afcb07baf. The commit details show 2 changed files with 4 additions and 0 deletions. One file, 'data-processed/metaviz_long.rds', is a binary file. The main content of the commit is a diff of the 'docs/README.md' file. A large red arrow points from the circled commit message down to the diff area. The diff highlights several additions in green, including sections on Data Viz, Git, and Cheatsheets.

```
diff --git a/docs/README.md b/docs/README.md
@@ -99,6 +99,7 @@ Here you can find a list of resources specifically to the topics we cover in the
 99  99  - [YAML Options Overview](https://zsmith7.github.io/rmarkdown_crash_course/lesson-4-yaml-headers.html)
100 100  - [Parameterized Reports](https://zsmith7.github.io/rmarkdown_crash_course/lesson-7-parameterized-reports.html)
101 101  - [Overview of all R Markdown formats](https://rmarkdown.rstudio.com/formats.html)
102 + - [Rendering .R scripts with the rmarkdown package](https://rmarkdown.rstudio.com/articles_report_from_r_script.html)
103 103
104 104 ###### Data Viz
105 105 - [TidyTuesday Live Coding from David Robinson](https://www.youtube.com/watch?v=WxKSauh0Y4g)
106 106
107 107 @@ -110,6 +111,9 @@ Here you can find a list of resources specifically to the topics we cover in the
110 111  - [Happy Git & GitHub for the useR](http://happygitwithr.com/) (bookdown site, hilarious)
111 112  - [List of Git Tutorials and Documentation](https://git-scm.com/doc/ext)
112 113  - [Git: The Simple Guide](https://rogerdudler.github.io/git-guide/index.html)
113 114  + - [What is a fork?](https://docs.github.com/en/github/getting-started-with-github/fork-a-repo)
114 115  + - [How to create a new repository?](https://docs.github.com/en/github/getting-started-with-github/create-a-repo)
115 116  + - [How to create a GitHubPages Website?](https://docs.github.com/en/github/working-with-github-pages/creating-a-github-pages-site)
116 117
117 118
118 119 ###### Cheatsheets
119
```

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Git vocabulary

- Repo(sitory)
- Commits / Commit Message
- Clone
- Push / Pull
- Diff

Hands-on

GitHub Time



Head over to GitHub



Let's connect the repository to RStudio Cloud

Git & R-projects: Recommended Workflow

1. Set up a GitHub repository. ✓
2. Create an R-project connected to the GitHub repository
3. Develop R-scripts
4. Push and pull project changes to and from GitHub

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

Copy the URL of YOUR repo

your username your repo-name
~~lisallreiber / R-workshop-git~~ Template

Unwatch 1 Star 0 Fork 0

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

main 1 branch 0 tags

lisallreiber adjust template file

Clone

HTTPS SSH GitHub CLI

<https://github.com/lisallreiber/R-workshop-git>

Use Git or checkout with SVN using the web URL.

