

Advanced R

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Adapted from *Tidy Tools* by Hadley Wickham



Welcome to the **Advanced R** Workshop!

1. Get connected to the wifi:
2. Get the course materials:
`usethis::use_course("bit.ly/advr-jul18")`
3. Follow the instructions in **setup.R**
4. Stuck? Please ask for help!

Preliminaries

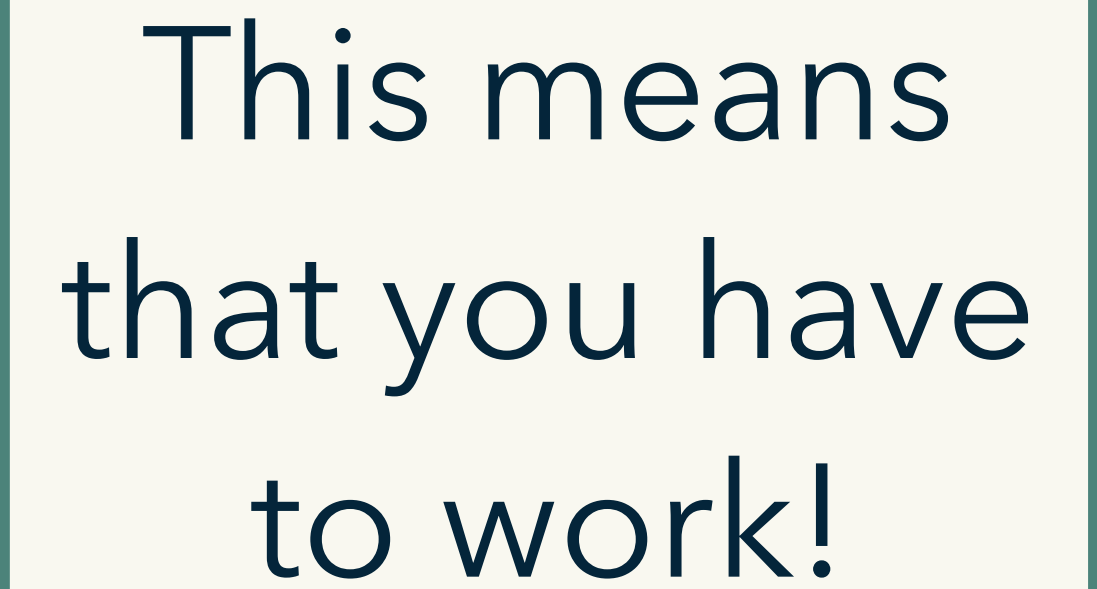
HELLO my name is

Charlotte

Your turn

This course is very hands on, and while we're here to help you, the best resource is often the person sitting next to you.

Introduce yourself to your neighbours. Who are you and what are you using R for?



This means
that you have
to work!

Goal

Go from code like this...

```
# Fix missing values  
df$a <- df$a[df$a == -99] <- NA  
df$b <- df$b[df$b == -99] <- NA  
df$c <- df$c[df$c == -99] <- NA  
df$d <- df$d[df$d == -99] <- NA  
df$e <- df$e[df$e == -99] <- NA  
df$f <- df$f[df$f == -99] <- NA  
df$g <- df$g[df$g == -98] <- NA  
df$h <- df$h[df$h == -99] <- NA  
df$i <- df$i[df$i == -99] <- NA  
df$j <- df$i[df$j == -99] <- NA  
df$k <- df$k[df$k == -99] <- NA
```

To code like this...

```
fix_missing <- function(x) {  
  x[x == -99] <- NA  
  x  
}  
df <- modify(df, fix_missing)
```


Overall goal:

Code that expresses what you did, not the details of how you did it.

Learning Objectives

By the end of the day you'll be able to ...

Functions

Reduce repetitive code by extracting a common action into a function

1. Identify when to write a function, and use a strategy for how to write a function
2. Apply good design principles to make your functions easy for you and others to use.

