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HDS Tutorial 3
Week 6

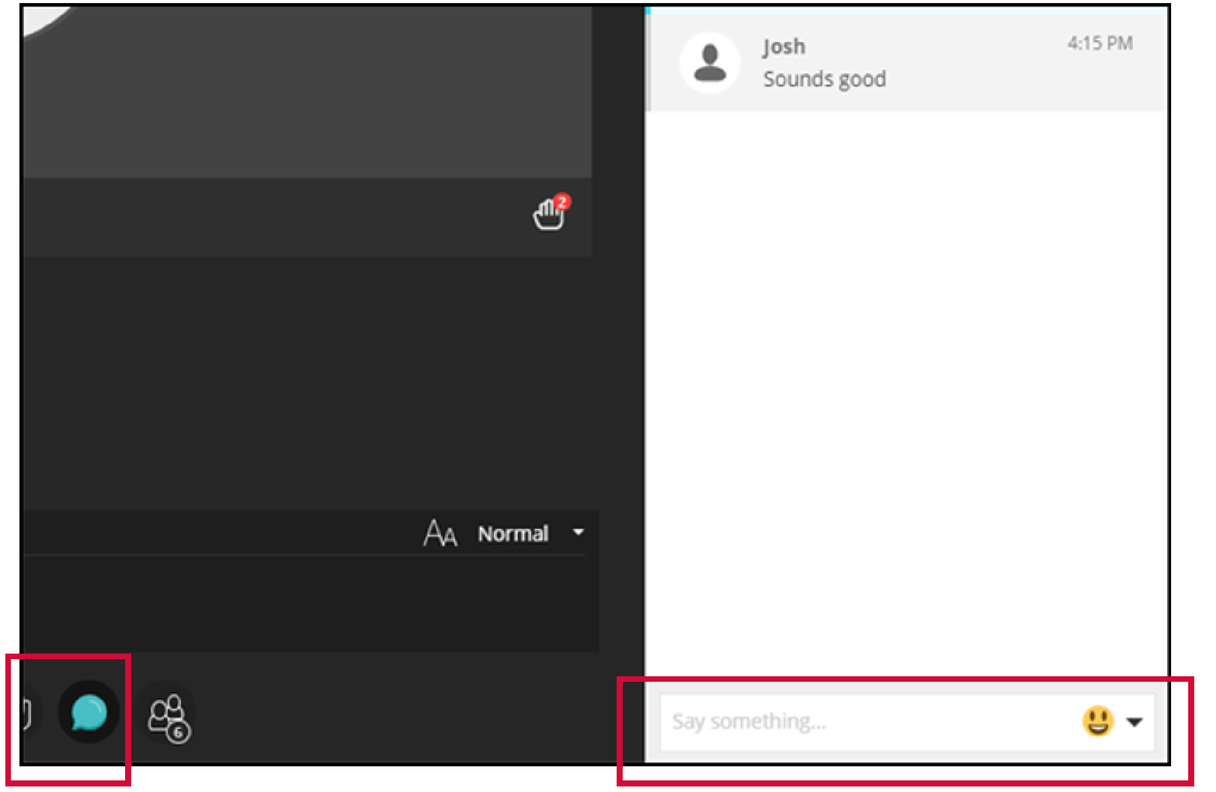
Audio check

Can you hear the presenter talking?

Please type **yes** or **no** in the “Text chat area”

If you can’t hear:

- Check your Audio/Visual settings in the Collaborate Panel
- Try signing out and signing back into the session
- Type into the chat box and a moderator will try to assist you



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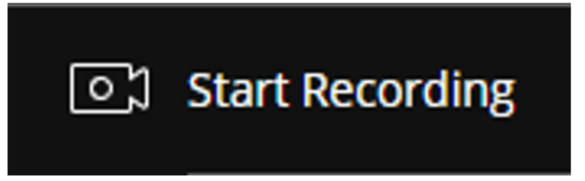

