

Welcome to the Tidy Tools Workshop!

1. Get connected to the wifi:

2. Get the course materials

```
usethis::use_course("rstd.io/  
tidytools19")
```

3. Check you have the needed packages by
running setup.R

4. Stuck? Please ask for help!

Get materials: usethis::use_course("rstd.io/tidytools19")

Preliminaries

Get materials: `usethis::use_course("rstd.io/tidytools19")`

HELLO my name is

Hadley

data science ↔ software engineering

Get materials: usethis::use_course("rstd.io/tidytools19")



Emi Tanaka
School of Mathematics
and Statistics,
The University of Sydney

Get materials: `usethis::use_course("rstd.io/tidytools19")`



Danielle Navarro

School of Psychology,
University of New South
Wales

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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!

Get materials: `usethis::use_course("rstd.io/tidytools19")`

Goal: help build tidy tools

Writing functions

Individual
functions to
solve individual
problems

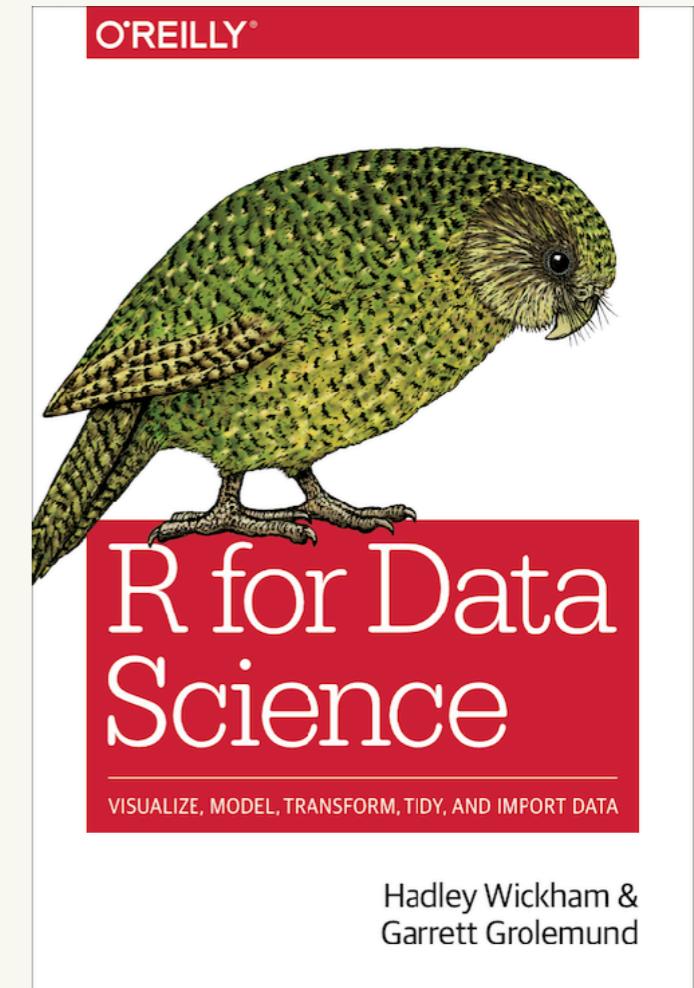
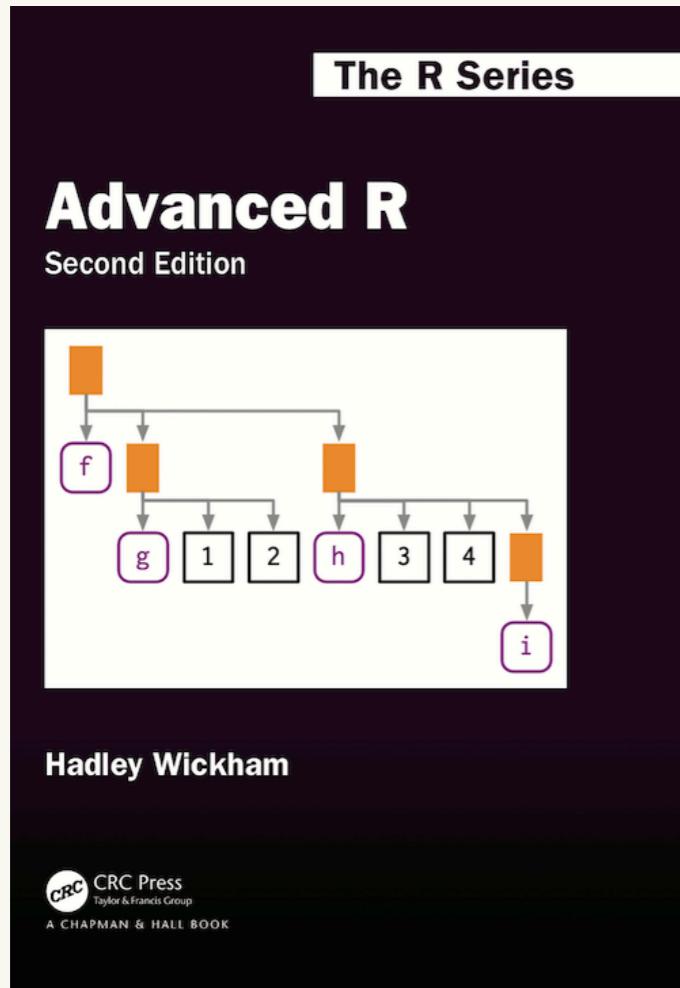


Designing APIs

Family of
functions that
work together to
solve family of
problems

Get materials: usethis::use_course("rstd.io/tidytools19")

Much of the course is drawn from existing books



<http://adv-r.hadley.nz/>

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

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

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But the primary book does not yet exist

???

Hadley Wickham

<https://principles.tidyverse.org>

How to solve real problems with R

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Schedule

Day 1	Day 2
Package basics	Errors
Morning tea	Morning tea
Testing	Object Oriented Programming
Lunch	Lunch
API Design	Tidy Evaluation
Afternoon tea	Afternoon tea
Functional Programming	Document/Share

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Warmups

Don't expect to know all the answers!

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Your turn

What are the four common types of atomic vectors? (Bonus points for the two uncommon types)

What are the three fundamental properties of a vector?

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Four common types: logical, integer, double, character

```
typeof(TRUE)
```

```
typeof(1L)
```

```
typeof(1.5)
```

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

We'll talk about this (S3) later:

```
typeof(factor(1:10))
```

```
typeof(Sys.Date())
```

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Every vector has three properties:

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

```
# 1. Type:  
typeof(x)
```

```
# 2. Length  
length(x)
```

```
# 3. Attributes  
attributes(x)  
# (we'll come back to those later)
```

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Missing values

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

What should you use instead?

