

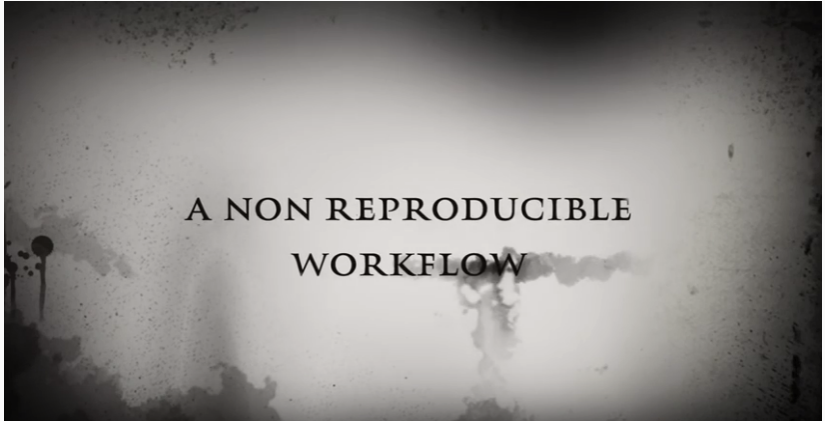
# Reproducible dynamic documents with Rmarkdown

---

Francisco Rodríguez-Sánchez

<https://frodriguezsanchez.net>

A scary movie... with happy ending

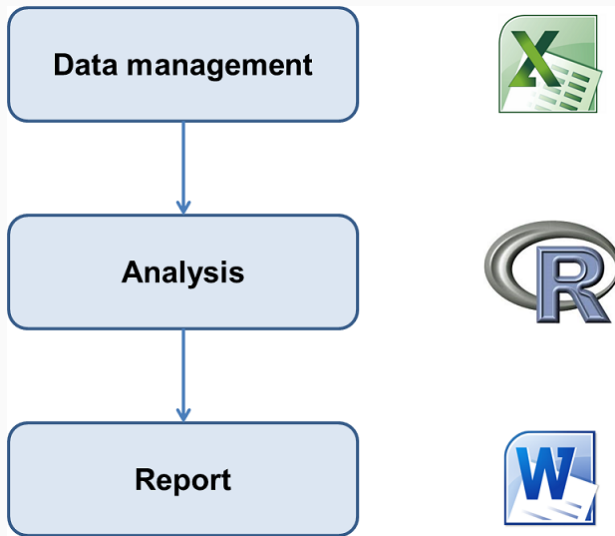


<https://youtu.be/s3JldKoA0zw>

## A typical research workflow

1. Prepare data (**s**preadsheet)
2. Analyse data (**R**)
3. Write report/paper (**W**ord)
4. Start the email attachments nightmare...





- How did you do this? What analysis is behind this figure? Did you account for ...?

- How did you do this? What analysis is behind this figure? Did you account for ...?
- What dataset was used? Which individuals were left out? Where is the clean dataset?

- How did you do this? What analysis is behind this figure? Did you account for ...?
- What dataset was used? Which individuals were left out? Where is the clean dataset?
- Oops, there is an error in the data. Can you repeat the analysis? And update figures/tables in Word!

## Manual copy-paste is tedious & problematic

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	-0.0651657	0.4264970	-0.153	0.879
sunshine	0.0100228	0.0004232	23.683	<2e-16

‘Transcribing numbers from stats software by hand was the largest source of errors’

(Eubank 2016)





**Trevor A. Branch**

@TrevorABranch

 Follow

My rule of thumb: every analysis you do on a dataset will have to be redone 10–15 times before publication. Plan accordingly. [#Rstats](#)

Your **closest collaborator** is you 6 months ago,  
and you don't respond to emails.

(P. Wilson)

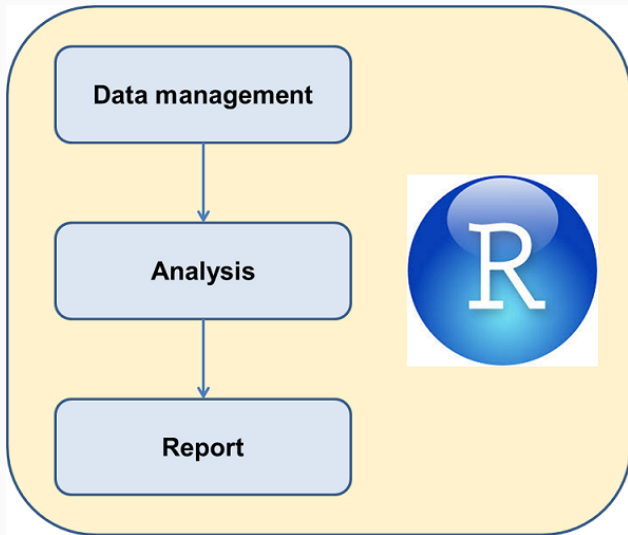
Even **you** will struggle to reproduce  
**your own results** from a few weeks/months ago.

