

Intro to R

RStudio

Help! Office hours

Poll: What times are best for you for office hours?

Today is different

Ava will hold office hours from 5:00pm - 6:00pm EST.

Office hours will always be held at the *same Zoom link*.

Working with R – RStudio

RStudio is an Integrated Development Environment (IDE) for R

- It helps the user effectively use R
- Makes things easier
- Is NOT a dropdown statistical tool (such as Stata)
 - See [Rcmdr](#) or [Radiant](#)
- All R Studio snapshots are taken from <http://ayeimanol-r.net/2013/04/21/289/>



[[source](#)]

RStudio

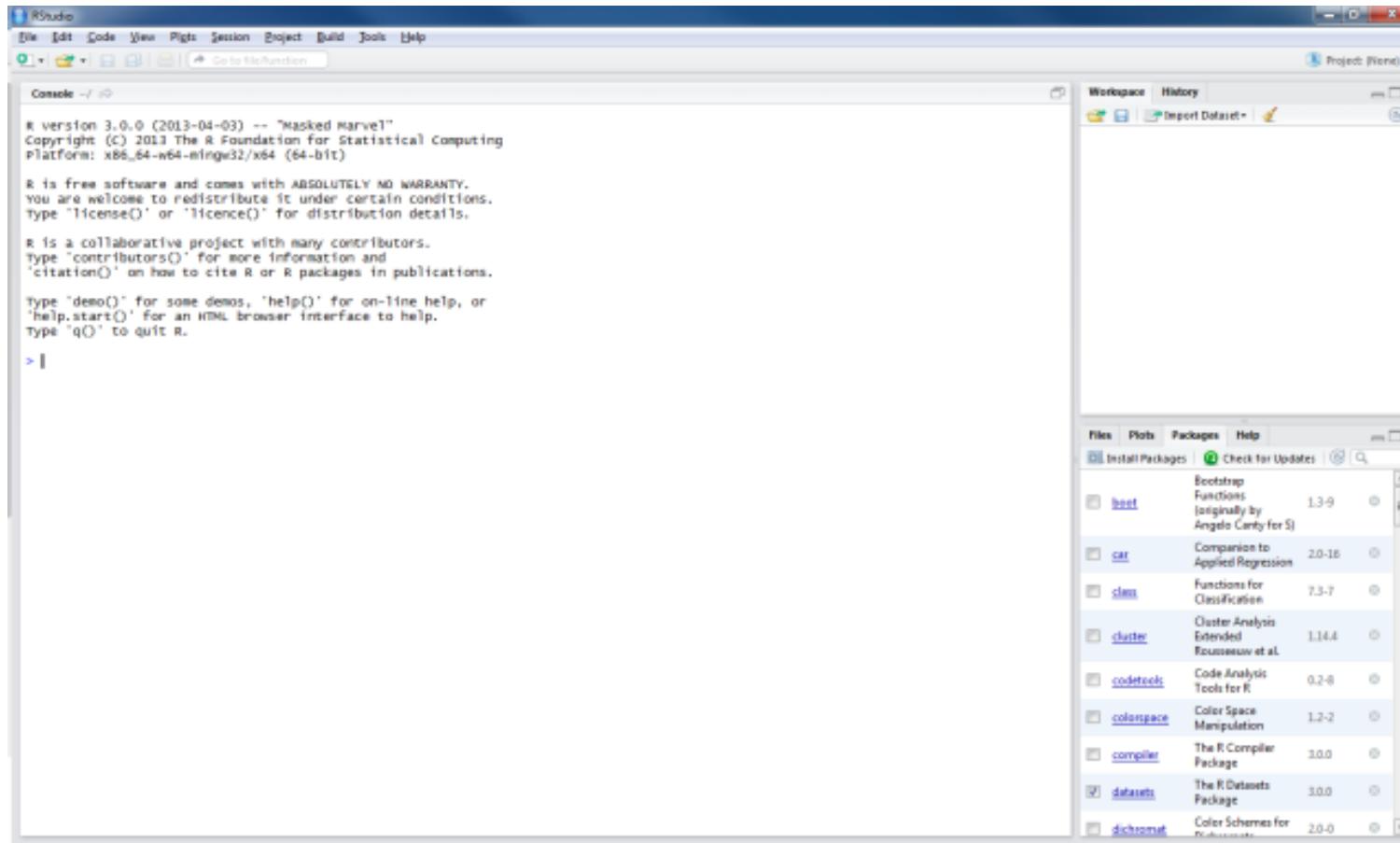
Easier working with R

- Syntax highlighting, code completion, and smart indentation
- Easily manage multiple working directories and projects

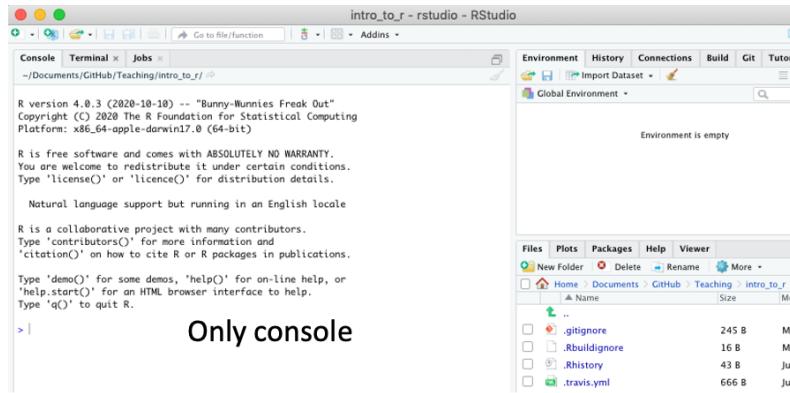
More information

- Workspace browser and data viewer
- Plot history, zooming, and flexible image and file export
- Integrated R help and documentation
- Searchable command history