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There isn't a single unknown value

```
age_john <- NA  
age_mary <- NA  
age_john == age_mary
```

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

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

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Your turn

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

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blank

include all

integer

+ve: include

0: drop all

-ve: exclude

logical

keep TRUEs

character

lookup by name

Get materials: `usethis::use_course("rstd.io/tidytools19")`

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])
```

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Your turn

```
x <- runif(1e6)  
lobstr::obj_size(x)  
#> 8,000,040 B
```



<https://lobstr.r-lib.org/>

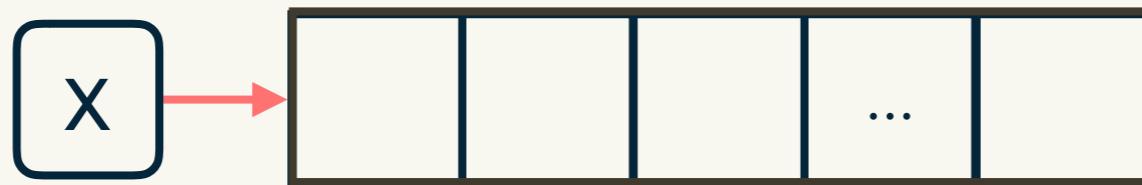
```
y <- list(x, x, x)  
lobstr::obj_size(y)  
#> ???
```

```
y[[1]][[1]] <- NA  
lobstr::obj_size(y)  
#> ???
```

Get materials: usethis::use_course("rstd.io/tidytools19")

A name is a reference to a value

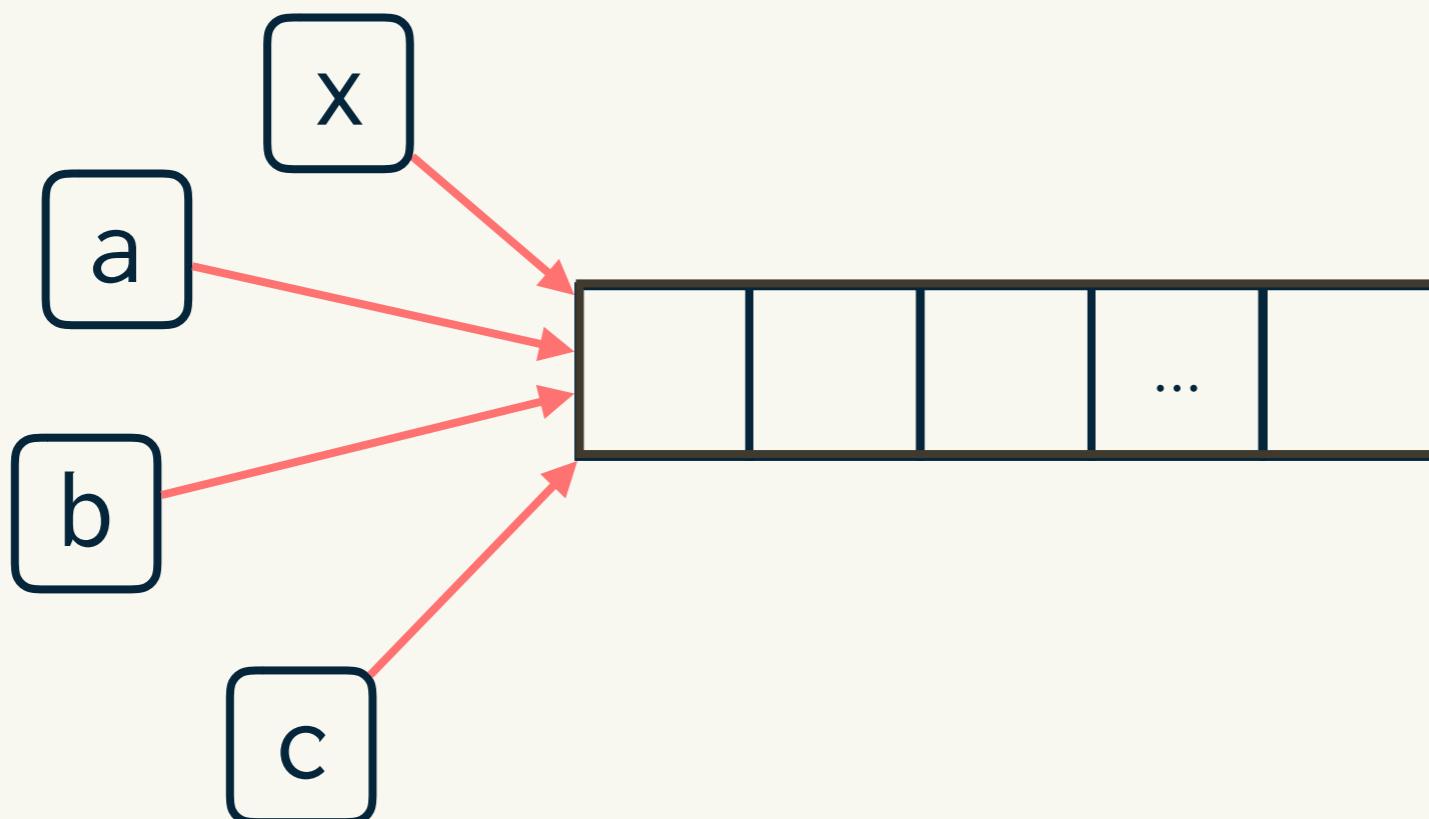
```
x <- runif(1e6)
```



Get materials: usethis::use_course("rstd.io/tidytools19")

Many references can point to one object

```
a <- b <- c <- x
```



How big is **a**?

How big is **b**?

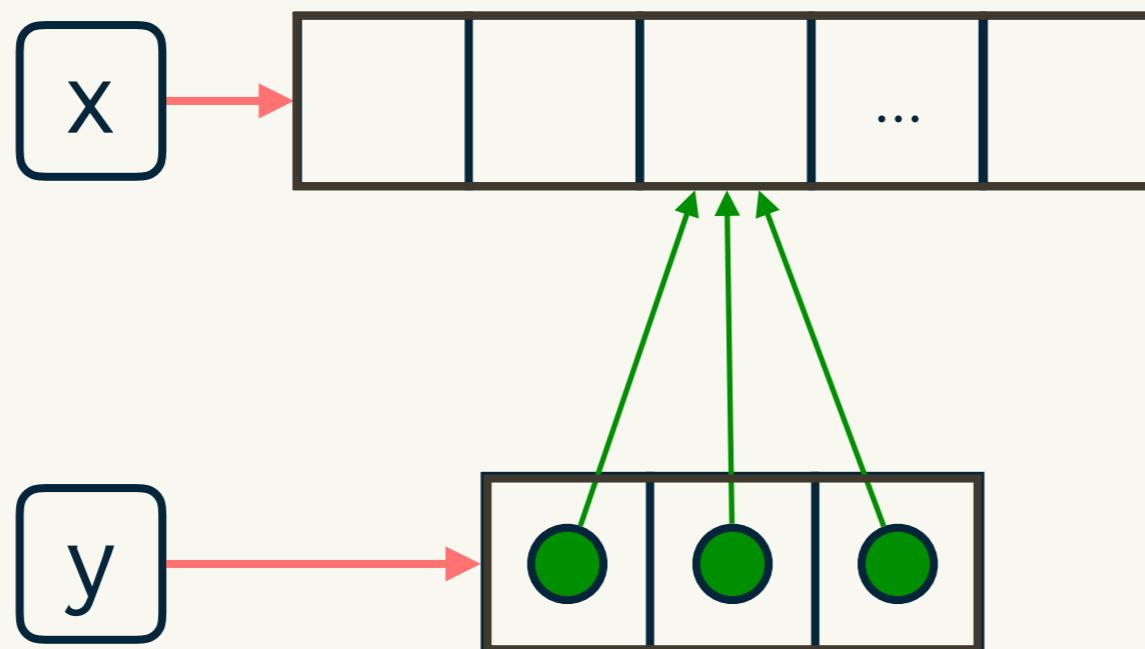
How big are **a** and **b** together?

Get materials: usethis::use_course("rstd.io/tidytools19")

Elements of lists are also references

