

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:

Use this link, **not**
one in handout!

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!

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

Preliminaries

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

HELLO my name is

Charlotte

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

HELLO my name is

Erin

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

HELLO my name is

Sam

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

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.

This means
that you have
to work!

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

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

Goal

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

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
```

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

To code like this...

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

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

Overall goal:

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

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Learning Objectives

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

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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.

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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()`

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

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 `!!`

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

Schedule

10:15-10:30

Morning break

12:30-14:00

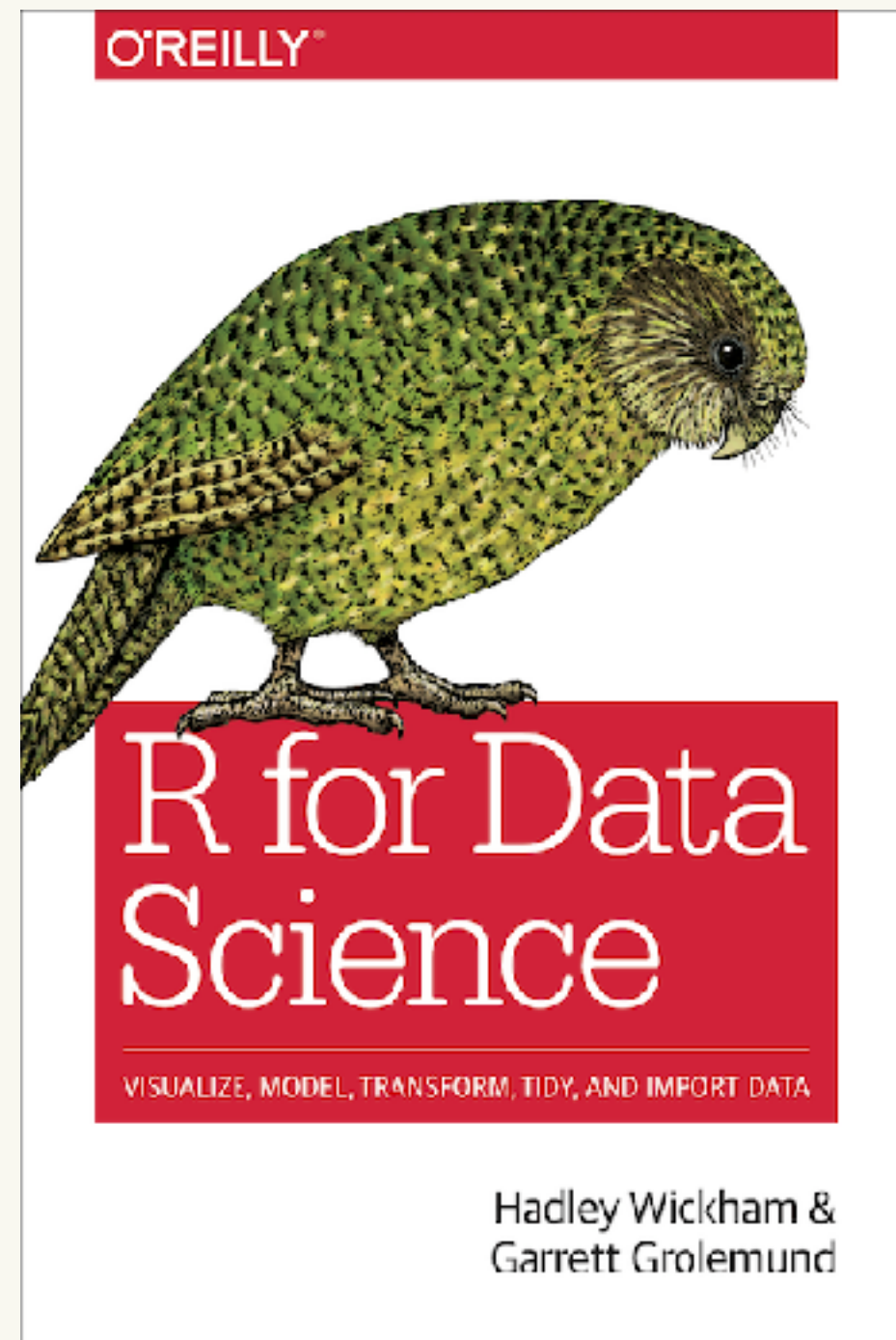
Lunch

15:15-15:30

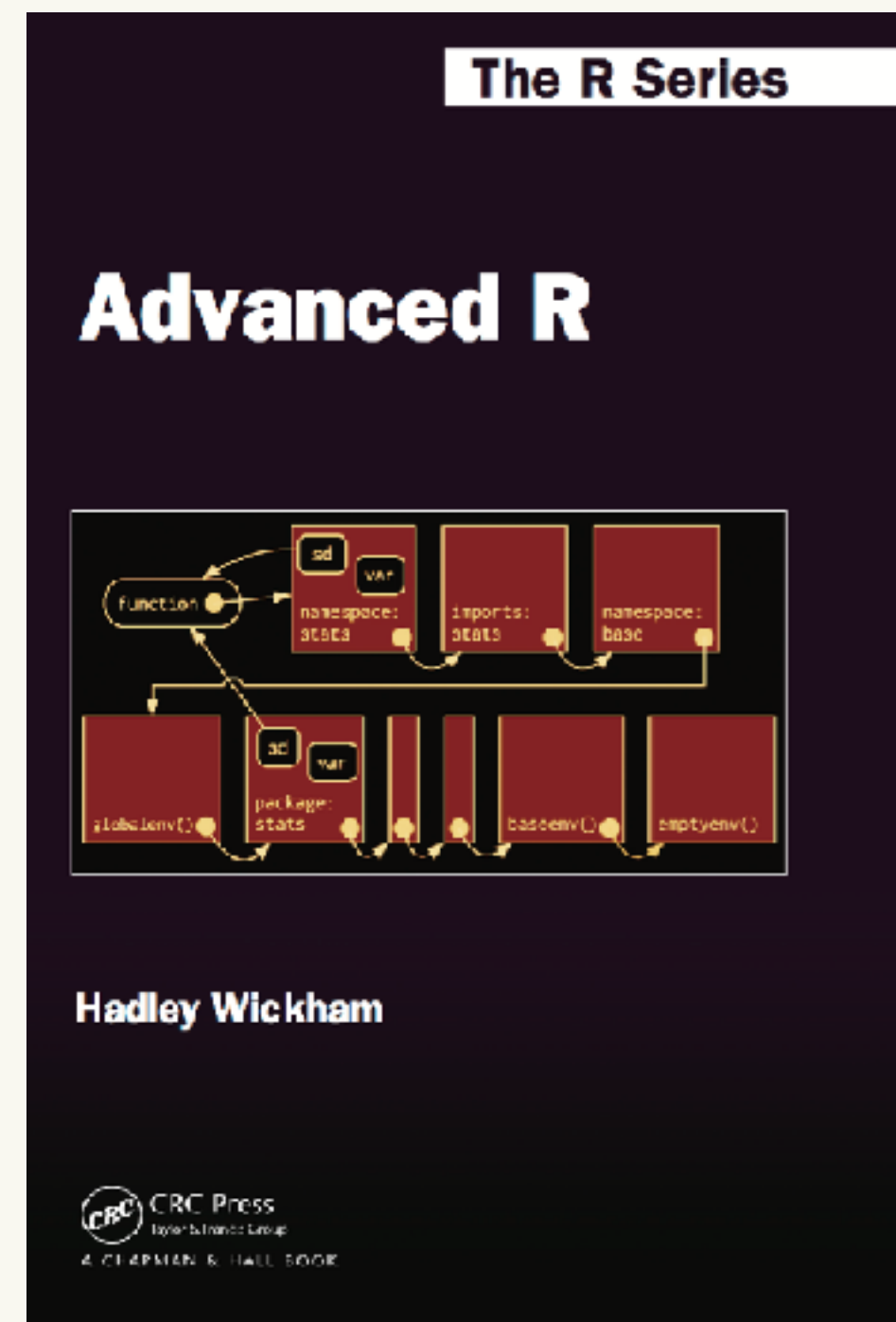
Afternoon break

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

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>

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

Warmups

Don't expect to know all the answers!

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

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?

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

Four common types: logical, integer, double, character

