A UNIFIED APPROACH FOR WRITING AUTOMATIC REPORTS

Parameterization and Generalization of R-Markdown

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02_Basics

Rmd: what is it?

Authoring framework for **data science**

Can be used to

- **Save** and **run** code
- Generate *high* **quality reports**

Both *computing code* and *description* in *same document*

Results are **automatically generated** from source code

Rmd: Why?

- Mix text and code chunks
- Customizable layout
- Personal website
- Personalized reports
- Interactive plots allowed
- Books
- Other languages friendly:
  - Python
  - SQL
  - C++
  - ...

Rmd: Why?

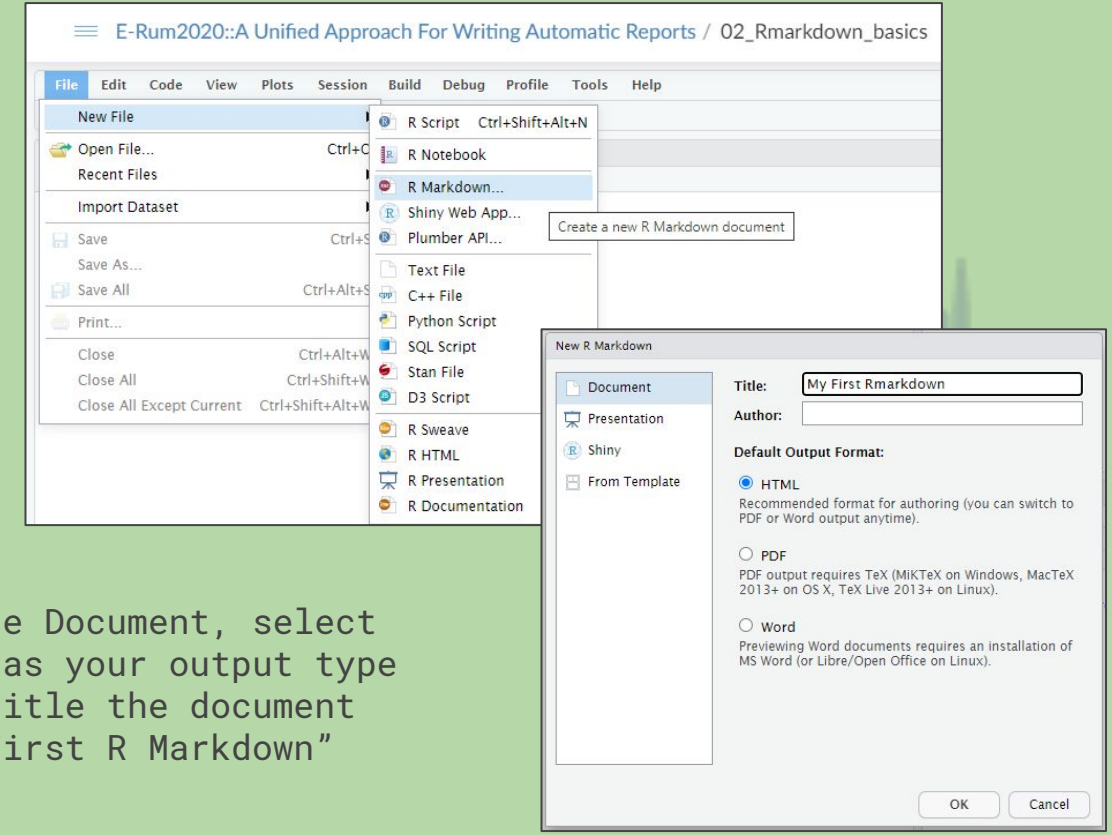
- Mix text and code chunks
- Customizable layout
- Personal website
- Personalized reports
- Interactive plots allowed
- Books
- Other languages friendly:
  - Python
  - SQL
  - C++
  - ...

...and much more..