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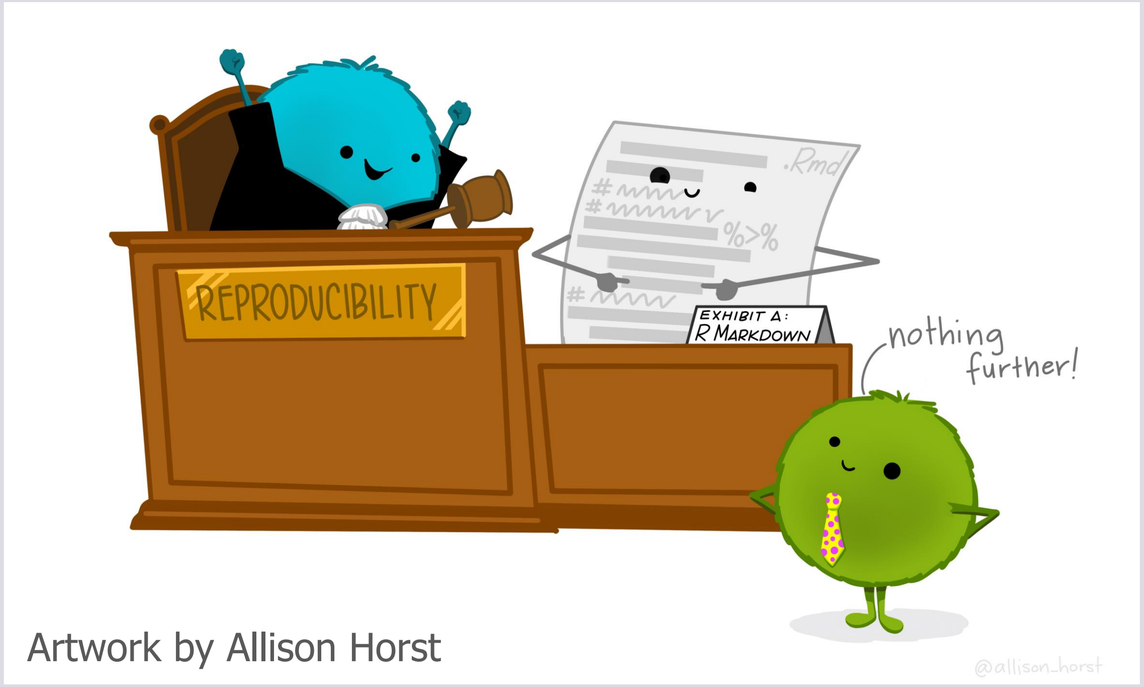
HDS Tutorial 3
Week 6

Agenda



Artwork by Allison Horst

- **What is R Markdown**
- **Why use R Markdown**
- **Demonstration**
- **Resources for further study**
- **Q&A**

Have you installed all of the necessary packages for R Markdown?

Have you already looked through some of this week's content
(i.e., opened the R Markdown practice document?)

You might be thinking…

Okay… but why R Markdown, why should we not just stick with script files?

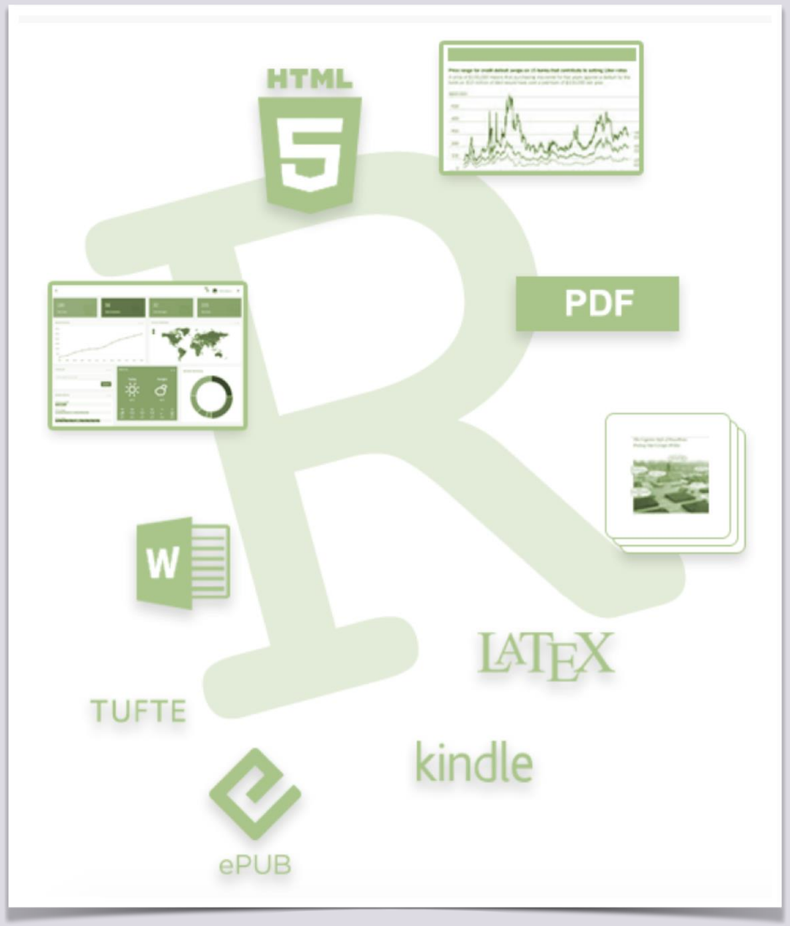
An R Markdown workflow is...

