

Cómo escribir manuscritos reproducibles

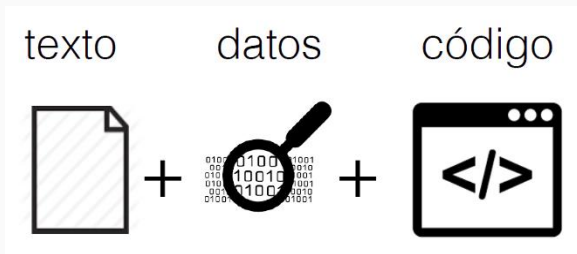
(algunas ideas y herramientas)

Francisco Rodríguez-Sánchez

@frod_san

<https://frodriguezsanchez.net>

¿Qué es un manuscrito reproducible?



DATOS + CÓDIGO

- **trazar** proceso de análisis
- **reproducir** (regenerar) todos los resultados

La inmensa mayoría
de artículos científicos
NO son reproducibles

La reproducibilidad es un gradiente



Rodríguez-Sánchez et al. 2016 (modif. Peng 2011)

Reproducibilidad básica

Reproducibilidad básica

- **MANUSCRITO** (Texto + Tablas + Figuras)
- **DATOS** (archivo permanente)
- **CÓDIGO** (archivo permanente)

Archivo permanente:

- Zenodo, Dryad, OSF, Figshare, Data Paper...
- NO GitHub, web...

Cómo compartir datos

- Formato **abierto** (csv, txt)

Cómo compartir datos

- Formato **abierto** (csv, txt)
- Datos brutos + código depuración

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- Datos brutos + código depuración
- **README** (who, what, when, where, why, how)

Cómo compartir datos

- Formato **abierto** (csv, txt)
- Datos brutos + código depuración
- **README** (who, what, when, where, why, how)
- Descripción variables (dataspice, codebook)

Cómo compartir datos

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- Descripción variables (dataspice, codebook)
- Licencia (CC0, CC-BY, ODbL)

Cómo compartir datos

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- Licencia (CC0, CC-BY, ODbL)
- Cita (DOI)

Cómo compartir datos

- Formato **abierto** (csv, txt)
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- Descripción variables (dataspice, codebook)
- Licencia (CC0, CC-BY, ODbL)
- Cita (DOI)
- **Metadatos** estandarizados (JSON, XML)

Cómo compartir código

- Scripts **texto** (.R)

Eglen et al 2016

Cómo compartir código

- Scripts **texto** (.R)
- **Archivo permanente** (ej. Zenodo) con DOI (citable)

Eglen et al 2016

Cómo compartir código

- Scripts **texto** (.R)
- **Archivo permanente** (ej. Zenodo) con DOI (citable)
- [Licencia](#)

Eglen et al 2016

Cómo compartir código

- Scripts `texto (.R)`
- Archivo permanente (ej. Zenodo) con DOI (citable)
- [Licencia](#)
- README (incluir `sessionInfo()`)

Eglen et al 2016

sessionInfo(): registro del entorno computacional

```
sessionInfo()
```

```
## R version 4.0.2 (2020-06-22)
## Platform: x86_64-pc-linux-gnu (64-bit)
## Running under: Ubuntu 20.04.1 LTS
##
## Matrix products: default
## BLAS: /usr/lib/x86_64-linux-gnu/blas/libblas.so.3.9.0
## LAPACK: /usr/lib/x86_64-linux-gnu/lapack/liblapack.so.3.9.0
##
## locale:
##  [1] LC_CTYPE=en_GB.UTF-8      LC_NUMERIC=C
##  [3] LC_TIME=es_ES.UTF-8      LC_COLLATE=en_GB.UTF-8
##  [5] LC_MONETARY=es_ES.UTF-8  LC_MESSAGES=en_GB.UTF-8
##  [7] LC_PAPER=es_ES.UTF-8     LC_NAME=C
##  [9] LC_ADDRESS=C             LC_TELEPHONE=C
## [11] LC_MEASUREMENT=es_ES.UTF-8 LC_IDENTIFICATION=C
##
## attached base packages:
## [1] stats      graphics  grDevices  utils      datasets  methods   base
##
## other attached packages:
## [1] knitr_1.30
##
## loaded via a namespace (and not attached):
##  [1] compiler_4.0.2  magrittr_1.5    htmltools_0.5.0 tools_4.0.2
##  [5] yaml_2.2.1      codetools_0.2-16 stringi_1.5.3   rmarkdown_2.3
##  [9] binb_0.0.6      stringr_1.4.0  xfun_0.17      digest_0.6.25
## [13] rlang_0.4.7     evaluate_0.14
```