Your turn: Exercise 1

Create your first R Markdown document

1. Select New File from the File Menu

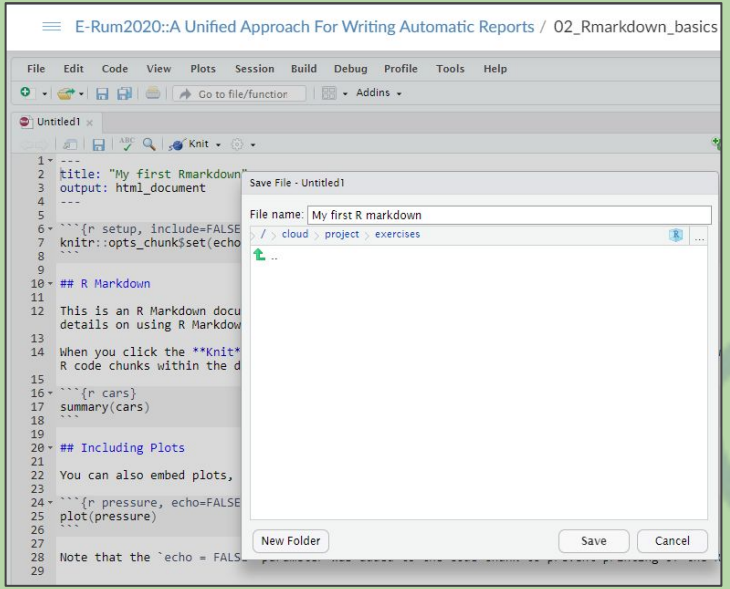


2. Choose Document, select HTML as your output type and title the document "My First R Markdown"

Time: 5 min

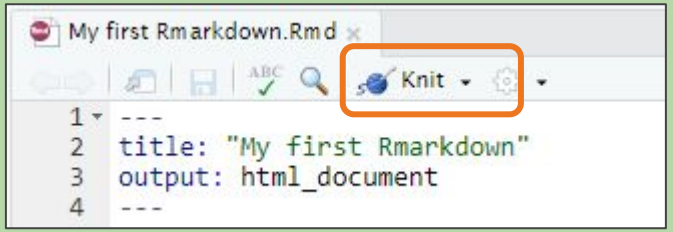
Your turn: Exercise 1