Less

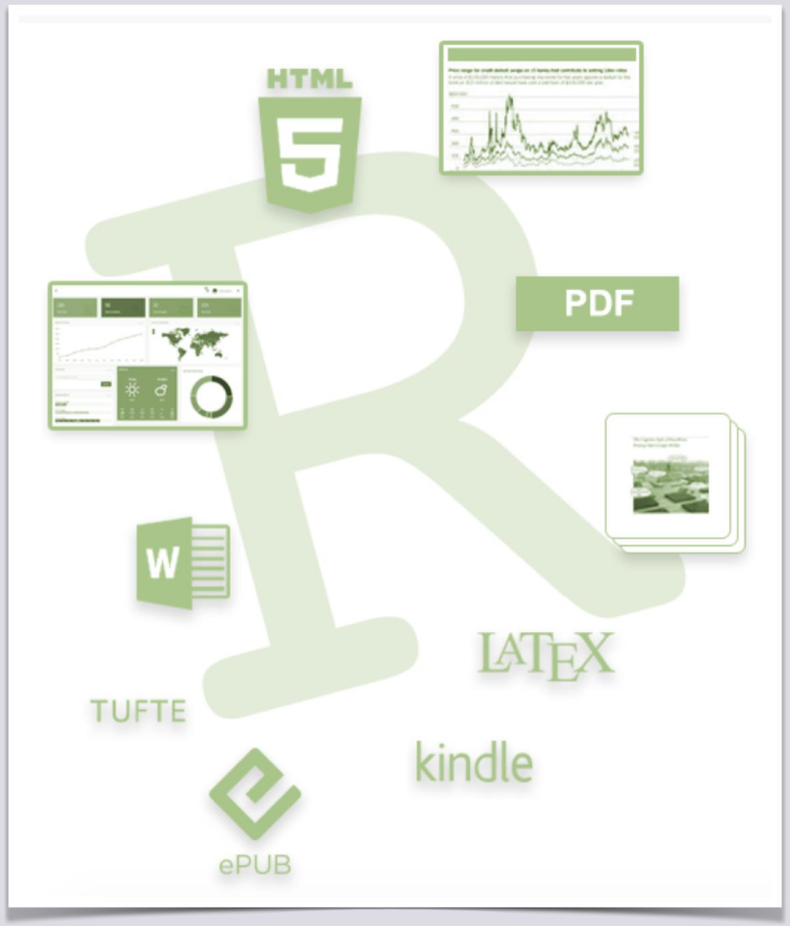
- ↓ **Error-prone**
- ↓ **Time consuming (once you get the hang of it)**

More

- ✓ **Dynamic**
- ✓ **Reproducible**
- ✓ **Transparent**



- Create dynamic documents that combine code, output (including figures + tables), and writing
- Same document holds code & narrative surrounding the data -- an authoring framework for data science!
- Can be used to…
  - Reproduce your analyses
  - Collaborate and share code with others
  - Communicate your findings with others (even those who do not understand code)



- Present analyses in high quality documents, reports, and presentations
- Support dozens of output formats, like PDFs, Word files, slideshows, and more
- Documents are fully reproducible — you can update your document at any time by re-knitting the code chunks
- Productive notebook interface weaves together narrative text & code to produce elegantly formatted output
- Can use multiple languages including R, Python, and SQL

R Markdown as…

1. Literate Programming
2. A Data Product
3. A Control Document
4. Templating

Credit: Thomas Mock's blog
(Customer Success Manager @ Rstudio)

R Markdown:

Literate Programming

Goal: Capture code, text/comments, and output in a single document

MVP of reproducibility

- HAS to run successfully to save/knit the output
- Self-documenting (code is embedded)
- Self-contained workspace

Exploratory Data Analysis

R Markdown:

As a data product

Goal: Generate output natively in R for general consumption

- Presentations (ppt, web-formats – xaringan, LateX formats - Beamer)
- Dashboards (flexdashboard)
- Reports (HTML, Word, PDF)
- Websites & Blogs (blogdown, distill)
- Books & Manuscripts (bookdown)

R Markdown:

As control document

Goal: Scale data science tasks, automate the boring stuff, create robust pipelines

- Automation with parameters
- Child documents
- R Markdown for emails with blastula

R Markdown:

As templating

Goal: Don’t repeat yourself, generate *input* templates or *output* documents from code

- Knit with knit::render() which lets you generate R Markdown outputs programmatically with code
- Looping outputs
- Templating engines whisker or usethis::use_template()