Functional Programming

Reduce repetitive code by having functions write for loops for you

1. Describe what it means that functions in R are first class citizens
2. Solve iteration problems using `purrr::map()` and friends
3. Avoid a single error stopping iteration with `purrr::safely()`

Tidy Evaluation

Write functions that wrap tidyverse functions

1. Identify arguments in functions that are automatically quoted
2. Refer to a saved variable in the quoted arguments of a tidyverse function
3. Wrap a tidyverse function inside your own function by combining `quo()` and `!!`

Schedule

10:15 -10:30

Morning break

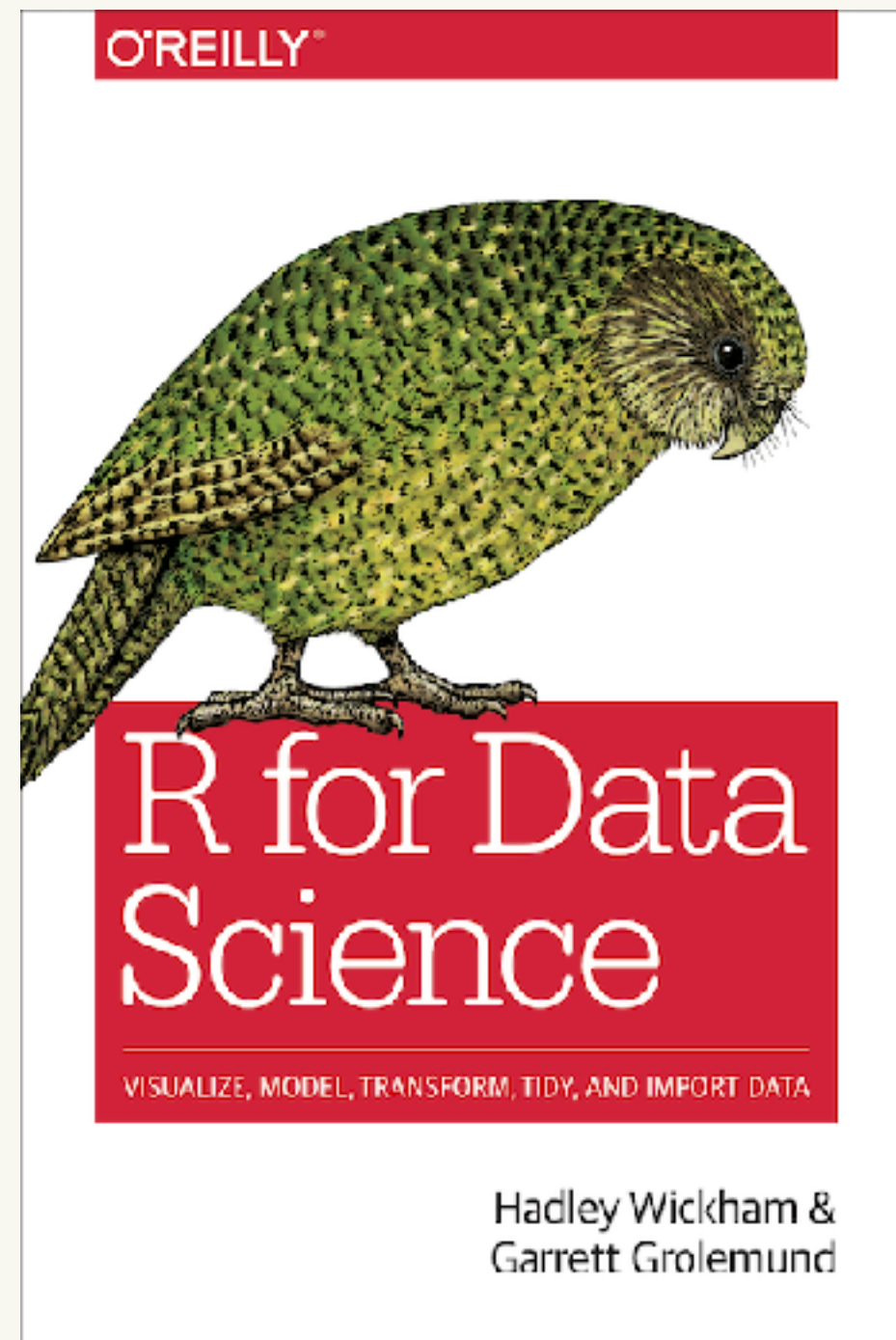
12:00 -13:00

Lunch

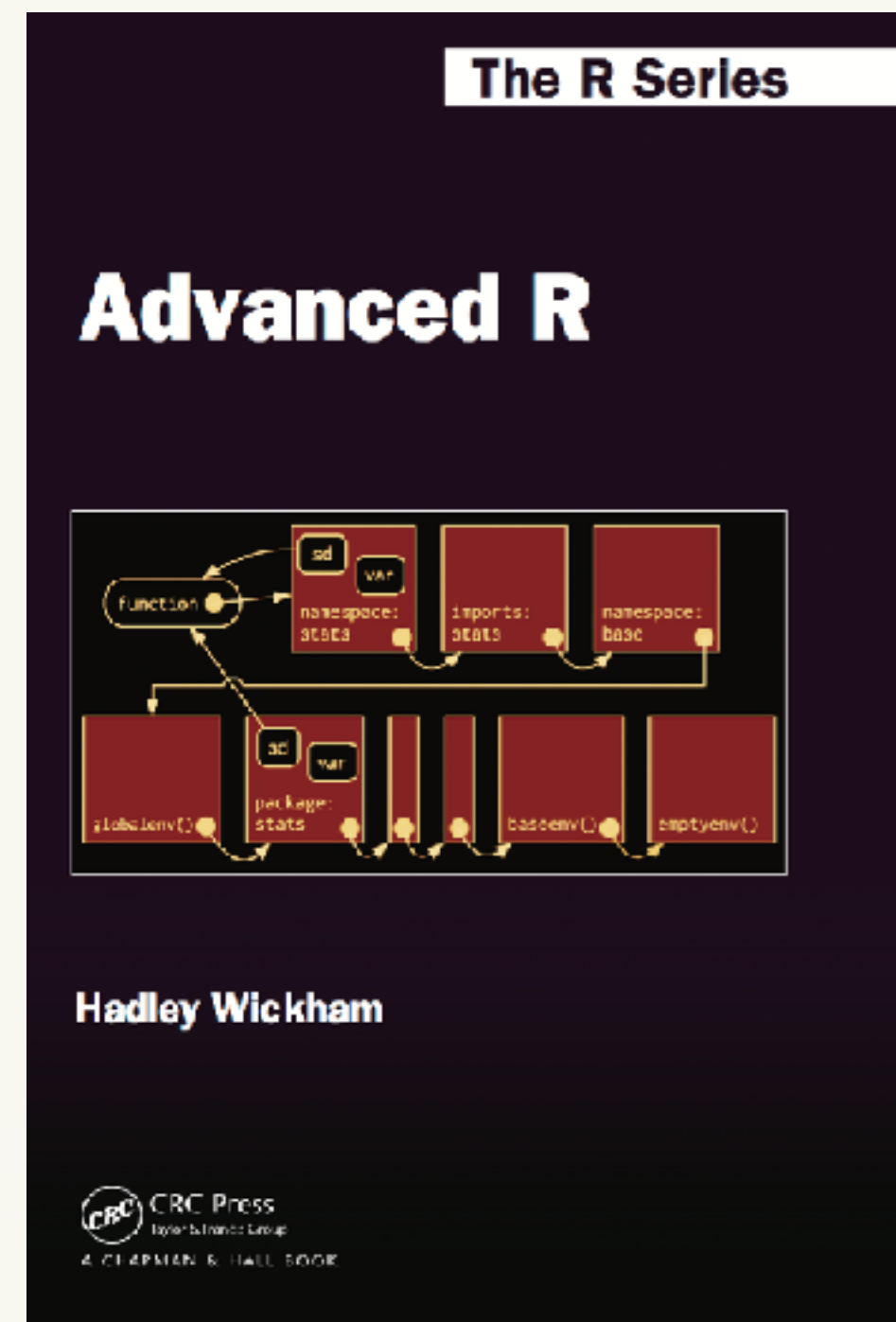
14:30 -14:45

Afternoon break

Much of the course is drawn from existing books



<http://r4ds.had.co.nz>



<http://adv-r.had.co.nz/>

2nd Ed. WIP:
<https://adv-r.hadley.nz>

Warmups

Don't expect to know all the answers!

Your turn

What are the four common types of **atomic vectors**?

(Bonus points for the two uncommon types)

What are the three primary properties of a vector?