Open with Codespaces

Open with GitHub Desktop

Download ZIP

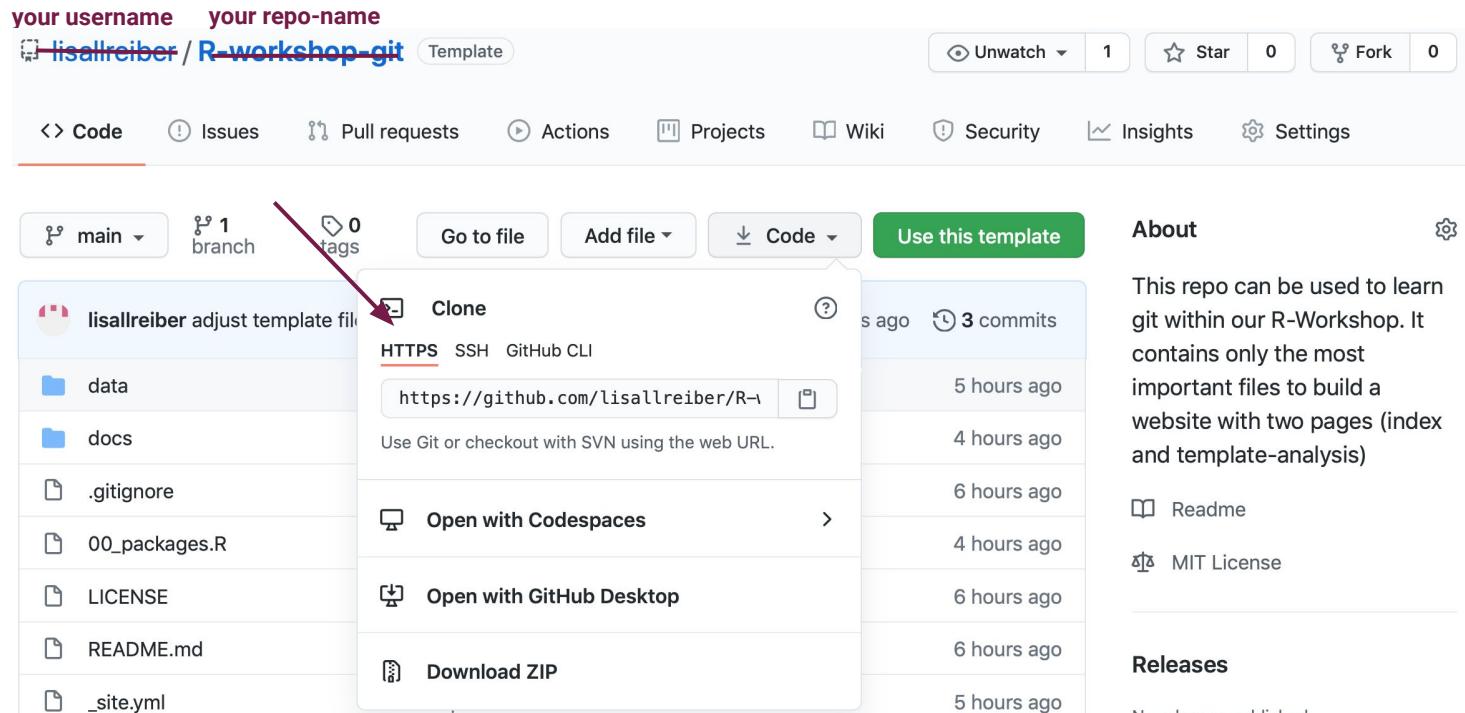
About

This repo can be used to learn git within our R-Workshop. It contains only the most important files to build a website with two pages (index and template-analysis)

Readme

MIT License

Releases



@lisa_reiber <https://speakerdeck.com/jennybc/happy-git-and-github-for-the-user?slide=86>

Hands-on

05:00

Challenge



Make a GitHub website in 5 minutes

How to use the R-workshop template

The screenshot shows a GitHub repository page for 'lisallreiber / R-workshop-git'. The repository is labeled as a 'Template'. The main navigation bar includes links for Code, Issues, Pull requests, Actions, Projects, Wiki, Security, Insights, and Settings. Below the navigation bar, there are buttons for main (1 branch), tags (0), Go to file, Add file, and a green 'Use this template' button. The repository has 1 commit by 'lisallreiber' with the message 'adjust template files'. The commit was made 4 hours ago. The commit history also includes 'Initial commit' for '.gitignore', '00_packages.R', 'LICENSE', and 'README.md'. The 'About' section describes the repository as a template for learning git within an R-Workshop, containing files to build a website with two pages. It also links to Readme and MIT License. The 'Releases' section is currently empty.

lisallreiber / R-workshop-git Template

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

main 1 branch tags Go to file Add file Use this template

lisallreiber adjust template files 06e0b66 4 hours ago 3 commits

| File | Message | Time |
|---------------|-----------------------|-------------|
| data | add template content | 5 hours ago |
| docs | adjust template files | 4 hours ago |
| .gitignore | Initial commit | 5 hours ago |
| 00_packages.R | adjust template files | 4 hours ago |
| LICENSE | Initial commit | 5 hours ago |
| README.md | Initial commit | 5 hours ago |

About

This repo can be used to learn git within our R-Workshop. It contains only the most important files to build a website with two pages (index and template-analysis)

Readme

MIT License

Releases

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

5. GitHubPages

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your username

lisallreiber / R-workshop-git

Template

Unwatch ▾ 1

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Code

Issues

Pull requests

Actions

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Wiki

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Insights

Settings

main

1 branch

0 tags

Go to file

Add file ▾

Code ▾

Use this template

About



This repo can be used to learn git within our R-Workshop. It contains only the most important files to build a website with two pages (index and template-analysis)

Readme

MIT License

Releases

No releases published

Clone

HTTPS SSH GitHub CLI

<https://github.com/lisallreiber/R-workshop-git>



Use Git or checkout with SVN using the web URL.