(1) YAML = metadata

- Save output options here
- Different syntax/language than the rest of the document
- Watch out for your spaces!

```
---
author: Your name here
title: Your title here
output: html_document
---
```

```
---
author: Your name here
title: Your title here
output:
  html_document:
    toc: true
    toc_float: true
    theme: flatly
---
```

(2) Text & (3) Code

- Code chunks!
- You can think of each chunk sort of like a mini-script file within the larger document
- Text written following Markdown

syntax	becomes
Plain text End a line with two spaces to start a new paragraph. *italics* and _italics_ **bold** and __bold__ superscript^2^ ~~strikethrough~~ [link](www.rstudio.com) # Header 1 ## Header 2 ### Header 3 #### Header 4 ##### Header 5 ###### Header 6	Plain text End a line with two spaces to start a new paragraph. *italics* and *italics* **bold** and **bold** superscript^2 ~~strikethrough~~ link **Header 1** **Header 2** **Header 3** **Header 4** **Header 5** **Header 6**

(3b) Global Setup chunk

- A special chunk label: setup
- Typically the first chunk
- All following chunks will use these options because it sets globally the chunk options – hence "global set up chunk"
- Set include = FALSE so that is is not printed out
- You can (and should) use individual chunk options too

````
9
10 ```{r setup, include=FALSE}
11 knitr::opts_chunk$set(
12   echo = TRUE,
13   warning = FALSE,
14   message = FALSE)
15 ```
16
````

Code Chunk Options

option	default	effect
eval	TRUE	Whether to evaluate the code and include its results
echo	TRUE	Whether to display code along with its results
warning	TRUE	Whether to display warnings
error	FALSE	Whether to display errors
message	TRUE	Whether to display messages
tidy	FALSE	Whether to reformat code in a tidy way when displaying it
results	"markup"	"markup", "asis", "hold", or "hide"
cache	FALSE	Whether to cache results for future renders
comment	"##"	Comment character to preface results with
fig.width	7	Width in inches for plots created in chunk
fig.height	7	Height in inches for plots created in chunk

