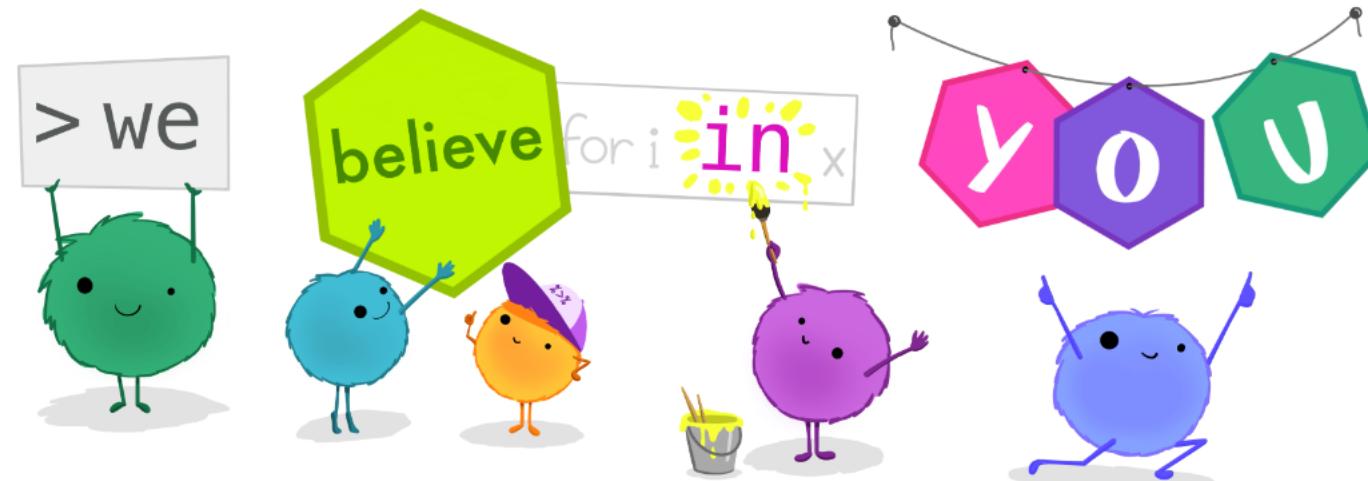


# MSc Neuroscience – Introduction to R

remote R learners,



Artwork by @Allison\_horst



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# What is R and RStudio?

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- R: statistical programming language → highly used in data science and statistical modelling settings.
- Rstudio: An interface which sits on top of R → more intuitive/enjoyable user experience
- Free
- Open source
- Functional programming
- Iterative releases / continual development



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# Why use it?

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- Flexibility & scalability
- Accessibility                  =            
- Continual development
- Employability
- Wealth of online help forums / books / twitter community → get stuck? Web probably has an answer for you



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# How do I get it?

- **R** (must be downloaded BEFORE Rstudio):

<https://cran.r-project.org/>

**Download and Install R**

Precompiled binary distributions of the base system and contributed packages, **Windows and Mac** users most likely want one of these versions of R:

- [Download R for Linux](#)
- [Download R for \(Mac\) OS X](#)
- [Download R for Windows](#)

R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

- **RStudio** (must be downloaded BEFORE Rstudio):

<https://rstudio.com/products/rstudio/download/#download>

OS	Download	Size	SHA-256
Windows 10/8/7	<a href="#"> RStudio-1.3.1093.exe</a>	171.62 MB	62b9e60a
macOS 10.13+	<a href="#"> RStudio-1.3.1093.dmg</a>	148.66 MB	bdc4d3a4
Ubuntu 16	<a href="#"> rstudio-1.3.1093-amd64.deb</a>	124.33 MB	72f05048



