

Writing reproducible manuscripts in R Markdown

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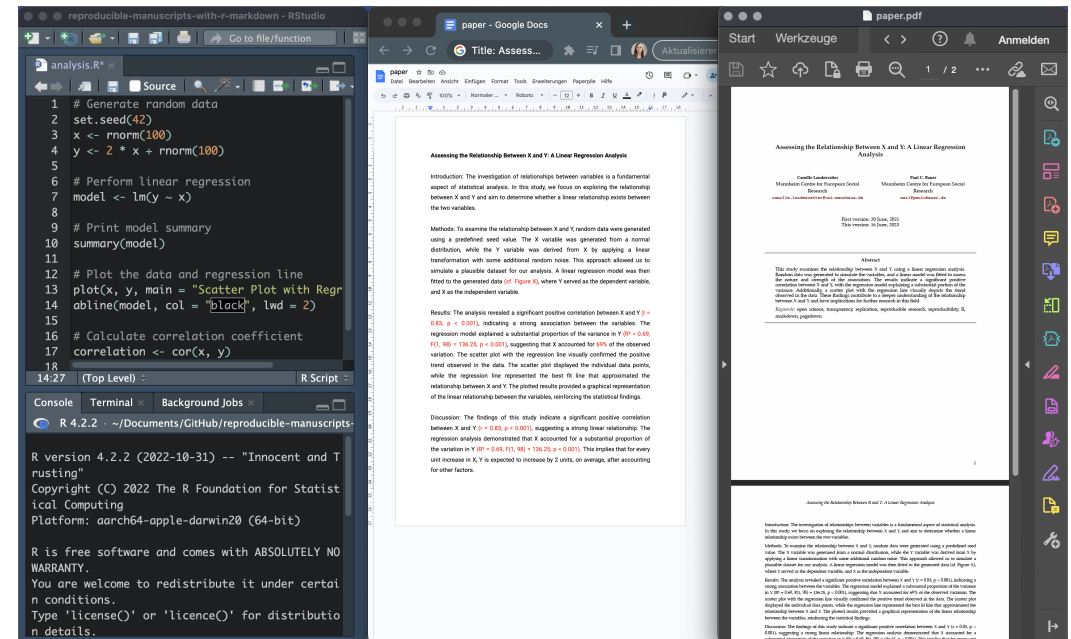


What is a Reproducible Manuscript?

A reproducible manuscript is a research document that includes all the necessary information and code to reproduce the reported findings and results.

It combines the traditional elements of a manuscript (text, figures, tables) with the computational code used for data analysis and visualizations.

- Reproducible Manuscripts versus "Traditional Workflows"?



A 'traditional' workflow with 3 open tabs

How do you currently incorporate your research findings into your paper manuscript?

Let us know on Slido:

<https://app.sli.do/event/m8n4VwLfmo1a9yHT6NViyH>

Why Reproducible Manuscripts?

- **Trust and Credibility:** Reproducible manuscripts enhance the integrity of research, as it allows for thorough scrutiny of methods, data, and analyses. They allow others to independently verify and replicate the reported results.
- **Efficiency:** Adopting reproducible workflows improves efficiency, as researchers can easily update and modify their work, easily spot errors and save time in the long run.
- **Sharing and Collaboration:** By providing transparent and accessible documentation of methods, data, and code, reproducible manuscripts promote collaboration and allow others to build upon and replicate the research findings. This efficient sharing of knowledge fosters faster progress in scientific discovery and innovation.

How to create Reproducible Manuscripts...

- ... using R Markdown?



Coding Language // Framework // R Markdown related packages

How to create Reproducible Manuscripts...

Repositories on GitHub:

- <https://github.com/rstudio/rmarkdown>
- <https://github.com/rstudio/bookdown>
- <https://github.com/rstudio/pagedown>
- <https://github.com/rstudio/blogdown>
- <https://github.com/yihui/xaringan>
- <https://github.com/rstudio/rticles>
- <https://github.com/cjvanlissa/worcs>
- <https://github.com/ClaudioZandonella/trackdown>

R Markdown

- R Markdown is a powerful tool that allows you to blend text, code, and output in a single document.
- essential tool for reproducible research and creating dynamic reports, manuscripts, presentations and many more.

rmarkdown package (Allaire et al. 2023)

