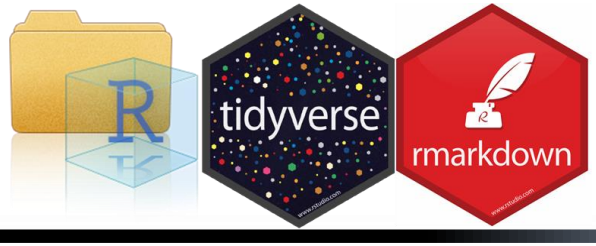
R: A Hitchhikers Guide to Reproducible Research

- Take control



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Clinical Research Facility - Cork &
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CRF-C
HRB Clinical Research Facility Cork

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh
School of Public Health

R Markdown

~/Open_Science/Digital_Badge/RCR - master - RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function | Addins

lettuce_report.Rmd*

Knit | Insert | Run

```
---
title: "This is a reproducible document"
author: "Dr. Brendan Palmer"
date: "18th June 2019"
output:
  word_document:
    fig_height: 4
    fig_width: 6
---
# This is the beginning of the project

Our initial reports might be restricted to lab meetings etc. We can use `R Markdown` to show the code we are using, so that the meetings are not just a demonstration of the results, but also an examination of the `code` used to obtain them.

## Data overview
```{r packages and setup, include = FALSE}

knitr::opts_chunk$set(echo = FALSE, message = FALSE, warning = FALSE)

# Load your packages here
library(tidyverse)
library(knitr)
```

The plot below is call from the ggplot object entitled `report_plot` created in the script `03_final_analysis.R`.

```{r Plots from script, echo = FALSE}

source("scripts/03_final_analysis.R")

# The location of the Rmd file dictates whether the path to other files is intact
```

This is a reproducible document

Dr. Brendan Palmer

18th June 2019

This is the beginning of the project

Our initial reports might be restricted to lab meetings etc. We can use R Markdown to show the code we are using, so that the meetings are not just a demonstration of the results, but also an examination of the code used to obtain them.

Data overview

The plot below is call from the ggplot object entitled report_plot created in the script 03_final_analysis.R.

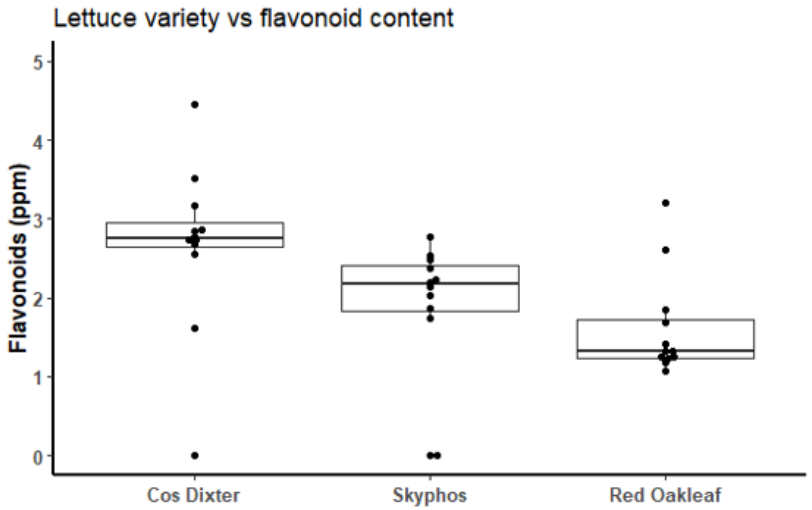
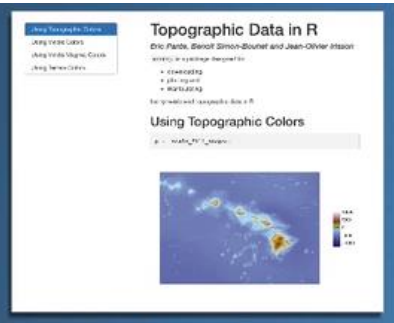


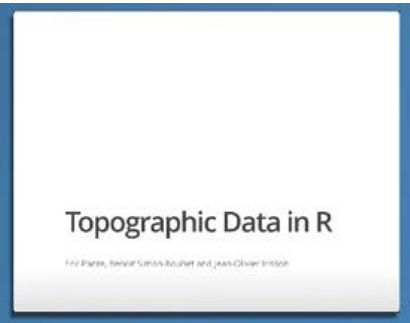
Fig. 1. Flavonoid content of three lettuce varieties under three experimental conditions.

Or we can also recreate the code within the R Markdown document as seen below.
```