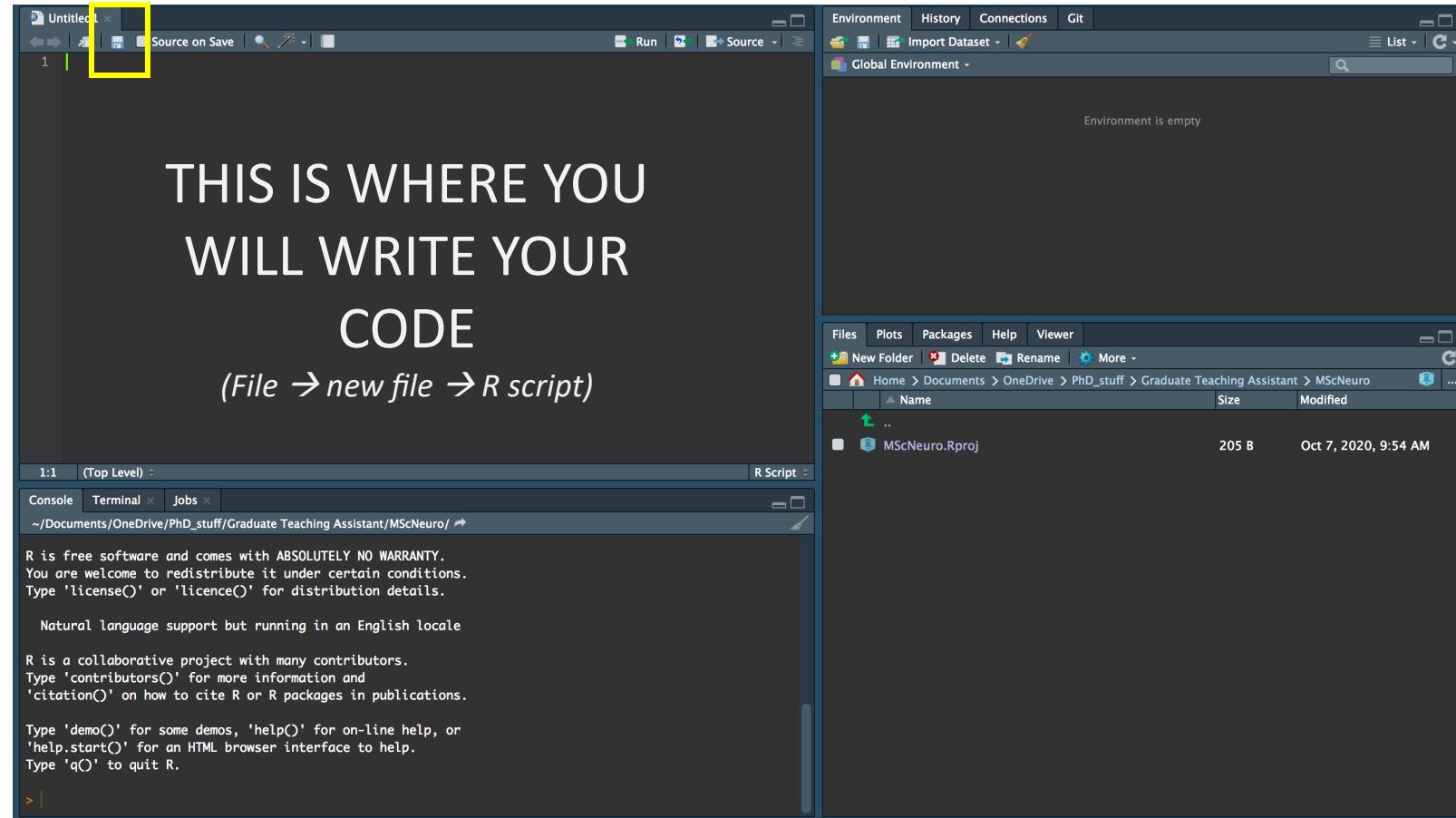
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# How do I navigate it?