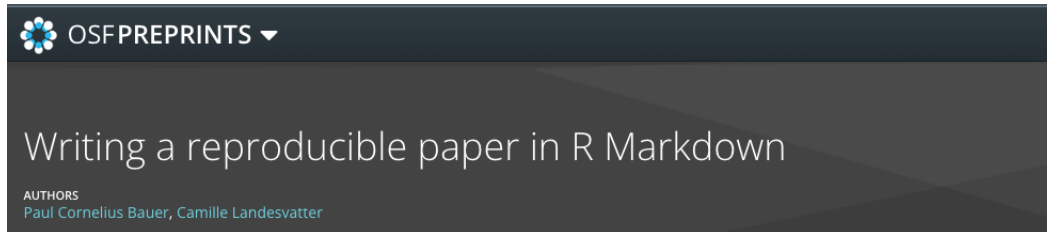
- the powerhouse behind R Markdown, providing the tools and functions to render your documents into different formats like HTML, PDF, Word, and more.
- allows you to effortlessly switch between output formats, making it easy to share your work with collaborators, supervisors, or even publish it online.
 - but also consider documenting your data analysis process with Rmd
- using R Markdown eliminates the need for manual updates or copy-pasting code and results into different documents, saving you time and reducing the chances of errors.

R Markdown: Template (Bauer & Landesvatter 2023)

OSF: <https://osf.io/q395s>

: [/2021_Writing_a_reproducible_paper_in_rmarkdown](#)

: [/paulcbauer/Writing_a_reproducible_paper_in_rmarkdown](#)



Bauer, P.; Landesvatter, C. 2023

How can you use this templates?

- download all available files:
 - 'paper.rmd'
 - 'references.bib'
 - 'data.csv'
 - 'american-sociological-association.csl'
- open .Rproj
- start creating your first manuscript in rmd, use our working paper (wp) style or modify the styling sheets

Pagedown (Xie et al. 2022)

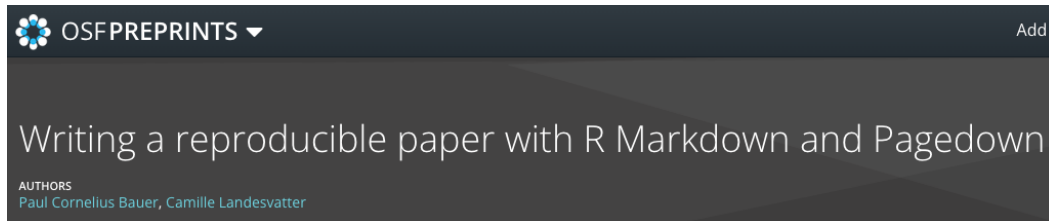
- R Markdown based extension
- create paginated HTML reports that are converted into PDF format
- add headers, footers, page numbers, and more to your documents
- by specifying YAML metadata, you can customize various aspects of your document's style, such as fonts, colors, margins, and page dimensions
 - HTML and CSS styling sheets
- pagedown offers a range of pre-built templates for different purposes, such as CVs, theses, letters, and journal articles, making it easy to get started
- create professional-looking documents without the need for complex LaTeX formatting or advanced CSS knowledge
- greater choice for generating polished reports or preparing documents that require a print-ready PDF format

Pagedown: Template (Bauer & Landesvatter 2023)

OSF: <https://osf.io/k8jhx/>

: [/paulcbauer/Writing_a_reproducible_paper_in_pagedown](https://github.com/paulcbauer/Writing_a_reproducible_paper_in_pagedown)

: [/2021_Writing_a_reproducible_paper_in_pagedown](https://doi.org/10.21203/rs.3.rs-2811111/v1)



Bauer, P.; Landesvatter, C. 2023

Writing a reproducible paper with R Markdown and Pagedown²

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Download: <https://osf.io/k8jhx>

Abstract

The present paper provides a template to write a reproducible scientific paper with R Markdown and Pagedown.¹ Below we outline some of the “tricks”/code (e.g., referencing tables, sections etc.) we had to figure out to produce this document. The underlying files which produce this document can be [downloaded here](#). Importantly, we also provide different CSS and HTML files that can be used to achieve a pdf output with the look of a “working paper”. We are convinced that in the future there will be many improvements and developments with regards to RStudio, R markdown and Pagedown. We intend to update this file when we discover more convenient code. You can follow any updates on the [github repository](#).

Keywords: open science, transparency, replication, reproducible research, reproducibility, R, markdown, pagedown.