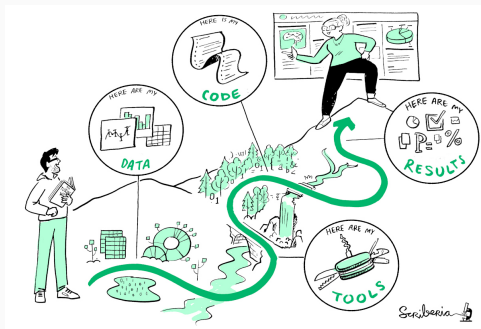
Cómo escribir código más reproducible

BES guide to reproducible code



Cómo escribir código más reproducible

Turing Way





PERSPECTIVE

Good enough practices in scientific computing

Greg Wilson^{1☯*}, Jennifer Bryan^{2☯}, Karen Cranston^{3☯}, Justin Kitzes^{4☯}, Lex Nederbragt^{5☯},
Tracy K. Teal^{6☯}

[Wilson et al 2017](#)

<https://rstats.wtf>

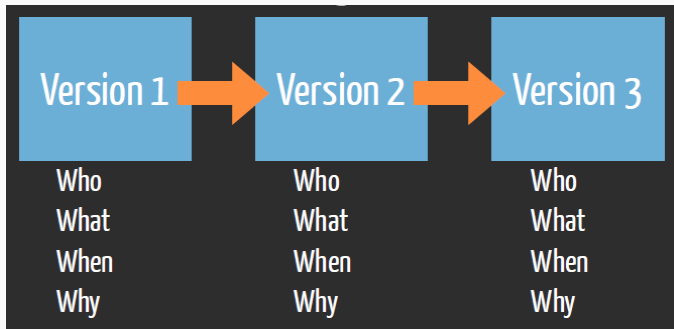
What They Forgot to Teach You About R

Jennifer Bryan

Jim Hester

Cómo escribir código más reproducible

Control de versiones (`git`)



R. Fitzjohn

Cómo escribir código más reproducible

`fertile`: creating optimal conditions for reproducibility

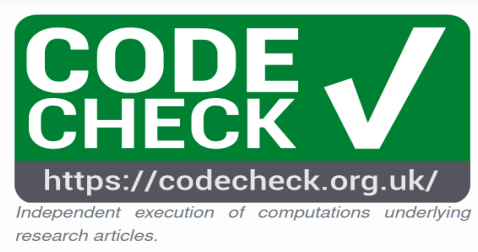
```
library("fertile")  
setwd("C:/Users/FRS")
```

Error: setwd() is likely to break reproducibility. Use here::here() instead.

<https://github.com/baumer-lab/fertile>

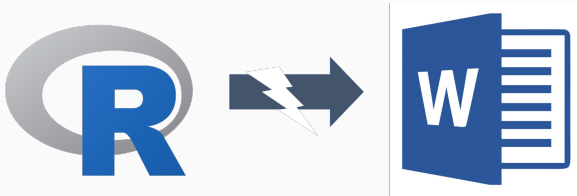
Codecheck: ¿es tu artículo reproducible?

<https://codecheck.org.uk>



‘Literate programming’ con Rmarkdown

Desconexión de código y manuscrito genera problemas



'Transcribing numbers **from stats software to ms** by hand was the largest source of errors'

(Eubank 2016)

Había un dato erróneo...

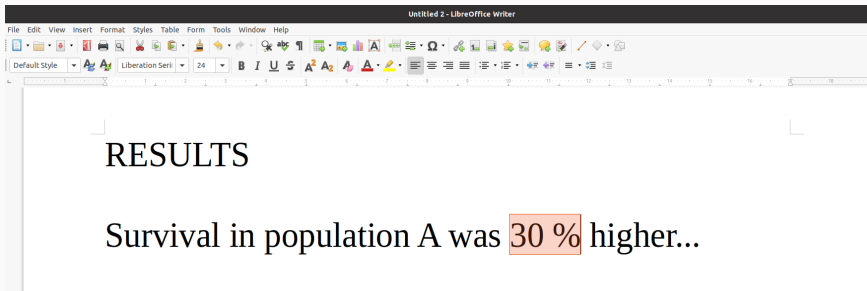
¿Puedes repetir el análisis y actualizar el ms?