Writing reproducible manuscripts is hard

Revising non-reproducible manuscripts is even harder

.

Also, please note that because rev#1  
asked to re-calculate effect sizes (...)   
we need to change every single  
number in the main text.

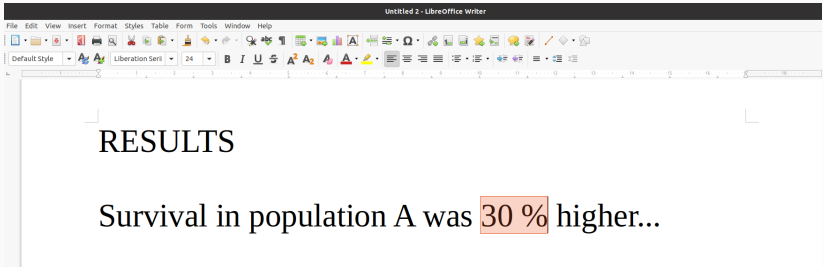


# Rmarkdown documents

- **Fully reproducible** (trace all results inc. tables and plots)
- **Dynamic** (regenerate with 1 click)
- **Multiple outputs:**
  - documents (HTML, Word, PDF)
  - presentations (HTML, PDF, PowerPoint)
  - books
  - websites...



# Where does this value come from?



*Rmarkdown:*

Survival in population A was ``r surv.diff`` % higher

*Output:*

Survival in population A was **30** % higher

```
mydata <- read.csv('data.txt')
```

*Rmarkdown:*

We measured `nrow(mydata)` individuals

*Output:*

We measured **100** individuals

*Much better than copy-paste!*



# Rmarkdown: code (R, Python, etc) + text (Markdown)

```
---  
title: "Does sunshine make people happy?"  
author: "FRS"  
output: word_document  
---
```

Metadata  
(YAML)

## ## Introduction

It is well known that individual well-being can be influenced by climatic conditions.

Text  
(Markdown)

## ## Methods

```
```{r echo=FALSE}  
## Read data  
data <- read.table("data.txt", header = TRUE)  
  
# Fit linear model  
model <- lm(happiness ~ sunshine, data = data)  
```
```

Code  
(R, Python...)

We collected data on `nrow(data)` individuals and fitted a linear model.

```
```{r echo=FALSE, eval=TRUE, cache=TRUE, fig.height=3}  
plot(iris)  
```
```

<https://yihui.org/knitr/options/>

```
```{r}  
#| echo = FALSE  
#| eval = TRUE  
#| fig.cap = 'My figure caption'  
  
plot(iris)  
```
```

# Naming chunks helps debugging

```
processing file: test.Rmd
|.....| 14%
ordinary text without R code

|.....| 29%
label: setup (with options)
List of 1
 $ include: logi FALSE

|.....| 43%
ordinary text without R code

|.....| 57%
label: read.data
|.....| 71%
ordinary text without R code

|.....| 86%
label: plot (with options)
List of 1
 $ echo: logi FALSE

Quitting from lines 28-29 (test.Rmd)
Error in eval(predvars, data, env) : object 'specie' not found
Calls: <Anonymous> ... plot.formula -> eval -> eval -> <Anonymous> -> eval -> eval
Execution halted
```

# Naming chunks helps navigating long docs

```
1 ---
2 title: "My Analysis"
3 author: "FRS"
4 output: html_document
5 ---
6
7 ```{r setup, include=FALSE}
8 knitr::opts_chunk$set(echo = TRUE)
9 ```
10
11 This is an R Markdown document. Markdown is a simple
12 for authoring HTML, PDF, and MS Word
13 re details on using R Markdown see
14 .rstudio.com>.
```

**My Analysis**

Chunk 1: setup

Chunk 2: read.data

Chunk 3: plot

11:60 (Top Level) ↕ R Markdown ↕

## Naming chunks: figure files take chunk name



unnamed-chunk-1-1.png



unnamed-chunk-1-2.png



unnamed-chunk-1-3.png



unnamed-chunk-1-4.png

knitr engines:

|      |             |             |            |         |          |           |
|------|-------------|-------------|------------|---------|----------|-----------|
| [1]  | "asis"      | "asy"       | "awk"      | "bash"  | "block"  | "block2"  |
| [7]  | "bslib"     | "c"         | "cat"      | "cc"    | "coffee" | "comment" |
| [13] | "css"       | "ditaa"     | "dot"      | "embed" | "eviews" | "exec"    |
| [19] | "fortran"   | "fortran95" | "gawk"     | "go"    | "groovy" | "haskell" |
| [25] | "highlight" | "js"        | "julia"    | "lein"  | "mysql"  | "node"    |
| [31] | "octave"    | "perl"      | "php"      | "psql"  | "python" | "R"       |
| [37] | "Rcpp"      | "Rscript"   | "ruby"     | "sas"   | "sass"   | "scala"   |
| [43] | "scss"      | "sed"       | "sh"       | "sql"   | "stan"   | "stata"   |
| [49] | "targets"   | "tikz"      | "verbatim" | "zsh"   |          |           |

# Header

## Subheader

*\*italic\**

**\*\*bold\*\***

[a link](https://example.com)

.