```
y <- list(x, x, x)
```

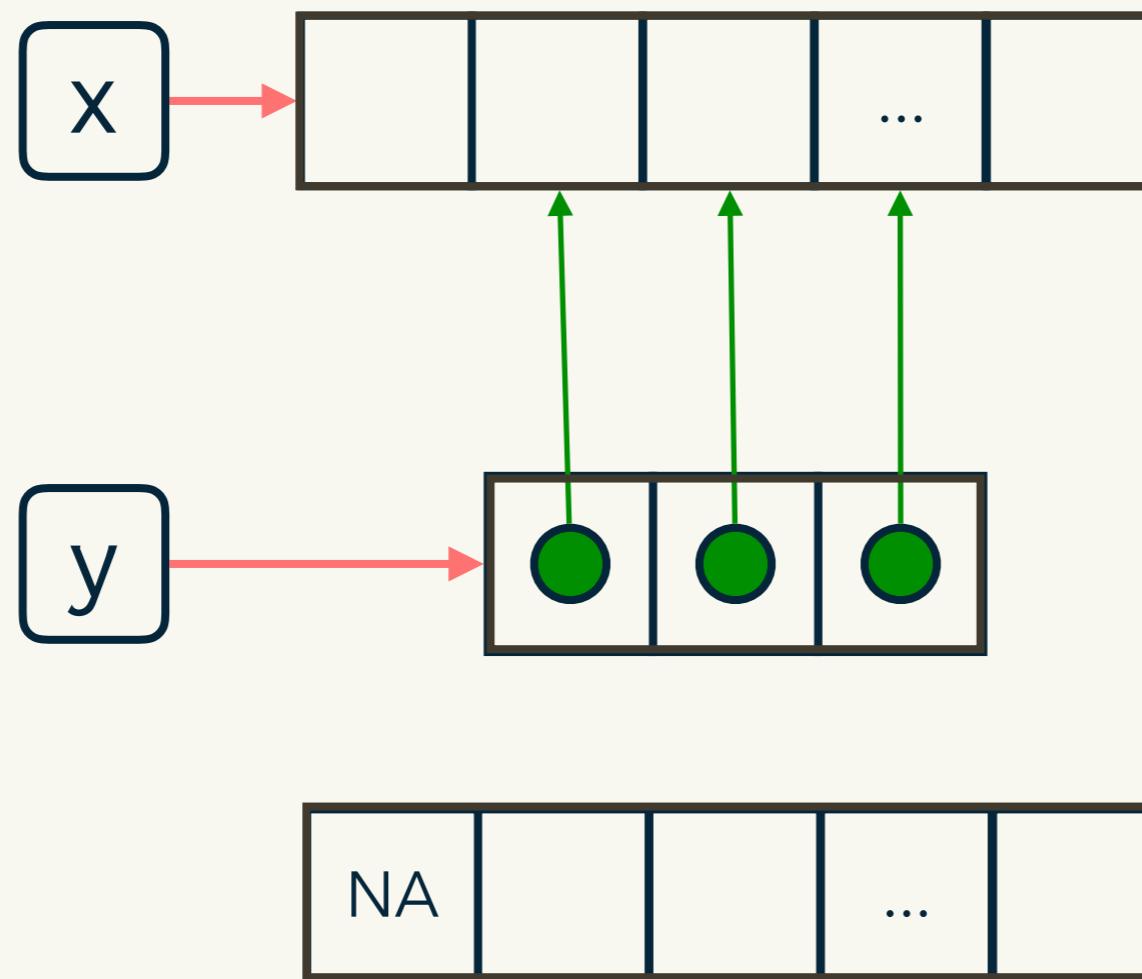
How big is **x**? How
big is **y**? How big
are **x** and **y**
together?



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Modifying an object creates a copy

```
y[[1]][[1]] <- NA
```

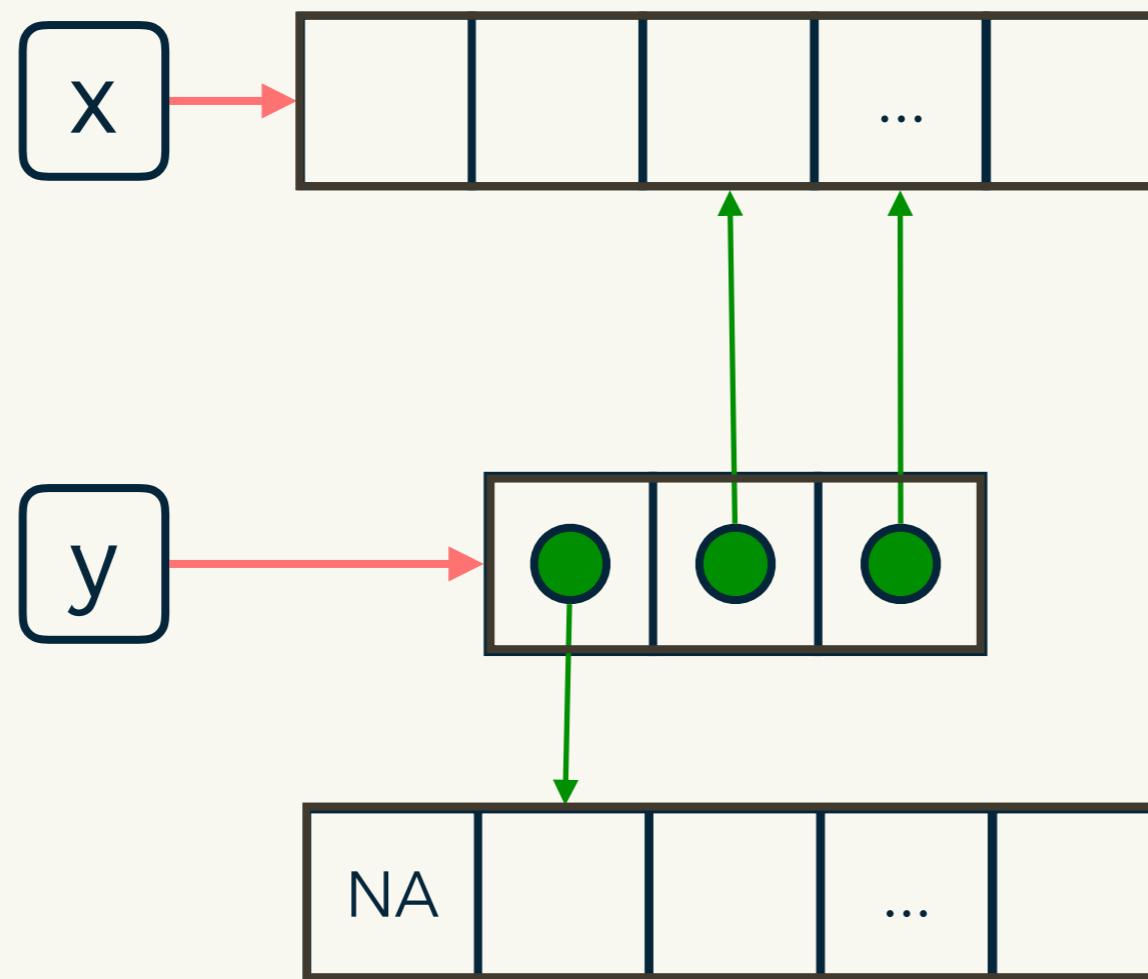


Get materials: usethis::use_course("rstd.io/tidytools19")

Modifying an object creates a copy