R SCRIPT



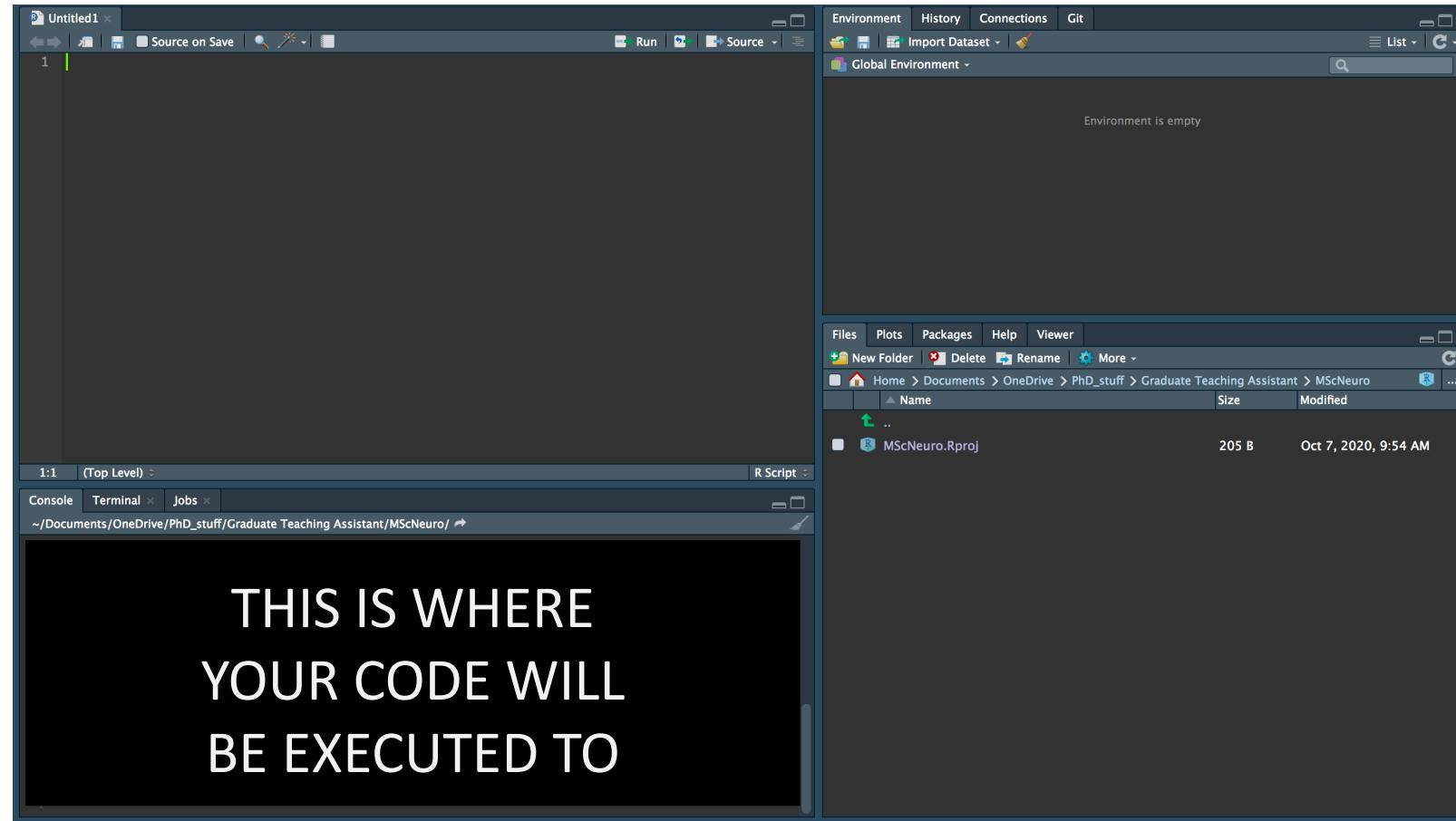
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# How do I navigate it?