Copiar y pegar...

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

¿De dónde sale este número?



Documentos dinámicos con Rmarkdown

Rmarkdown:

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

Output:

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

Documentos dinámicos con Rmarkdown

```
datos <- read.csv("datos.csv")
```

Rmarkdown:

We measured ``r nrow(datos)`` individuals

Output:

We measured **86** individuals

¡Mucho mejor que copiar y pegar!

Rmarkdown: texto + código

Metadatos
(YAML)

Texto
(Markdown)

Código
(R, Python...)

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

Introduction

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

Methods

```
```{r echo=FALSE}  
Read data
data <- read.table("data.txt", header = TRUE)

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

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

Regenera Word/PDF/html... con un click

```
---
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 `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

a

Does sunshine make people happy?

b

Introduction

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

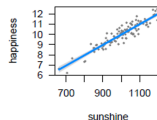
Methods

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 |



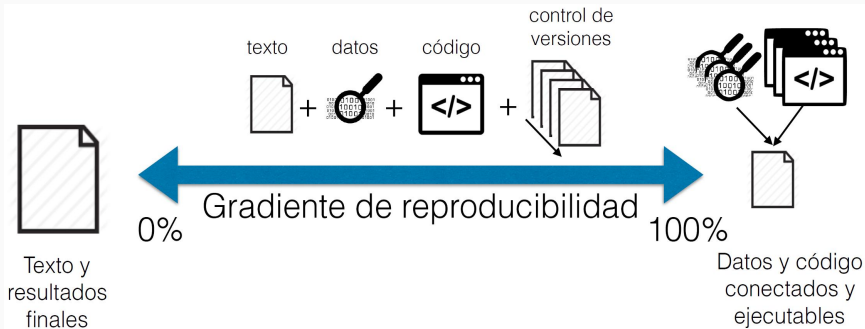
Discussion

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.

Rmarkdown: resultados trazables y ejecutables



Rodríguez-Sánchez et al. 2016

Rmarkdown: generación automática de tablas

```
model <- lm(happiness ~ sunshine, data = datos)
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 |

¡Modelos que se auto-describen!

```
library("report")  
model <- lm(happiness ~ sunshine, data = datos)  
report(model)
```

We fitted a linear model (estimated using OLS) to predict happiness with sunshine (formula = `happiness ~ sunshine`). Standardized parameters were obtained by fitting the model on a standardized version of the dataset. Effect sizes were labelled following Cohen's (1988) recommendations.

The model explains a 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 happiness = 0 and sunshine = 0, is at -0.07 (SE = 0.43, 95% CI [-0.91, 0.78], $p = 0.879$). Within this model:

- The effect of (Intercept) is negative and can be considered as very small and not significant ($b = -0.07$, SE = 0.43, 95% CI [-0.91, 0.78], std. beta = $2.28e-16$, $p = 0.879$).
- The effect of sunshine is positive and can be considered as large and significant ($b = 0.01$, SE = $4.23e-04$, 95% CI [$9.18e-03$, 0.01], std. beta = 0.92, $p < .001$).

Revisa tu gramática

<https://github.com/ropenscilabs/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

Bibliografía: Cita via DOI, búsqueda, Zotero... (RStudio 1.4)

Insert Citation

My Sources

- Bibliography
- Zotero
- My Library
- From DOI
- Crossref
- DataCite
- PubMed

Search for citation

| | | |
|--|--|---|
| @baghizadehfini2020 | Baghizadeh Fini, M 2020 | + |
| What dentists need to know about COVID-19 | | |
| @bostanciklioglu2020 | Bostanciklioglu, M 2020 | + |
| Severe Acute Respiratory Syndrome Coronavirus 2 is Penetrating to Dementia Re... | | |
| @fran | Elliott, C, and Hudak, P 1997 | + |
| Functional reactive animation | | |
| @guo2020 | Guo, Y, Cao, Q, Hong, Z, Tan, Y, Chen, et al. 2020 | + |
| The origin, transmission and clinical therapies on coronavirus disease 2019 (CO... | | |
| @hu2020 | Hu, B, Huang, S, and Yin, L 2020 | + |
| The cytokine storm and COVID-19 | | |
| @malik2020 | Malik, Y, Kumar, N, Sircar, S et al. 2020 | + |
| Coronavirus Disease Pandemic (COVID-19): Challenges and a Global Perspective | | |
| @R-base | R Core Team 2017 | + |
| R: A language and environment for statistical computing | | |

Selected Citation Keys

Add to bibliography: book.bib

Insert Cancel

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

¡No olvides citar los paquetes de R!