```
typeof(TRUE)
```

```
typeof(1L)
```

```
typeof(1.5)
```

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

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

Every vector has three properties:

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

```
# 1. Type:
```

```
typeof(x)
```

```
# 2. Length
```

```
length(x)
```

```
# 3. Attributes
```

```
attributes(x)
```

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

Missing values

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

What should you use instead?

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

There isn't a single unknown value

```
age_john <- NA
```

```
age_mary <- NA
```

```
age_john == age_mary
```

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

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

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

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

Your turn

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

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

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

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

blank	include all
	+ve : include
integer	0 : drop all
	-ve : exclude
logical	keep TRUEs
character	lookup by name

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

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]
```

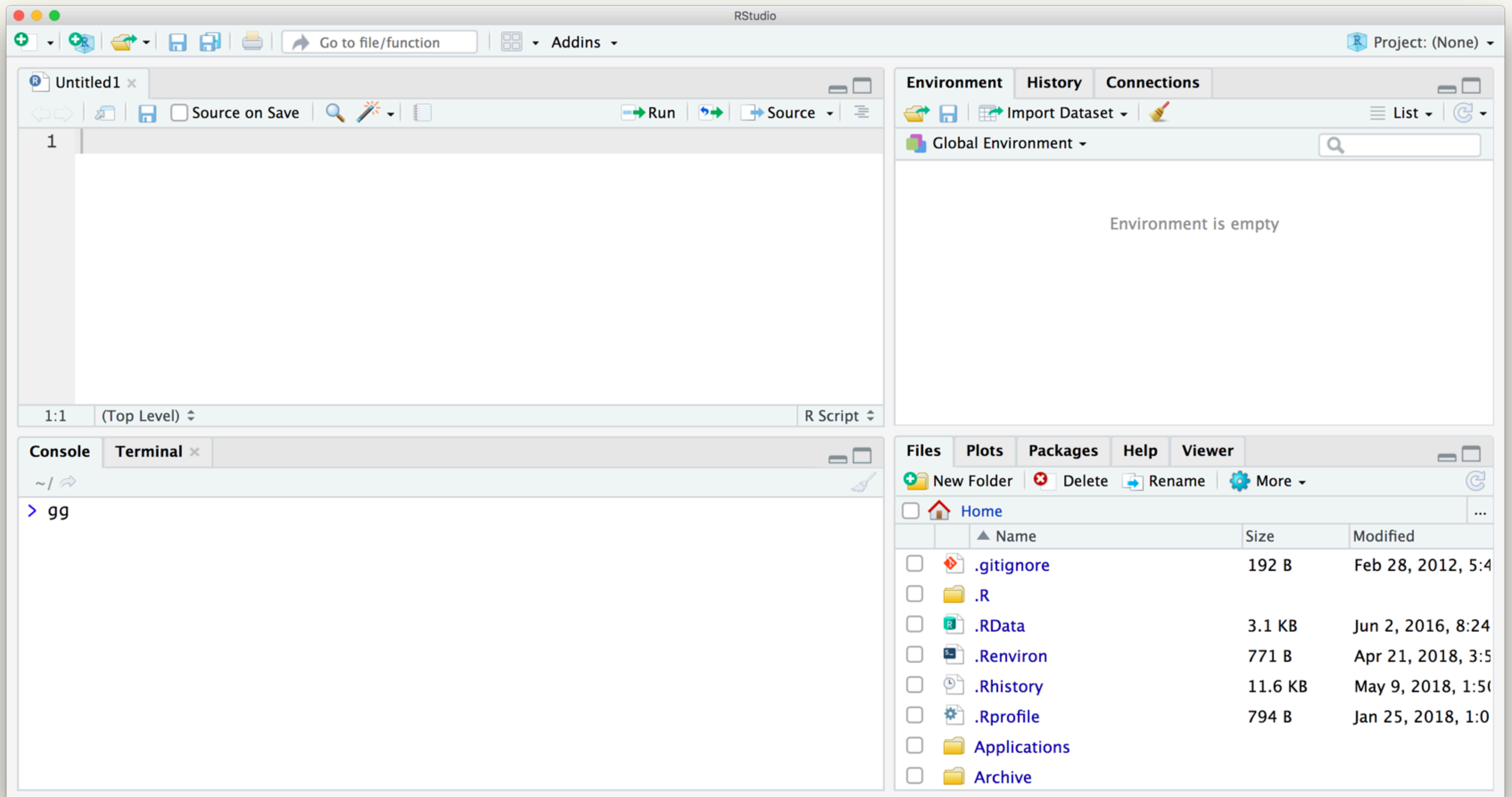
```
unname(lookup[x])
```

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

RStudio

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

Get materials: `usethis::use_course("bit.ly/advr-jul18")`



Get materials: `usethis::use_course("bit.ly/advr-jul18")`

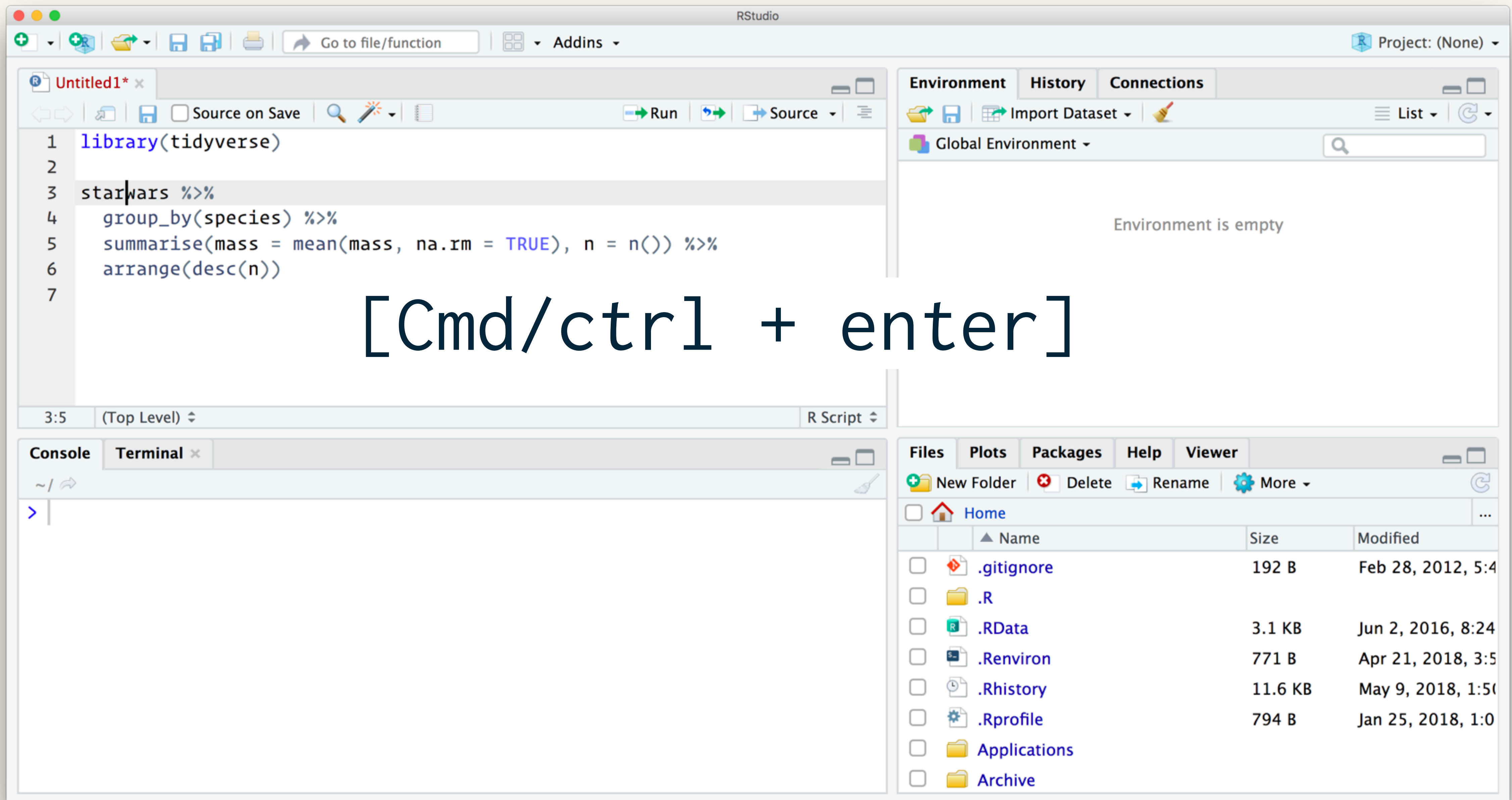
The screenshot shows the RStudio IDE with the following components:

- Source Editor:** Contains R code for creating ggplots. The last line is highlighted: `ggplot(mtcars, aes(mpg, cyl)) + aes(colour = NULL, linetype = NULL) + geom.`
- Environment Pane:** Shows "Global Environment" and "Environment is empty".
- Files Pane:** Shows the home directory with a list of files and folders.