R  
CONSOLE

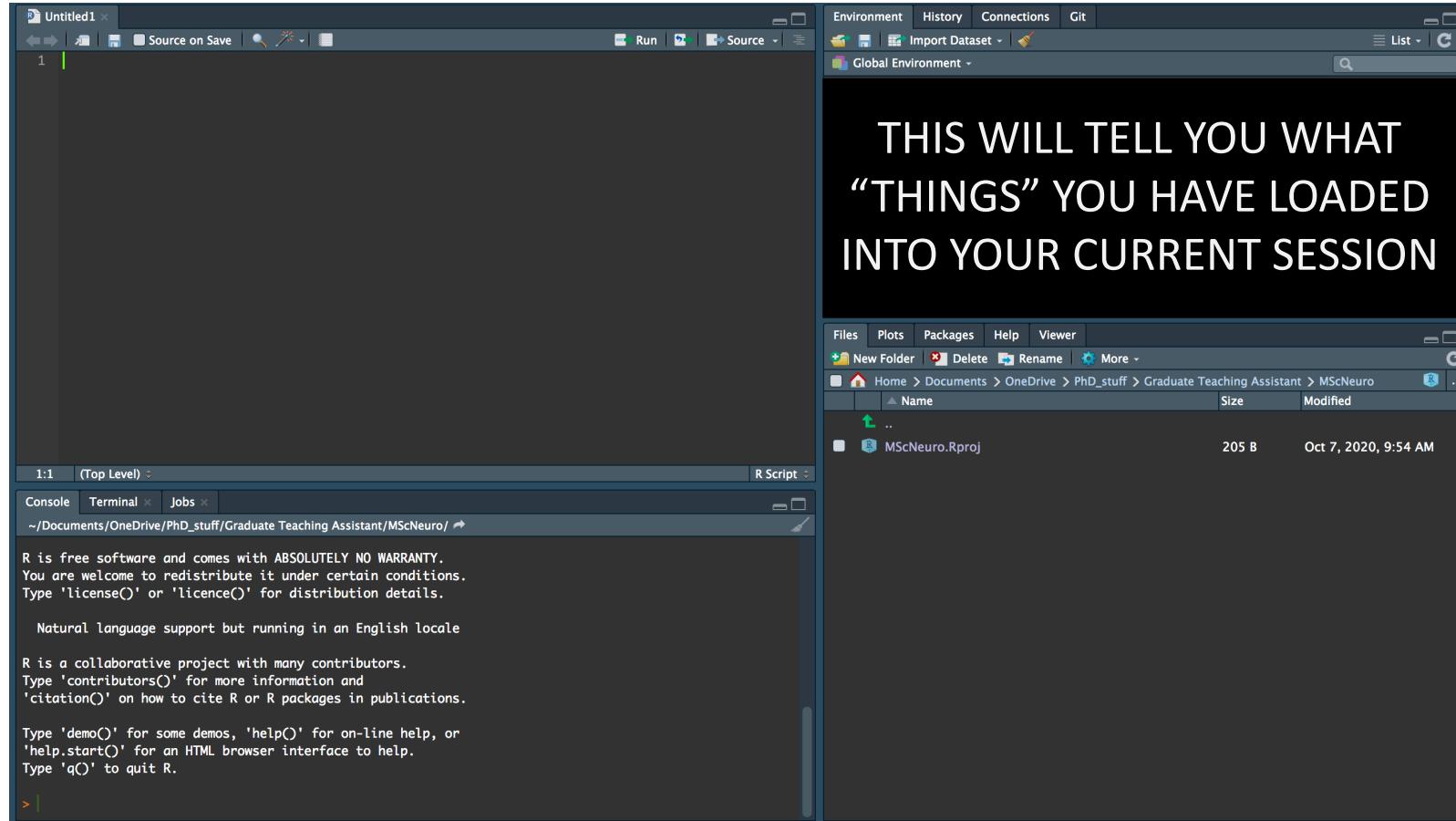


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# How do I navigate it?