Create your first R Markdown document



3. Save File in "exercise" folder as "My First Markdown"

4. Knit the document



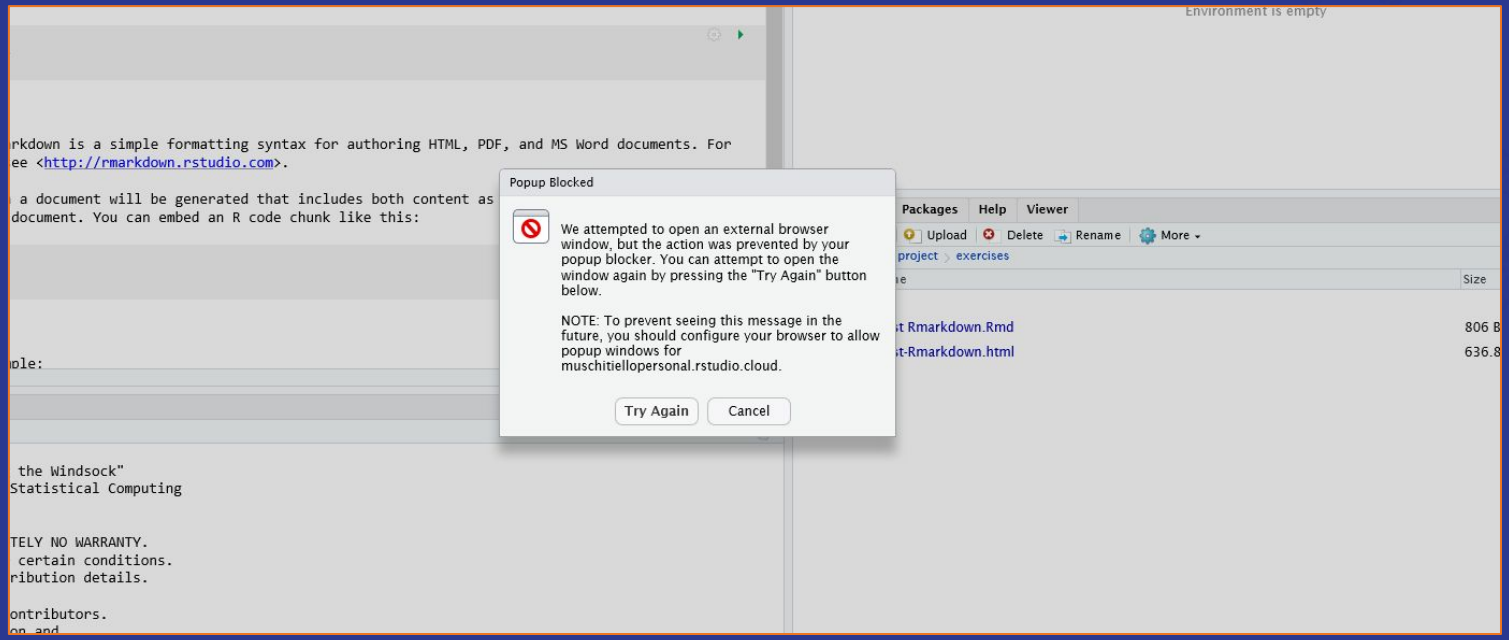
5:00

Time: 5 min

Your turn: Exercise 1

Create your first R Markdown document

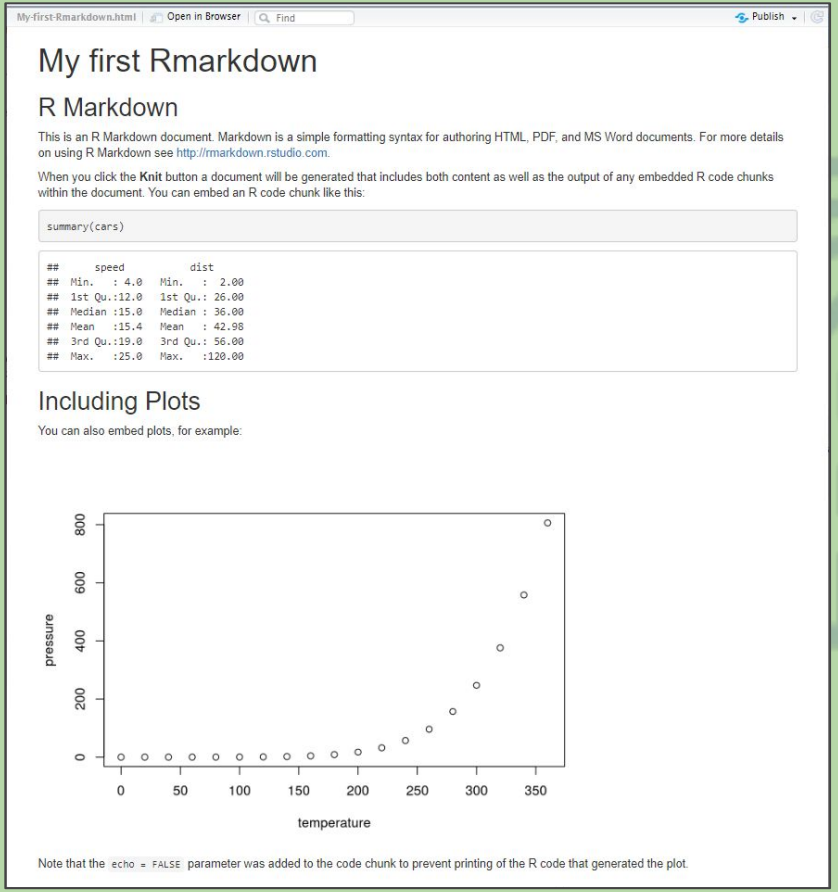
Don’t Panic!!!! Click “Try Again” and it should be fine!