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

[Cmd/Ctrl + ↑]

Get materials: `usethis::use_course("bit.ly/advr-jul18")`



Get materials: `usethis::use_course("bit.ly/advr-jul18")`

RStudio

Project: (None)

Untitled1*

```
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
```

[Cmd/ctrl + enter]

Environment History Connections

Global Environment

Environment is empty

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

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

Get materials: `usethis::use_course("bit.ly/advr-jul18")`

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

New Folder Delete Rename More

Home

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

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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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Files Plots Packages Help Viewer

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<input type="checkbox"/>	Archive		

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RStudio

Go to file/function

Addins

Project: (None)

Keyboard Shortcut Quick Reference

Tabs	Source Navigation	Source Editor	Source Control
Tabs			
<code>^⇧.</code> Switch to Tab...	<code>⌘F9</code> Back	<code>⇧⌘I</code> Insert Chunk	<code>^⇧D</code> Diff Files
<code>^⇨</code> Next Tab	<code>⌘F10</code> Forward	<code>⇧⌘R</code> Insert Section...	<code>^⇧M</code> Commit...
<code>^⇧⇨</code> Previous Tab	<code>⇧⌘U</code> Find Usages	<code>⇧⌘X</code> Extract Function	
<code>^⇧F11</code> First Tab	<code>⌘E</code> Use Selection for Find	<code>⇧⌘V</code> Extract Variable	
<code>^⇧F12</code> Last Tab	<code>⌘F</code> Find...	<code>⇧⌘C</code> Comment/Uncomment Lines	
	<code>^G</code> Find Next	<code>⌘I</code> Reindent Lines	Build
	<code>⇧⌘G</code> Find Previous	<code>⇧⌘/</code> Reflow Comment	<code>⇧⌘K</code> Compile PDF
	<code>⇧⌘J</code> Replace and Find	<code>⇧⌘A</code> Reformat Code	<code>⇧⌘K</code> Preview
	<code>^.</code> Go To File/Function...	<code>⇧⇧⌘D</code> Show Diagnostics (Project)	<code>⇧⌘B</code> Knit Document
Panes	<code>⇧⇧⌘G</code> Go to Line...	<code>⇧⇧⌘L</code> Collapse Fold	<code>⇧⌘L</code> Load All
<code>^1</code> Move Focus to Source	<code>⇧⇧⌘J</code> Jump To...	<code>⇧⇧⌘L</code> Expand Fold	<code>⇧⌘E</code> Check Package
<code>^2</code> Move Focus to Console	<code>^P</code> Jump To Matching	<code>⇧⇧⌘0</code> Collapse All Folds	<code>⇧⌘T</code> Test Package
<code>⇧⇧⌘T</code> Move Focus to Terminal	<code>⇧⇧⌘E</code> Expand To Matching	<code>⇧⇧⌘0</code> Expand All Folds	<code>⇧⌘D</code> Document
<code>^3</code> Move Focus to Help	<code>⇧⌘0</code> Show Document Outline	<code>^K</code> Delete to Line End	
<code>^4</code> Show History	<code>^⇧↑</code> Add Cursor Above Current Cursor	<code>⇧↑</code> Move Lines Up	Console
<code>^5</code> Show Files	<code>^⇧↓</code> Add Cursor Below Current Cursor	<code>⇧↓</code> Move Lines Down	<code>^L</code> Clear Console
<code>^6</code> Show Plots	<code>⇧⇧⌘↑</code> Expand Selection	<code>⌘D</code> Delete Line	<code>⌘↑</code> Popup Command History
<code>^7</code> Show Packages	<code>⇧⇧⌘↓</code> Shrink Selection	<code>^U</code> Yank Line Up to Cursor	
<code>^8</code> Show Environment	<code>⌘PgDn</code> Go to Next Section	<code>^K</code> Yank Line After Cursor	Terminal
<code>^9</code> Show Viewer	<code>⌘PgUp</code> Go to Previous Section	<code>^Y</code> Insert Yanked Text	<code>⇧⇧⌘R</code> New Terminal
<code>^F1</code> Show Vcs	<code>^⇧A</code> Split Into Lines	<code>^T</code> Transpose Letters	<code>^⇧F11</code> Previous Terminal
<code>^F2</code> Show Build	<code>^⇧⇧↑</code> Move active cursor up	<code>⇧-</code> Insert Assignment Operator	<code>^⇧F12</code> Next Terminal
<code>^F5</code> Show Connections	<code>^⇧⇧↓</code> Move active cursor down	<code>⇧⌘M</code> Insert Pipe Operator	
<code>⇧⇧⌘0</code> Show All Panes		<code>⇧⇧⌘M</code> Rename in Scope	
<code>⇧⇧⌘0</code> Add Shift to zoom (maximize) pane.		<code>⇧⇧⌘R</code> Insert Roxygen Skeleton	