GLOBAL  
ENVIRONMENT

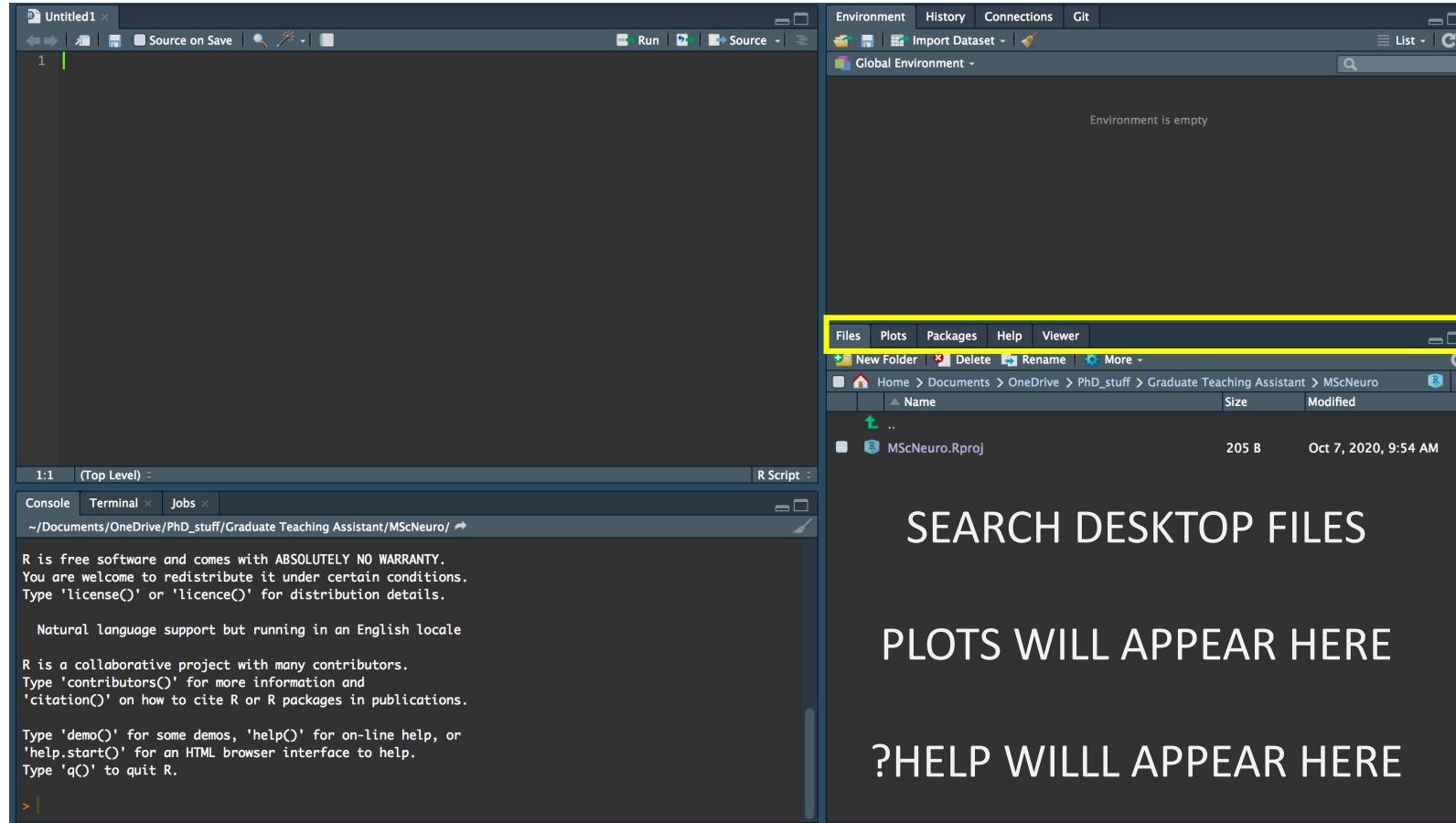


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# How do I navigate it?



FILE SPACE, PLOT  
VIEWER, HELP



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# How do I navigate it?

---

- You can customize the colour / layout of your studio environment  
*(mine may look different to yours – that's okay!)*
- Code can be written into the SCRIPT or the CONSOLE
- Script code can be saved and edited.
- Console code cannot be saved or edited once executed.



GET INTO THE HABIT OF  
WRITING YOUR CODE INTO  
SCRIPTS!!



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# How do I use it? - Objects

- Objects store some data into your current environment, under a specified name.

- The value of an object is assigned using <-

e.g. **my\_number <- 7**

↑  
*Object name (can  
be anything) to the  
left of the arrow*

↑  
*The “thing” you  
want to assign to  
that object to the  
right*

- Once saved, the object is saved in R's memory, so you can use it again later by referring to the name you've assigned to it.

e.g. `> print(my_number)`  
[1] 7

- This becomes VERY useful / important when you start to deal with big and complex data or complex functions.



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# How do I use it? - Objects

---

- Objects names can be anything, BUT:
  - NoSpaces
  - 2. No names which start with a number
  - No names which are the same as an existing function  
(e.g. don't name your object "print").
- **Be careful:** If you name an object with the same name as an existing object, it will override the pre-existing object with no warning.
- Try to make object names informative -> you may return to your script later and want to be able to recognize what your object is!
- Storing something as an object won't print anything into the console – it will store it in the background. If you want to see it, you will need to use an R function (next slide).



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# How do I use it? – Built in functions

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- R functions let you **do** something.
- **print()** is an example of a built-in function → allows you to print your code into the console.
- Functions can be nested within each other

e.g. **print(class("hello"))**



```
> print(class("hello"))
[1] "character"
```

- At more advanced stages, you may start to create your own user defined functions.