Four common types: logical, integer, double, character

```
typeof(TRUE)
```

```
typeof(1L)
```

```
typeof(1.5)
```

```
typeof("a")
```

Every vector has three properties:

```
x <- 1:5
```

```
# 1. Type:
```

```
typeof(x)
```

```
# 2. Length
```

```
length(x)
```

```
# 3. Attributes
```

```
attributes(x)
```

Missing values

What does `NA == NA` return? Why?

What should you use instead?

There isn't a single unknown value

```
age_john <- NA
```

```
age_mary <- NA
```

```
age_john == age_mary
```

```
is.na(x)
```

```
sum(is.na(x))
```

```
mean(is.na(x))
```

Your turn

What are the six types of thing that you can put inside []?

Number (be specific), Integer (be more specific)

1. positive integer (get those elements)
2. negative integer (exclude)
3. zero
4. logical
5. character
6. nothing

blank

include all

+ve: include

integer

0: drop all

-ve: exclude

logical

keep TRUEs

character

lookup by name

Use character subsetting for simple look ups

```
x <- c("m", "f", "u", "f", "f", "m", "m")
```

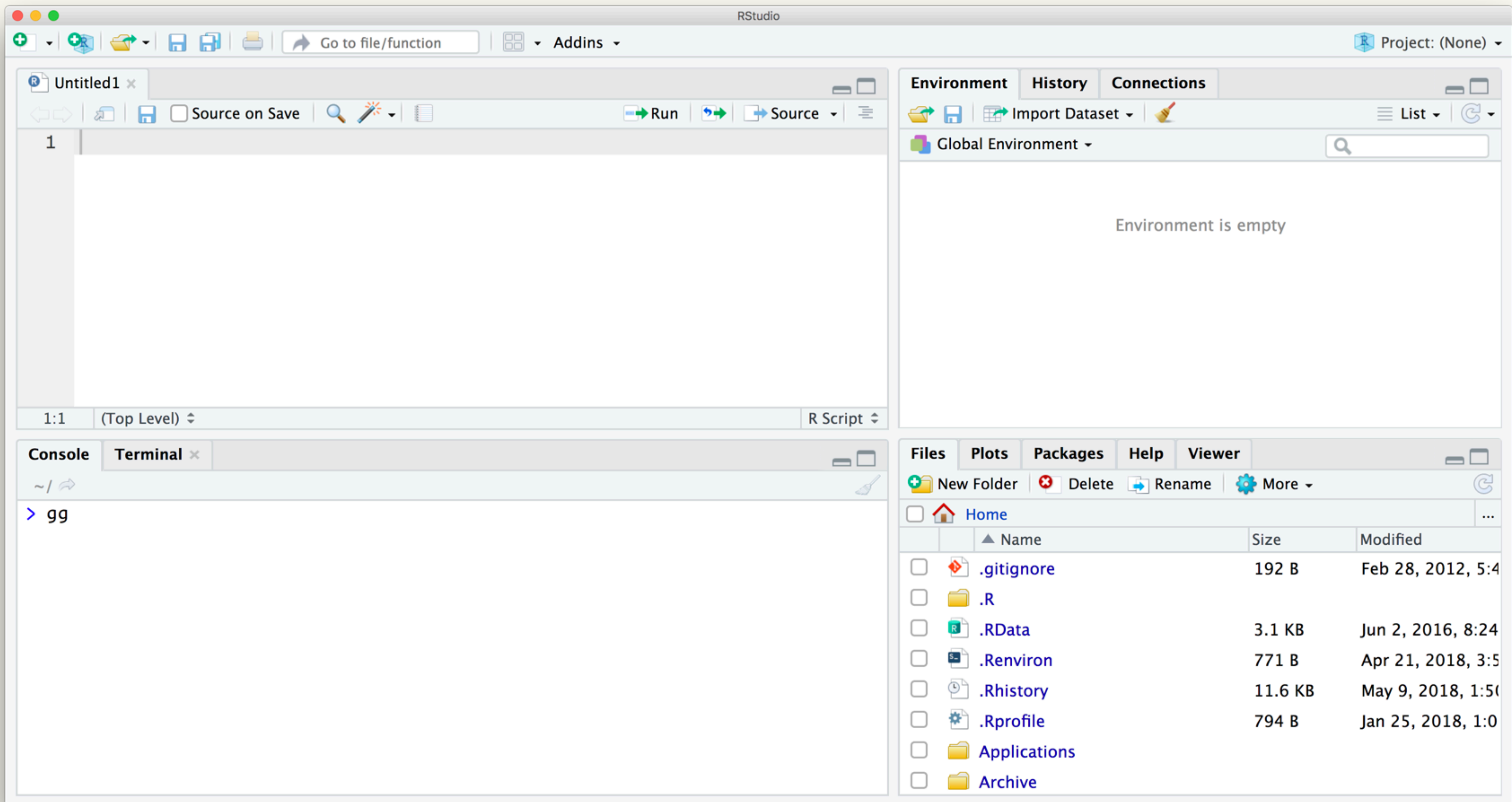
```
lookup <- c(m = "Male", f = "Female", u = NA)
```

```
lookup[x]
```

```
unname(lookup[x])
```