Rmarkdown:

```
knitr::write_bib()
```

Procesador texto:

```
grateful::cite_packages()
```

Formatea bibliografía para cualquier revista

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

Repositorio de 'citation styles' (CSL):

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

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

Plantillas Rmarkdown

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

My cool paper written in Rmarkdown

F. Rodríguez-García^{1,2} and And Friends³

¹Some Institute of Technology, Department, Street, City, State, Zip; ²Another University Department, Street, City, State, Zip
This manuscript was compiled on September 10, 2018

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. The notes 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 correct journal format. Instructions for use are provided below.

Note: please start your introduction without including the word "Introduction" as a section heading (except for math articles in the Physical Sciences 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 submission, 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 Affiliation, 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 spaces, 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, spaces, and the number of characters displaced by figures, tables, and equations. When submitting tables, figures, and/or equations in addition to text, keep the text for your manuscript under 39,000 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 BibTeX, 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. SI reference



Fig. 1. Pseudofish image of a frog with a large sample caption to show publication writing.

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 manuscript would benefit from professional editing are encouraged to use a language-editing service (see list at [www.pnas.org/site/authors/language-editing.shtml](#)). PNAS does not take responsibility for or endorse these services, and their use has no bearing on acceptance of a manuscript for publication.

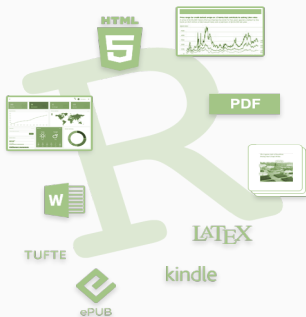
Significance Statement

Authors must submit a 150-word maximum statement about the significance of their research paper written at a level understandable to an undergraduate educated scientist outside their field of specialty. The primary goal of the Significance Statement is to explain the relevance of the work to a broad context to a broad readership. The Significance Statement appears in the paper file and is required for all research papers.

Do not provide details of other contributions here.
Do not discuss details of other contributions here.

Documentos dinámicos con Rmarkdown

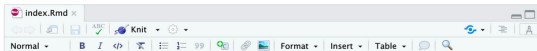
<https://rmarkdown.rstudio.com/>



'Visual Rmarkdown' en Rstudio 1.4 trae múltiples ventajas

¡Como escribir en procesador de texto, pero todas las ventajas de Rmarkdown!

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



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

Format

| | |
|-----------------------------|----|
| B Bold | ⌘B |
| <i>I</i> Italic | ⌘I |
| <code></></code> Code | ⌘D |
| Text | ▶ |
| Bullets & Numbering | ▶ |
| Blockquote | |
| Line Block | |
| Div Block... | |
| Code Block... | |
| Raw | ▶ |
| Clear Formatting | ⌘\ |
| Edit Attributes... | F4 |

Insert

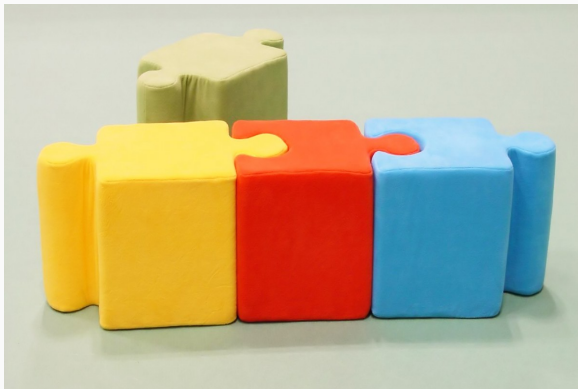
| | |
|-----------------|------|
| Rmd Chunk | ⌘⌘I |
| Image... | ⌘⌘I |
| Link... | ⌘K |
| Horizontal Rule | ⌘_ |
| Definition | ▶ |
| Inline Math | |
| Display Math | |
| Footnote | ⌘⌘F7 |
| Citation... | |
| Div Block... | |
| Code Block... | |
| YAML Block | |
| Comment | ⌘⌘C |