```
y[[1]][[1]] <- NA
```

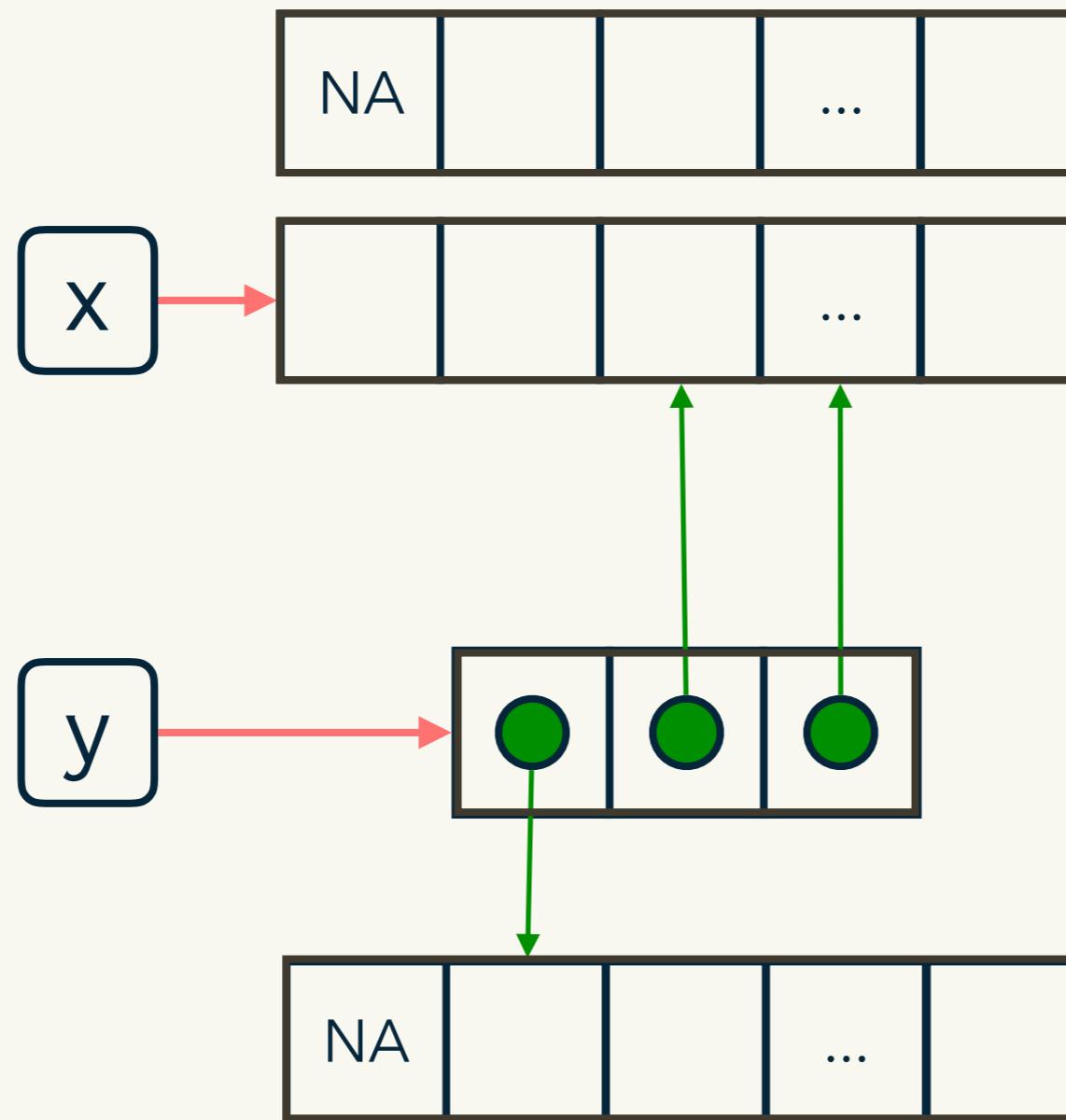
How big is **x**?
How big is **y**?
How big are **x** and **y** together?



Get materials: usethis::use_course("rstd.io/tidytools19")

Modifying an object creates a copy

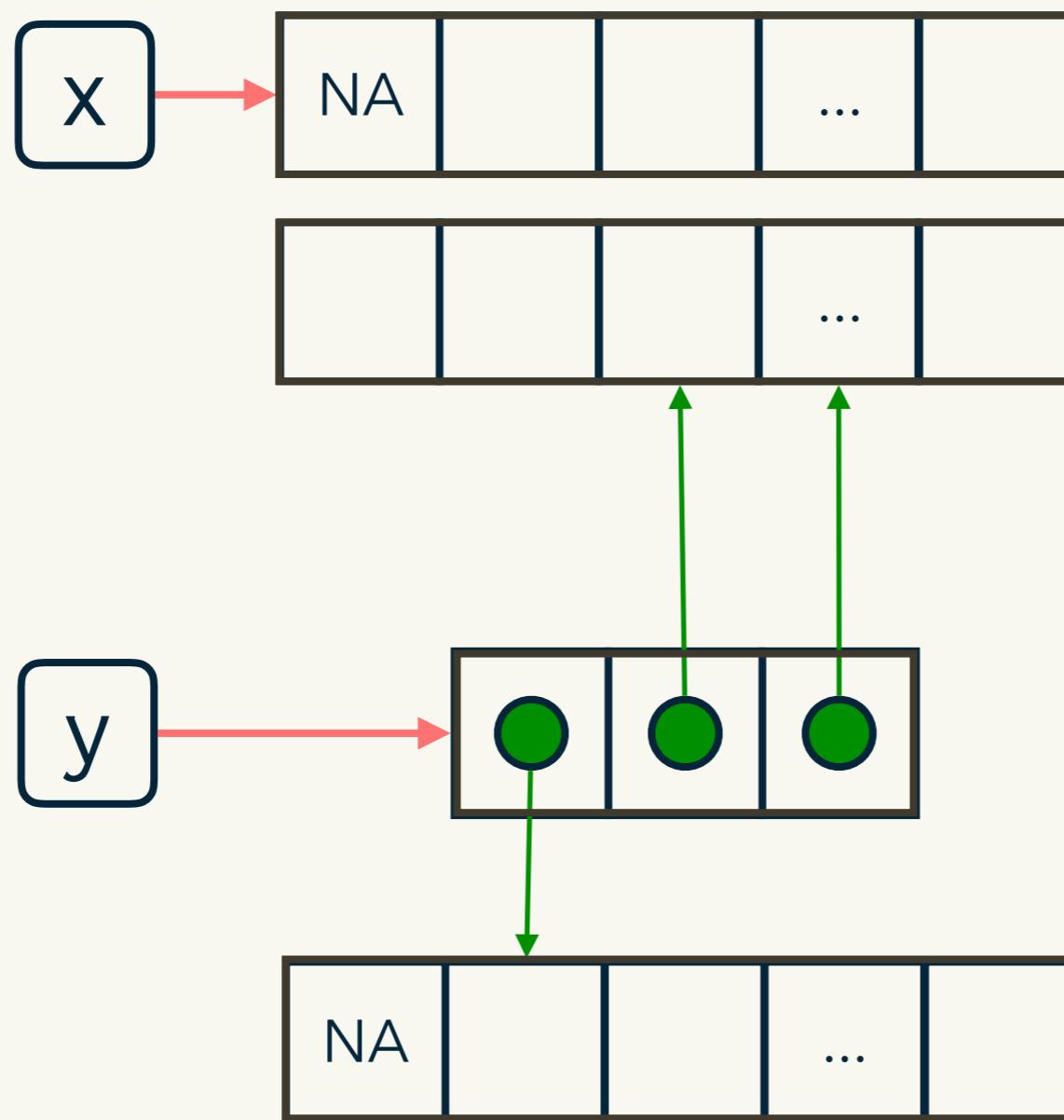
```
x[[1]] <- NA
```



Get materials: `usethis::use_course("rstd.io/tidytools19")`

Modifying an object creates a copy

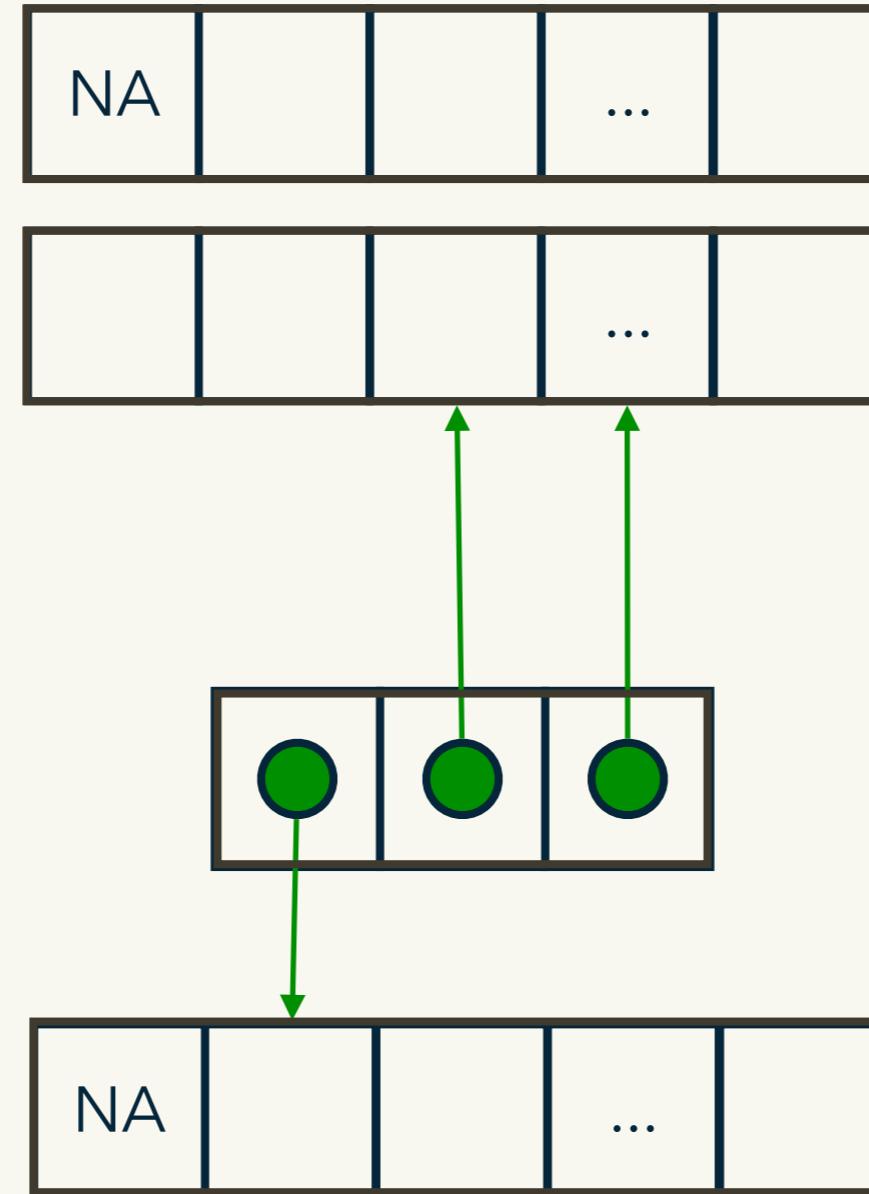
```
x[[1]] <- NA
```



