

# Sweave/Knitr for reproducible research with LaTeX

Juan R Gonzalez

## Contents

---

1	Reproducible research (RR)	1
1.1	Example of non-reproducible research . . . . .	1
1.2	Example of reproducible research . . . . .	1
2	References	2
3	Session information	2

## 1 Reproducible research (RR)

---

- In it's most general sense... the ability to reproduce results from an experiment or analysis conducted by another.
- From Wikipedia... 'The ultimate product is the **paper along with the full computational environment** used to produce the results in the paper such as the code, data, etc. that can be **used to reproduce the results and create new work** based on the research
- Concept is strongly based on the idea of **literate programming** such that the logic of the analysis is clearly represented in the final product by combining computer code/programs with ordinary human language [Knuth, 1992].

### 1.1 Example of non-reproducible research

1. Gather data
  - Begins with general question or research objectives
  - Data collected in raw format (hard copy) converted to digital (Excel spreadsheet)
2. Analyze data
  - Import data into stats program or analyze directly in Excel
  - Create figures/tables directly in stats program
  - Save relevant output
3. Report Result
  - Create research report using Word or other software
  - Manually insert results into report
  - Change final report by hand if methods/analysis altered

### 1.2 Example of reproducible research

1. Gather data
  - Begins with general question or research objectives
  - Data collected in raw format (hard copy) converted to digital **text file**
2. Analyze data
  - Create **integrated script** for importing data (data path is known)

- Create figures/tables directly in stats program
- **No need to export** (reproduced on the fly)

### 3. Report Result

- Create research report using RR software
- **Automatically include results** into report
- **Change final report automatically** if methods/analysis altered

Easily adopted using [RStudio](#). Also possible with [Tinn-R](#) or via command prompt but not as intuitive. Requires a LaTeX distribution system - use [MikTeX for Windows](#). It is essentially a LaTeX document that incorporates R code and these programs use Sweave (or Knitr) to convert .Rnw file to .tex file, then LaTeX is used to create pdf files. Sweave comes with utils package, Knitr should be loaded.

## 2 References

---

## 3 Session information

---

```
## R version 3.3.2 (2016-10-31)
## Platform: x86_64-w64-mingw32/x64 (64-bit)
## Running under: Windows 10 x64 (build 14393)
##
## locale:
## [1] LC_COLLATE=Spanish_Spain.1252  LC_CTYPE=Spanish_Spain.1252
## [3] LC_MONETARY=Spanish_Spain.1252 LC_NUMERIC=C
## [5] LC_TIME=Spanish_Spain.1252
##
## attached base packages:
## [1] stats      graphics  grDevices  utils      datasets  methods   base
##
## other attached packages:
## [1] knitr_1.15.1    BiocStyle_2.2.1
##
## loaded via a namespace (and not attached):
## [1] backports_1.0.5 magrittr_1.5    rprojroot_1.2  tools_3.3.2
## [5] htmltools_0.3.5 yaml_2.1.14     Rcpp_0.12.9    stringi_1.1.2
## [9] rmarkdown_1.3   stringr_1.1.0  digest_0.6.11  evaluate_0.10
```