

# Creating documents in R

author: Kevin Shook date: January 24, 2018

## Why create documents in R?

- Makes research reproducible
- combines code with output
- allows detailed explanation of the code
- Makes your research document more reproducible
- will always contain up-to-date values
- Allows you to distribute your results to others

## R documents

- Can include
- text
- Live R code
- code output
- figures
- images
- equations

## R documents types

- Reports
- Books
- Research notebooks
- Slides
- Documentation
- Web apps

## Output formats

- html
- pdf
- Word

## Creating R documents

- Write plain text using Markdown
  - text markup language
  - simpler than LaTeX (can also use LaTeX)
  - Install package **rmarkdown**
  - Needs to have several packages installed
  - slow, but only needs to be done once
- 
- Need LaTeX installed if you use equations
  - Install Pandoc to convert output formats <http://pandoc.org>

## Markdown

- All documents, regardless of type or output format use same formatting
  - R studio has built-in cheatsheets
  - Command is **Help|Cheatsheets**
- 

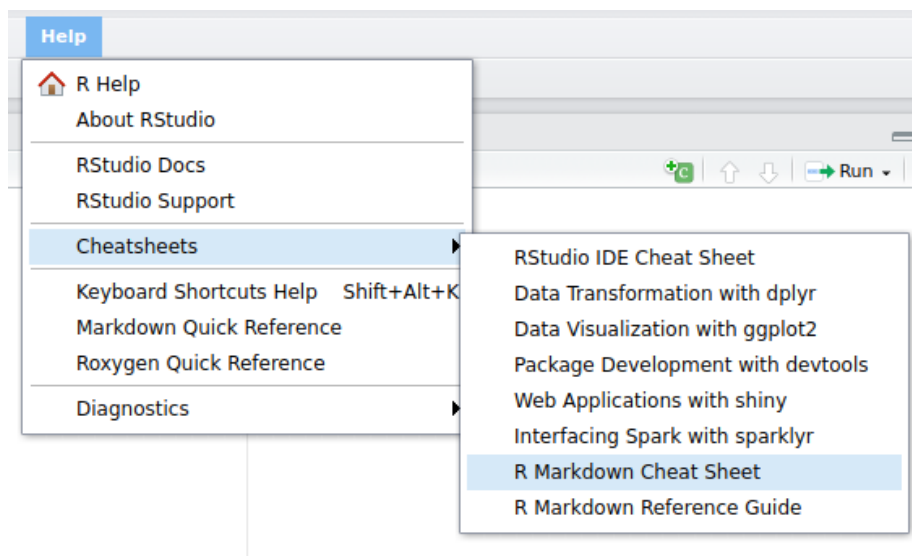


Figure 1:

## Text

- All text is in paragraphs, even if you manually break the line
- To force a line break, put 2 spaces at the end of a line

This is an example  
of how to break text

## Emphasis

- put asterisks or underscores before and after text to emphasize it
- – italics \* -> *italics*
- \*\* bold \*\* -> **bold**

## Titles

- Titles indicated using leading # symbols

# Header 1 # Header 1 ## Header 2 ## Header 2 \*\*\* '### Header 3 ###  
Header 3

## Bullets

- Each bullet is prefixed by a hyphen
- indent using tab or 2 spaces

## Inline R code

- Put code between back ticks following “r”: ‘r “ ‘ ““

Example:

There were ‘ r nrow(cars)’ cars studied

Will produce:

There were 50 cars studied

## R code chunks

- R code can be placed in chunks of multiple lines
- Each chunk can be executed separately
- Insert a new chunk by pressing **[Ctrl][Alt][i]**

## Running a chunk

- Click on the green triangle to run
- Click on the gear to set options

1 2 3 4 5 6 7 8 9 10

## LaTeX

- Equations can be added by enclosing them with  $\$$
- Use  $\$$  $\$$  to centre equation on the line

$\frac{\alpha}{\beta} = \gamma$

$$\frac{\alpha}{\beta} = \gamma$$

## Tables

- Create a table using pipes (|) and hyphens

```
header1|header2
-----|-----
row1|row1
row2|row2
```

header1	header2
row1	row1
row2	row2

## Formatting R output

- Many R commands produce tables of output
- work well for monospaced text

- not optimised for proportionally-spaced text

```
head(mtcars)
```

```
      mpg  cyl  disp  hp  drat    wt   qsec  vs  am  gear  carb
Mazda RX4         21.0   6  160 110  3.90 2.620 16.46  0   1    4    4
Mazda RX4 Wag     21.0   6  160 110  3.90 2.875 17.02  0   1    4    4
Datsun 710        22.8   4  108  93  3.85 2.320 18.61  1   1    4    1
Hornet 4 Drive    21.4   6  258 110  3.08 3.215 19.44  1   0    3    1
Hornet Sportabout 18.7   8  360 175  3.15 3.440 17.02  0   0    3    2
Valiant           18.1   6  225 105  2.76 3.460 20.22  1   0    3    1
```

## Using other packages

- Package **printr** automatically tidies tables

```
library(printr)
```

```
head(mtcars)
```