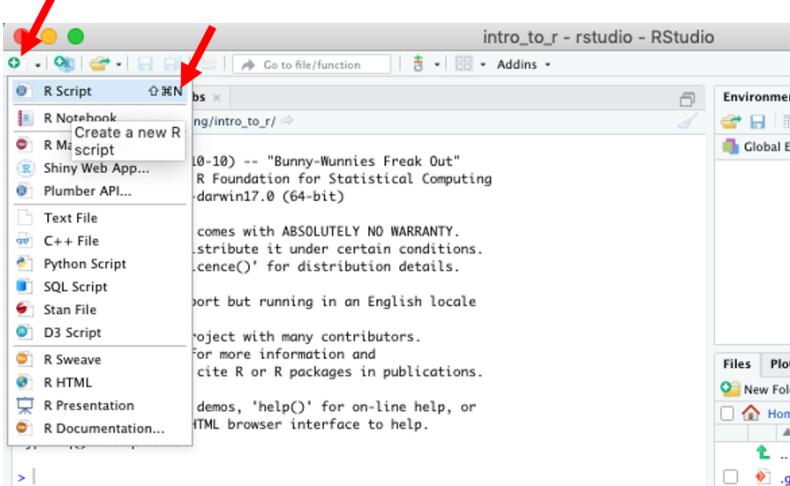
RStudio



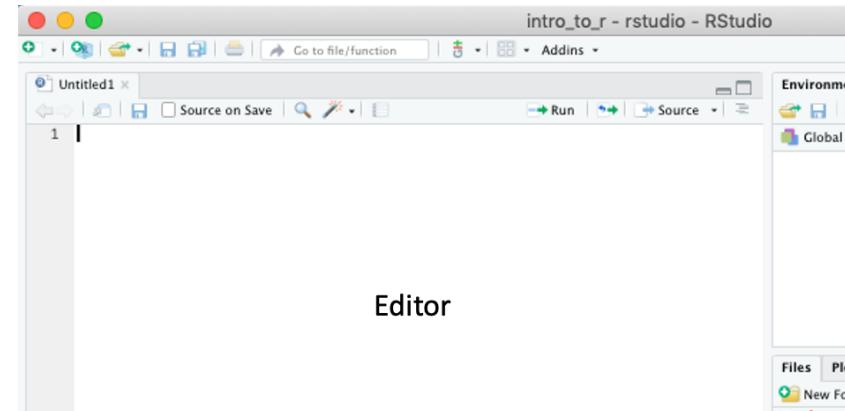
Getting the editor



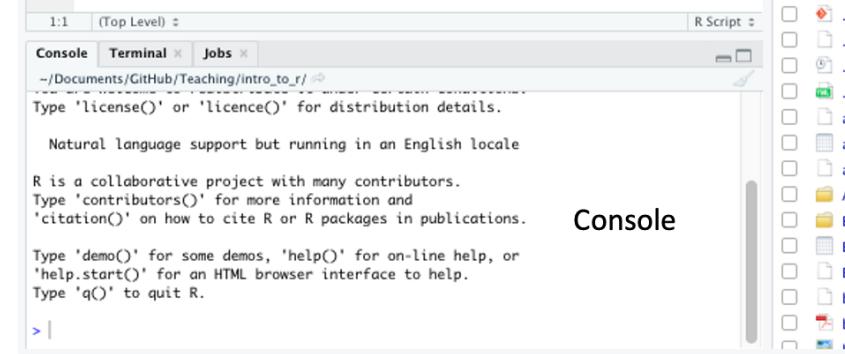
Only console



|



Editor



Console

Working with R in R Studio - 2 major panes:

1. The **Source/Editor**: "Analysis" Script + Interactive Exploration

- Static copy of what you did (reproducibility)
- Top by default

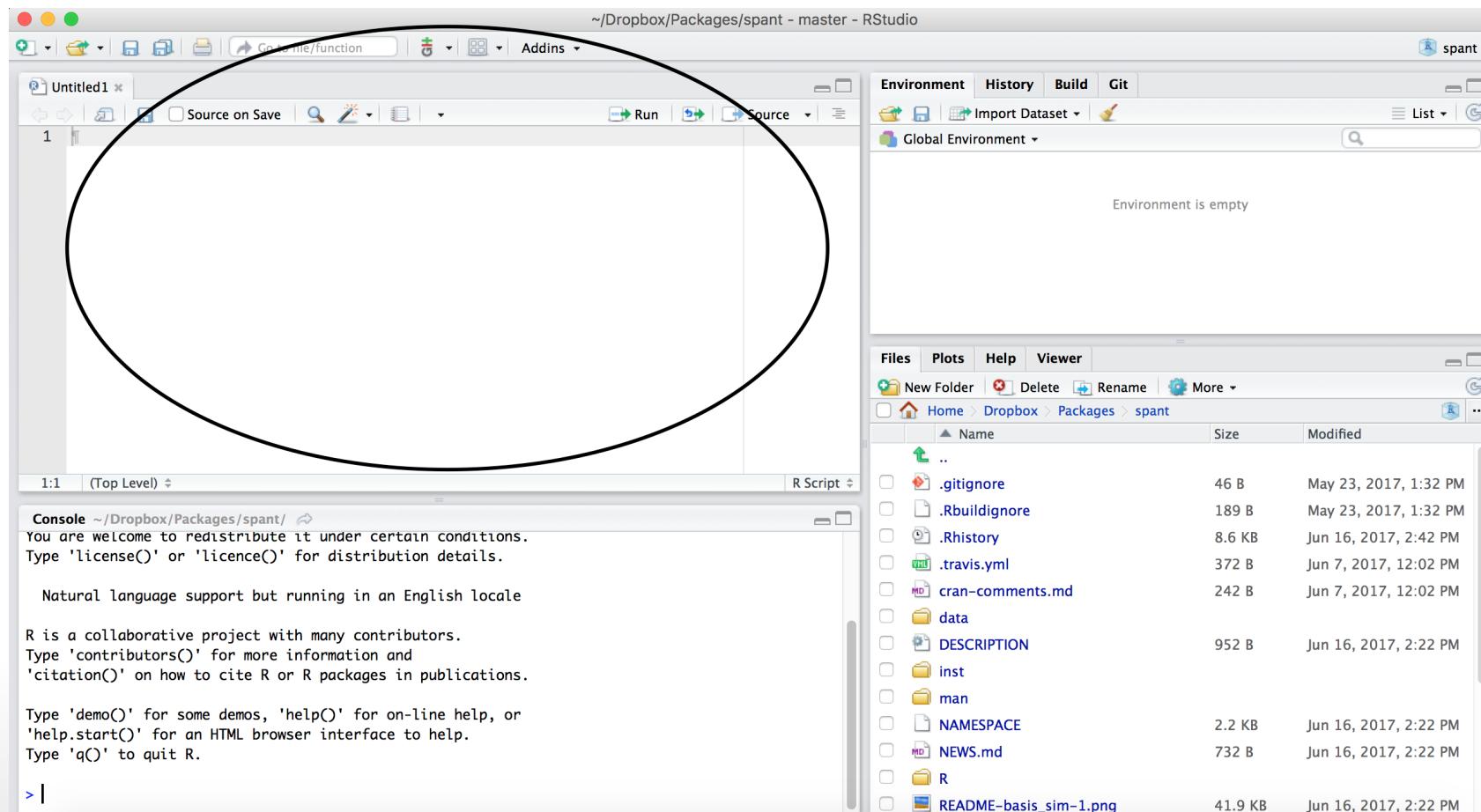
2. The **R Console**: "interprets" whatever you type

- Calculator
- Try things out interactively, then add to your editor
- Bottom by default

