
A NON REPRODUCIBLE
WORKFLOW
0:00 / 1:44

Introduction to R-Markdown

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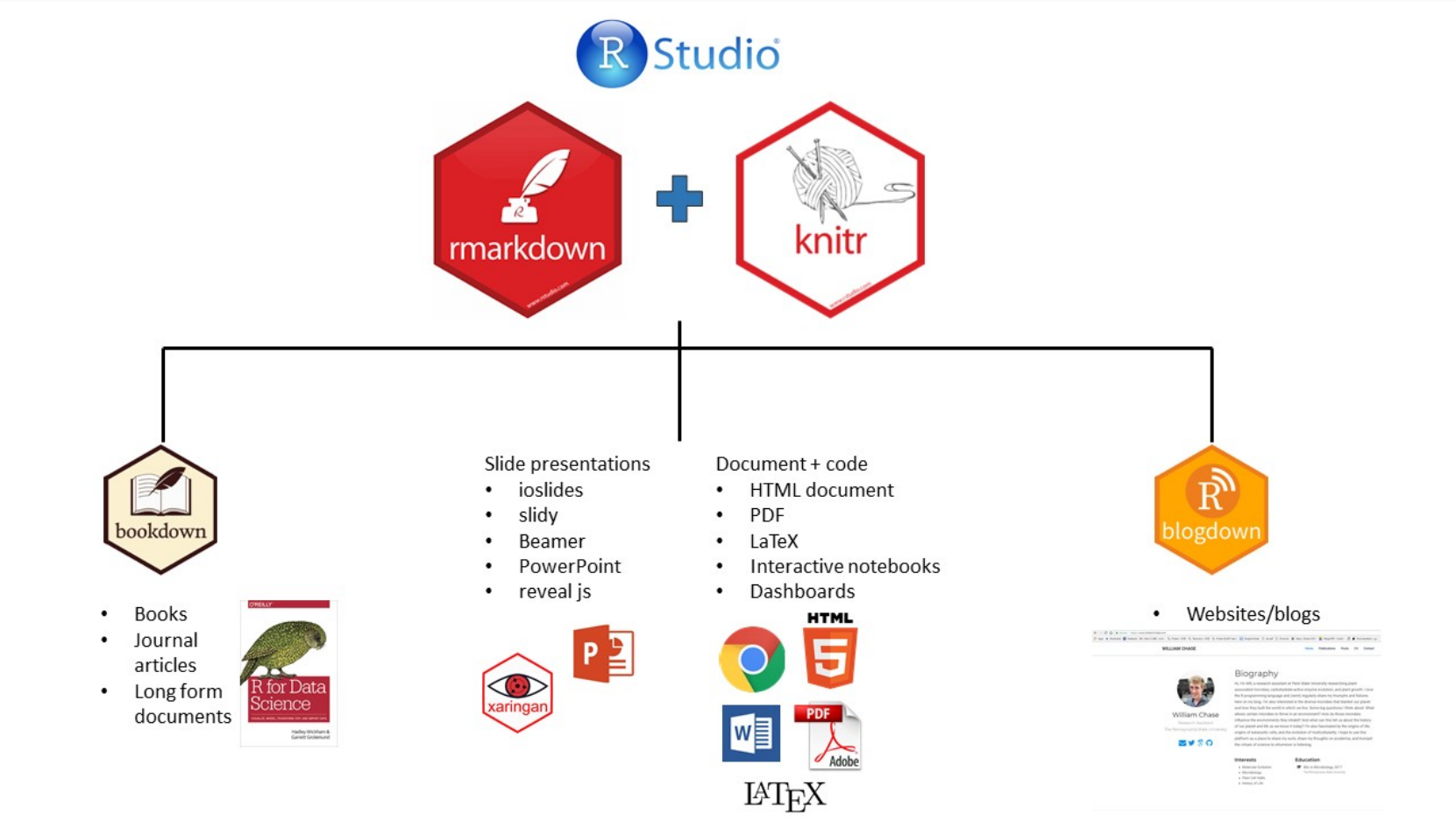
BDSI / RSB