Table

| | |
|---------------------|-----|
| Insert Table... | ⌘⌘T |
| ✓ Table Header | |
| Table Caption | |
| Align Column | ▶ |
| Insert Row Above | |
| Insert Row Below | |
| Insert Column Left | |
| Insert Column Right | |
| Delete Row | |
| Delete Column | |
| Delete Table | |

Control de flujos de trabajo

En proyectos complejos es necesario **organizar las piezas**



Script maestro ejecuta código en orden adecuado

makefile.R

```
source("clean_data.R")
```

```
source("fit_model.R")
```

```
source("generate_report.R")
```

Script maestro ejecuta código en orden adecuado

<https://github.com/Pakillo/exclosures-Almoraima>

```
#### READ AND PREPROCESS DATA ####
```

```
## Read site info
```

```
read_siteinfo("data-raw/sites_info_raw.csv")
```

```
## Read and prepare species info
```

```
read_sppinfo(sppdata = "data-raw/species_info_raw.csv")
```

```
## Prepare dataset
```

```
make_dataset()
```

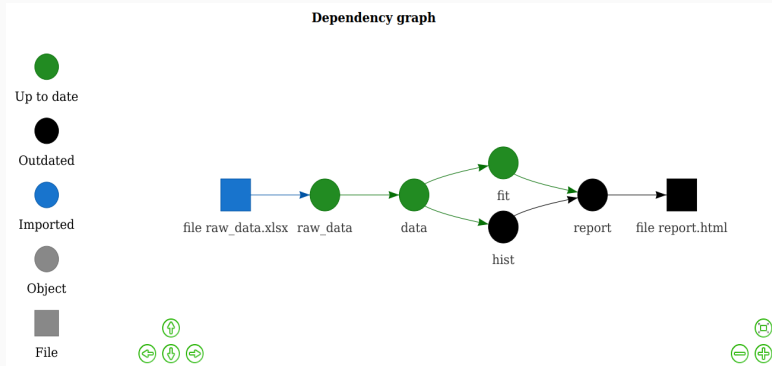
```
#### EXPLORATORY ANALYSIS ####
```

```
rmarkdown::render("analyses/EDA.Rmd")
```

```
#### MANUSCRIPT ####
```

```
rmarkdown::render("manuscript/cercados_Almoraima/cercados_Almoraima.Rmd")
```

drake/targets: control total del flujo de trabajo



<https://docs.ropensci.org/drake/>

<https://wlandau.github.io/targets/>

Control de dependencias

Cambios en paquetes pueden romper/alterar el análisis

¿Cómo reproducir el análisis dentro de un año, o en otro ordenador?

sessionInfo registra paquetes usados y versiones, OS...

```
sessionInfo()
```

```
## R version 4.0.2 (2020-06-22)
## Platform: x86_64-pc-linux-gnu (64-bit)
## Running under: Ubuntu 20.04.1 LTS
##
## Matrix products: default
## BLAS: /usr/lib/x86_64-linux-gnu/blas/libblas.so.3.9.0
## LAPACK: /usr/lib/x86_64-linux-gnu/lapack/liblapack.so.3.9.0
##
## locale:
##  [1] LC_CTYPE=en_GB.UTF-8      LC_NUMERIC=C
##  [3] LC_TIME=es_ES.UTF-8      LC_COLLATE=en_GB.UTF-8
##  [5] LC_MONETARY=es_ES.UTF-8  LC_MESSAGES=en_GB.UTF-8
##  [7] LC_PAPER=es_ES.UTF-8     LC_NAME=C
##  [9] LC_ADDRESS=C             LC_TELEPHONE=C
## [11] LC_MEASUREMENT=es_ES.UTF-8 LC_IDENTIFICATION=C
##
## attached base packages:
## [1] stats      graphics  grDevices  utils      datasets  methods   base
##
## other attached packages:
## [1] report_0.1.0 xtable_1.8-4 knitr_1.30
##
## loaded via a namespace (and not attached):
##  [1] magrittr_1.5      insight_0.9.6      tidyselect_1.1.0   performance_0.5.0
##  [5] R6_2.4.1          rlang_0.4.7        highr_0.8          stringr_1.4.0
##  [9] dplyr_1.0.2       tools_4.0.2        broom_0.7.0        xfun_0.17
## [13] bayestestR_0.7.2  htmltools_0.5.0    equatiomatic_0.1.0 ellipsis_0.3.1
```

checkpoint reconstruye paquetes en fecha determinada

```
library("checkpoint")  
checkpoint("2019-10-08")  
  
source("analysis.R")
```