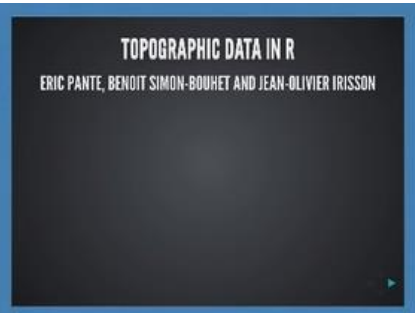
What has R Markdown ever done for us?



html

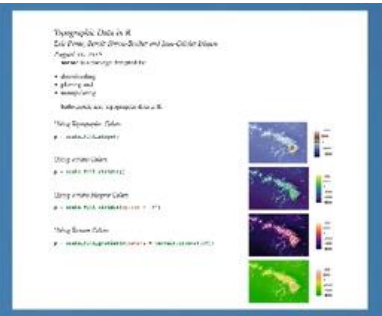


ioslides

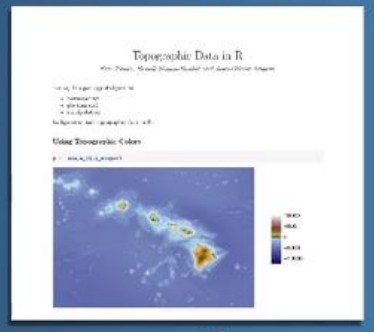


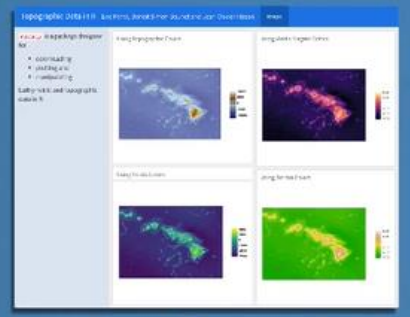
reveal.js


rtf

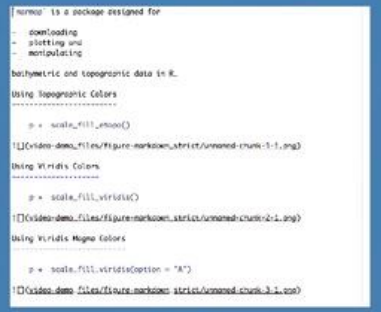

tufte handout

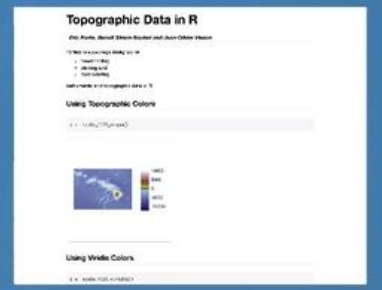
book


pdf

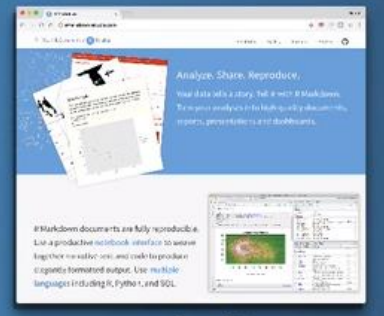

dashboard

slidy

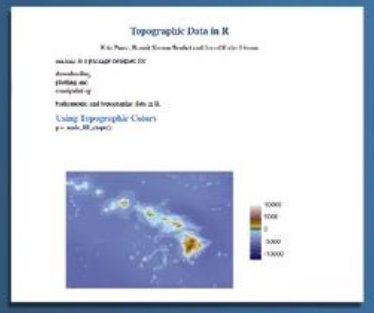

markdown

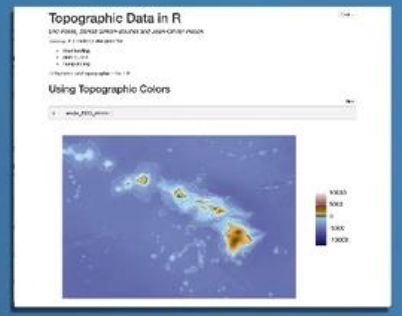


package vignette

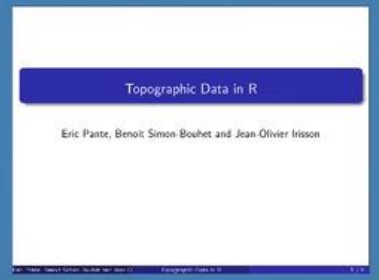