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21.0	6	160	110	3.90	2.620	16.46	0	1	4	4
Mazda RX4 Wag	21.0	6	160	110	3.90	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108	93	3.85	2.320	18.61	1	1	4	1
Hornet 4 Drive	21.4	6	258	110	3.08	3.215	19.44	1	0	3	1
Hornet Sportabout	18.7	8	360	175	3.15	3.440	17.02	0	0	3	2
Valiant	18.1	6	225	105	2.76	3.460	20.22	1	0	3	1

## Notebooks

- Creates a notebook of R code, using chunks
- use **File|New File|Notebook**
- Creates a skeleton document
- Default output is html, can be changed

## Example notebook

- Small piece of R work
- Combines text, an image, R code, output (including figures)
- Output table is formatted

## Notebook parameters

- Parameters can be passed to notebooks
- Useful for creating custom reports

## Slides

- You can create 2 types of presentations:
  1. **.Rpres** presentations
  2. **.Rmd** presentations

## .Rpres presentations

- This presentation is an example
- Stored in file with extension **.Rpres**
- Requires RStudio to view
- To create a presentation, use **File|New File|R Presentation**
- Each slide has a title line with at least 3 equals signs underneath:

Slide title

=====

## .Rmd presentations

- Can produce more sophisticated slides
- Requires LaTeX
- To create a presentation, use **File|New File|R Markdown**

---

## Documentation

- Each R function in a package needs to be documented
- R package documentation can include **vignettes**
- long form documentation, written in Markdown
- A great way to contribute to an R package
- a great way to learn about R packages
- Command is **File|New File|R Markdown...**
- select **From Template**, then **Package Vignette (HTML)**

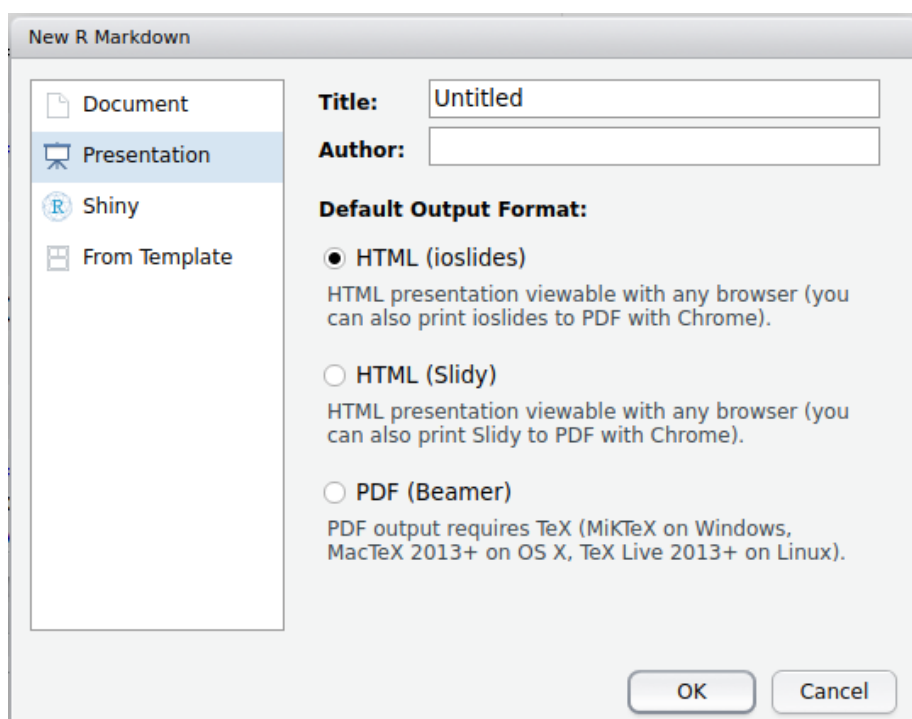


Figure 2:

## Books

- The manual for ggplot2 is written in Markdown.
- You can download it and build the document <https://github.com/hadley/ggplot2-book>
- Uses lots of add-in packages, and there can be issues with their versions
- I have already built the book, you can download the file **ggplot-book.pdf** from the github repository for this seminar

## Bookdown

- Can create books (printed or eBooks) in R
- Get package **bookdown**
- Books can be in PDF, LaTeX, HTML, EPUB, or Word
- E books can also be published to web: <https://bookdown.org>

## Thesis

- It is possible to write a thesis in R!
- A package **thesisdown** was created by Reed College
- Required **bookdown** <https://github.com/ismayc/thesisdown>

## Shiny

- For building websites powered by R
- Install package **shiny** normally
- See website <https://shiny.rstudio.com/> for more info
- Code can run on your own computer, or on a cloud server (free for up to 5 apps, \$ for more) or a local server
- Shiny app has 2 parts:
- ui - creates the user interface
- server - runs on the server

## Summary

- You *can* create a wide variety of documents in **R**
- Whether or not you *should* depends on your use
- also depends on what the final purpose of your document will be, and who will be using it