Your turn: Exercise 1

Create your first R Markdown document

Output



Time: 5 min

See what's underneath

Three main components in Rmd:

1. Metadata
2. Text
3. Code

1. Metadata: the YAML header

```
---
title: "My first Rmarkdown"
output: html_document
---
```

Written between the three dashes

Written in YAML (YAML Aint Markup Language)*

Sources:
https://en.wikipedia.org/wiki/YAML

1. Metadata: the YAML header

```yaml
---
title: "My First Markdown"
output: html_document
author: "Nick Stamboglis"
date: "`r format(Sys.time(), '%e %B %Y')`"
link-citations: yes
---
```

- ➔ Safer to always quote
- ➔ Indentation matters
- ➔ Options available
- ➔ Logicals allowed

Source:
https://bookdown.org/yihui/bookdown/r-markdown.html
https://holtzy.github.io/Pimp-my-rmd/

2. Text

```
# Header 1

## Header 2

### Header 3

*italics* or _italics_

**bold** or __bold__

`inline code`

[links](https://github.com/muschitiello)

etc.

Lists:

* Item 1
* Item 2
    + Item 2a
    + Item 2b

1. Item 1
2. Item 2
3. Item 3

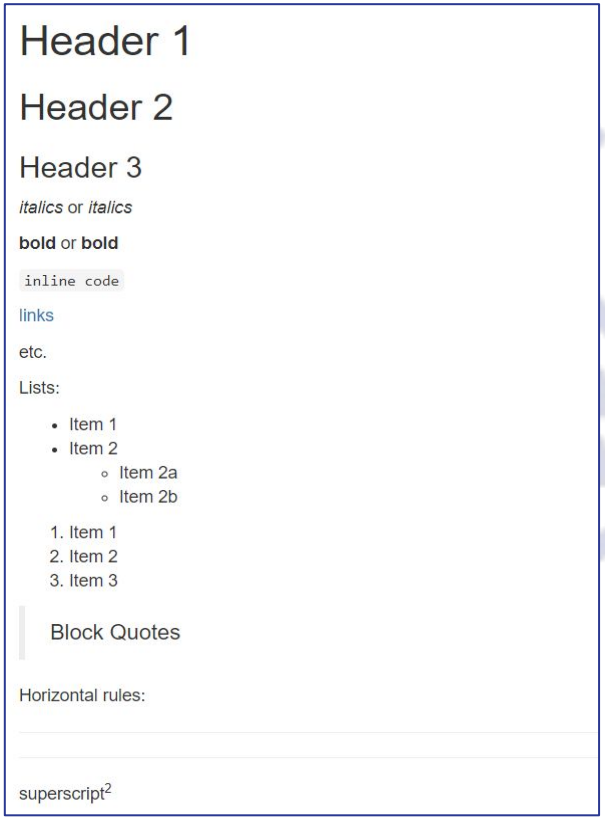
> Block Quotes

Horizontal rules:

***

---

superscript^2^
```



2. Mathematics

```
# Inline math code

Inline LaTeX equations can be written in a pair of dollar signs
using the LaTeX syntax, e.g., `$\lim_{x \to \infty} f(x)$` (actual
output:$\lim_{x \to \infty} f(x)$)

# Centered math code

Math expressions of the display style can be written in a pair of
double dollar signs, e.g., `$$x_{1} + x_{2} + \cdots + x_{n}$$`,
and the output looks like this:

$$x_{1} + x_{2} + \cdots + x_{n}$$
```

LaTeX Friendly

Inline math code

Inline LaTeX equations can be written in a pair of dollar signs using the LaTeX syntax, e.g., `$\lim_{x \to \infty} f(x)$` (actual output:$\lim_{x \to \infty} f(x)$)

Centered math code

Math expressions of the display style can be written in a pair of double dollar signs, e.g., `$$x_{1} + x_{2} + \cdots + x_{n}$$`, and the output looks like this:

$$x_1 + x_2 + \cdots + x_n$$

Click here for Suggestions for the use of mathematics in Rmarkdown

3. Code

```
# Inline code

Today is `r format(Sys.time(), '%e %B %Y')`.

# Code Chunks

You can easily add a code chunk by clicking **Ctrl + Alt + I**
```{r, include = TRUE}

# Appearing Code
summary(cars)

```

Chunk Options

Chunk output can be customized with knitr options arguments set in the {} of a chunk header. The most common options are:

 - `include = FALSE` prevents code and results from appearing in the finished file. R Markdown still runs the code in the chunk, and the results can be used by other chunks.
 - `echo = FALSE` prevents code, but not the results from appearing in the finished file. This is a useful way to embed figures.

For a complete list see [R Markdown reference guide](https://rstudio.com/wp-content/uploads/2015/03/rmarkdown-reference.pdf?_ga=2.116435842.520650959.1591111953-1268727786.1573311084)
```

Inline code

Today is 2 June 2020.