website


Word



notebook



beamer


latex

custom template


shiny app

R Markdown

YAML header

```
---
title: "Diamond sizes"
date: 2016-08-25
output: html_document
---
```

Chunks of code

````
```{r setup, include = FALSE}
library(ggplot2)
library(dplyr)
smaller <- diamonds %>%
filter(carat <= 2.5)
```
````

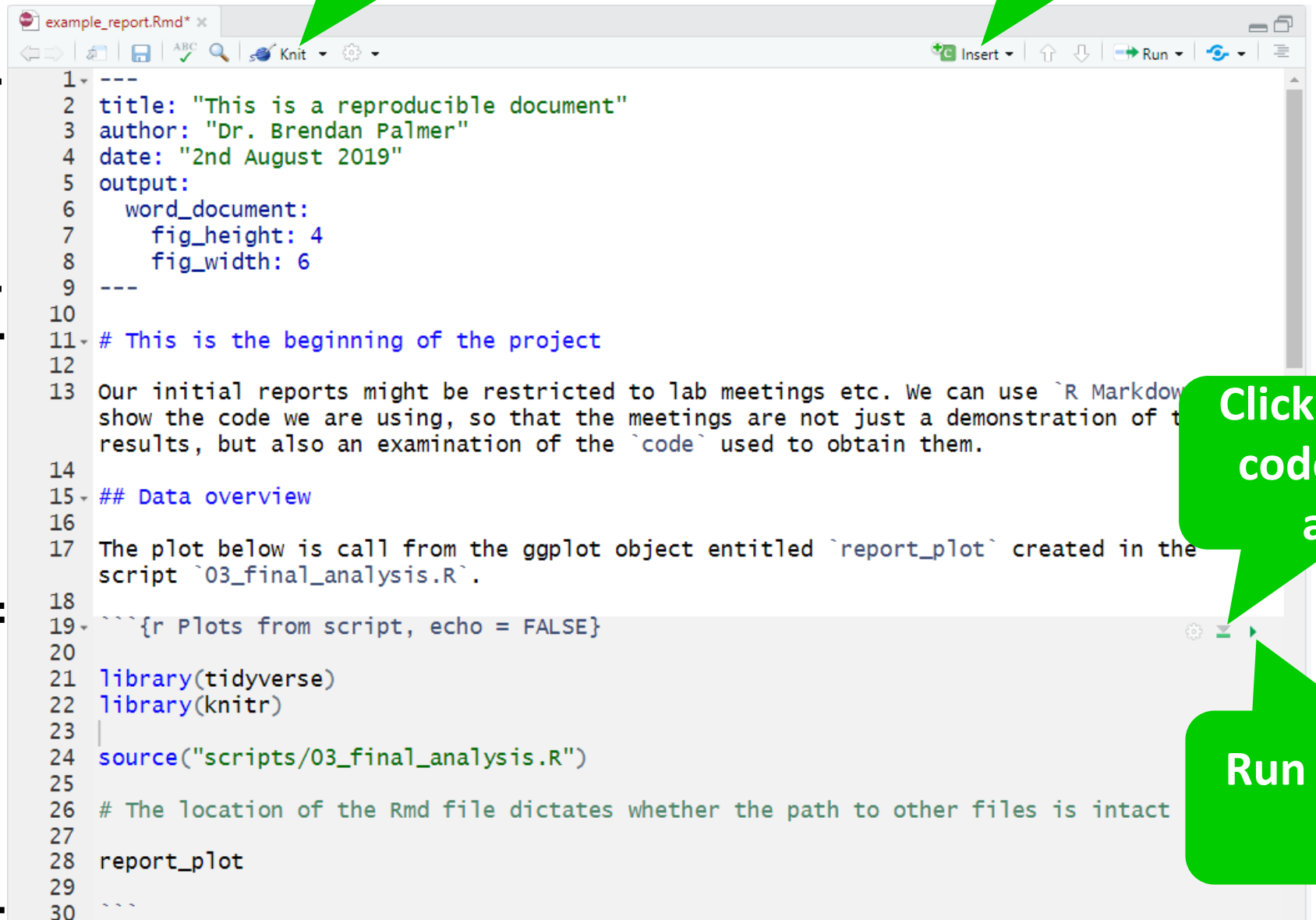
Plain text with data outputs from R code

````
We have data about `r nrow(diamonds)`
diamonds. Only
`r nrow(diamonds) - nrow(smaller)` are
larger than
2.5 carats. The distribution of the
remainder is shown below:
````