Handy: <https://thinkr-open.github.io/remedy/>

Or use [Visual Markdown Editor](#)



**a**

```
---
title: "Does sunshine make people happy?"
output: pdf_document
bibliography: refs.bib
---

# Introduction

Climate influences individual well-being [Rehdanz_2005].
However, ...

# Methods

```{r echo=FALSE}
# read data
data <- read.table("data.txt", header=T)
data[10,1] <- 11 # correct error

# fit linear model
model <- lm(happiness ~ sunshine, data=data)
```

We collected data on `r nrow(data)` individuals and fitted a
linear model.

# Results

We found that...

```{r echo=FALSE, results='asis'}
# make table with model output
print(xtable::xtable(model), comment = FALSE)
```

```{r echo=FALSE, fig.height=3, fig.width=3, fig.align='center'}
visreg::visreg(model) # plot
```

# Discussion

Our results confirm that happiness is related to
sunshine (slope = `r coef(model)[2]`).

# References
```

**b**

## Does sunshine make people happy?

### Introduction

Climate influences individual well-being (Rehdanz and Maddison 2005). However, ...

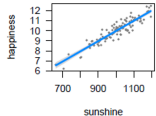
### Methods

We collected data on 100 individuals and fitted a linear model.

### Results

We found that...

|             | Estimate | Std. Error | t value | Pr(> t ) |
|-------------|----------|------------|---------|----------|
| (Intercept) | -0.0986  | 0.4271     | -0.23   | 0.8180   |
| sunshine    | 0.0101   | 0.0004     | 23.75   | 0.0000   |



The scatter plot shows a positive linear relationship between sunshine (x-axis, ranging from 700 to 1100) and happiness (y-axis, ranging from 6 to 12). A blue regression line is fitted to the data points, which are represented by small black dots.



### Discussion

Our results confirm that happiness is related to sunshine (slope = 0.0100652).

### References


Rehdanz, Katrin, and David Maddison. 2005. "Climate and Happiness." *Ecological Economics* 52 (1). Elsevier BV: 111–25. doi:10.1016/j.ecolecon.2004.06.015.

- Make changes in Rmarkdown document
- Click **Knit** in Rstudio
- Report will **update automatically!**

  **Convince me to start using R Markdown**

**R Markdown** markdown

---

 **Darren\_Dahly**

1. Start using R Markdown to generate reports of your data analyses.
2. If the data changes, rerun the report with a click of the mouse.
3. Take 3 days off of work.
4. On the 4th day, tell your collaborators that the re-analysis is complete.
5. Be hailed as a hero.

<https://community.rstudio.com/t/convince-me-to-start-using-r-markdown/1636/12>

Your turn

---

# Create, edit and share Rmarkdown document

File > New File > Rmarkdown

Write text

Insert code chunks

Change chunk options (echo, eval, etc)

HTML/Word/PDF output

PDF generation requires LaTeX

```
library('tinytex')
```

```
install_tinytex()
```

## Rmarkdown bells and whistles

---

# 'Visual Rmarkdown': Rmd as in word processor

The editor toolbar includes buttons for the most commonly used formatting commands:



Additional commands are available on the **Format**, **Insert**, and **Table** menus:

| Format                 | Insert             | Table                 |
|------------------------|--------------------|-----------------------|
| <b>B</b> Bold ⌘B       | 📄 Rmd Chunk ⌘⇧I    | 📊 Insert Table... ⌘⇧T |
| <i>I</i> Italic ⌘I     | 🖼️ Image... ⌘⇧I    | ✓ Table Header        |
| </> Code ⌘D            | 🔗 Link... ⌘K       | Table Caption         |
| Text ▶                 | Horizontal Rule ⌘_ | Align Column ▶        |
| Bullets & Numbering ▶  | Definition ▶       | Insert Row Above      |
| Blockquote             | Inline Math        | Insert Row Below      |
| Line Block             | Display Math       | Insert Column Left    |
| Div Block...           | Footnote ⌘⇧F7      | Insert Column Right   |
| Code Block...          | Citation...        | Delete Row            |
| Raw ▶                  | Div Block...       | Delete Column         |
| ✂️ Clear Formatting ⌘\ | Code Block...      | Delete Table          |
| Edit Attributes... F4  | YAML Block         |                       |
|                        | 💬 Comment ⌘⇧C      |                       |