Code Chunks

You can easily add a code chunk by clicking **Ctrl + Alt + I**

```
# Appearing Code
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
```

Chunk Options

Chunk output can be customized with knitr options arguments set in the {} of a chunk header. The most common options are:

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For a complete list see R Markdown reference guide

R Markdown Reference Guide

3. Code (bonus tip)

````
---

```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
```

## 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:

```{r cars}
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

## Including Plots
````

Code chunks can be run before knitting to debug and preview

R Markdown Reference Guide

4. And more ....

- Images
- Bibliography
- Citations
- ...

Your turn: Exercise 2

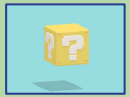
02_Rmarkdown_components.Rmd

Add or change components in Rmarkdown

Add equation of the "mean" in exercise 2:

```
56
57 ### Equation of the *mean*
58
59 $$\bar{x} = \frac{1}{n} \sum_{i=1}^{n}x_{i}$$
60
```

$$\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$$



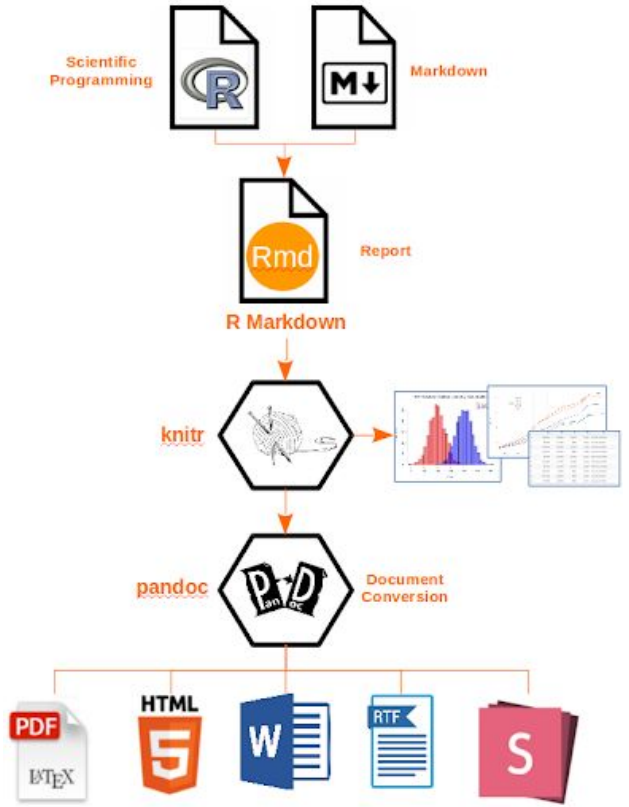
Time: 5 min

Output formats

Multiples formats

- HTML
- PDF
- Word
- Slides
- Latex document
- Dashboards
- Website

… and more!



Sources:
https://bookdown.org/yihui/bookdown/r-markdown.html

Your turn: Exercise 3

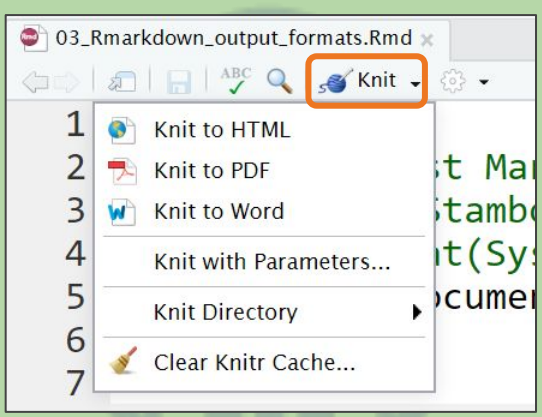
03_Rmarkdown_output_formats.Rmd

Knit in different output formats