Chunks of code

````
```{r, echo = FALSE}
smaller %>%
ggplot(aes(carat)) +
geom_freqpoly(binwidth = 0.01)
```
````

R Markdown




```
---
title: "This is a reproducible document"
author: "Dr. Brendan Palmer"
date: "2nd August 2019"
output:
  word_document:
    fig_height: 4
    fig_width: 6
---

# This is the beginning of the project

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## Data overview

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```{r Plots from script, echo = FALSE}

library(tidyverse)
library(knitr)

source("scripts/03_final_analysis.R")

# The location of the Rmd file dictates whether the path to other files is intact

report_plot

```
```

R Markdown - Headers

```
# Header 1
## Header 2
### Header 3
#### Header 4
##### Header 5
###### Header 6
```

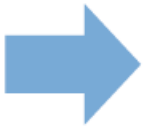

Header 1

Header 2

Header 3

Header 4

Header 5

Header 6

R Markdown - Formatting

```
Text
_italics_
__bold__
`code`
```

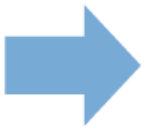

Text

italics

bold

`code`

R Markdown - Lists

```
Bullets

* bullet 1
* bullet 2

Numbered list

1. item 1
2. item 2
```

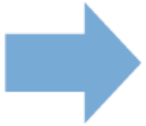

Bullets

- bullet 1
- bullet 2

Numbered list

1. item 1
2. item 2

R Markdown - Hyperlinks

```
This is a
[link](www.git.com).
```

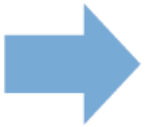

This is a link.

R Markdown - Equations

```
According to
Einstein,
$E=mc^{2}$
```

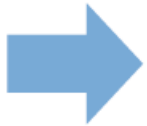

According to Einstein, $E = mc^2$

R Markdown - Images

```
![](images/1.png)
The RStudio logo.
```

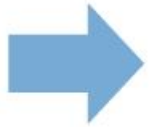

R Markdown – Code chunks