<https://rstudio.github.io/visual-markdown-editing>

```
model <- lm(happiness ~ sunshine, data = mydata)
xtable(model)
```

|             | Estimate | Std. Error | t value | Pr(> t ) |
|-------------|----------|------------|---------|----------|
| (Intercept) | -0.0652  | 0.4265     | -0.15   | 0.8789   |
| sunshine    | 0.0100   | 0.0004     | 23.68   | 0.0000   |

Many alternatives: `gtsummary`, `modelsummary`, `huxtable`, etc



We fitted a linear model:

```
library('equatiomatic')  
model <- lm(happiness ~ sunshine, data = mydata)  
extract_eq(model)
```

$$\text{happiness} = \alpha + \beta_1(\text{sunshine}) + \epsilon \quad (1)$$

# Models that describe themselves!

```
library('report')  
model <- lm(happiness ~ sunshine, data = mydata)  
report(model)
```

We fitted a linear model (estimated using OLS) to predict happiness with sunshine (formula:  $\text{happiness} \sim \text{sunshine}$ ). The model explains a statistically significant and substantial proportion of variance ( $R^2 = 0.85$ ,  $F(1, 98) = 560.90$ ,  $p < .001$ , adj.  $R^2 = 0.85$ ). The model's intercept, corresponding to  $\text{sunshine} = 0$ , is at  $-0.07$  (95% CI  $[-0.91, 0.78]$ ,  $t(98) = -0.15$ ,  $p = 0.879$ ). Within this model:

- The effect of sunshine is statistically significant and positive ( $\beta = 0.01$ , 95% CI  $[9.18\text{e-}03, 0.01]$ ,  $t(98) = 23.68$ ,  $p < .001$ ; Std.  $\beta = 0.92$ , 95% CI  $[0.85, 1.00]$ )

Standardized parameters were obtained by fitting the model on a standardized version of the dataset. 95%

Confidence Intervals (CIs) and p-values were computed using a Wald t-distribution approximation.

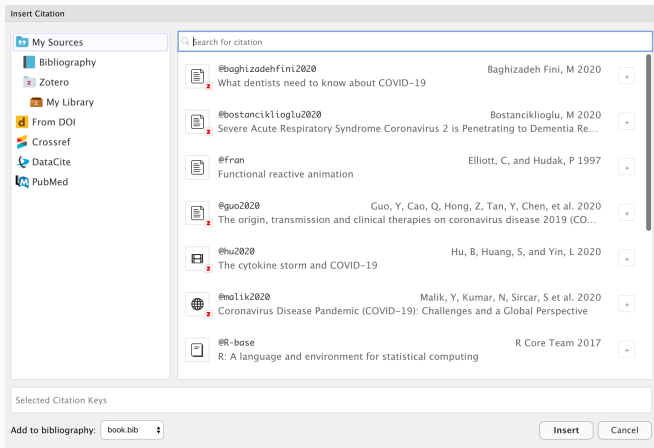
Using LaTeX:

```
$$  
y \sim N(\mu, \sigma^2)  
$$
```

$$y \sim N(\mu, \sigma^2)$$

- Mathpix: <https://github.com/jonocarroll/mathpix>

# Citing bibliography



<https://rstudio.github.io/visual-markdown-editing/#/citations>

```
---  
title: "My awesome Rmd"  
output: html_document  
bibliography: references.bib  
---
```

```
---  
title: "Does sunshine make people happy?"  
author: "FRS"  
output: word_document  
bibliography: myrefs.bib  
csl: ecology-letters.csl  
---
```

Thousands of Citation Styles:

<https://www.zotero.org/styles>

<https://github.com/citation-style-language/styles>

- rticles
- papaja
- rrttools
- pinp
- rmdTemplates
- pagedreport
- GitHub!

## My cool paper written in Rmarkdown

F. Rodriguez-Sanchez<sup>1,2</sup> and And Flander<sup>3</sup>

<sup>1</sup>From Institute of Technology, Department of Science, Street, City, State, Zip; <sup>2</sup>Teacher/University Department, Street, City, State, Zip;

<sup>3</sup>This manuscript was completed on September 10, 2010

Please provide an abstract of no more than 250 words in a single paragraph. Abstracts should explain to the general reader the major contributions of the article. References in the abstract must be cited in full within the abstract itself and cited in the text.

one | two | optional | optional | optional

This PNAS journal template is provided to help you write your work in the current journal format. Instructions for use are provided below.

Note: please start your introductions without including the word "Introduction" as a section heading (except for search articles in the Physical Science section); this heading is implied in the first paragraph.

### Guide to using this template

Please note that while this template provides a preview of the typeset manuscript for information, to help in this preparation, it will not necessarily be the final publication layout. For more detailed information please see the [PNAS Information for Authors](#).

**Author Affiliations.** Include department, institution, and complete address, with the ZIP/postal code, for each author. Use lower case letters to match authors with institutions, as shown in the example. Authors with an ORCID ID may supply this information at submission.

**Submitting Manuscripts.** All authors must submit their articles at [PNAScentral](#). If you are using Overleaf to write your article, you can use the "Submit to PNAS" option in the top bar of the editor window.