For more details visit yihui.name/knitr/

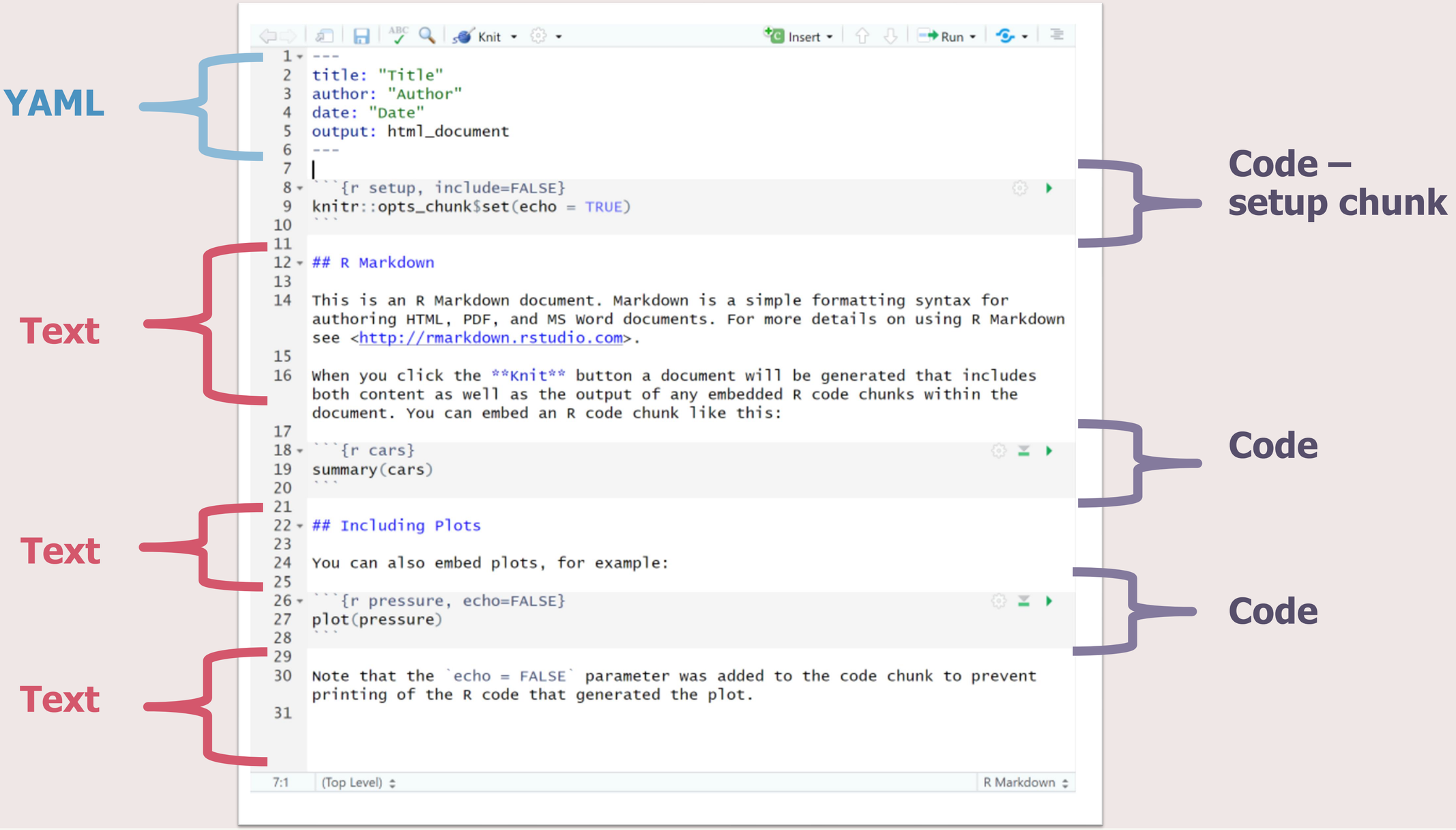
Chunk Labels

GOOD	BAD
my-plot	my_plot
myplot	my plot
myplot1	everything else!
myplot-1	
MY-PLOT	

- Place between curly braces
{r label}

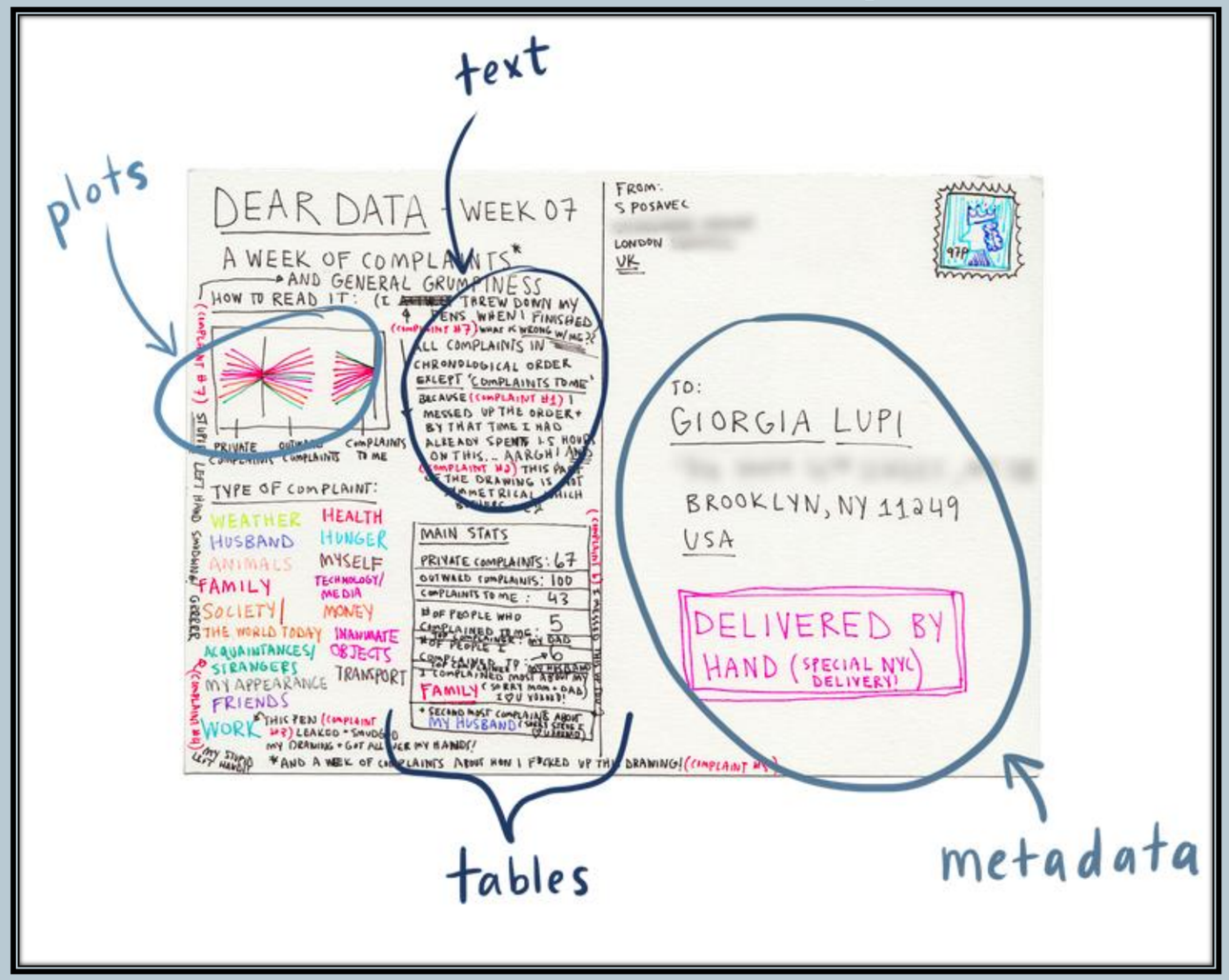
- Separate options with commas
{r label, option1=value}