Get materials: `usethis::use_course("rstd.io/tidytools19")`

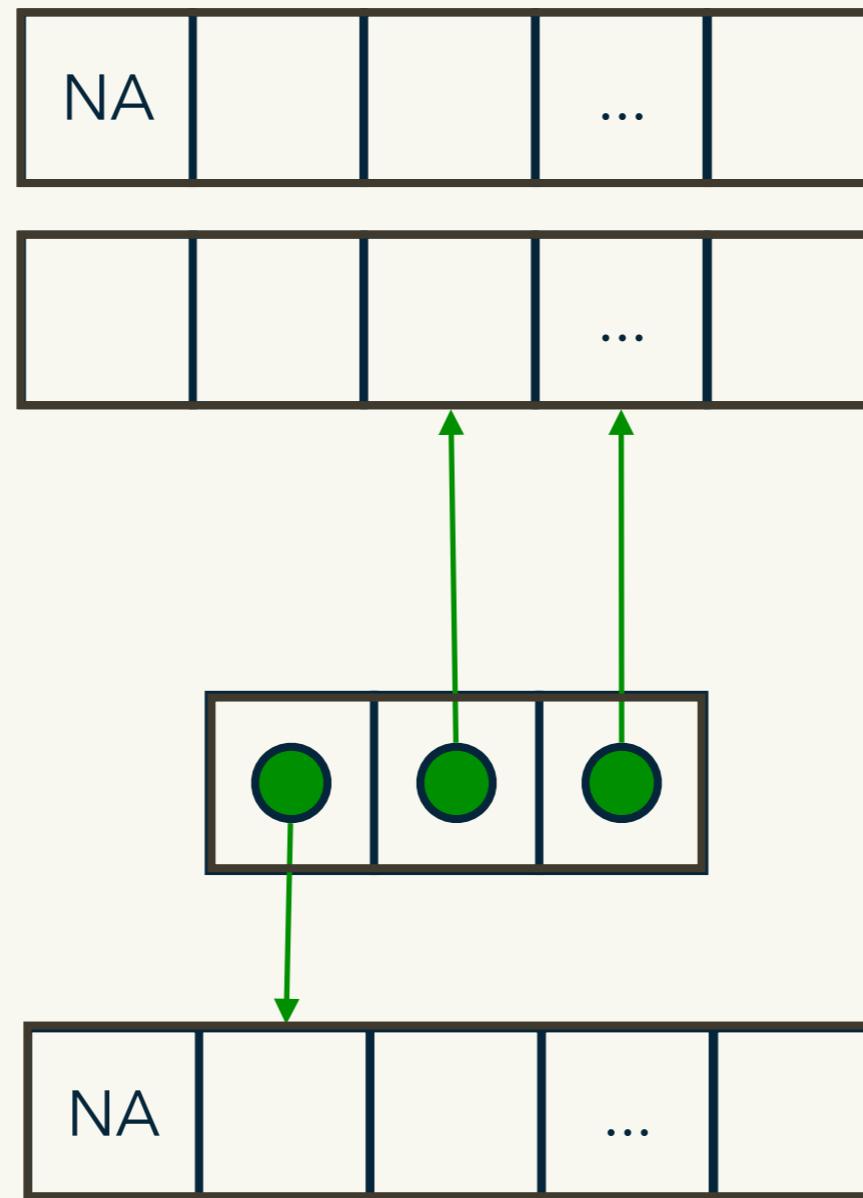
`rm()` removes references

`rm(x, y)`



Get materials: `usethis::use_course("rstd.io/tidytools19")`

The garbage collector removes values



Get materials: usethis::use_course("rstd.io/tidytools19")

The garbage collector removes values

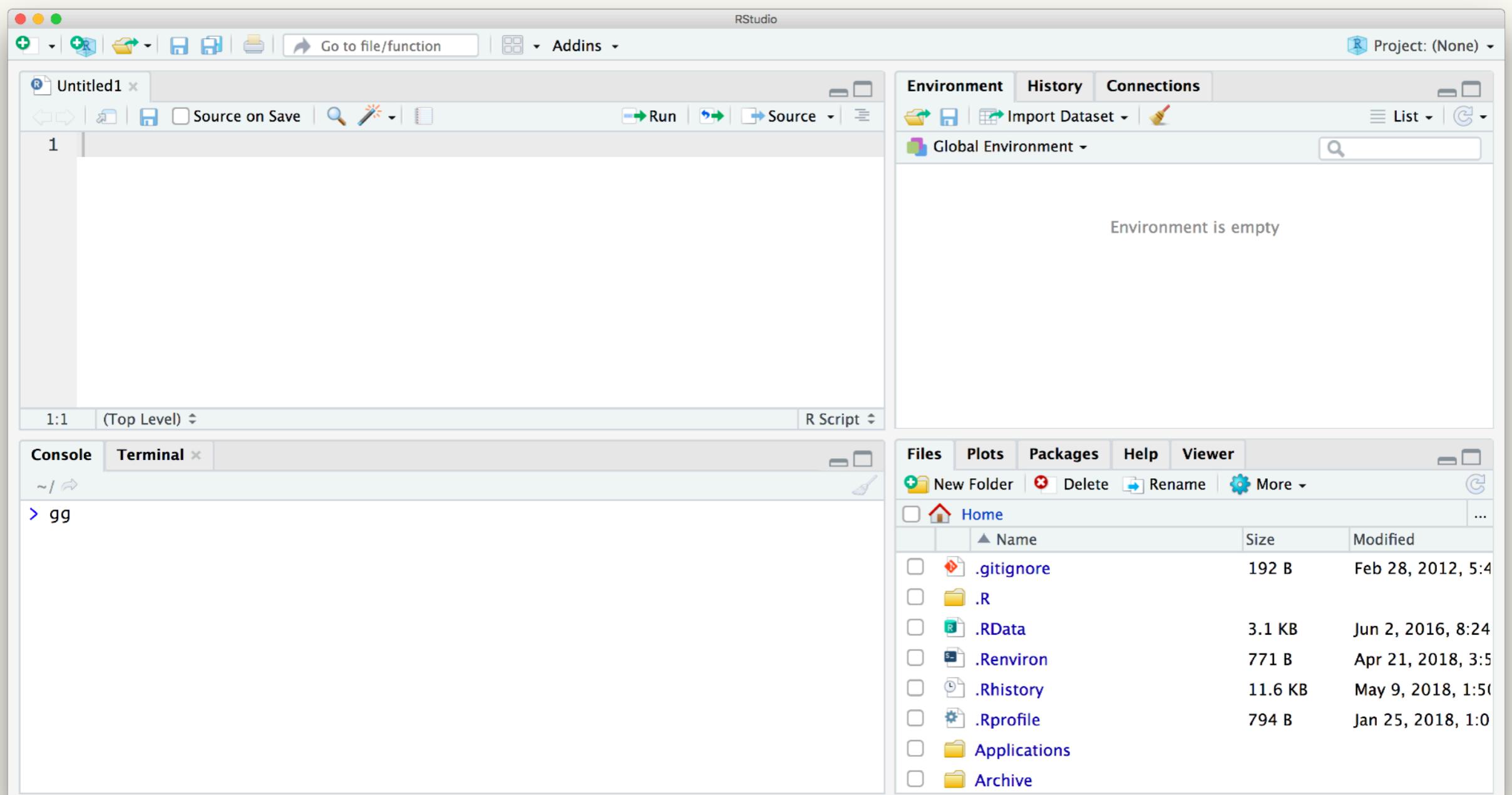


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RStudio

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