**Format.** Many authors find it useful to organize their manuscripts with the following order of sections: Title, Author Affiliations, Keywords, Abstract, Significance Statement, Results, Discussion, Materials and Methods, Acknowledgments, and References. Other orders and headings are permitted.

**Manuscript Length.** PNAS generally uses a two-column format averaging 67 characters, including space, per line. The maximum length of a Direct Submission research article is six pages and a PNAS PLUS research article is ten pages including all text, space, and the number of characters displayed by figures, tables, and equations. When submitting tables, figures, and/or equations in addition to text, keep the text for your manuscript under 30,000 characters (including spaces) for Direct Submissions and 72,000 characters (including spaces) for PNAS PLUS.

**References.** References should be cited in numerical order as they appear in text; this will be done automatically via biblatex, e.g. (1) and (2, 3). All references, including for the SI, should be included in the main manuscript file. References appearing in both sections should not be duplicated. All references



Fig. 1. Placeholder image of a frog with a large sample caption to show publication setting.

included in tables should be included with the main reference section.

**Data Archival.** PNAS must be able to archive the data essential to a published article. Where such archiving is not possible, deposition of data in public databases, such as GenBank, ArrayExpress, Protein Data Bank, Unidata, and others outlined in the Information for Authors, is acceptable.

**Language-Editing Services.** Prior to submission, authors who believe their manuscripts would benefit from professional editing are encouraged to use a language-editing service (see list at [www.pnas.org/authors/language-editing.cfm](#)). PNAS does not take responsibility for or endorse those services, and their use has no bearing on acceptance of a manuscript for publication.

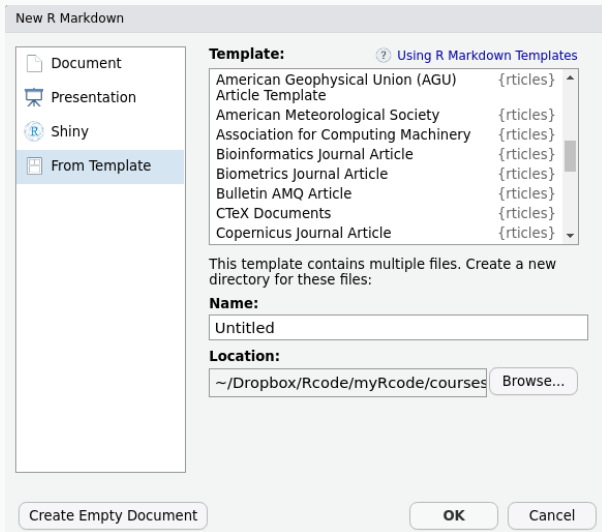
### Significance Statement

Authors must submit a 120-word maximum statement about the significance of their research paper written at a level understandable to an undergraduate student interested outside their field of specialty. The primary goal of the Significance Statement is to explain the relevance of the work in broad context to a broad readership. The Significance Statement appears in the paper final and is required for all research papers.

We provide details on our contribution to.

We use to show our credit of research work.

# Accessing Rmd templates





# Revise writing style: gramr

**Ignore**

- ☐ Passive Voice
- ☐ Duplicate words (the the)
- ☒ 'So' at start of sentence
- ☐ 'There is/are; at start of sentence
- ☐ Avoid weasel words
- ☐ Wordiness
- ☐ Problematic Adverbs
- ☐ Cliches
- ☐ Avoid 'Being' words

Next Finish

**Text to Check**

So the cat was stolen. 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>>.

"was stolen" may be passive voice

<https://github.com/ropenscilabs/gramr>

<https://github.com/nevrome/wellspell.addin>

# Find synonyms

prevent

×

Synonyms of prevent

avoid ▼

Replace "prevent" with

avoid

↔ Replace

🔀 Random

✖ Cancel

<https://github.com/gadenbuie/synamyn>

| Method          | koRpus      | stringi       |
|-----------------|-------------|---------------|
| Word count      | 107         | 104           |
| Character count | 604         | 603           |
| Sentence count  | 10          | Not available |
| Reading time    | 0.5 minutes | 0.5 minutes   |

<https://github.com/benmarwick/wordcountaddin>

# Automated reproducibility checks


<https://github.com/brandmaier/reproducibleRchunks>

```
15 ▾ ## Some Computation
16
17 Here is a computation:
18
19 ▾ {reproducibleR addition}
20 my_sum <- x + 1
21 ▾
22
```

Here is a computation:

```
my_sum <- x + 1
```

Code Chunk Reproduction Report

-  my\_sum: REPRODUCTION SUCCESSFUL

Here is a computation:

```
my_sum <- x + 1
```

Code Chunk Reproduction Report

-  my\_sum: **REPRODUCTION FAILED** Fingerprints are not identical.