RStudio

You don't have to use RStudio,
but if you do, try to master it!



RStudio

Project: (None)

Environment History Connections

Global Environment

Environment is empty

Files Plots Packages Help Viewer

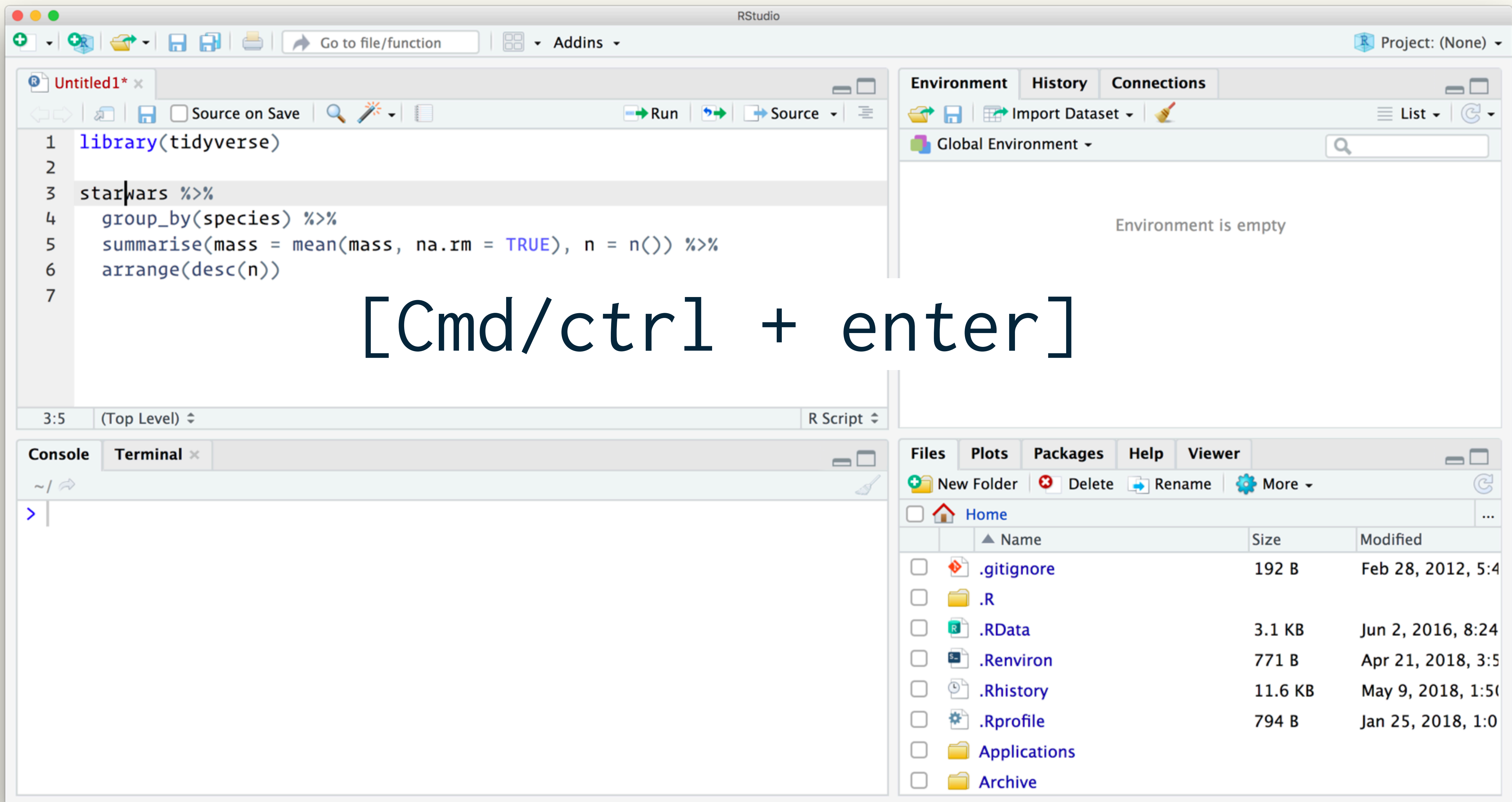
New Folder Delete Rename More

Home

	Name	Size	Modified
<input type="checkbox"/>	.gitignore	192 B	Feb 28, 2012, 5:4
<input type="checkbox"/>	.R		
<input type="checkbox"/>	.RData	3.1 KB	Jun 2, 2016, 8:24
<input type="checkbox"/>	.Renvirom	771 B	Apr 21, 2018, 3:5
<input type="checkbox"/>	.Rhistory	11.6 KB	May 9, 2018, 1:50
<input type="checkbox"/>	.Rprofile	794 B	Jan 25, 2018, 1:0
<input type="checkbox"/>	Applications		
<input type="checkbox"/>	Archive		

```
ggplot(fake_df, aes(x=x,y=y,quantile=quantile)) + geom_fan()  
ggplot(fake_df, aes(x=x,y=y)) + geom_fan() + theme_bw()  
ggplot(fake_df, aes(x=x,y=y)) + geom_fan() + theme_bw() + scale_fill_disti  
ggplot(fake_df, aes(x=x, y=y)) + geom_fan(intervals=c(50,80,95)/100) +  
ggplot(fake_df_sex, aes(x=x,y=y)) + geom_fan() + theme_bw() + scale_fill_g  
ggplot(.x, aes(carat, price)) +  
ggsave(.x, .y, width = 6, height = 6)  
ggplot(df, aes(carat, price)) +  
ggtitle(title)  
ggplot(mtcars, aes(mpg, cyl)) + aes(colour = NULL, linetype = NULL)  
ggplot(mtcars, aes(mpg, cyl)) + aes(colour = NULL, linetype = NULL) + geom.  
  
> gg
```

[Cmd/Ctrl + ↑]



RStudio

Project: (None)

Untitled1*

Source on Save

Run Source

```
1 library(tidyverse)
2
3 starwars %>%