````
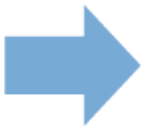
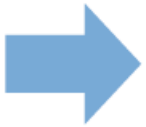
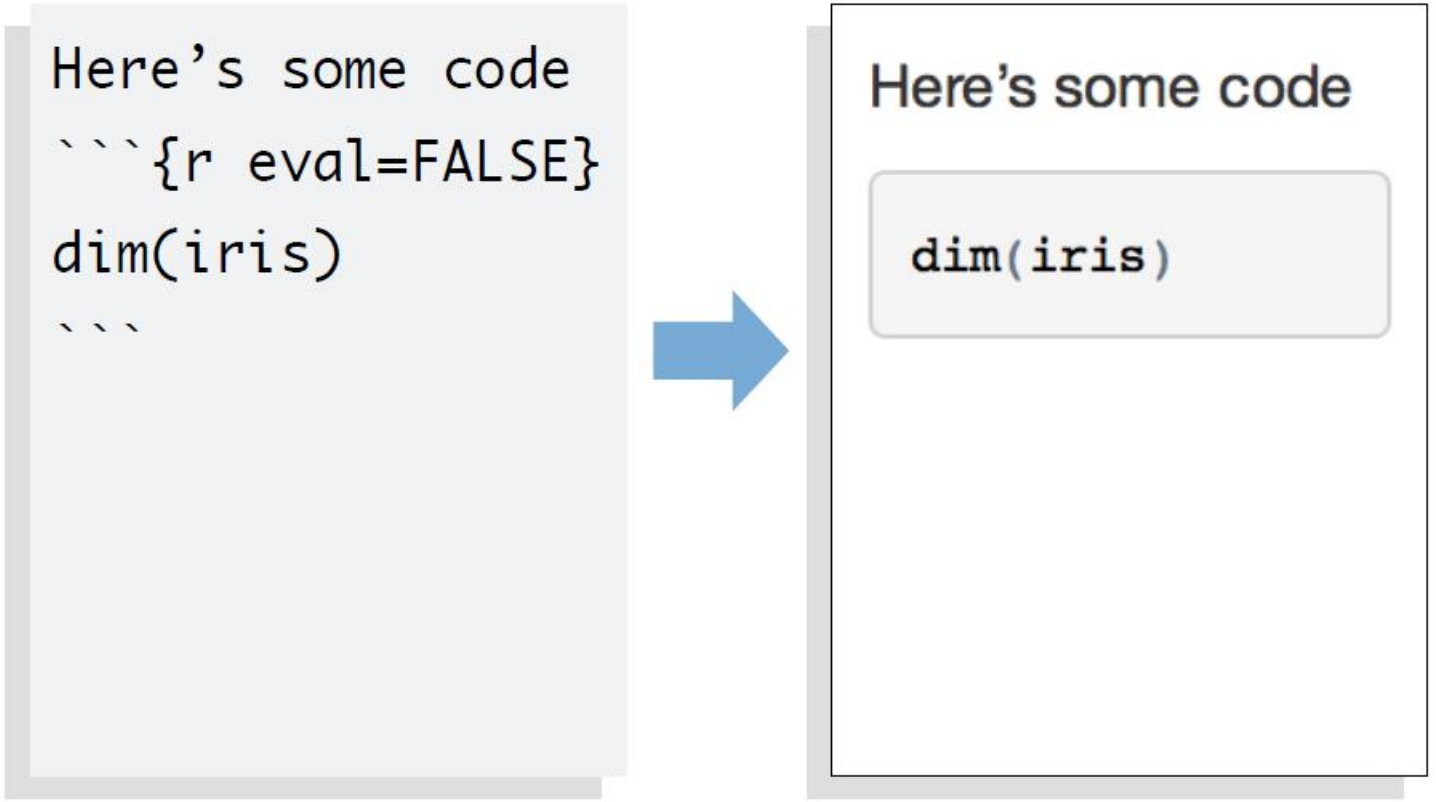
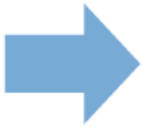
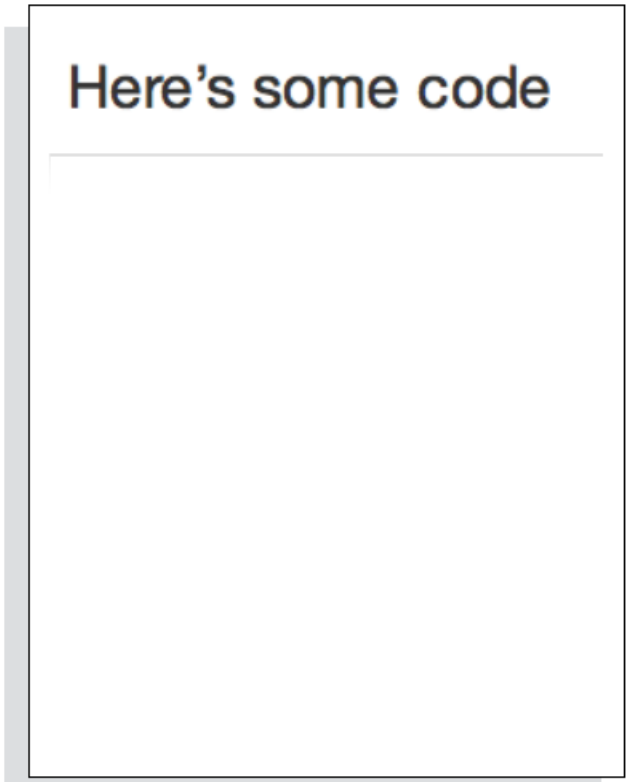
Here's some code
```{r}
dim(iris)
```
````



Here's some code