Why use R-Markdown/Knitr

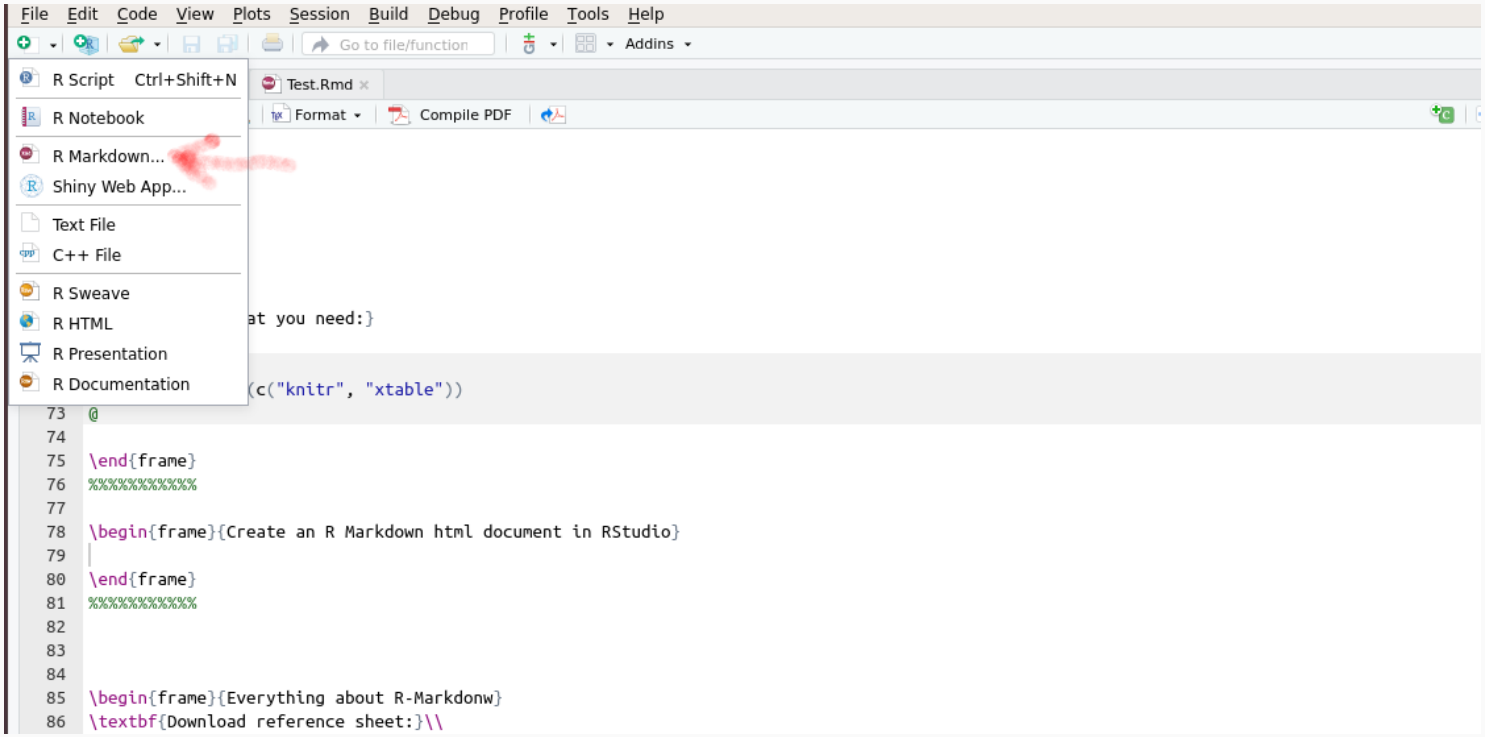


- Make your life easier
- Reproducible science

What you need:

```
install.packages(c("knitr", "xtable"))
```

Create an R Markdown html document in RStudio



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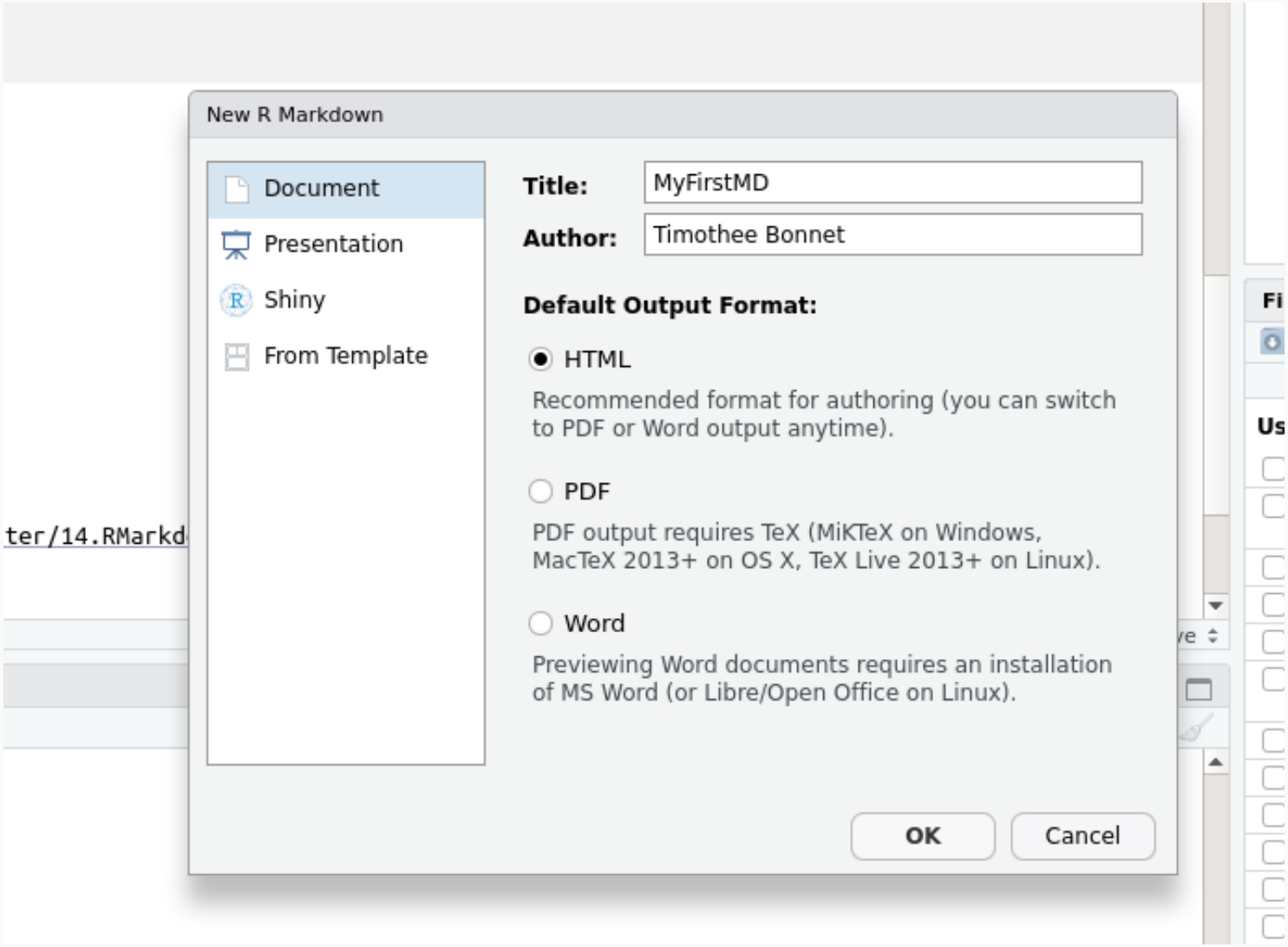

Create an R Markdown html document in RStudio

Components of R-Markdown:

1. YAML = Configuration
2. Text
3. Code chunks

Text: Markdown syntax

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```
Simple text
```

Simple text

Text: Markdown syntax

```
Simple text
# Header (main)
```

Simple text

Header (main)

Text: Markdown syntax