## BOOKDOWN

### Write HTML, PDF, ePub, and Kindle books with R Markdown

The **bookdown** package is an [open-source R package](https://bookdown.org) that facilitates writing books and long-form articles/reports with R Markdown. Features include:

- Generate printer-ready books and ebooks from R Markdown documents.
- A markup language easier to learn than LaTeX, and to write elements such as section headers, lists, quotes, figures, tables, and citations.
- Multiple choices of output formats: PDF, LaTeX, HTML, EPUB, and Word.
- Possibility of including dynamic graphics and interactive applications (HTML widgets and Shiny apps).
- Support a wide range of languages: R, C/C++, Python, Fortran, Julia, Shell scripts, and SQL, etc.
- LaTeX equations, theorems, and proofs work for all output formats.
- Can be published to GitHub, bookdown.org, and any web servers.
- Integrated with the RStudio IDE.
- One-click publishing to <https://bookdown.org>.



<https://bookdown.org/>

# Presentation Ninja



with xaringan

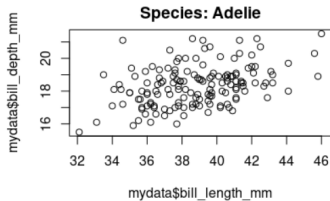
Yihui Xie

RStudio, PBC

<https://slides.yihui.org/xaringan/>

# Parameterised reports

```
---  
title: "My template report"  
output: html_document  
params:  
  sp: Adelie  
---  
  
```${r}```  
library(palmerpenguins)  
data("penguins")  
  
mydata <- subset(penguins, species == params$sp)  
  
plot(mydata$bill_length_mm, mydata$bill_depth_mm,  
      main = paste0("Species: ", params$sp))  
```${r}```
```





## Render thousands of individual reports from Rmd template

```
library('rmarkdown')

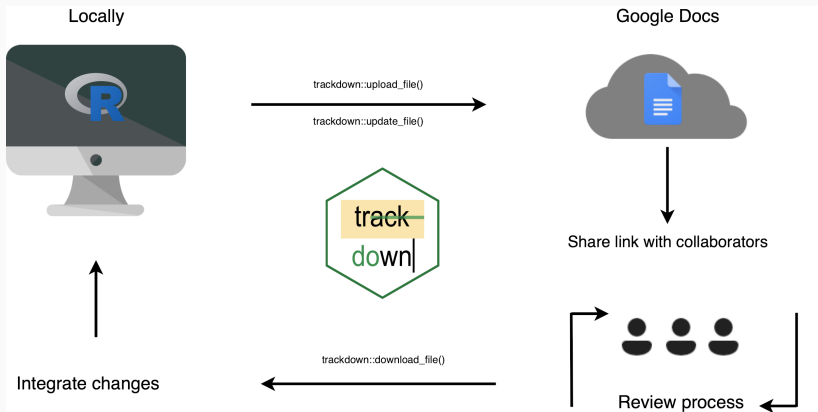
for (i in unique(penguins$species)) {

  render('template_report.Rmd',
        params = list(sp = i))

}
```

# Collaborative writing

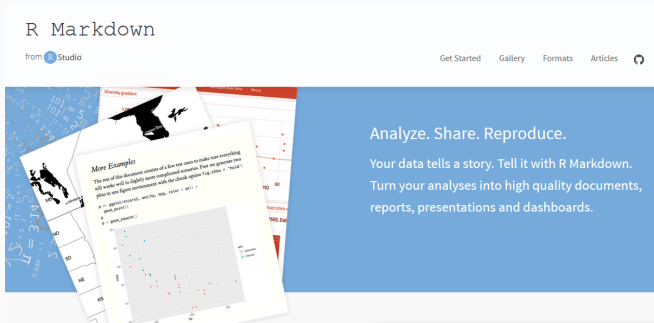
- GitHub, GitLab, etc
- Google Docs ([trackdown](#))
- [redoc](#)



## Rmarkdown resources

---

<http://rmarkdown.rstudio.com/>



The screenshot shows the R Markdown website homepage. At the top, the text "R Markdown" is displayed, followed by "from RStudio". To the right, there are navigation links: "Get Started", "Gallery", "Formats", "Articles", and a user profile icon. Below the navigation bar, there is a large blue banner with the text "Analyze. Share. Reproduce." and "Your data tells a story. Tell it with R Markdown. Turn your analyses into high quality documents, reports, presentations and dashboards." To the left of the banner, there is a collage of various R Markdown outputs, including a map of Italy, a scatter plot, a line graph, and a document page with text and code.

# Rmarkdown cheat sheet

## R Markdown Cheat Sheet

learn more at [rstudio.com](http://rstudio.com)



### Rmd files

An R Markdown (.Rmd) file is a record of your research. It contains the code that a scientist needs to reproduce your work along with the narration that a reader needs to understand your work.

### Reproducible Research

At the click of a button, or the type of a command, you can rerun the code in an R Markdown file to reproduce your work and export the results as a finished report.