```yaml
---
title: "My First Markdown"
author: "Nick Stamboglis"
date: "`r format(Sys.time(), '%e %B %Y')`"
output: pdf_document
---
```

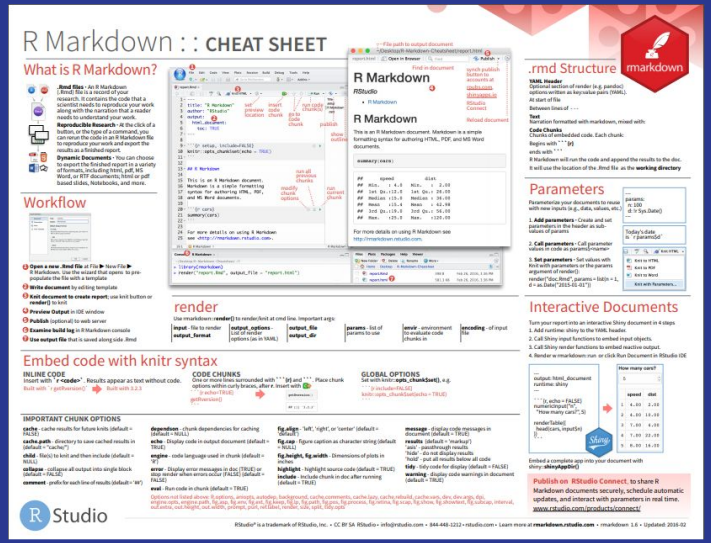
```yaml
---
title: "My First Markdown"
author: "Nick Stamboglis"
date: "`r format(Sys.time(), '%e %B %Y')`"
output: word_document
---
```

```yaml
---
title: "My First Markdown"
author: "Nick Stamboglis"
date: "`r format(Sys.time(), '%e %B %Y')`"
output: html_document
---
```

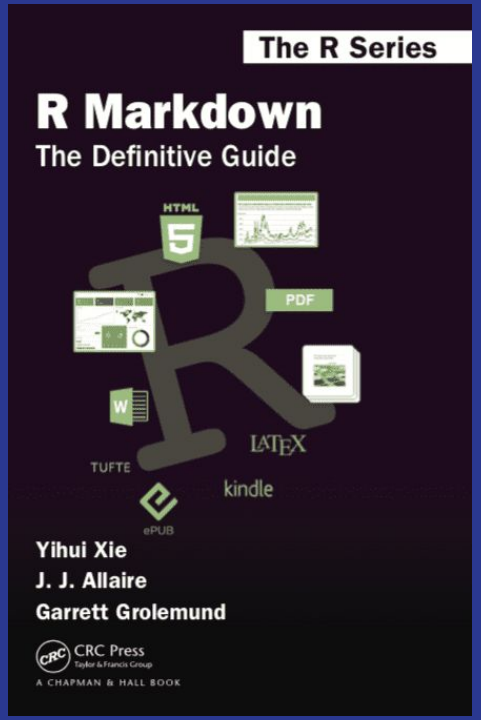


Time: 5 min

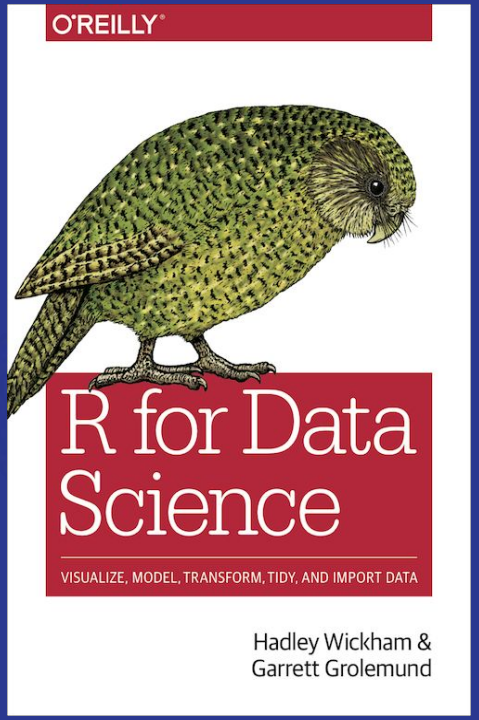
Resources:



R Markdown Cheat Sheet



R Markdown The Definitive Guide



R for Data Science

Questions

Next up: Parametrization

Source: giphy.com