Open with Codespaces



Open with GitHub Desktop



Download ZIP

@lisa_reiber <https://speakerdeck.com/jennybc/happy-git-and-github-for-the-user?slide=86>

1. R-Studio

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R-Workshop

Sharing:
GitHubPages

The website is made up by RMarkdown generated .html files

index.html

Each website needs a “homepage”. GitHub Pages expects the contents of the homepage to be found in the index.html. Don't forget to generate it.

docs/

in your Git repository, make sure to have a folder that contains all of your generated html files. This is the folder that GitHub Pages reads in order to display your website.

This file contains your default YAML code for all R markdowns in the same folder. It defines the look of the website, the content of the header and which website is displayed where.

_site.yml

You can create the content (text, graphs, links etc) with R-Markdown scripts. Set the output to html_document.

Editor:
R-Markdown

5

GitHubPages

Recap

- ✓ We created a github repository
- 🤓 We know “commit, push and pull”
- ☁️ We shared a website via GitHubPages

6

Theme oriented groups

Theme oriented groups

1. Keep working on git
2. Revisit RMarkdown - Plots
3. Revisit RMarkdown - Websites
4. Other?

Use the resources:

<https://lisallreiber.github.io/R-Workshop/>

Lunch Time

Thursday

09:00 - 10:30 Welcome & RStudio Intro

10:30 - 11:00 Break

11:00 - 12:30 R Markdown Intro

12:30 - 13:30 Lunch

13:30 - 15:00 Meta-Viz and ggplot2

15:00 - 15:30 Break

15:30 - 17:00 R Markdown: website features

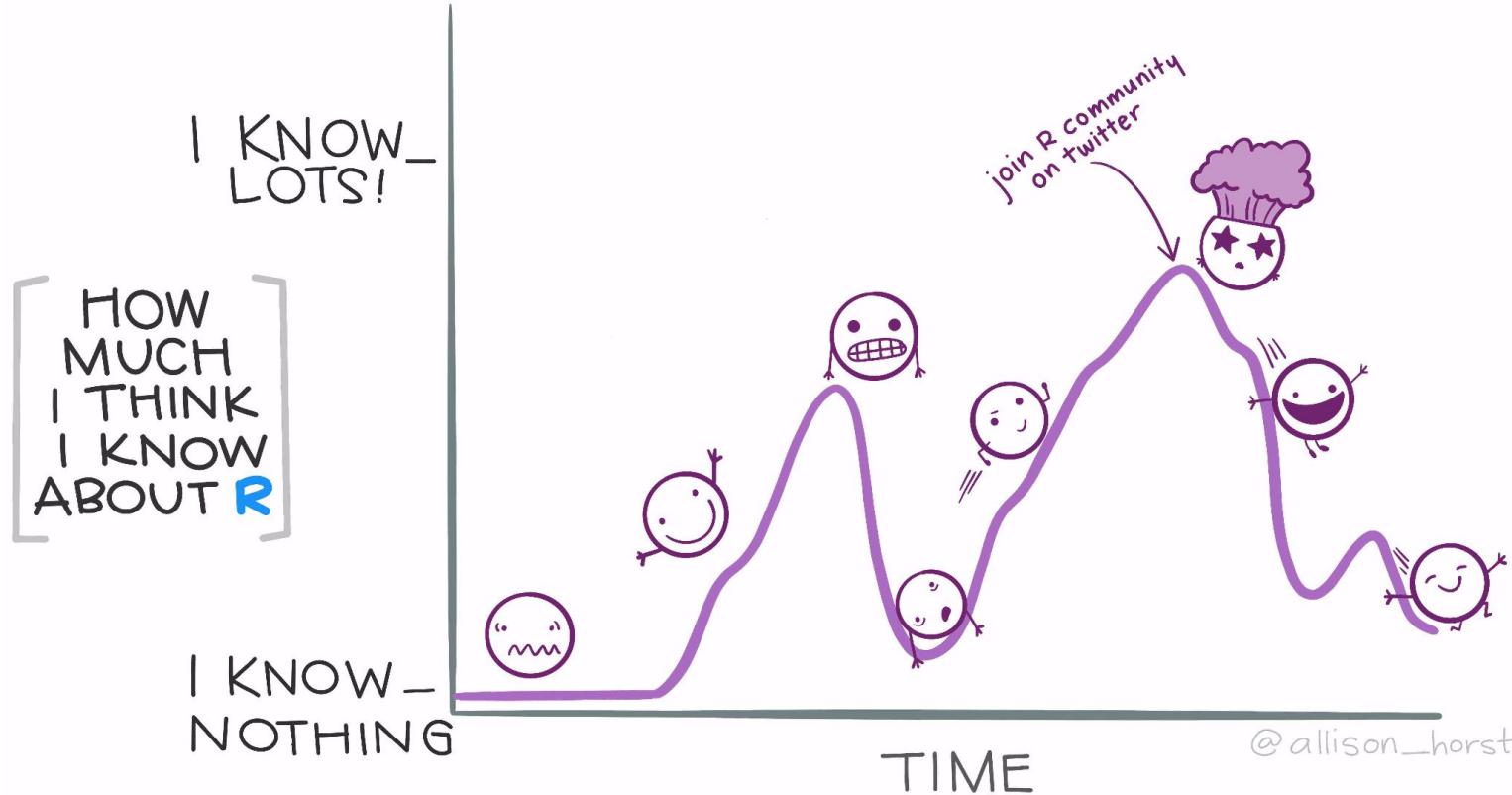
Friday (half-day)

09:00 - 10:30 Git + GitHubPages

10:30 - 11:00 Break

11:00 - 12:30 Putting all the pieces together

12:30 - 13:00 Wrap-up





Reproducible Data Availability Visualization with GitHub Pages

University of Basel: February 11th-12th 2021

Lisa Reiber
 @lisa_reiber

Credits

Some of the workshop materials are modifications of the following resources

[Kara Woo, Jenny Bryan, and Jim Hester's Rstudio::conf\(2020\)](#)

[RStudio Webinar](#)