```
dim(iris)
```

```
## [1] 150   5
```

R Markdown – Code chunks

````
Here's some code
```{r echo=FALSE}
dim(iris)
```
````



Here's some code

```
## [1] 150   5
```

- Displays the results but not the code

R Markdown – Code chunks



- Displays the code, but not the results (code is not run)

R Markdown – Code chunks

````
Here's some code
```{r include=FALSE}
dim(iris)
```
````





- Neither code nor results displayed (but the code is run)

R Markdown

Tips:

- Ensure each notebook has a descriptive title
- If you reach a research dead end, don't delete it
    - Write a note about it. It may be useful later

- At the end of each day run a clean knit of the note book

- If there's an error message, correct it while its still fresh in your mind

- If you want your code to be reproducible in the long run, you'll need to keep a rigorous track of the package versions
    - Consider using the packrat package to help with this

- For an deeper dive into R Markdown visit https://bookdown.org/yihui/rmarkdown

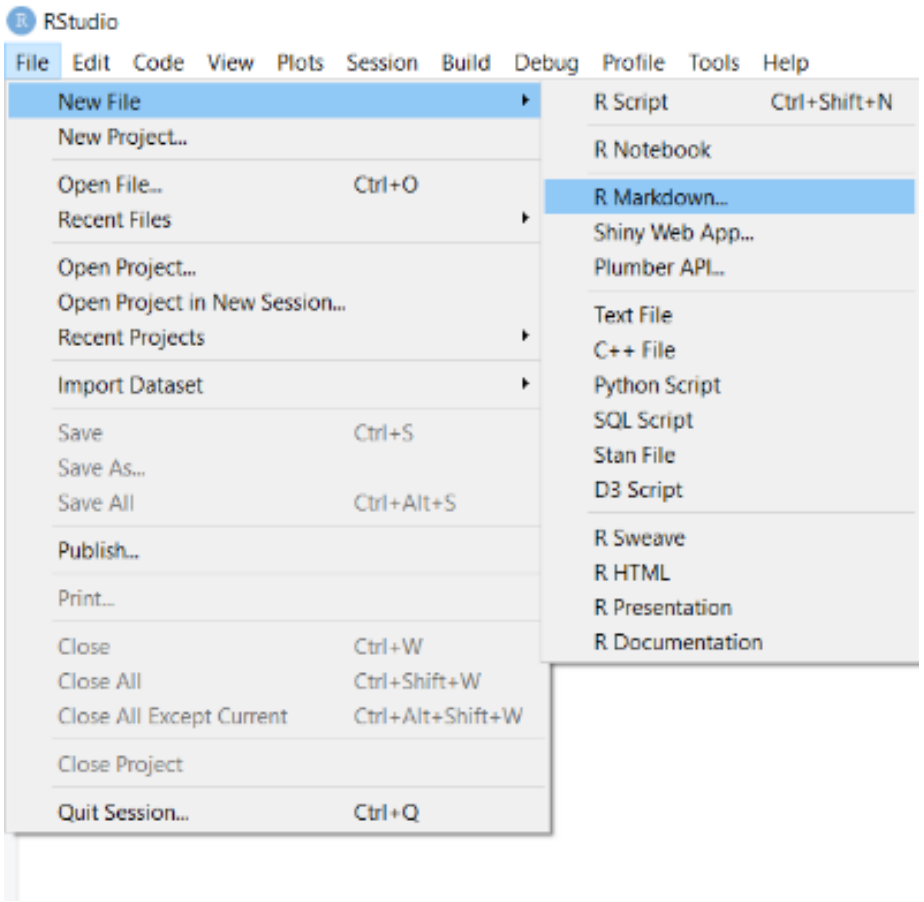
Introduction to R Markdown

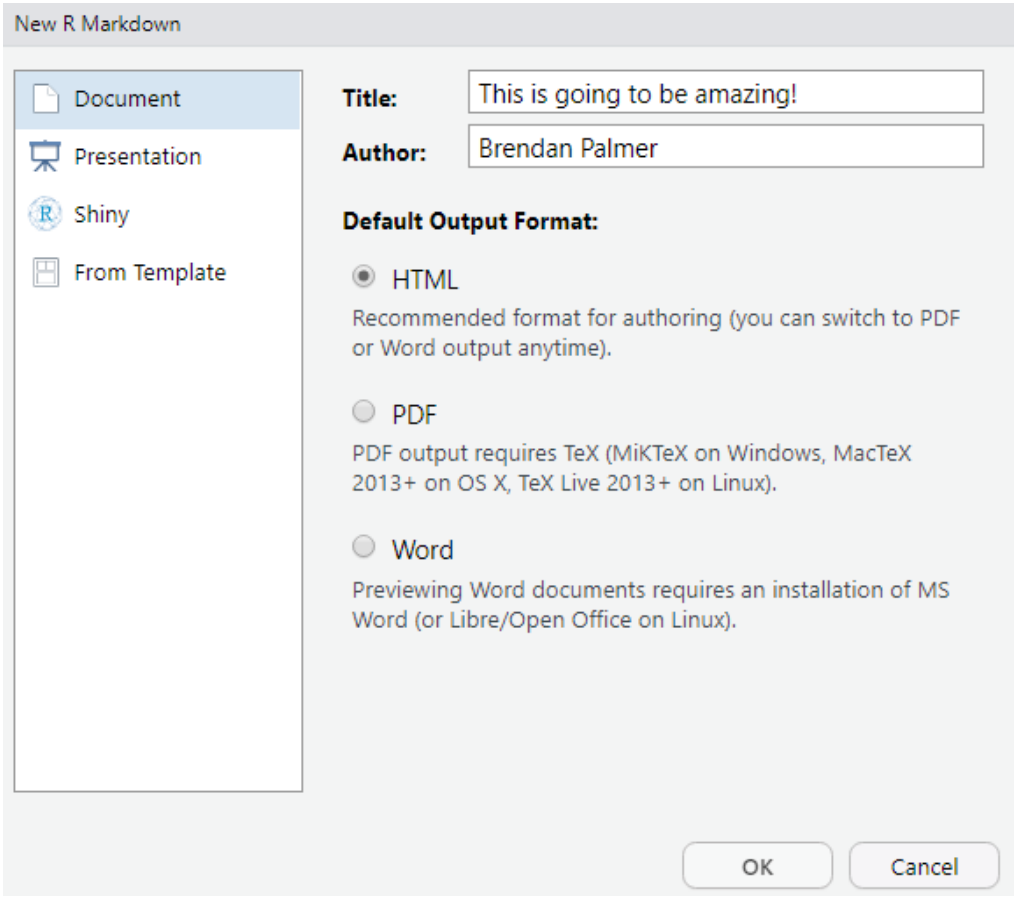
- We're now going to look at a R Markdown file that provides some of the tips and tricks you'll need yourselves
    - Code chunks
    - Formatting
    - Tables
    - Figures etc.

- Open the R Markdown file Day_3/docs/intro_to_RMarkdown.rmd
- Open the R Markdown file Day_3/fancy_R-markdown_bits.rmd

Worksheet – R Markdown DIY

- Create a R Markdown document and begin compiling





- Save the file as Day_3/diy_r_markdown.rmd