### Dynamic Documents

You can choose to export the finished report as an HTML, PDF, MS Word, ODT, RTF, or markdown document, or as an HTML or PDF based slide show.

### Workflow

1. Open a new .Rmd file at File > New File > R Markdown. Use the wizard that opens to pre-populate the file with a template.
2. Write document by editing template.
3. Knit document to create report (Use knit button or `render()` in IDE window).
4. Preview output in IDE window.
5. Publish (optional) to web or server. Search public online to accounts at GitHub, RStudio Connect, Retool document. Find in document file path to output document.
6. Examine build log in R Markdown console.
7. Use output file that is saved alongside .Rmd.

### Interactive Documents

Turn your report into an interactive Shiny document in 4 steps

1. Add runtime: shiny to the YAML header.
2. Call Shiny input functions to embed input objects.
3. Call Shiny render functions to embed reactive output.
4. Render with `markdown::run` or click Run Document in RStudio IDE.

### Embed code with knitr syntax

#### Inline code

Insert with `<code>` results inline as text without code.

Build with `<code>` or `<code>` (Build with 3.2.3)

#### Code chunks

One or more lines of R code. Place chunk syntax within curly braces, after an insert with `<code>`.

#### Global options

Set with `knitr::opts_chunk$set()` e.g. `knitr::opts_chunk$set(echo = TRUE)`.

#### Important chunk options

- cache** - cache results for future knits (default = FALSE).
- cache.path** - directory to save cached results (default = "cache/").
- child** - insert to knit another include (default = NULL).
- collapse** - collapse all output into single block (default = FALSE).
- comment** - prefix for each line of code (default = "#").
- depend** - chunk dependencies for caching (default = NULL).
- echo** - display code in output document (default = TRUE).
- engine** - code language used in chunk (default = "R").
- error** - Display error messages in doc (TRUE) or stop render when errors occur (FALSE) (default = TRUE).
- eval** - Run code in chunk (default = TRUE).
- fig.align** - "left", "right", or "center" (default = "center").
- fig.cap** - figure caption as character string (default = NULL).
- fig.height**, **fig.width** - Dimensions of plots in inches.
- highlight** - highlight source code (TRUE) or stop render when errors occur (FALSE) (default = TRUE).
- include** - include chunk in doc after running (default = TRUE).
- message** - display code messages in document (default = TRUE).
- results** - (default = "markup")
  - "text" - plaintext results
  - "html" - do not display results
  - "hold" - put all results below all code
- tidy** - tidy code for display (default = FALSE).
- warning** - display code warnings in document (default = TRUE).

For more details on using R Markdown see <http://rmarkdown.rstudio.com>

### Render()

Use `markdown::render()` to render .Rmd in R console. Important args:

input: file to render

output: filename

output\_dir: output file path to output document

param: list of params to use

envir: environment to evaluate code chunks in

encoding: of input file

Embed a complete app into your document with `shiny::shinyApplet()`

\* Your report will render on a shiny app, which means you must choose an HTML output format, say `knitr::opts_chunk$set(output = "html")`, and serve it with an R Shiny Server.

### Parameters

Parameterize your documents to reuse with different inputs (e.g., data sets, values, etc.)

1. Add parameters. Create and set parameters in the header as sub-values of `params`.
2. Call parameters. Call parameter values in code as `params$paramname`.
3. Set parameters. Set values with `knitr::params()` in the chunk header.

render("doc.Rmd", params = list("1", 0 = as.Date("2015-01-01")))

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[https://www.rstudio.org/links/r\\_markdown\\_cheat\\_sheet](https://www.rstudio.org/links/r_markdown_cheat_sheet)

# Rmarkdown reference guide



## R Markdown Reference Guide

Learn more about R Markdown at [rmarkdown.rstudio.com](http://rmarkdown.rstudio.com)  
Learn more about Interactive Docs at [shiny.rstudio.com/articles](http://shiny.rstudio.com/articles)

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 <code>r</code> 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 <code>r</code> in braces. End the chunk with three back ticks:</p> <pre>paste("Hello", "World!")  ## [1] "Hello World!"</pre>   |
| <p>Place code inline with a single back tick. The first back tick must be followed by an <code>R</code>, like this: <code>&lt;code&gt;R&lt;/code&gt; paste("Hello", "World!")</code>.</p>        | <p>Place code inline with a single back tick. The first back tick must be followed by an <code>R</code>, like this: <code>&lt;code&gt;R&lt;/code&gt; paste("Hello", "World!")</code>.</p> |
| <p>Add chunk options within braces. For example, <code>echo=FALSE</code> 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>                              |