1. Detecta paquetes usados en el proyecto
2. Instala versión correspondiente a esa fecha (solo CRAN)
3. Instalación independiente (no interfiere con paquetes ya instalados)

automagic registra e instala paquetes (CRAN + GitHub)

```
automagic::make_deps_file()
```

Crea `deps.yaml` especificando dependencias:

```
- Package: equatiomatic  
  Repository: CRAN  
  Version: 0.1.0  
  
- Package: report  
  GithubUsername: easystats  
  GithubRepo: report  
  GithubRef: HEAD  
  GithubSHA1: c48a4bb0a40df7116bc502aa3ce2cbbc9d70b7e2
```

Para instalar todas esas dependencias:

```
automagic()
```

renv también controla las dependencias del proyecto

```
renv::init()
```

```
renv::snapshot()
```

```
# Captura dependencias en fichero lockfile
```

```
renv::restore()
```

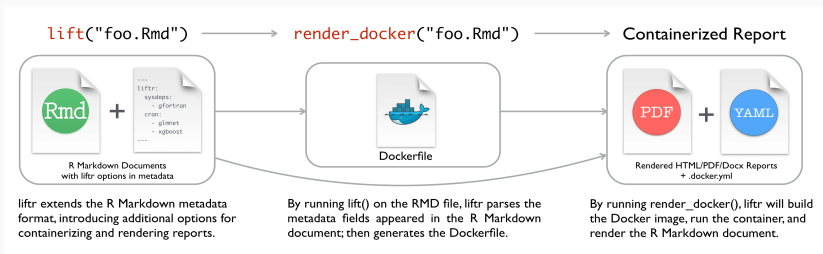
```
# Regenera dependencias a partir del lockfile
```

<https://environments.rstudio.com/>

Para asegurar la reproducibilidad,
además de los paquetes de R
necesitamos controlar
el **sistema/entorno computacional**

Docker permite recrear sistemas virtuales
a partir de un **Dockerfile**
que especifica la configuración

liftr: procesa documento Rmd en un contenedor Docker



<https://liftr.me/>

containerit facilita creación de Dockerfile

```
library("containerit")  
  
dockfile <- dockerfile(from = "mypaper.Rmd")
```

<https://o2r.info/containerit>

holepunch: reproduce análisis en la nube (Binder)

The image is a collage illustrating the process of reproducing analysis using Binder. It includes:

- A blue and yellow comic-style speech bubble with the word "BAM!".
- A screenshot of an RStudio session showing a terminal window with R code and output. The code includes comments about the R version and the use of the RStudio Desktop interface.
- A red and yellow comic-style speech bubble with the word "OMG!".
- A screenshot of the Binder website showing the "Starting repository: karthik/friday-test/master" message.
- A screenshot of a GitHub repository page for "holepunch" with a "Use this template" button highlighted.
- A screenshot of the RStudio Desktop interface showing a file explorer and a terminal window.

<https://karthik.github.io/holepunch/>

Organización del proyecto

Principios sobre organización de proyectos

- README
- Licencia
- Datos brutos + limpios + código depuración
- Código modular (funciones)
- Makefile
- Control de dependencias