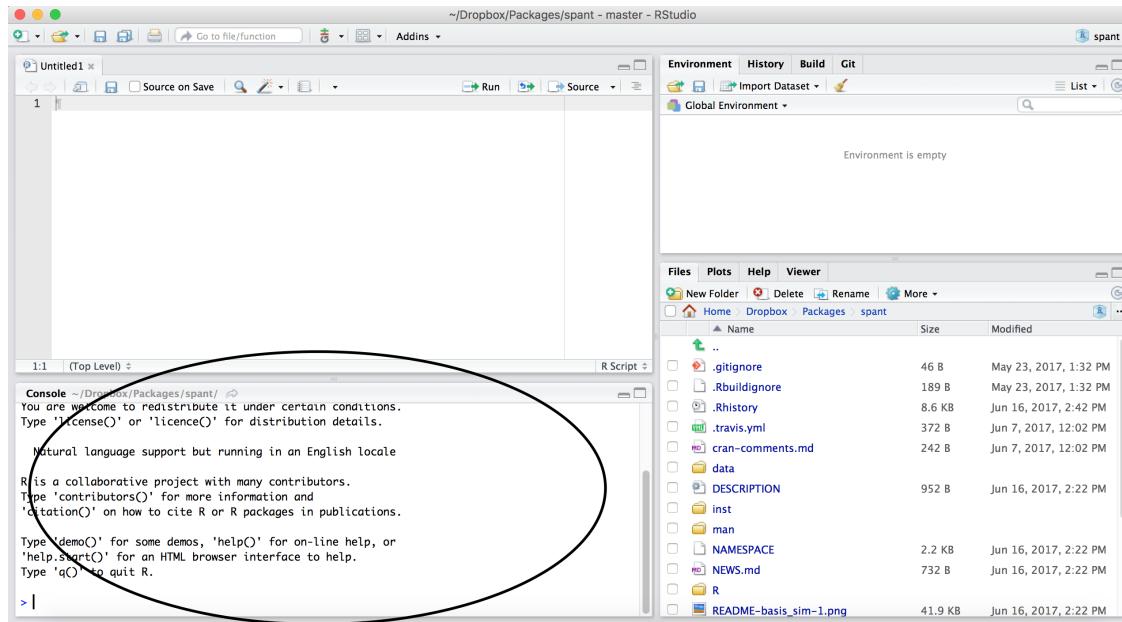
Source / Editor

- Where files open to
- Have R code and comments in them
- Can highlight and press (CMD+Enter (Mac) or Ctrl+Enter (Windows)) to run the code

In a .R file (we call a script), code is saved on your disk



R Console



- Where code is executed (where things happen)
- You can type here for things interactively to test code
- Code is **not saved** on your disk

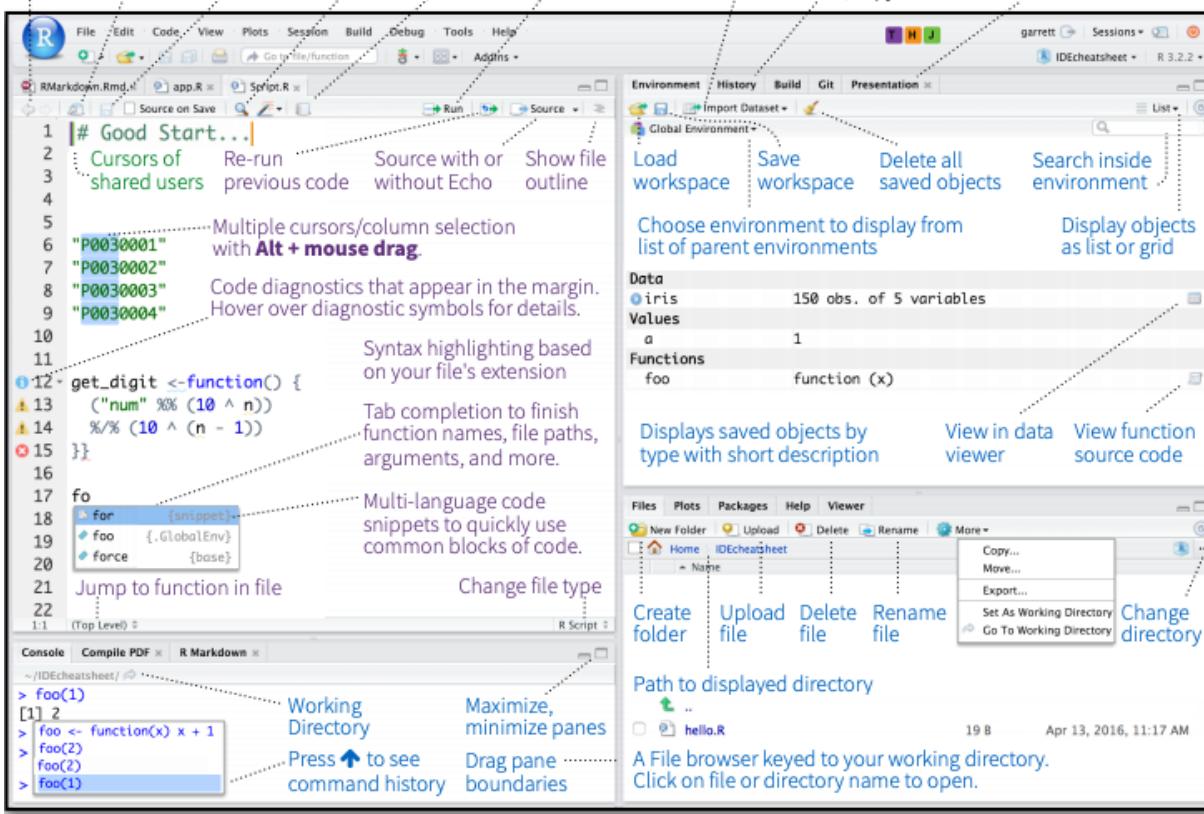
RStudio

Super useful “cheat sheet”:

<https://github.com/rstudio/cheatsheets/raw/master/rstudio-ide.pdf>

Write Code

Navigate tabs
Open in new window
Save
Find and replace
Compile as notebook
Run selected code



R Support

Import data with wizard
History of past commands to run/copy
Display .RPres slideshows
File > New File > R Presentation

RStudio layout

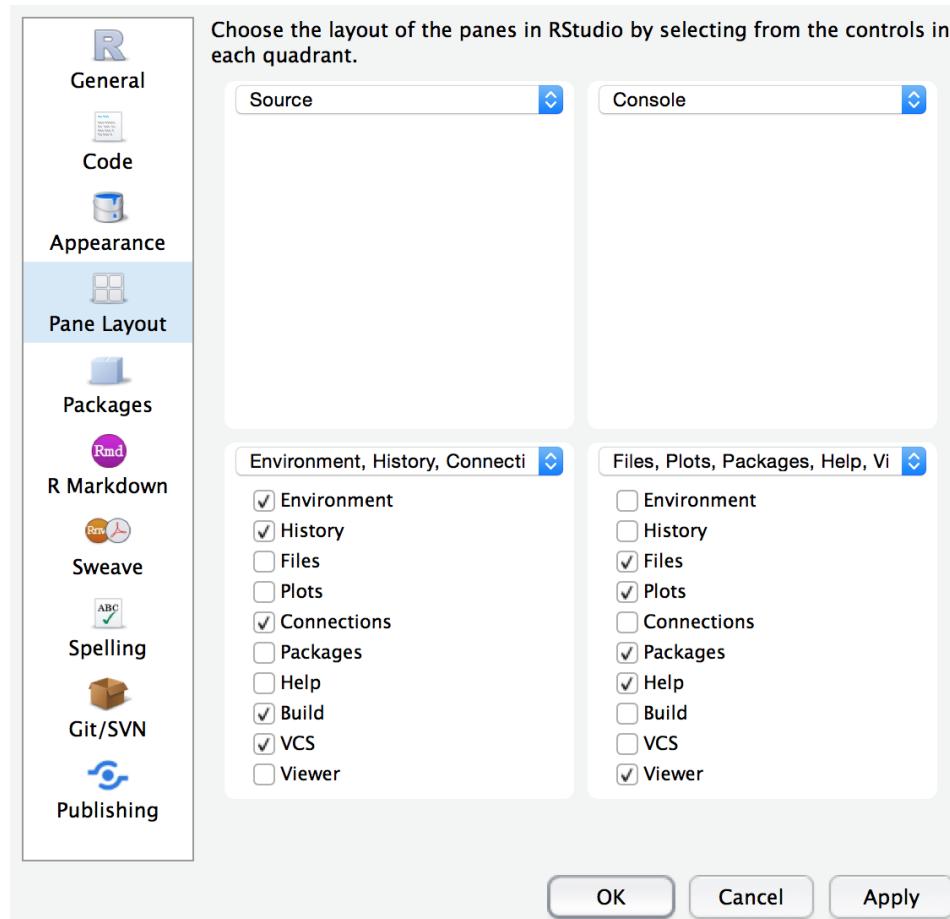
The screenshot displays the RStudio interface with the following components:

- Code Editor (Left Panel):** Shows the R Markdown file "Untitled1.Rmd". The code includes setup code for knitr, followed by a section titled "# R Markdown" which describes R Markdown syntax and provides a link to <http://rmarkdown.rstudio.com>. It also shows an example of embedding an R code chunk.
- Environment (Top Right Panel):** Shows the Global Environment pane, which is currently empty.
- File Browser (Bottom Right Panel):** Shows the file structure for the "intro_to_r" directory. The contents include .gitignore, .Rbuildignore, .Rhistory, .travis.yml, all_functions.xlsx, all_the_functions.csv, all_the_packages.txt, Arrays_Split, Basic_R, Best_Model_Coefficients.csv, Best_Model_Coefficients.xlsx, bibliography.bib, black_and_white_theme.pdf, and bloomberg_logo_small_horizontal.png.
- Console (Bottom Left Panel):** Displays the R console output, including the R welcome message, license information, natural language support, and R's collaborative nature. It also shows the command to run demos and how to quit R.

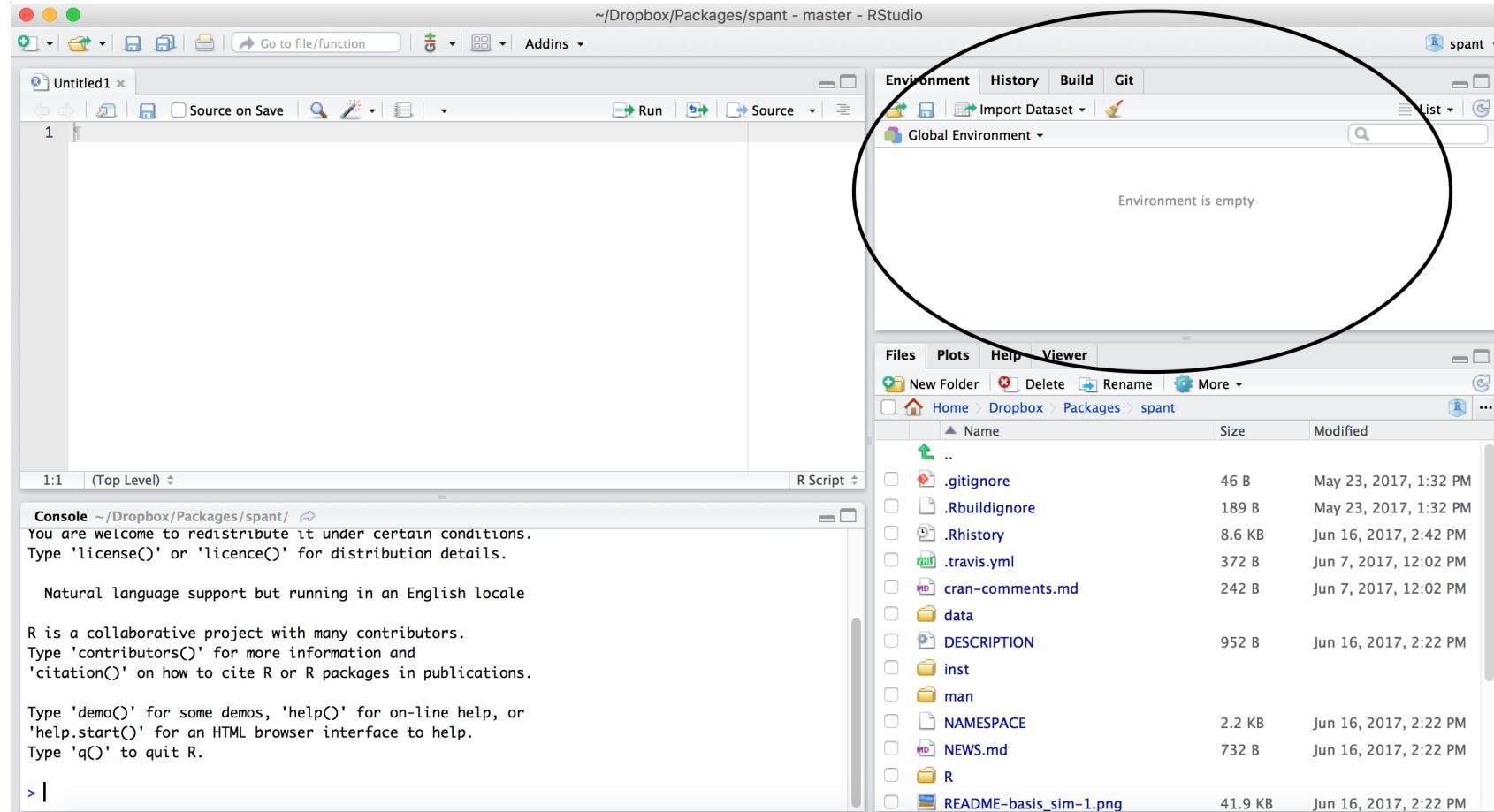
RStudio Layout

If RStudio doesn't look the way you want (or like our RStudio), then do:

RStudio → Preferences → Pane Layout



Workspace/Environment



Workspace/Environment

- Tells you what **objects** are in R
- What exists in memory/what is loaded?/what did I read in?

History

- Shows previous commands. Good to look at for debugging, but **don't rely** on it.
Instead use RMarkdown!
- Also type the “up” key in the Console to scroll through previous commands

Other Panes

- **Files** - shows the files on your computer or the directory you are working in
- **Viewer** - can view data or R objects
- **Help** - shows help of R commands
- **Plots** - pictures and figures
- **Packages** - list of R packages that are loaded in memory

Let's take a look at R Studio
ourselves!