- No duplicate chunk labels! You will get an error


YAML
Text
Text
Text
Code – setup chunk
Code
Code
Knit
Insert
Run
---
title: "Title"
author: "Author"
date: "Date"
output: html_document

```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
```
R Markdown
This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:
```{r cars}
summary(cars)
```
Including Plots
You can also embed plots, for example:
```{r pressure, echo=FALSE}
plot(pressure)
```
Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.
7:1
(Top Level)
R Markdown

R Markdown as a postcard



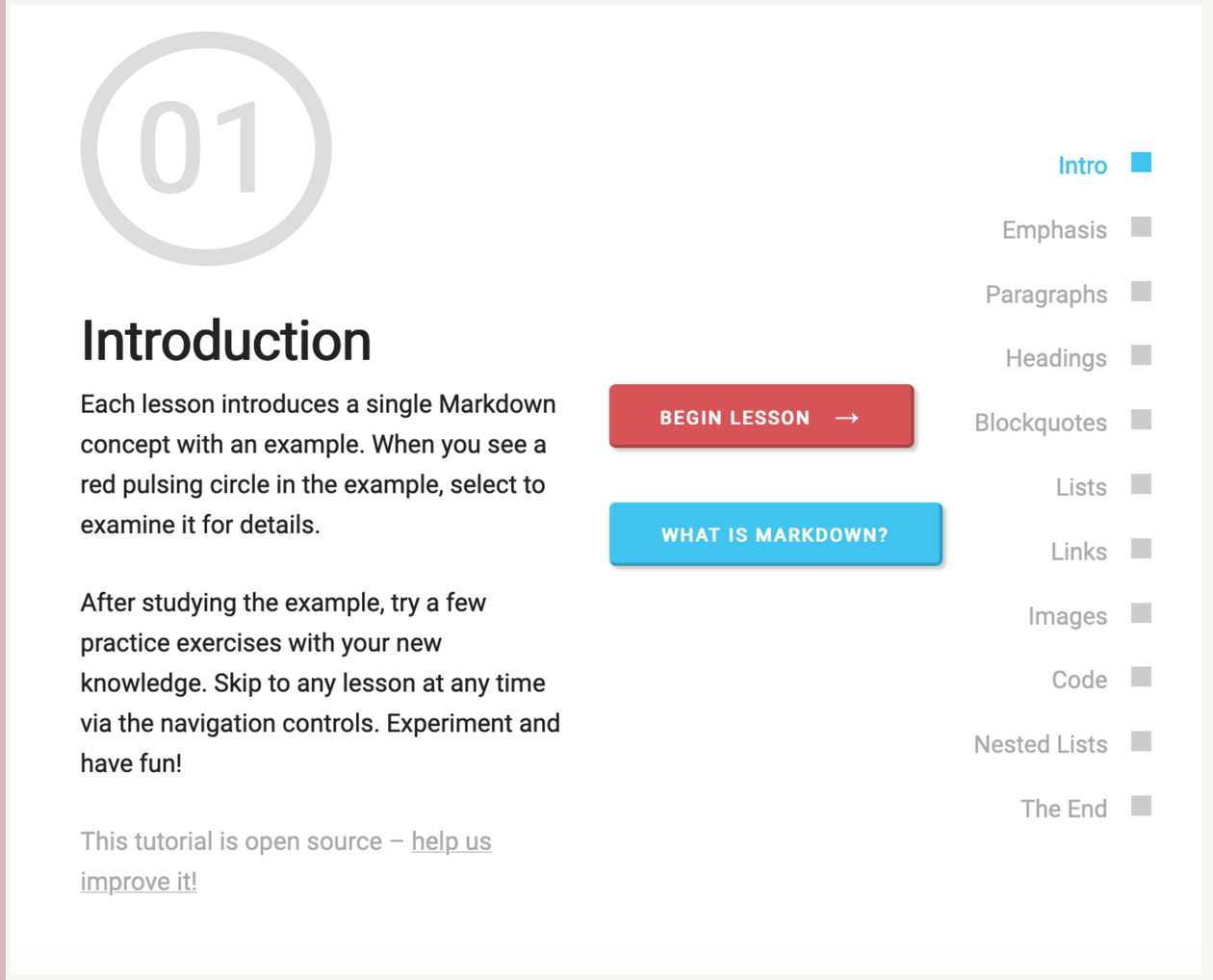
Credit: Allison Hill
https://www.apreshill.com/