[Olivier Gimenez's R Markdown Talk](#)

[Ulrik Lyngs' R Markdown Workshops](#)

[Aaron Peikert's Repro Workshop](#)

[Jenny Brian's Talk Happy Git and GitHub for useR](#)

Illustrations

[Allison Horst](#)

[unsplash](#)

[giphy](#)

[9gag](#)

Virtual Environment

[RStudioCloud](#)

[gather.town](#)

1. R-Studio

2. R-Markdown

3. Meta-Viz

4. Websites

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Template

- Template Text
- Second Row

YAML Recap

Add picture of YAML, highlight the parts and explain again what they are doing

Make a slide with _site.yml and YAML header, different examples

Ask what will be the output?

Do you remember the first code chunk with the options that set the default for all other chunks?

Its the same with the YAML code in the .yml file. It sets the default for all the websites.

- What do you think makes sense to add to the .yml file and what is better defined in the RMarkdown file itself?
 - Theme
 - Author, date
 - Navigation bar

The screenshot shows the RStudio IDE interface with the following details:

- File Menu:** File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help.
- Toolbar:** Includes icons for New, Open, Save, Print, Go to file/function, Addins, and various document-related functions.
- Code Editor:** The main workspace displays the following R Markdown code:

```
1 ----  
2 title: "Untitled"  
3 author: "Lisa Reiber"  
4 Date: "11.02.2021"  
5 output: html_document  
6 ----  
7  
8 ```{r setup, include=FALSE}  
9 knitr::opts_chunk$set(echo = TRUE)  
10```  
11  
12 ## R Markdown  
13  
14 This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see  
http://rmarkdown.rstudio.com.  
15  
16 When you click the Knit button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:  
17  
18 ```{r cars}  
19 summary(cars)  
20```  
21  
22 ## Including Plots  
23  
24 You can also embed plots, for example:  
25
```
- Status Bar:** Shows the current file is '# Untitled' and the mode is 'R Markdown'.
- Page Number:** The page number 138 is located in the bottom right corner.