Noble 2009, Rodriguez-Sanchez et al 2016, Wilson et al 2017

rrtools facilita la creación de compendios (paquetes)

```
library("rrtools")

use_compendium("~/mynewproject/") # crea proyecto

use_readme_rmd() # crea README

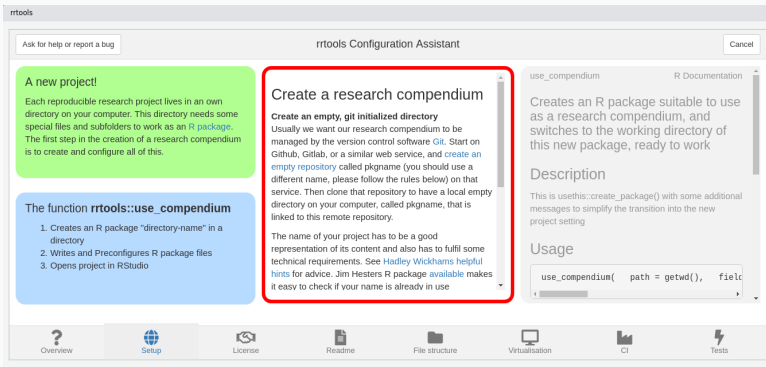
use_analysis() # crea carpeta con manuscrito Rmd

use_dockerfile() # crea Dockerfile

use_travis() # Usa Travis para integración continua

use_testthat() # Usa tests para las funciones
```

rrtools.addin te guía para crear un nuevo proyecto



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

Estructura del proyecto (con funciones)

```
- README
- LICENSE
- DESCRIPTION
- travis.yml
- Dockerfile
- analysis/
  |
  |- paper/
    | - paper.Rmd
    | - references.bib
  |
  |- figures/
  |
  |- data/
    | - raw_data/
    | - derived_data/
- R/
  |- functions.R
- man/
```

Integración continua: chequeo continuo tras cada 'commit'

Travis-CI, Circle-CI, GitHub Actions...

Travis CI

About UsBlogStatusHelp

Sign in with GitHub

Help make Open Source a better place and start building better software today!

Pakillo / Carex.bipolar

build passing

CurrentBranchesBuild HistoryPull Requests

More options

| | | | |
|---------------------|---|-------------------------|---------------------------------|
| ✓ master
Pakillo | add two more articles to pkgdown | → #7 passed
1c006ff | ⌚ 3 min 22 sec
📅 a day ago |
| ✓ master
Pakillo | added leaflet occurrence maps to appear as a | → #6 passed
57f5374 | ⌚ 5 min 23 sec
📅 a day ago |
| ✓ master
Pakillo | build site with pkgdown | → #5 passed
6108a7a | ⌚ 17 min 35 sec
📅 a day ago |
| ✗ master
Pakillo | still trying to fix error with sf in travis (via rnat | → #4 failed
2c922d4 | ⌚ 16 min 58 sec
📅 2 days ago |
| ! master
Pakillo | adding more sf dependencies to travis | → #3 errored
5a60b49 | ⌚ 13 min 59 sec
📅 2 days ago |
| ! master
Pakillo | trying to fix error with rgdal on travis | → #2 errored
076af29 | ⌚ 14 min 15 sec
📅 2 days ago |
| ! master
Pakillo | add travis | → #1 errored
4bce6e8 | ⌚ 18 min 54 sec
📅 3 days ago |

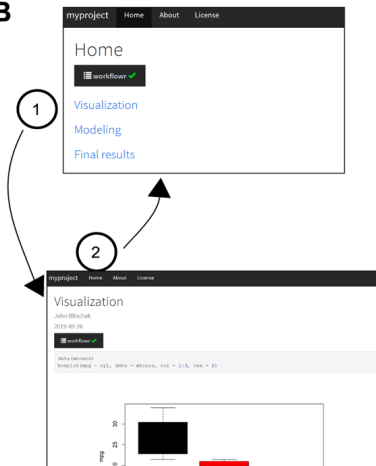
workflowr: proyectos reproducibles con website

```
library("workflowr")  
wflow_start("~/newproject")
```

A

```
myproject/  
├── _workflowr.yml  
├── analysis/  
│   ├── _site.yml  
│   ├── index.Rmd  
│   ├── about.Rmd  
│   ├── license.Rmd  
│   ├── visualize.Rmd  
│   ├── model.Rmd  
│   └── final.Rmd  
├── code/  
├── data/  
├── docs/  
│   ├── figure/  
│   ├── index.html  
│   ├── about.html  
│   ├── license.html  
│   ├── visualize.html  
│   ├── model.html  
│   ├── final.html  
│   └── site_libs/  
└── myproject.Rproj  
output/
```

B



Recapitulación

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- Rmarkdown: integra análisis + texto en documento dinámico

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- Rmarkdown: integra análisis + texto en documento dinámico
- Control de operaciones: makefile, drake/targets
- Dependencias: sessionInfo -> paquetes R -> Docker
- Estructura consistente de proyectos: rrtools, workflowr...