Rmarkdown
TEXT. CODE. OUTPUT.
(GET IT TOGETHER, PEOPLE.)
#HEADERS
CODE
italics
TEXT
PANDOC
KNITR
FAIRY DUST
RECIPE
1. ADD TEXT
2. ADD CODE
3. KNIT
4. (magic)
5. CELEBRATE PERCEIVED WIZARDRY
YAML
rmarkdown
.Rmd
.md
knitr
pandoc

If you have not done so already, try the following tutorial

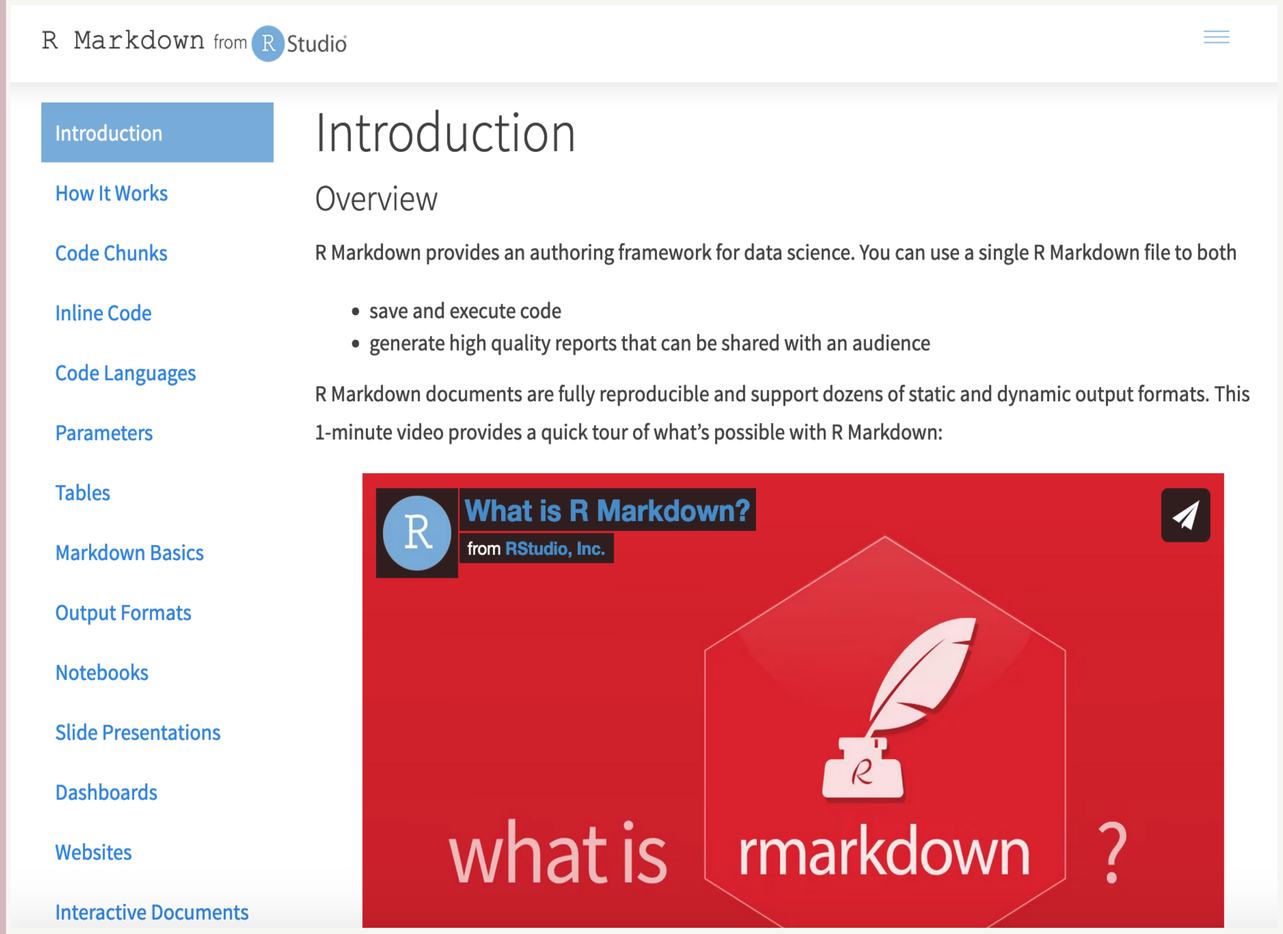
https://commonmark.org/help/tutorial/

Takes about 10 minutes