Get materials: `usethis::use_course("rstd.io/tidytools19")`



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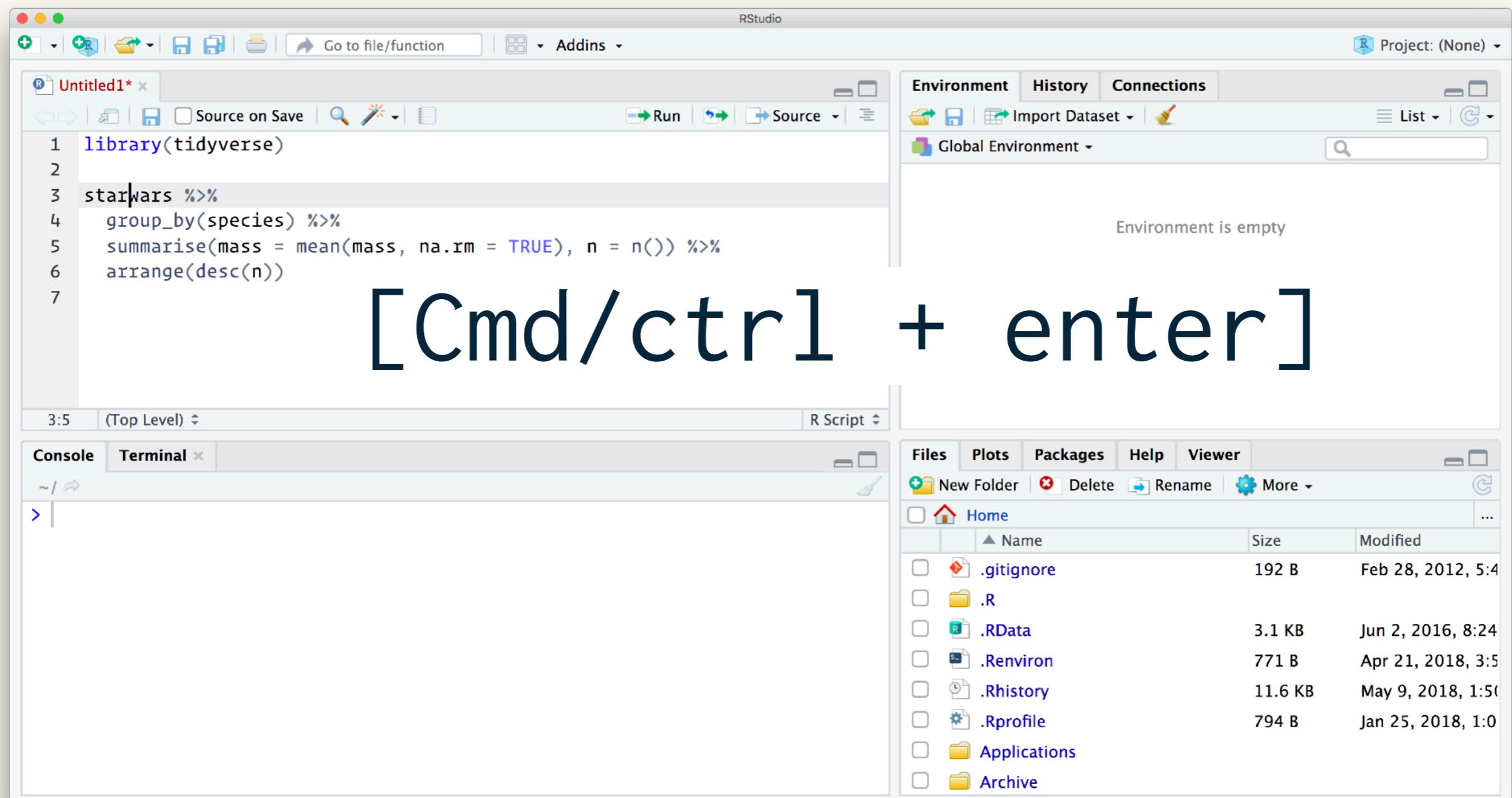
The screenshot shows the RStudio interface. The Source editor (left) contains R code for generating plots. The Environment pane (top right) shows 'Global Environment' with the message 'Environment is empty'. The Files pane (bottom right) shows a directory structure with files and folders like '.aitianore', 'Applications', and 'Archive'.