4   group_by(species) %>%
5   summarise(mass = mean(mass, na.rm = TRUE), n = n()) %>%
6   arrange(desc(n))
7
```

Environment History Connections

Global Environment

Environment is empty

[Cmd/ctrl + enter]

7:1 (Top Level) R Script

Console Terminal

```
> starwars %>%
+   group_by(species) %>%
+   summarise(mass = mean(mass, na.rm = TRUE), n = n()) %>%
+   arrange(desc(n))
# A tibble: 38 x 3
  species    mass     n
  <chr>    <dbl> <int>
1 Human      82.8    35
2 Droid      69.8     5
3 NA         48      5
4 Gungan     74      3
```

Files Plots Packages Help Viewer

New Folder Delete Rename More

Home

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<input type="checkbox"/>	Applications		
<input type="checkbox"/>	Archive		

RStudio

Project: (None)

Untitled1* x Untitled2* x

Source on Save Run Source

1 a
2 b
3 c
4 d
5 e
6 f
7 g
8 h

[Alt + drag]

1:2 (Top Level) R Script

Environment History Connections

Global Environment

Environment is empty

Console Terminal x

```
> starwars %>%  
+   group_by(species) %>%  
+   summarise(mass = mean(mass, na.rm = TRUE), n = n()) %>%  
+   arrange(desc(n))  
# A tibble: 38 x 3  
  species    mass     n  
  <chr>    <dbl> <int>  
1 Human      82.8    35  
2 Droid      69.8     5  
3 NA         48      5  
4 Gungan     74      3
```

Files Plots Packages Help Viewer

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<input type="checkbox"/>	Applications		
<input type="checkbox"/>	Archive		

RStudio

Project: (None)