Lab: Starting with R and RMarkdown

RStudio Lab

To do this lab we need to:

1. Download the file at the link above by clicking on the link or typing in:
https://jhudatascience.org/intro_to_r/modules/RStudio/lab/RStudio_Lab.Rmd

(Also on the [website](#) schedule page - Lab for day 1) 2) Find the downloaded file on your computer 3) Open the file in RStudio

This may require finding your downloads on your computer.

Recall that these videos can help:

If you have a PC: <https://youtu.be/we6vwB7DsNU>

If you have a Mac: <https://www.youtube.com/watch?v=Ao9e0cDzMrE>

R Markdown file

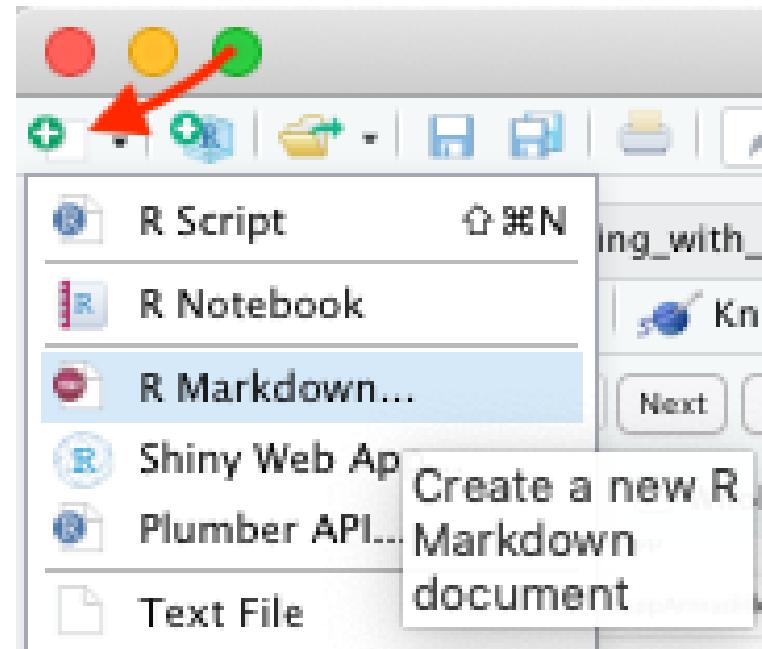
R Markdown files (.Rmd) help generate reports that include your code and output. Think of them as fancier scripts.

1. Helps you describe your code
2. Allows you to check the output
3. Can create many different file types

Create an R Markdown file

Go to File → New File → R Markdown

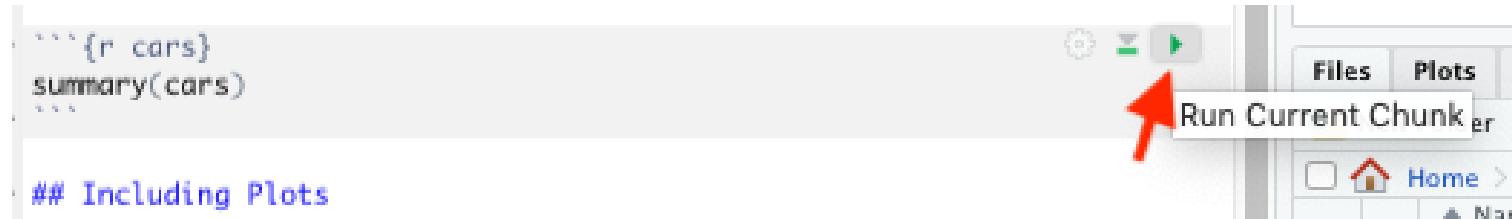
Call your file “first_markdown”



Code chunks

Within R Markdown files are code “chunks”

This is where you can type R code and run it!



The image shows a screenshot of the RStudio IDE. On the left, there is a code editor window containing R code. The code includes a code chunk indicator (three backticks) followed by `r cars`, the command `summary(cars)`, another code chunk indicator, and the text `## Including Plots` in blue. On the right, the RStudio toolbar is visible, featuring icons for file operations like Open, Save, and Run, as well as tabs for 'Files' and 'Plots'. A prominent red arrow points upwards from the bottom of the slide towards the 'Run Current Chunk' button in the toolbar.

```
```{r cars}
summary(cars)
```

## Including Plots
```

Create Chunks

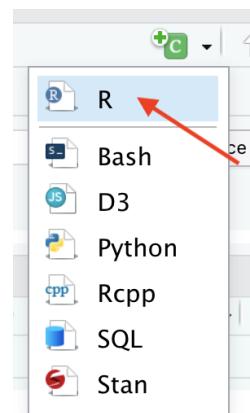
To create a new R code chunk:

Copy paste an existing chunk in the R Markdown file and replace the code **OR**

1. Use the insert code chunk button at the top of RStudio.

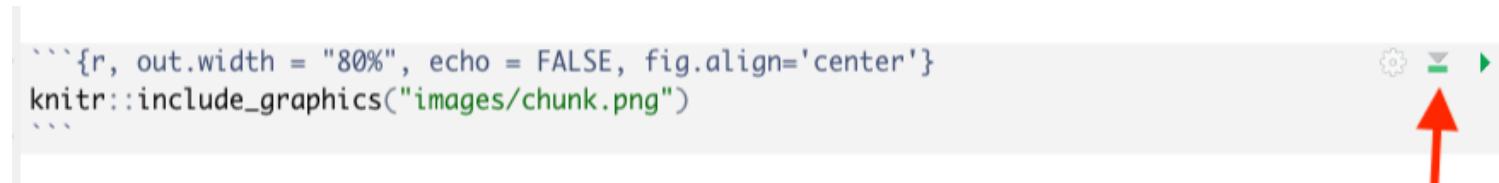


1. Select R (default) as the language:

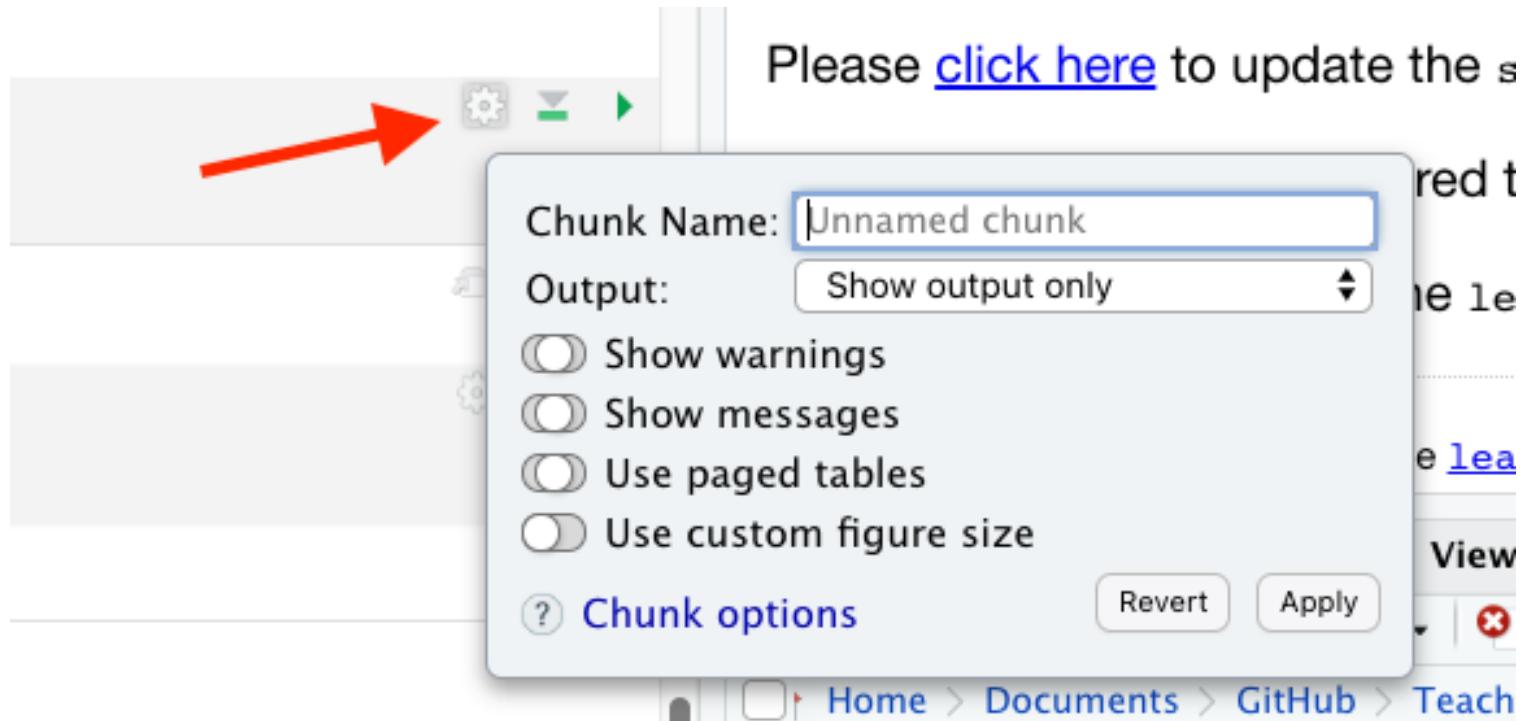


Run previous chunks button

You can run all chunks above a specific chunk using this button:

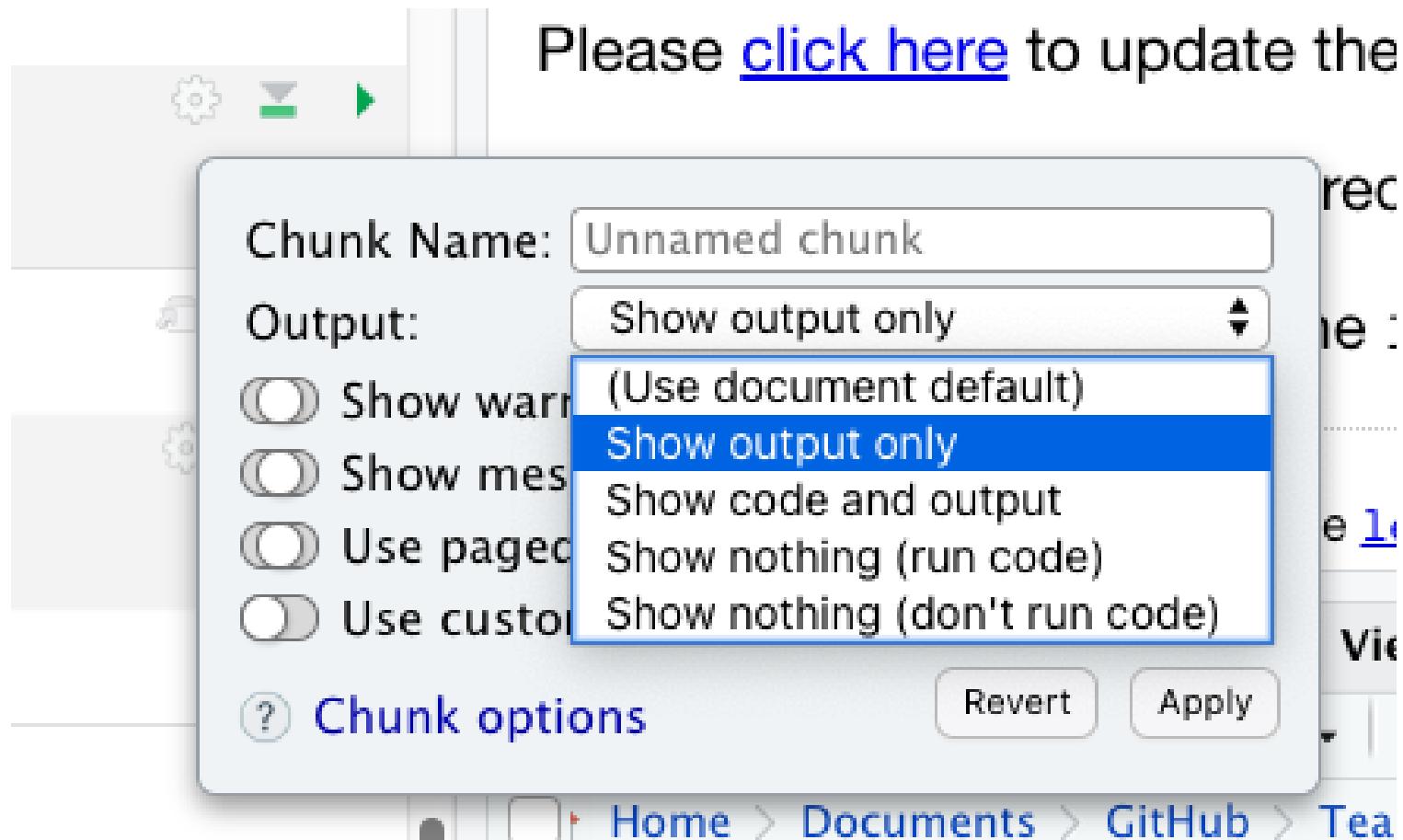


Chunk settings



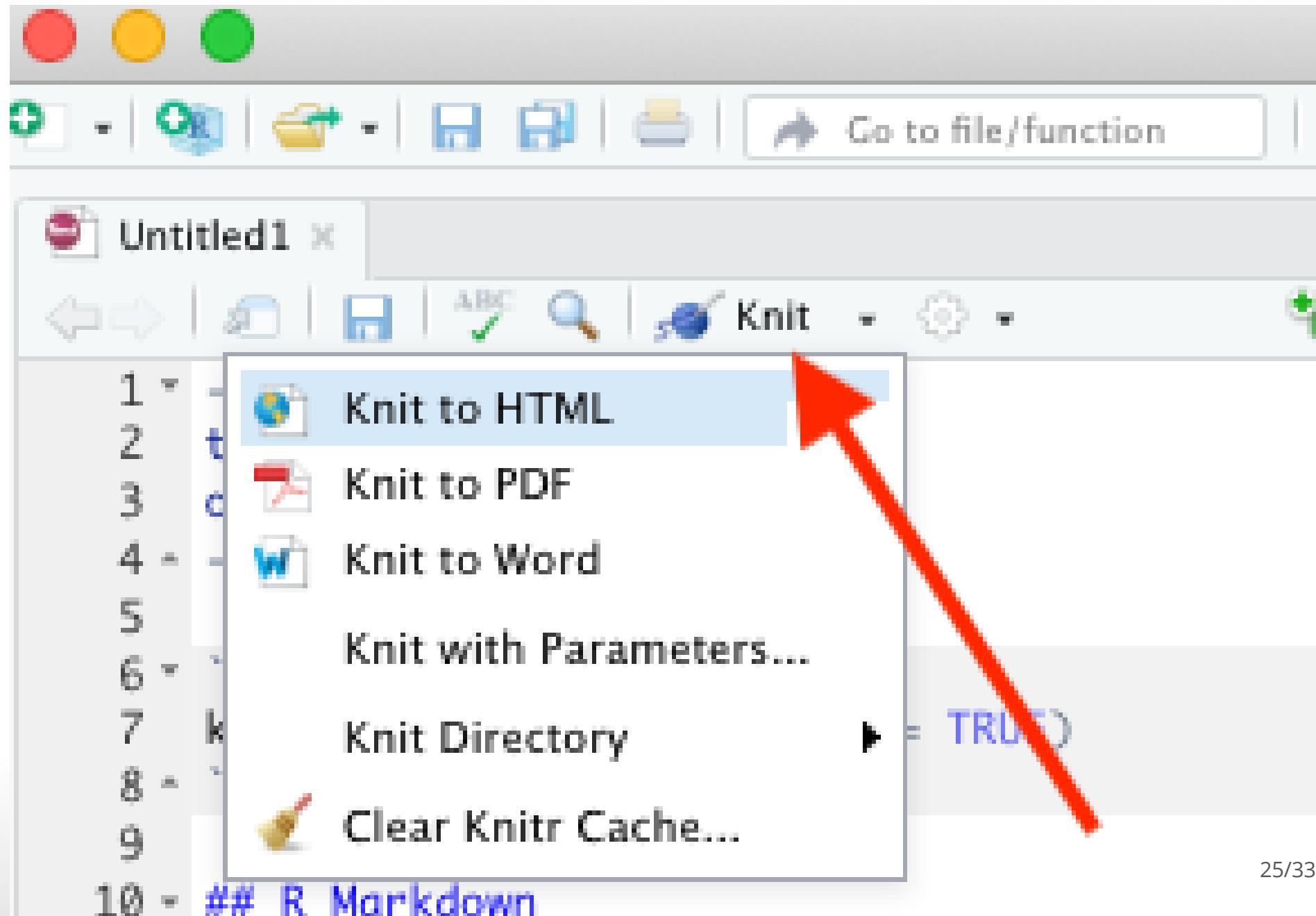
Chunk settings

You can specify if a chunk will be seen in the report or not.



Knit file to html

This will create a report from the R Markdown document!



Useful R Studio Shortcuts

- **Ctrl + Enter** in your script evaluates that line of code
 - It's like copying and pasting the code into the console for it to run.
- **Ctrl+1** takes you to the script page
- **Ctrl+2** takes you to the console
- http://www.rstudio.com/ide/docs/using/keyboard_shortcuts

If you get annoyed by inline code previews in Markdown files:

In RStudio Click the Edit tab → scroll down to Preferences... → R Markdown

Uncheck the following:

The screenshot shows the 'Options' dialog in RStudio. On the left, a sidebar lists various sections: General, Code, Console, Appearance, Pane Layout, Packages, R Markdown (which is selected and highlighted in blue), Python, Sweave, and Spelling. The main area has tabs for Basic, Advanced, Visual, and Citations, with 'Basic' selected. Under the 'R Markdown' section, there are several configuration options:

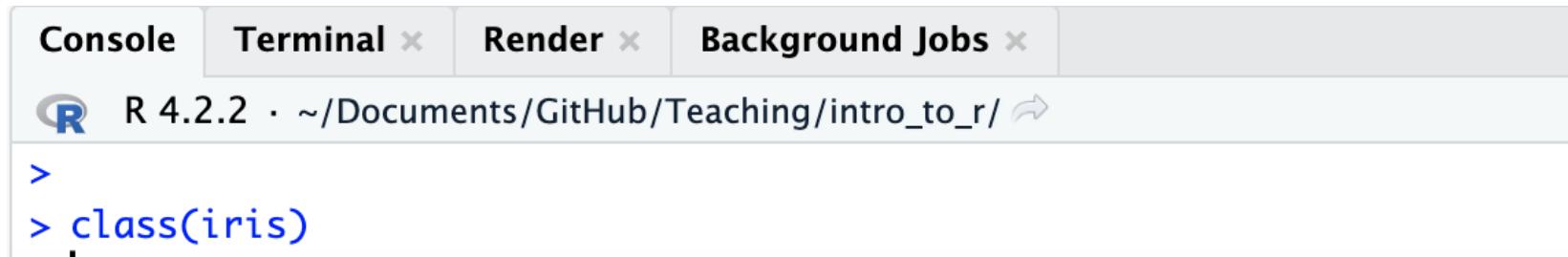
- Show document outline by default
- Soft-wrap R Markdown files
- Show in document outline:
- Show output preview in:
- Show output inline for all R Markdown documents
- Show equation and image previews:
- Evaluate chunks in directory:

Under the 'R Notebooks' section, two checkboxes are shown:

- Execute setup chunk automatically in notebooks
- Hide console automatically when executing notebook chunks

Recap of where code goes

- you can test code in the console



R 4.2.2 · ~/Documents/GitHub/Teaching/intro_to_r/ ↗

```
>
> class(iris)
.
```

- you can save code in a chunk in the editor (Markdown file)

```
## R Markdown
```

Code does not go here and instead goes within the grey chunks like this:

```
```{r}
summary(cars)
```
```



Getting help from the preview

When you type in a function name, a pop up will preview documentation to help you. It also helps you remember the name of the function if you don't remember all of it!

The screenshot shows two examples of RStudio's documentation preview feature.

Top Example: The user has typed "`> class`". A tooltip appears over the first result in the completion dropdown, which is `class(x)`. The tooltip contains the following text:
R possesses a simple generic function mechanism which can be used for an object-oriented style of programming. Method dispatch takes place based on the class of the first argument to the generic function.
Press F1 for additional help

Bottom Example: The user has typed "`> read_`". A tooltip appears over the first result in the completion dropdown, which is `read_csv`. The tooltip contains the following text:
The 'tidyverse'
read_csv(file, col_names = TRUE, col_types = NULL,
 col_select = NULL, id = NULL, locale =
 default_locale(), na = c("", "NA"), quoted_na =
 TRUE, quote = "\"", comment = "", trim_ws = TRUE,
 skip = 0, n_max = Inf, guess_max = min(1000,
 n_max), name_repair = "unique", num_threads =
 readr_threads(), progress = show_progress(),
 show_col_types = should_show_types(),
 ...)
Press F1 for additional help

Get help with the help pane



The screenshot shows the RStudio interface with the 'Help' tab selected in the top navigation bar. Below the navigation bar, there are several icons: a left arrow, a right arrow, a house icon, and a refresh/circular arrow icon. To the right of these icons is a search bar containing the text 'class'. Below the search bar, the text 'R: Object Classes' is displayed next to a dropdown arrow, and to its right is a 'Find in Topic' button. The main content area displays the title 'class {base}' and the text 'R Documentation'.

class {base} R Documentation

Object Classes

Description

R possesses a simple generic function mechanism which can be used for an object-oriented style of programming. Method dispatch takes place based on the class of the first argument to the generic function.