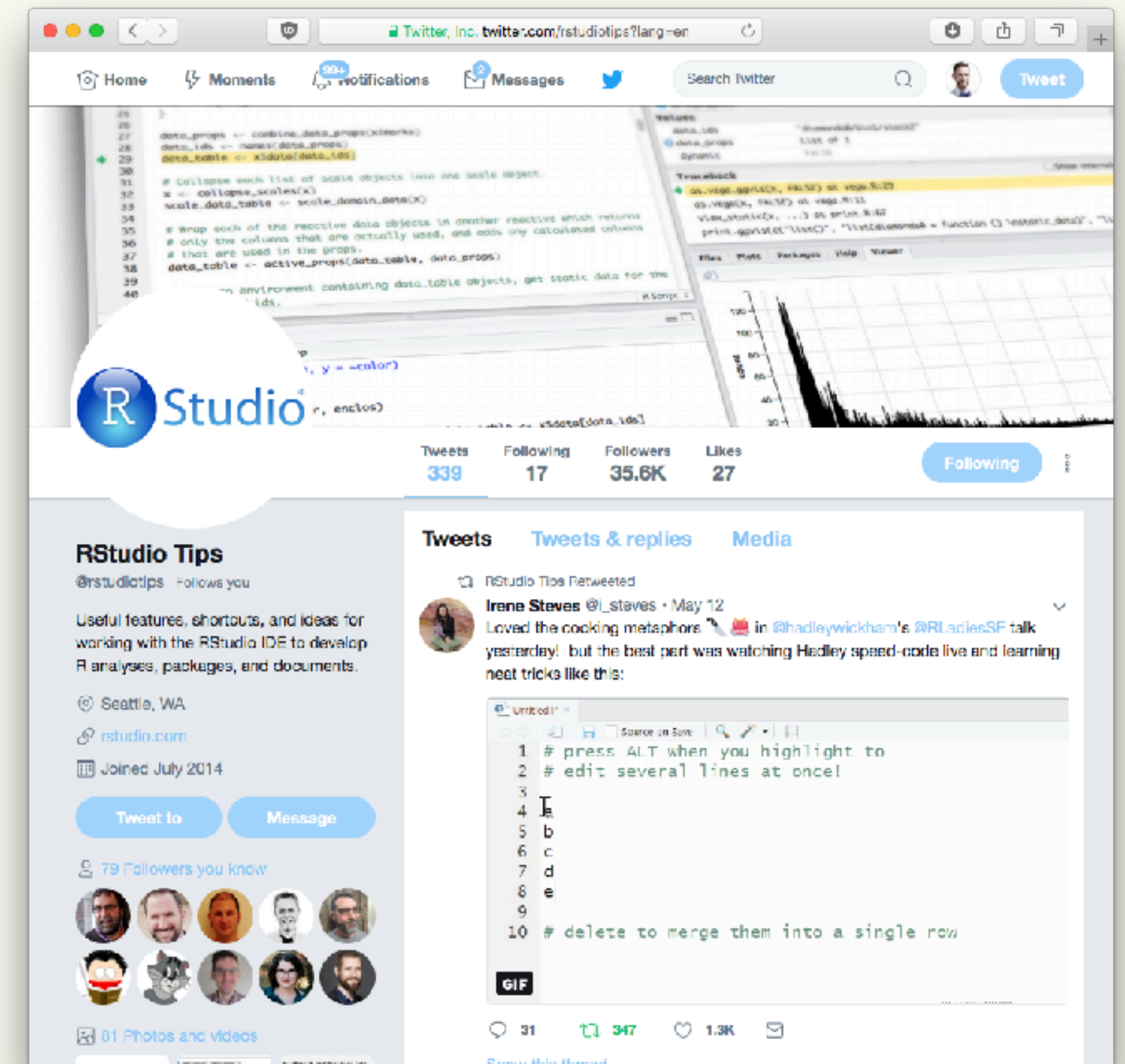
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Your turn

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

What about %>% (pipe)?

How can you quickly comment a
block of lines?



@rstudiotips

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Adapted from *Tidy Tools* by Hadley Wickham

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