Untitled1* x Untitled2* x

Source on Save Run Source

```
1 "a",
2 "b",
3 "c",
4 "d",
5 "e",
6 "f",
7 "g",
8 "h",
```

1:1 (Top Level) R Script

Environment History Connections

Global Environment

Environment is empty

Console Terminal x

```
> starwars %>%
+   group_by(species) %>%
+   summarise(mass = mean(mass, na.rm = TRUE), n = n()) %>%
+   arrange(desc(n))
# A tibble: 38 x 3
  species    mass     n
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1 Human      82.8    35
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<input type="checkbox"/>	Applications		
<input type="checkbox"/>	Archive		

Keyboard Shortcut Quick Reference

Tabs

- `^⇧.` Switch to Tab...
- `^→` Next Tab
- `^⇧→` Previous Tab
- `^⇧F11` First Tab
- `^⇧F12` Last Tab

Panes

- `^1` Move Focus to Source
- `^2` Move Focus to Console
- `^⇧T` Move Focus to Terminal
- `^3` Move Focus to Help
- `^4` Show History
- `^5` Show Files
- `^6` Show Plots
- `^7` Show Packages
- `^8` Show Environment
- `^9` Show Viewer
- `^F1` Show Vcs
- `^F2` Show Build
- `^F5` Show Connections
- `^⇧0` Show All Panes

Add Shift to zoom (maximize) pane.

Source Navigation

- `⌘F9` Back
- `⌘F10` Forward
- `⌘U` Find Usages
- `⌘E` Use Selection for Find
- `⌘F` Find...
- `^G` Find Next
- `⇧⌘G` Find Previous
- `⇧⌘J` Replace and Find
- `^.` Go To File/Function...
- `⇧⌘G` Go to Line...
- `⇧⌘J` Jump To...
- `^P` Jump To Matching
- `⇧⇧E` Expand To Matching
- `⇧⌘0` Show Document Outline
- `^⇧↑` Add Cursor Above Current Cursor
- `^⇧↓` Add Cursor Below Current Cursor
- `⇧⌘↑` Expand Selection
- `⇧⌘↓` Shrink Selection
- `⌘PgDn` Go to Next Section
- `⌘PgUp` Go to Previous Section