```
Simple text
# Header (main)
## Header (section)
```

Simple text

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Text: Markdown syntax

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# Header (main)
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### Header (sub-section)
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Text: Markdown syntax

```
Simple text
# Header (main)
## Header (section)
### Header (sub-section)
*Italics*
```

Simple text

Header (main)

Header (section)

Header (sub-section)

Italics

Text: Markdown syntax

```
Simple text
# Header (main)
## Header (section)
### Header (sub-section)
*Italics*
**Bold**
```

Simple text

Header (main)

Header (section)

Header (sub-section)

Italics

Bold

Text: Markdown syntax

```
Simple text
# Header (main)
## Header (section)
### Header (sub-section)
*Italics*
**Bold**
Make a list:
- You can use
- asterisks (*)
- instead of -
```

Simple text

Header (main)

Header (section)

Header (sub-section)

Italics

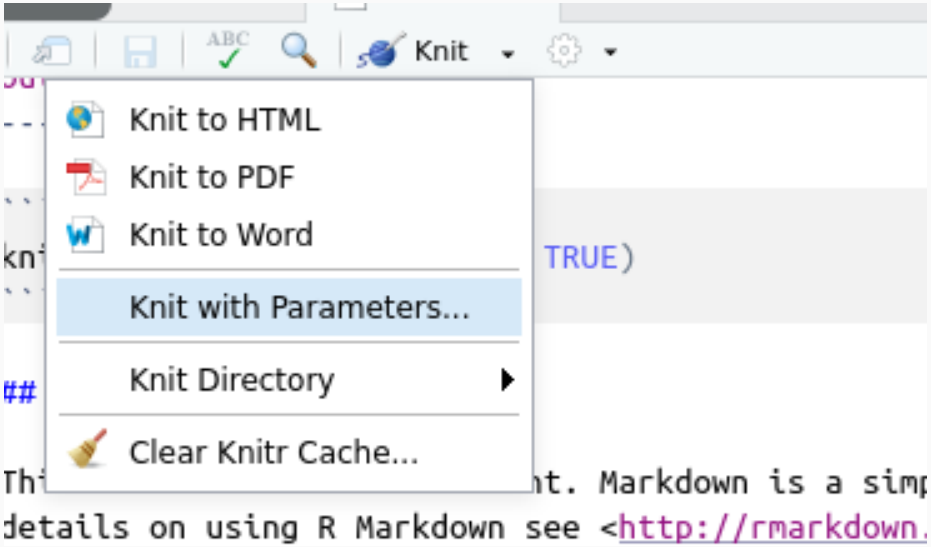
Bold

Make a list:

- You can use
- asterisks (*)
- instead of -

Turn code into document: Compilation

- Ctrl + Shift + K
- Click "Knit"



Text: Exercise

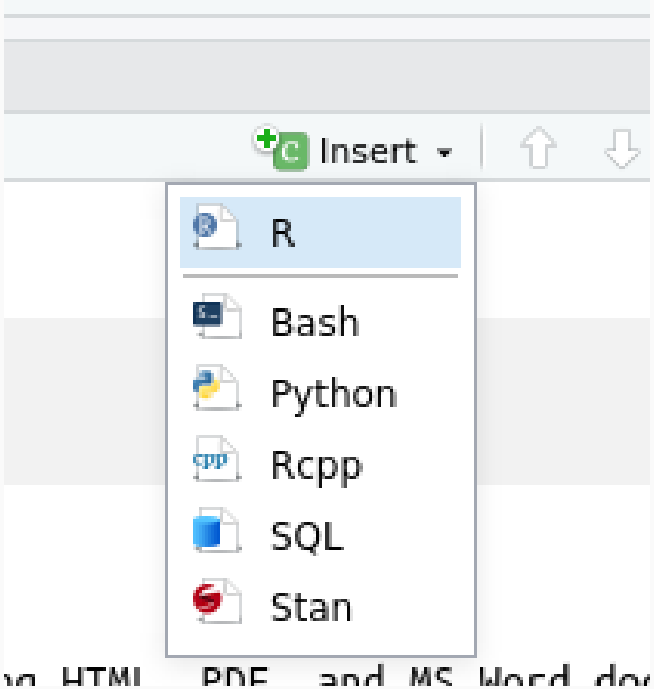
Create a new R Markdown document. Delete all of the R code chunks and write a bit of Markdown (some sections, some italicized text, and an itemized list).

Convert the document to a webpage.

R-Code

Insert a code chunk:

- Ctrl+Alt+I
- Click

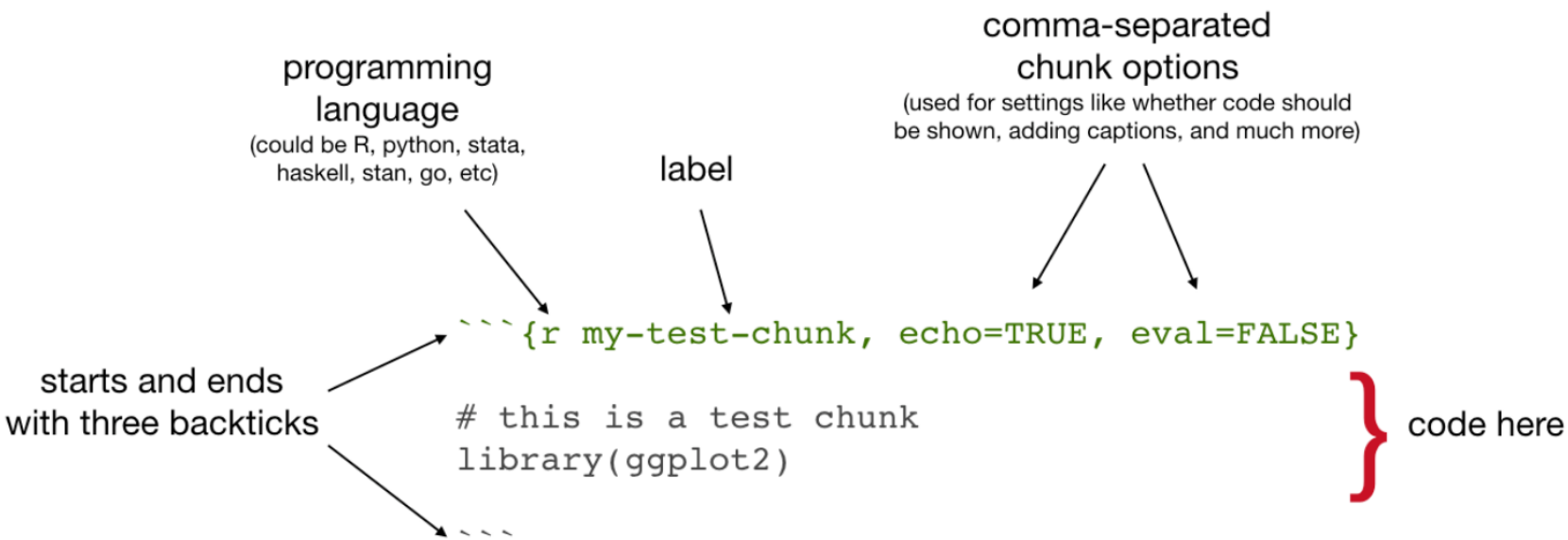


R-Code: Exercise

Insert the following code in your .Rmd document and compile it:

```
x1 <- rnorm(200)
x2 <- x1 +rnorm(200)
y <- 1 + x1 +rnorm(200)
summary(lm(y ~ x2))
plot(x2, y)
```

Control chunk behavior:



Control chunk behavior:

Important options:

- echo= TRUE/FALSE ; show the code?
- eval= TRUE/FALSE ; run the code?
- collapse= TRUE/FALSE ; combine code and output?
- warning / message / error = TRUE/FALSE ; show what R wants to tell you?
- include = TRUE/FALSE ; show anything from the chunk in the document?
- fig.width / fig.height ; figure dimensions in inches
- fig.cap ; figure caption
- dev = 'pdf' / 'png' / 'svg' / 'jpeg' / 'tikz' /... ; How to create images?

Inline R: make every number reproducible

Try the two:

inline code displayed:

```
` 1 + pi `
```

inline code output:

```
`r 1 + pi `
```

A little bit of YAML

YAML basics:

Warning: YAML is very sensitive to spaces/tabs!

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Starts and end with 3 dashes

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Starts and end with 3 dashes

- `title: "XX"`
- `author: "XX"`
- `date: "XX"`
- `output: html_document / word_document / pdf_document`

YAML options with html:

Add a table of content (floating or fixed)

```
output:
  html_document:
    toc: true
    toc_float: true
```

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output:
  html_document:
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```

Section numbering:

```
output:
  html_document:
    number_sections: true
```

Html document look

theme:

`default`, `cerulean`, `journal`, `flatly`, `darkly`, `readable`, `spacelab`, `united`, `cosmo`, `lumen`, `paper`, `sandstone`, `simplex`, and `yeti`. Pass `null` for no theme (in this case you can use the css parameter to add your own styles)

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highlight:

`default`, `tango`, `pygments`, `kate`, `monochrome`, `espresso`, `zenburn`, `haddock`, `textmate` and `null`

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```
output:
  html_document:
    theme: united
    highlight: tango
```

YAML: Exercise

1. Try compiling your Rmd as Word
2. (If you have LaTeXinstalled try compile as .pdf)
3. Using HTML compilation add a table of content and change the theme

More markdown syntax

Insert pictures

```
![caption](Figures/markdown.png)
```

or if you want more control with chunk options:

````
```{r, fig.cap="R Markdown logo", fig.width=6}
knitr::include_graphics("Figures/markdown.jpg")
```
````

Insert hyperlink

```
[text to show](http://the-web-page.com)
```

Insert tables

Use the function kable in your .Rmd :

```
data(cars)
knitr::kable(x = head(cars), caption = "A knitr kable table")
```

Insert equations

Follows LaTeXformat:

Inline Math

```
Hello $y_i = \mu + \beta \times x_i + \epsilon_i$, have a good day
```

Hello $y_i = \mu + \beta \times x_i + \epsilon_i$, have a good day

Insert equations

Follows LaTeXformat:

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Equation Math

```
Hello $$y_i = \mu + \beta \times x_i + \epsilon_i$$, have a good da
```

Hello

$$y_i = \mu + \beta \times x_i + \epsilon_i$$

, have a good day

Insert tabs in html with {.tabset}

Linear regression {.tabset}

Simple

A simple regression measures total associations

```r
summary(lm(y ~ x2))
```

Multiple

A multiple regression measures direct associations, corrected for indirect associations.

```r
summary(lm(y ~ x1+x2))
```

Final exercise

Turn the file "ToConvertToRMD.R" into a nice report/web-page For instance:

- Turn comments into text and equations
- Explain what the code is doing in text
- Add sections and table of content
- Print tables, figures (with captions!), inline numbers...
- Control the style
- Show or hide parts of the code (what goes in a report vs. just having a look at the data)
- Add iris pictures...
- ...have fun!

Use your own R code if you prefer!

Conclusions

Post-scriptum: Markdown or LaTeX?

Knitr can work with R-Markdonw (.Rmd files) and with Latex (.Rnw files)

- Markdown is much simpler
- LaTeXis much more flexible
- Pandoc let you translate a Markdown into Latex, then improve the Latex

Cool things we haven't seen

- Add citations and make a bibliography (e.g., package citr)
- Cross-referencing
- Add non-R code (Python, Bash, SQL, stan...)
- How to make Slides (powerpoint, ioslides, beamer...)
- ...

Everything about R-Markdonw

Download reference sheet:

https://github.com/timotheenivalis/RSB-R-Stats-Biology/raw/master/14.RMarkdown/rmarkdown-reference.pdf

Download quick cheatsheet:

https://github.com/timotheenivalis/RSB-R-Stats-Biology/raw/master/14.RMarkdown/rmarkdown-cheatsheet-2.0.pdf

More resources by RStudio:

https://rmarkdown.rstudio.com/index.html