Usage

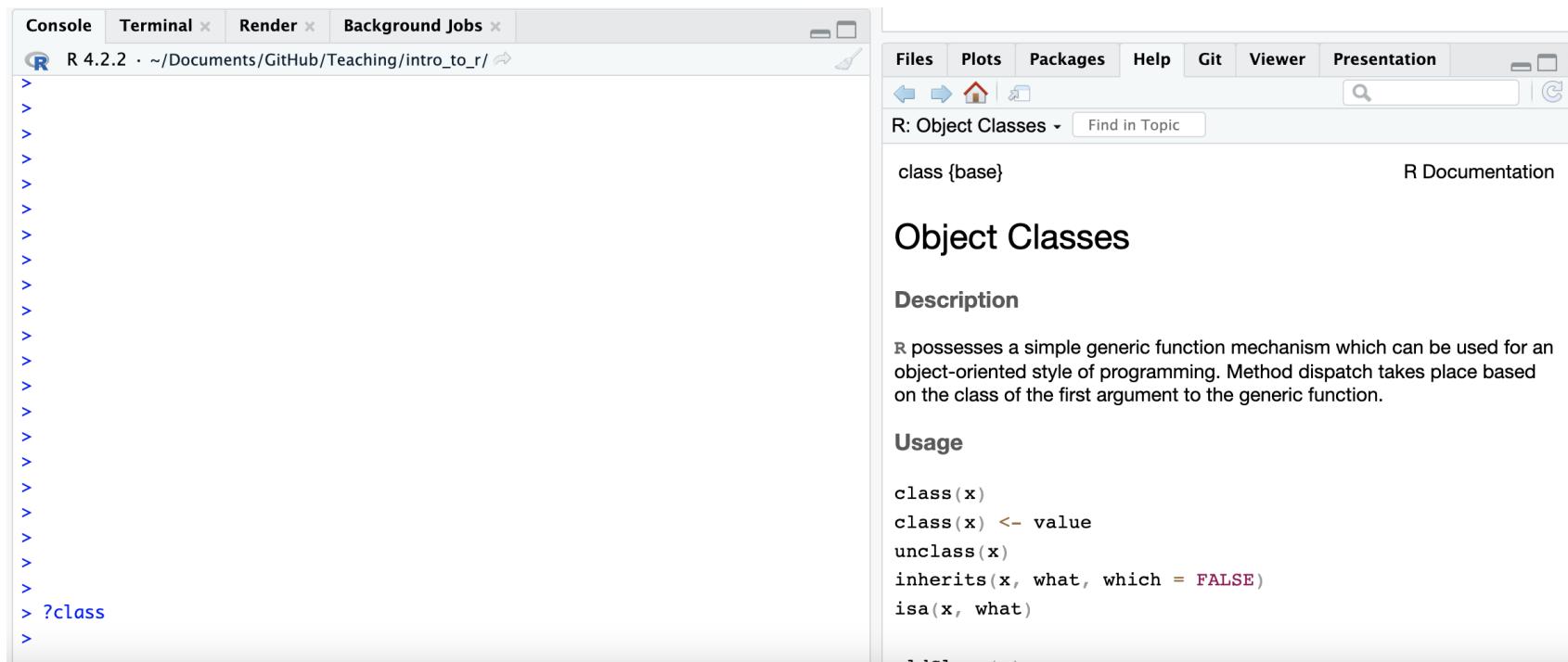
```
class(x)
class(x) <- value
unclass(x)
inherits(x, what, which = FALSE)
isa(x, what)
oldClass(x)
```

Getting Help with ?

If you know the name of a package or function:

Type `?package_name` or `?function_name` in the console to get information about packages and functions.

For example: ?readr or ?read_csv.



Double Question Mark

If you haven't loaded a package yet into R than you may get a response that there is no documentation.

Typing in `??package_name` can show you packages that you haven't loaded yet.

The screenshot shows the RStudio interface. On the left, the R console window displays R code and its output. The user has run several commands related to the tidyverse package, including `?class`, `?tidyverse`, and `??tidyverse`. The output for `??tidyverse` shows that there is no documentation for 'tidyverse' in specified packages and libraries, but suggests trying `??tidyverse`. The user then loads the tidyverse package using `library(tidyverse)`. The resulting output shows the attached packages (ggplot2, dplyr, tibble, stringr, tidyverse, purrr) and conflicts (dplyr::filter() masking stats::filter(), dplyr::lag() masking stats::lag()). On the right, the help viewer window is open for the tidyverse package. It shows the title 'tidyverse: Easily Install and Load the 'Tidyverse'', the description of the tidyverse package as a set of packages sharing common data representations and API design, the maintainer (Hadley Wickham), and other contributors. A 'tidyverse' logo is also visible.

Console Terminal × Render × Background Jobs ×

R 4.2.2 · ~/Documents/GitHub/Teaching/intro_to_r/ ↵

```
>
>
>
>
>
>
> ?class
> ?tidyverse
No documentation for 'tidyverse' in specified packages and libraries:
you could try '??tidyverse'
> ??tidyverse
> library(tidyverse)
— Attaching packages ————— tidyverse 1.3.2 —
✓ ggplot2 3.4.0   ✓ dplyr  1.0.10
✓ tibble  3.1.8   ✓ stringr 1.5.0
✓ tidyverse 1.2.0  ✓forcats 0.5.1
✓ purrr   1.0.0
— Conflicts ————— tidyverse_conflicts() —
✖ dplyr::filter() masks stats::filter()
✖ dplyr::lag()    masks stats::lag()
> ?tidyverse
> |
```

Files Plots Packages Help Git Viewer Presentation

R: tidyverse: Easily Install and Load the 'Tidyverse' Find in Topic

tidyverse-package {tidyverse} R Documentation

tidyverse: Easily Install and Load the 'Tidyverse'

Description

The 'tidyverse' is a set of packages that work in harmony because they share common data representations and 'API' design. This package is designed to make it easy to install and load multiple 'tidyverse' packages in a single step. Learn more about the 'tidyverse' at <https://www.tidyverse.org>.

Author(s)

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Other contributors:



Summary

- RStudio makes working in R easier
- the Editor is for static code like scripts or R Markdown documents
- The console is for testing code
- R markdown documents are really helpful for lots of reasons!
- R code goes within what is called a chunk (the gray box with a green play button)
- Code chunks can be modified so that they show differently in reports

[Class Website](#)

[Lab](#)



Image by [Gerd Altmann](#) from [Pixabay](#)