Learn more about chunk options at <http://yihui.name/knitr/options>

| Chunk options          |               |   |
|------------------------|---------------|---|
| option                 | default value | description   |
| <b>Code execution</b>  |               |   |
| <b>child</b>           | NULL          | A character vector of filenames. Knitr will knit the files and place them into the main document.   |
| <b>code</b>            | NULL          | Set to R code. Knitr will replace the code in the chunk with the code in the code option.   |
| <b>engine</b>          | "r"           | Knitr will evaluate the chunk in the named language, e.g. <code>engine = "python"</code> . Run <code>names(knitr::knit_engines\$get())</code> to see supported languages.   |
| <b>eval</b>            | TRUE          | If FALSE, knitr will not run the code in the code chunk.  |
| <b>include</b>         | TRUE          | If FALSE, knitr will run the chunk but not include the chunk in the final document.   |
| <b>raw</b>             | TRUE          | If FALSE, knitr will not include the chunk when <code>raw=part()</code> is used to extract the source code.   |
| <b>Results</b>         |               |   |
| <b>collapse</b>        | FALSE         | If TRUE, knitr will collapse all the source and output blocks created by the chunk into a single block.   |
| <b>echo</b>            | TRUE          | If FALSE, knitr will not display the code in the code chunk above it's results in the final document.   |
| <b>results</b>         | "markup"      | If "html", knitr will not display the code's results in the final document. If "text", knitr will delay displaying of output pieces until the end of the chunk. If "raw", knitr will pass through results without reformatting them (useful if results return raw HTML, etc.) |
| <b>error</b>           | TRUE          | If FALSE, knitr will not display any error messages generated by the code.  |
| <b>message</b>         | TRUE          | If FALSE, knitr will not display any messages generated by the code.  |
| <b>warning</b>         | TRUE          | If FALSE, knitr will not display any warning messages generated by the code.  |
| <b>Code formatting</b> |               |   |
| <b>background</b>      | "#f7f7f7"     | A background color for chunks in LaTeX output.  |
| <b>comment</b>         | "#"           | A character string. Knitr will append the string to the start of each line of results in the final document.  |
| <b>highlight</b>       | TRUE          | If TRUE, knitr will highlight the source code in the final output.  |
| <b>preprint</b>        | FALSE         | If TRUE, knitr will add ">" to the start of each line of code displayed in the final document.  |
| <b>size</b>            | "normal"      | Fontsize for LaTeX output.  |
| <b>strip.white</b>     | TRUE          | If TRUE, knitr will remove white spaces that appear at the beginning or end of a code chunk.  |
| <b>tidy</b>            | FALSE         | If TRUE, knitr will tidy code chunks for display with the <code>tidy_source()</code> function in the <code>formatt</code> package.  |

RStudio

Updated 10/30/2014

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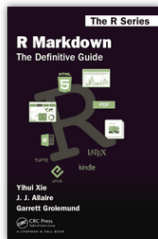
## R Markdown: The Definitive Guide

by Yihui Xie, J. J. Allaire, Garrett G. Rold

2018-09-11

Star

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The first official book authored by the core R Markdown developers that provides a comprehensive and accurate reference to the R Markdown ecosystem. With R Markdown, you can easily create reproducible data analysis reports, presentations, dashboards, interactive applications, books, dissertations, websites, and journal articles, while enjoying the simplicity of Markdown and the great power of R and other languages. *Read more* →

<https://bookdown.org/yihui/rmarkdown/>

<https://bookdown.org/yihui/rmarkdown-cookbook/>

## Quarto

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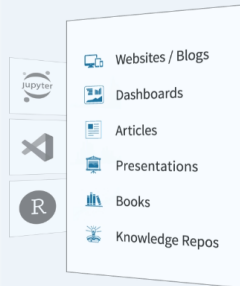


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## La Palma Earthquakes

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 MS Word

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 MECA Bundle

### PUBLISHED

February 23, 2024

### ABSTRACT

In September 2021, a significant jump in seismic activity on the island of La Palma (Canary Islands, Spain) signalled the start of a volcanic crisis that still continues at the time of writing. Earthquake data is continually collected and published by the Instituto Geográfico Nacional (IGN). ...

### KEYWORDS

La Palma, Earthquakes

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- 1 Introduction
- 2 Data & Methods
- 3 Conclusion
- References

#### Notebooks

-  Article Notebook
-  Data Screening

## 1 Introduction

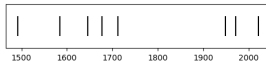


Figure 1: Timeline of recent earthquakes on La Palma

 Source: Article Notebook

Based on data up to and including 1971, eruptions on La Palma happen every 79.8 years on average.

Studies of the magma systems feeding the volcano, such as Marrero et al. (2019), have proposed that there are two main magma reservoirs feeding the Cumbre Vieja volcano; one in the mantle (30-40km depth) which charges and in turn feeds a shallower crustal reservoir (10-20km depth).

Eight eruptions have been recorded since the late 1400s (Figure 1).

Data and methods are discussed in Section 2.

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- Try templates (articles, rmdTemplates)
- Parameterised reports (e.g. different iris or penguin species)