R Studio also has a longer self-paced tutorial

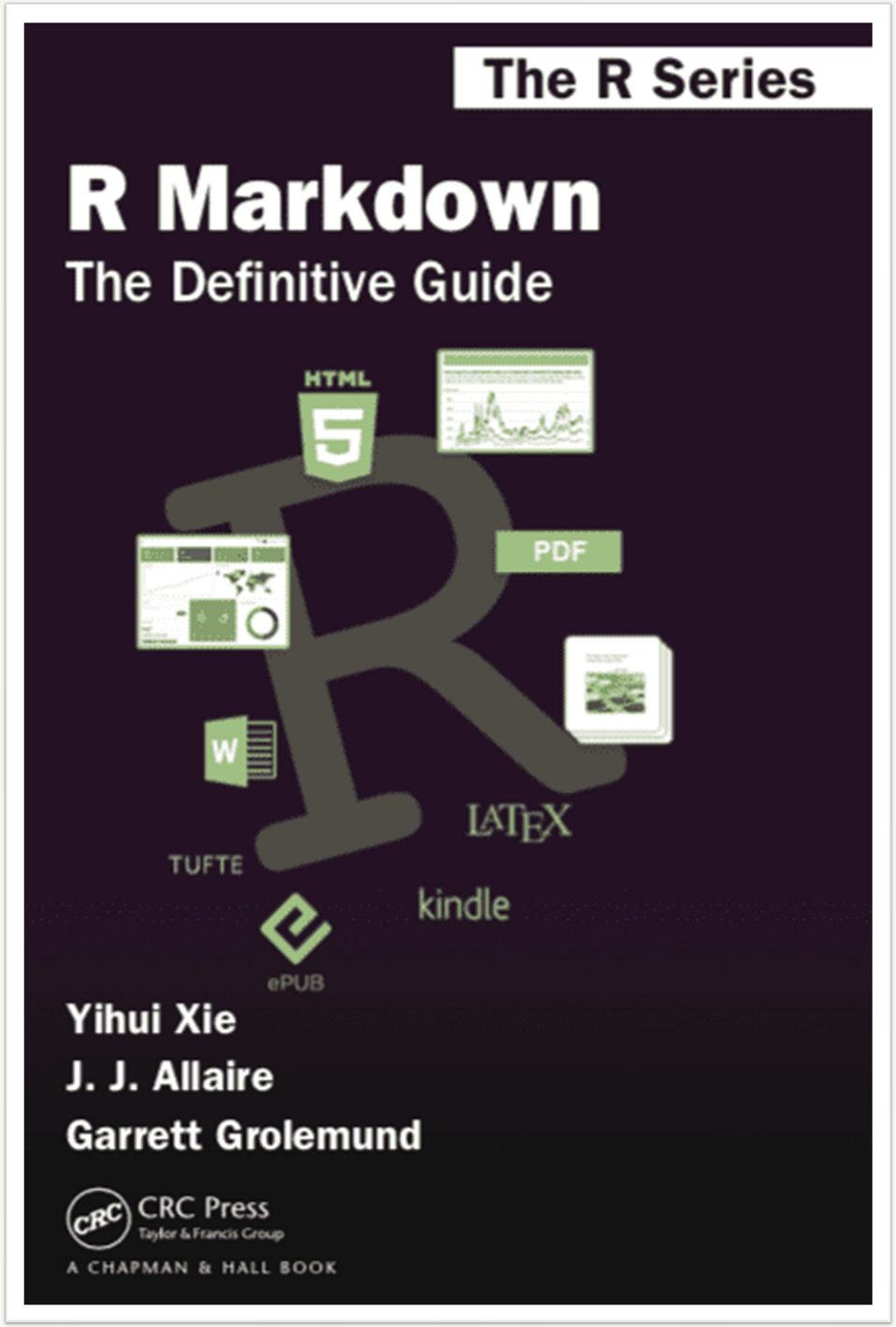
https://rmarkdown.rstudio.com/lesson-1.html



General go-to R Markdown resource

https://bookdown.org/yihui/rmarkdown/

By 2 of the authors of the knitr package!



Questions?

If you have not done so already, please fill out the mid-term course survey!

https://edinburgh.onlinesurveys.ac.uk/health-data-science-april-2022-mid-term-feedback