Additional Slides

Working with data



```
"~/mm/nope.csv"  
setwd( "/haha/good/luck/" )  
setwd( 'c:\iamyournightmare\!' )  
setwd( "C:\user\oh\no" )  
setwd( "path/that/only/works/on/my/machine" )
```



```
mockdata <- read_csv(  
  here::here("data/mockdata.csv")  
)
```

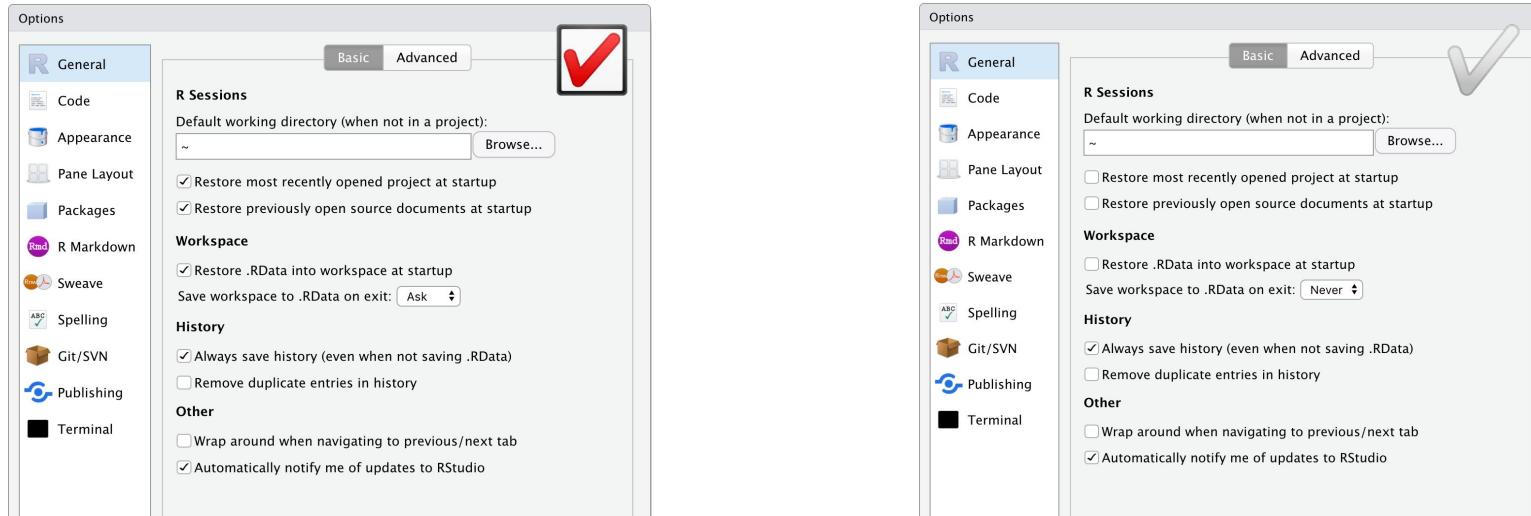


Where to get help

- Resources within RStudio: Help > Cheatsheets
- Stackoverflow
- Your local Corralaid Chapter
- Try turning it on and off again

Bonus tip: Global and Project options

- It's a good idea to stop RStudio from saving and restoring your workspace state.
- Set this in Tools > Global Options... || Tools > Project Options...



Workflow

Use R projects

JB's naming advice

`data/data-raw/`

Import → **Tidy** →

`data_tidying.Rmd`

`data/data-processed/`

Alison Hill's style:

```
{r load_scripts, include=FALSE}  
source('scripts/01-import.R')  
source('scripts/02-clean-names.R')  
source('scripts/03-tidy.R')  
etc.
```