Pre-Requisites for R Markdown and Pagedown

Both require: installation of R + recommended: Rstudio IDE

- R Markdown:
 - rmarkdown package + other dependencies, e.g. knitr package
 - for working without Rstudio: Pandoc Installation
 - for PDF output: a LaTeX distribution, e.g. tinytex (a lightweight, cross-platform LaTeX distribution)

```
install.packages(c('tinytex', 'rmarkdown'))  
tinytex::install_tinytex()
```

- Pagedown:
 - rmarkdown package + other dependencies, e.g. knitr
 - pagedown package
 - no LaTeX!

```
remotes::install_github('rstudio/pagedown')
```

Structure of a Reproducible Manuscript (.Rmd)

Demonstration in R Studio

: [/paulcbauer/Writing_a_reproducible_paper_in_rmarkdown](https://github.com/paulcbauer/Writing_a_reproducible_paper_in_rmarkdown)

Some more packages (Xaringan, Trackdown, Quarto)

Xaringan (Xie 2021)

- R Markdown extension that enables the creation of stylish and interactive slideshows using HTML and CSS
- R Studio add-in Infinite Moon Reader
- preview live changes while editing your files or even manuscript
- avoids manually knitting your document each time

```
xaringan::inf_mr()
```

- launches a local web server via the `servr` package (Xie 2021) and displays your pages in the RStudio viewer
- each time you save your document (Ctrl/Cmd+S) xaringan updates your pages in the viewer

Xaringans' Infinite Moon Reader

The screenshot displays the RStudio interface with the following components:

- Source Editor:** Contains R code for loading the `xaringan` package and starting a local web server via the `servr` package. The code includes comments explaining the setup and the `xaringan::inf_mr()` function call.
- Console:** Shows the output of the R session, including the URL `http://127.0.0.1:4321/mzes-xaringan-metropolis.html` and instructions on how to stop the server.
- Environment Pane:** Displays the current environment, showing the `data` object (47 obs. of 7 variables) and the `M1` object (List of 12).
- Viewer Pane:** Displays the rendered HTML page titled "Pagedowns' Infinite Moon Reader". The page content includes a list of features and the `xaringan::inf_mr()` function call.

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322 ---
323 # Pagedowns' Infinite Moon Reader
324
325 * xaringan package (Xie 2021) includes R Studio add-in Infinite Moon Reader
326 * preview live changes while editing your manuscript
327 * avoids manually knitting your document each time
328
329 ```{r xaringan-inf-mr, eval=F, echo=T}
330 xaringan::inf_mr()
331 ```
332
333 * launches a local web server via the servr package (Xie 2021) and displays your pages in the RStudio viewer
334 * Each time you save your document (Ctrl/Cmd+S) xaringan updates your pages in the viewer.
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```

Output created: mzes-xaringan-metropolis.html
To stop the server, run `servr::daemon_stop(1)` or restart your R session
Serving the directory `/Users/camillelandesvatter/Documents/GitHub/reproducible-manuscripts-with-RMD` at `http://127.0.0.1:4321/mzes-xaringan-metropolis.html`

Pagedowns' Infinite Moon Reader

- xaringan package (Xie 2021) includes R Studio add-in Infinite Moon Reader
- preview live changes while editing your manuscript
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```
xaringan::inf_mr()
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Slide 12 of 13

Trackdown

- R trackdown package for improving collaborative writing

: [ClaudioZandonella/trackdown](https://github.com/ClaudioZandonella/trackdown)

- collaborative workflow for the writing and editing process with R Markdown
- upload local .Rmd (or .Rnw) file as a plain-text file to Google Drive
- use Markdown (or LaTeX) syntax and Google Docs options (e.g. suggest edits, add comments)
- review and integrate all contributions
- the final document can be downloaded and rendered locally

R trackdown package for improving collaborative writing

```
remotes::install_github("claudiozandonella/trackdown",  
                        build_vignettes = TRUE)
```

```
upload_file(file = "trackdown_example.Rmd",  
            gpath = "trackdown_example",  
            hide_code = TRUE)
```

- `download_file()`
- `update_file()`
- `render_file()`

- Quarto is often referred to as "the next generation of R Markdown"
- main goal: seamlessly integrate narrative text and code, allowing for the generation of nicely formatted output documents
- like R Markdown, Quarto utilizes Knitr to execute R code, which means that most existing Rmd files can be rendered in Quarto without requiring extensive modifications

Rmd versus Quarto

- Quarto comes with enhanced support for interactive and dynamic documents (versus static documents)
 - Quarto supports multiple programming languages (e.g. R, Python, Julia, and Observable JS) - by adding Lua filters to the pandoc metadata, it achieves a cross-language standardization of outputs
 - Template? OSF: <https://osf.io/ur4xn>
- 🐱: [/paulcbauer/Writing_a_reproducible_paper_with_quarto](#)



Thank you!

: `clandesv/reproducible-manuscripts-with-r-markdown`

Xaringan Presentation on GitHub Pages: <https://clandesv.github.io/reproducible-manuscripts-with-rmarkdown/slides.html>