```
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_distributome()
ggplot(fake_df, aes(x=x,y=y)) + geom_fan() + theme_bw() + scale_fill_gradient()
ggplot(fake_df, aes(x=x, y=y)) + geom_fan(intervals=c(50,80,95)/100) +
  geom_fan()
ggplot(fake_df_sex, aes(x=x,y=y)) + geom_fan() + theme_bw() + scale_fill_grey()
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_fan()
> gg
```

Name	Size	Modified
.aitianore	192 B	Feb 28, 2012, 5:40 PM
	3.1 KB	Jun 2, 2016, 8:24 AM
	771 B	Apr 21, 2018, 3:50 PM
	11.6 KB	May 9, 2018, 1:50 PM
	794 B	Jan 25, 2018, 1:00 PM

[Cmd/Ctrl] + [↑]

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The screenshot shows the RStudio interface. In the top-left, the code editor window titled "Untitled1*" contains the following R code:

```
library(tidyverse)
starwars %>%
  group_by(species) %>%
  summarise(mass = mean(mass, na.rm = TRUE), n = n()) %>%
  arrange(desc(n))
```

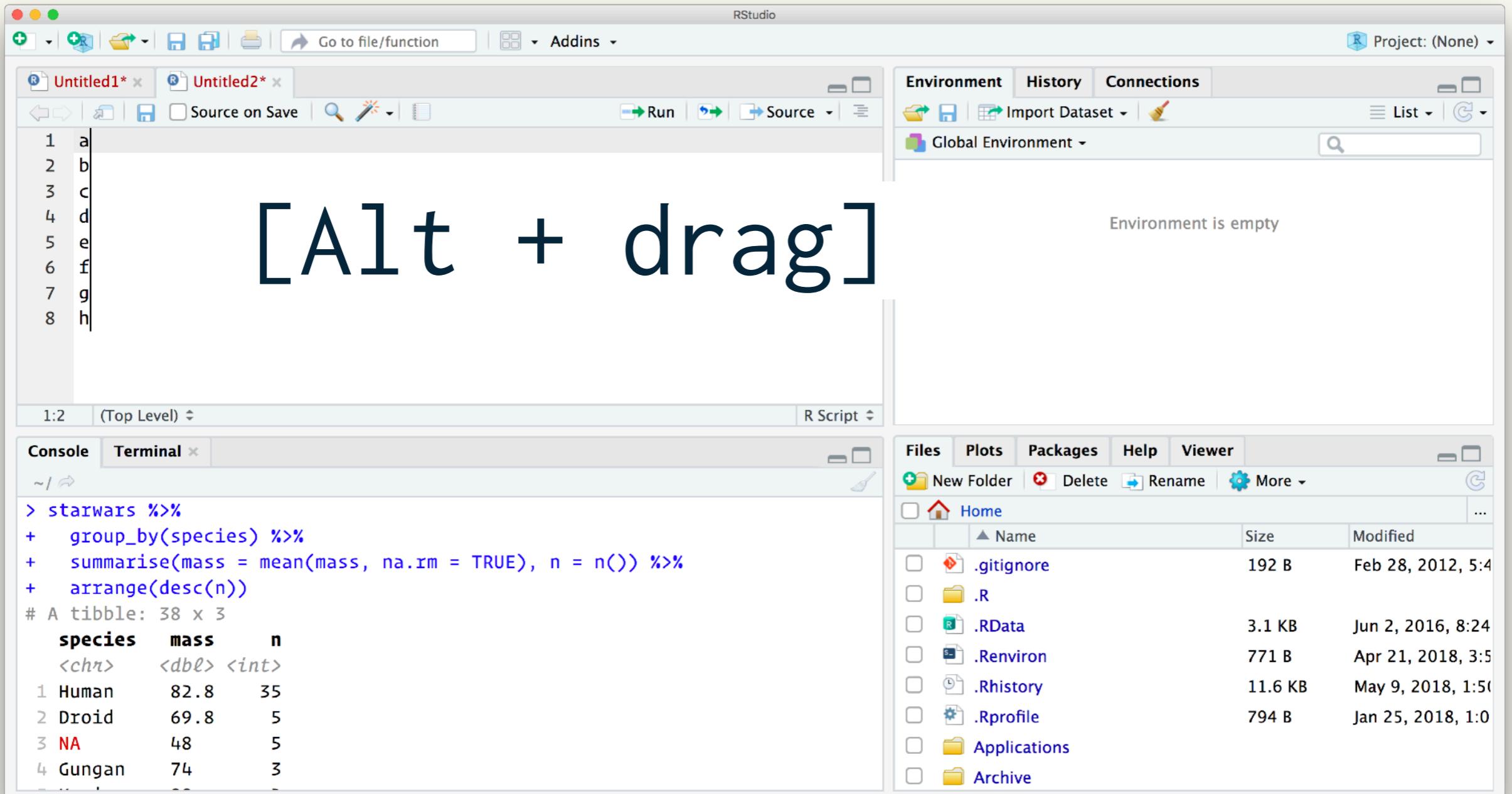
In the bottom-left, the Console tab displays the output of the code:

```
> 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
5 Wookie      70.1    12
6 Ewok         34.3    12
7 Dewback     113.     12
8 Rancor      114.     12
9 Tauntaun    115.     12
10 Wampa       116.     12
# ... with 28 more rows, and 1 more variable:
#   .groups: list of 1
```

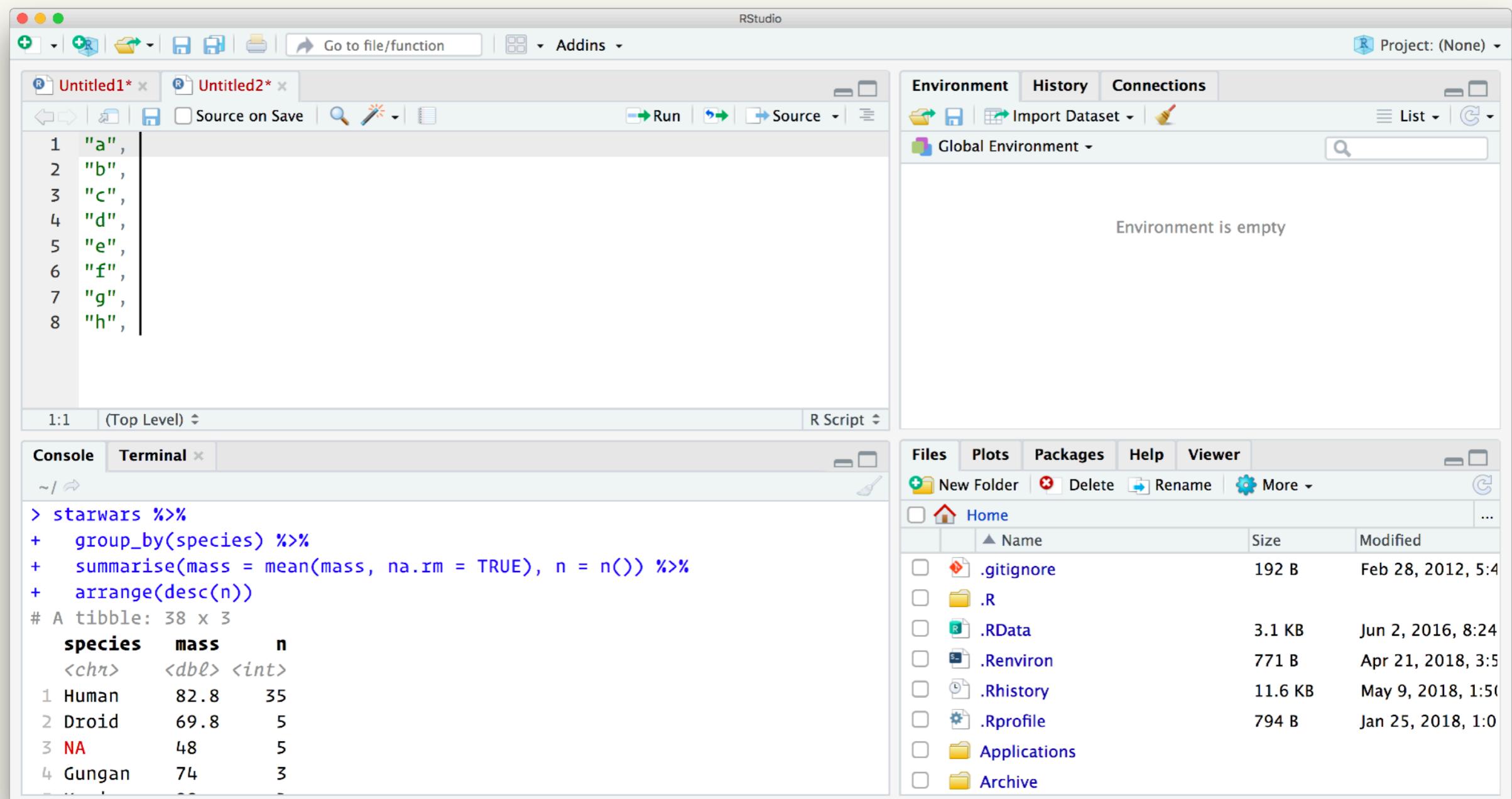
The right side of the interface includes the Environment, History, and Connections panes. The Environment pane shows "Global Environment" with "Environment is empty". The History pane is empty. The Connections pane is also empty.

A large, semi-transparent text overlay "[Cmd/ctrl + enter]" is centered over the RStudio interface.

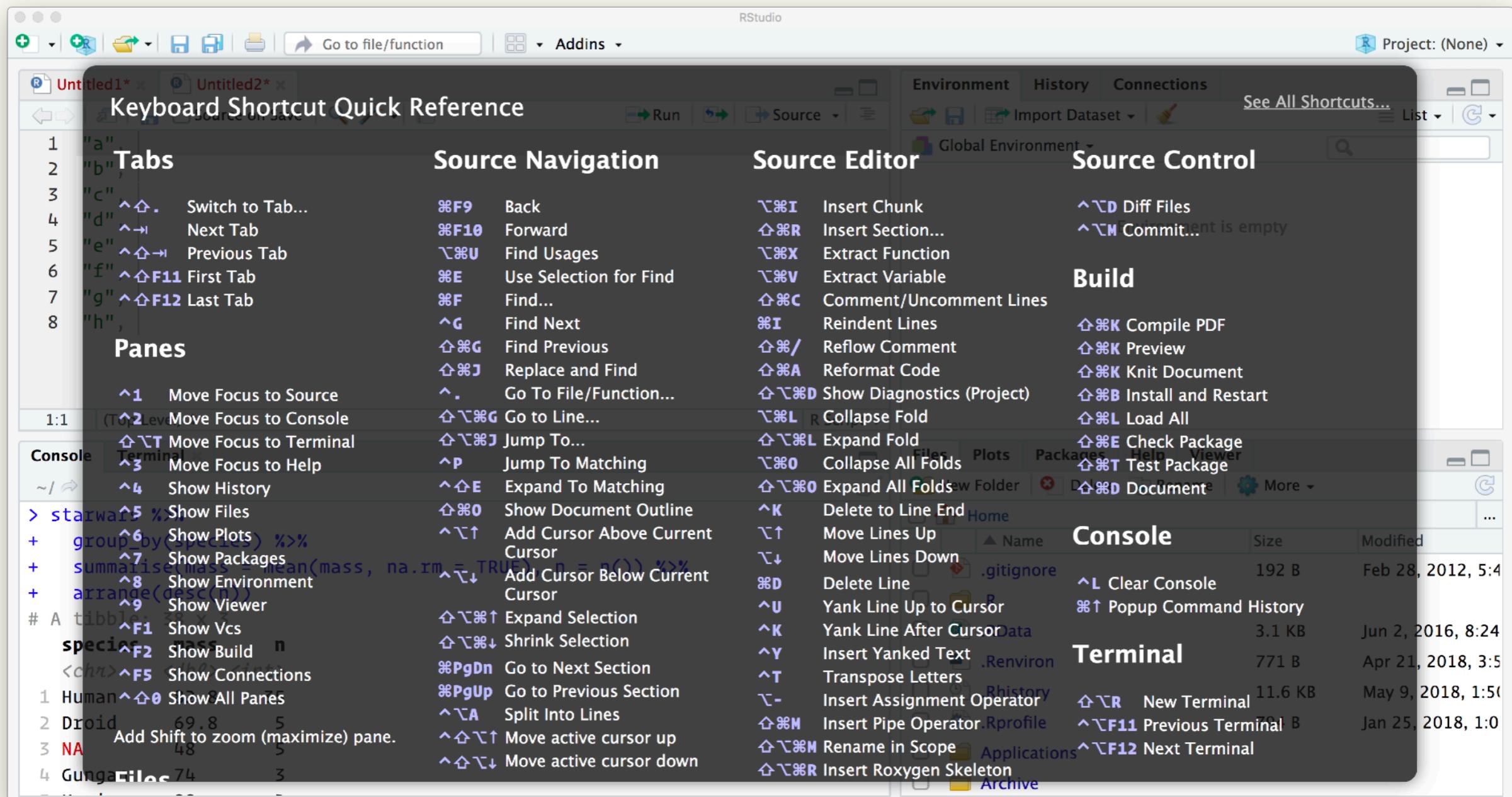
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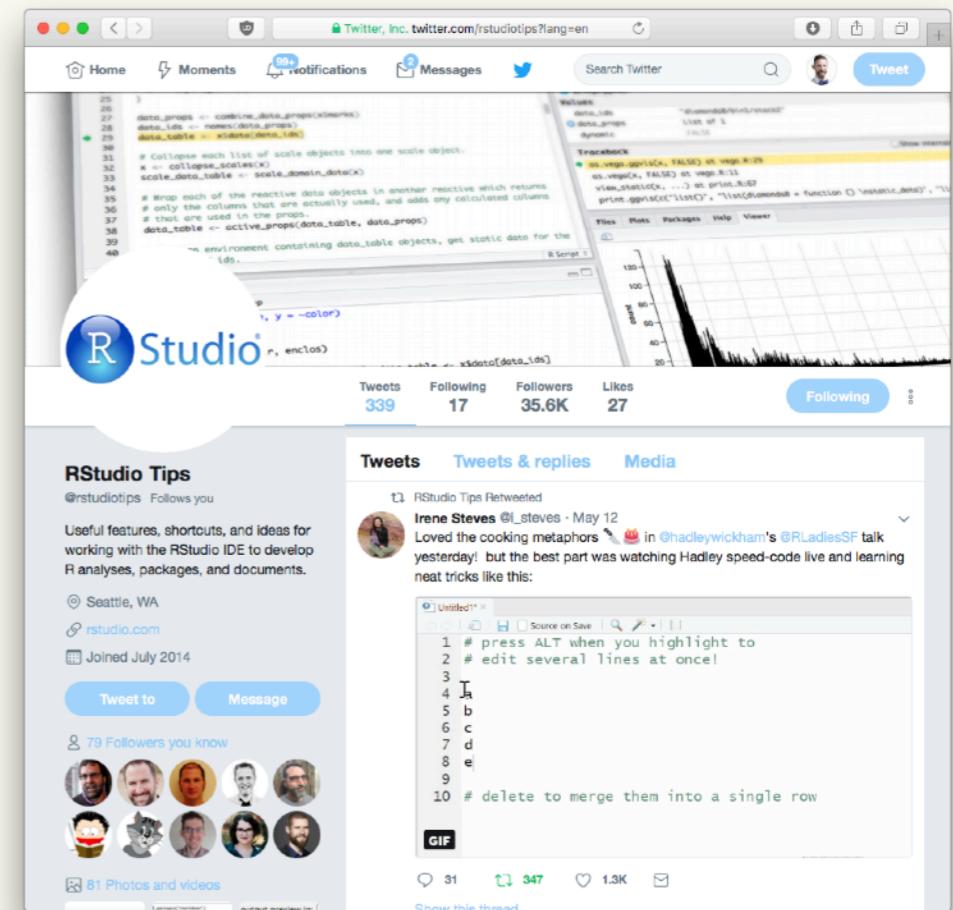
Your turn

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

What about %>% (pipe)?

How can you quickly
comment a block of lines?

How do you restart R?



@rstudiotips

Get materials: usethis::use_course("rstd.io/tidytools19")

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