- `^⇧A` Split Into Lines
- `⇧⇧⇧↑` Move active cursor up
- `⇧⇧⇧↓` Move active cursor down

Source Editor

- `⌘I` Insert Chunk
- `⇧⌘R` Insert Section...
- `⌘X` Extract Function
- `⌘V` Extract Variable
- `⇧⌘C` Comment/Uncomment Lines
- `⌘I` Reindent Lines
- `⇧⌘/` Reflow Comment
- `⇧⌘A` Reformat Code
- `⇧⌘D` Show Diagnostics (Project)
- `⌘L` Collapse Fold
- `⇧⌘L` Expand Fold
- `⌘0` Collapse All Folds
- `⇧⌘0` Expand All Folds
- `^K` Delete to Line End
- `⇧↑` Move Lines Up
- `⇧↓` Move Lines Down
- `⌘D` Delete Line
- `^U` Yank Line Up to Cursor
- `^K` Yank Line After Cursor
- `^Y` Insert Yanked Text
- `^T` Transpose Letters
- `⌘-` Insert Assignment Operator
- `⇧⌘M` Insert Pipe Operator
- `⇧⌘M` Rename in Scope
- `⇧⌘R` Insert Roxygen Skeleton

Source Control

- `^⇧D` Diff Files
- `^⇧M` Commit...
- `⇧⌘K` Compile PDF
- `⇧⌘K` Preview
- `⇧⌘K` Knit Document
- `⇧⌘B` Install and Restart
- `⇧⌘L` Load All
- `⇧⌘E` Check Package
- `⇧⌘T` Test Package
- `⇧⌘D` Document

Console

- `^L` Clear Console
 - `⌘↑` Popup Command History
- | Console | Size | Modified |
|---------|---------|-------------------|
| | 192 B | Feb 28, 2012, 5:4 |
| | 3.1 KB | Jun 2, 2016, 8:24 |
| | 771 B | Apr 21, 2018, 3:5 |
| | 11.6 KB | May 9, 2018, 1:50 |
| | 701 B | Jan 25, 2018, 1:0 |

Terminal

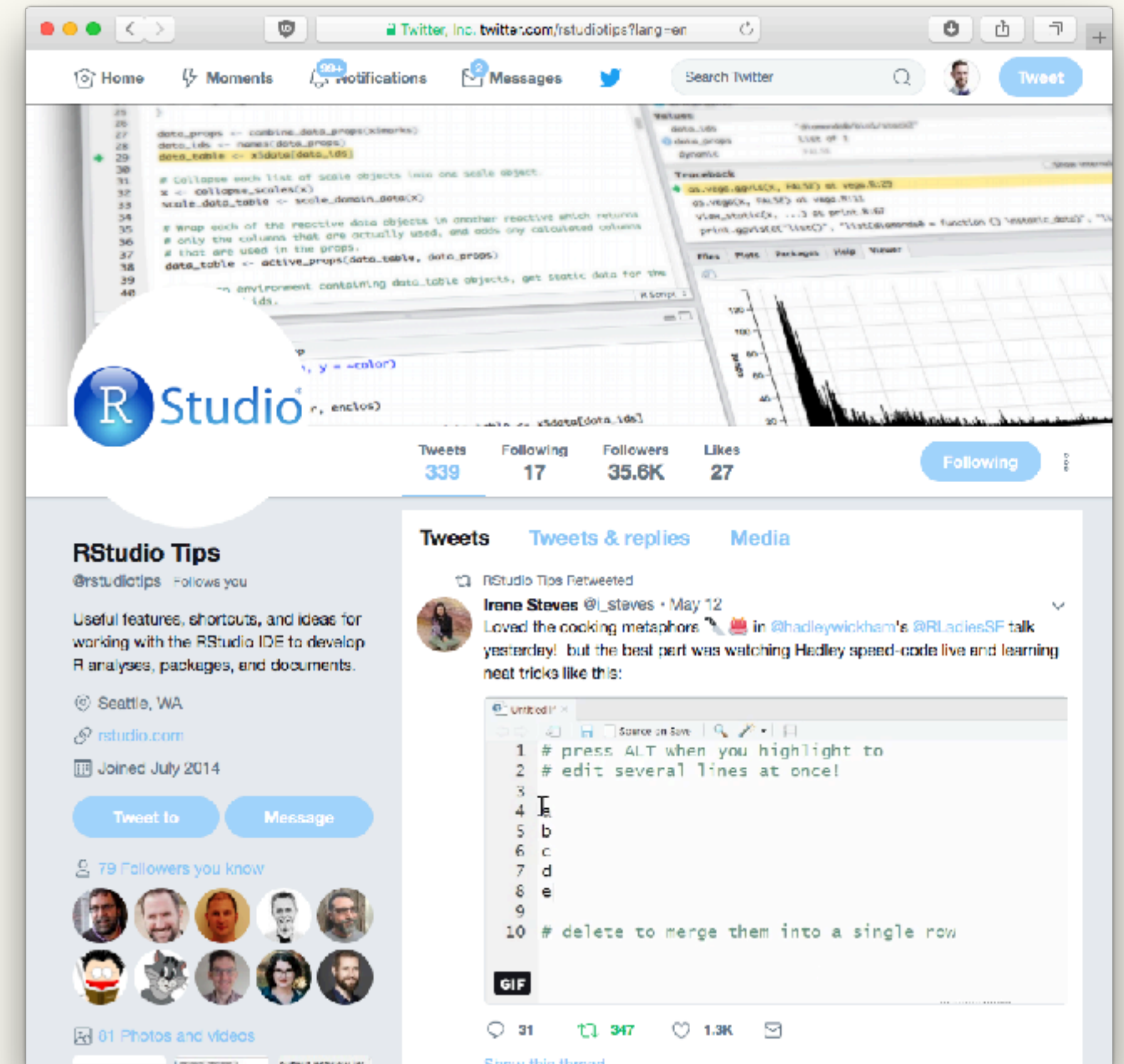
- `⇧⌘R` New Terminal
- `^⇧F11` Previous Terminal
- `^⇧F12` Next Terminal

Your turn

What's the shortcut for <-
(assignment)?

What about %>% (pipe)?

How can you quickly comment a
block of lines?



@rstudiotips

Adapted from *Tidy Tools* by Hadley Wickham

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