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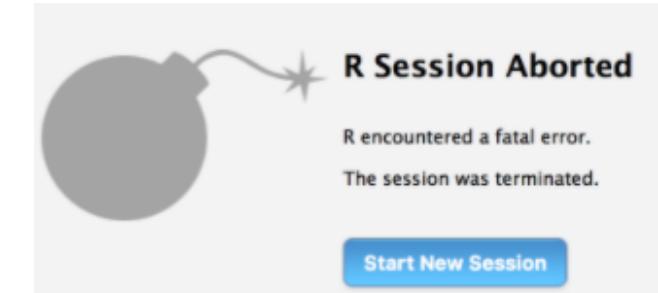


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# How do I use it? - Packages

`install.packages(" ")`

- R “ready to go” functions only let you go so far.
- Packages = additional add-ons which let you achieve specific tasks.
- **THOUSANDS** – so inefficient to have them all loaded in R at all times.
- Install **specific packages** needed for **specific tasks**.
- To install packages: `install.packages("package_name")`
- Each package comes with its own documentation.
- New packages are being developed all the time!



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# How do I use it? - Libraries

`library()`

- Once packages are installed into R, load their "library".  
`library(library_name)`
- The library name tends to be the same as the package name (but not always).
- Load libraries in every R session.
- Can also load ad-hoc, in-line with code using `::`  
e.g. `library_name::function`



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# The Tidyverse

`install.packages("tidyverse")`

- A **suite** of R packages
- Designed specifically for data science
- Follow a uniform and specific “grammar” and structure  
*(with the exception of ggplot which does what it wants)*
- INTUITIVE and READABLE ❤️
- You will likely load this library into **EVERY** session 😍
- Whole tidyverse / **R4DS community** out there – go and find them!



<https://tidyverse.org>



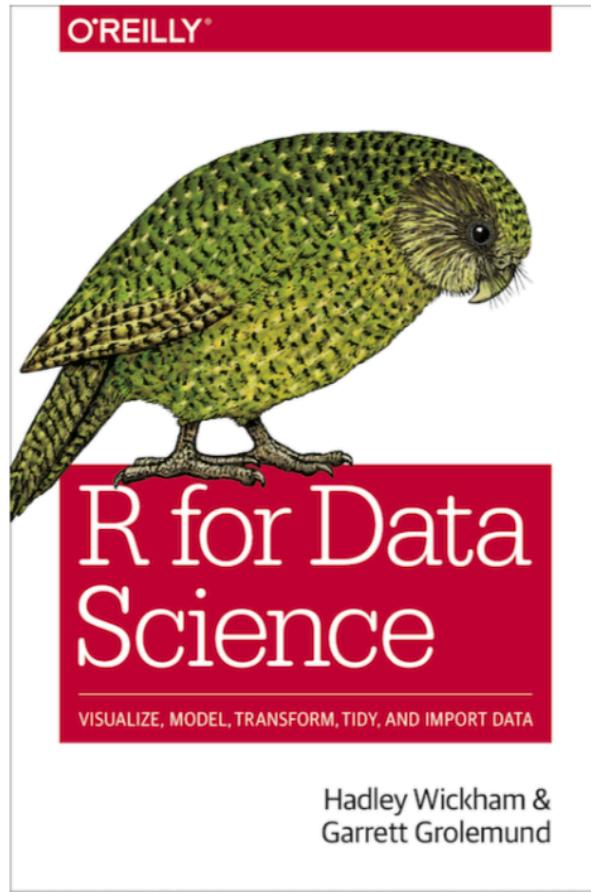
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# The Tidyverse

*library(tidyverse)*



THE HOLY GRAIL 😍

A circular profile picture of Hadley Wickham is centered in a white box. He has short brown hair and a beard, and is wearing a light-colored shirt with a blue patterned bow tie. To the right of the profile picture, the text 'THE HOLY GRAIL 😍' is written in bold black capital letters. Below the profile picture, the name 'Hadley Wickham' is followed by a blue checkmark icon. Underneath the name is the handle '@hadleywickham'. At the bottom, there is a bio: 'R, data, visualisation, 🐶, 🍹, 🌈. He/him'. There are small icons of a dog, a cocktail glass, and a rainbow next to the corresponding words.

Freely available as e-book online!:  
<https://r4ds.had.co.nz/>



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# Other useful things to know

---

- “Comment” out code using #

*# I can add this to my script and it will not evaluate it as code – so I can make notes to myself and others*

- Run a single chunk of code by highlighting the chunk/line in your script and using:



- Stop running code by typing



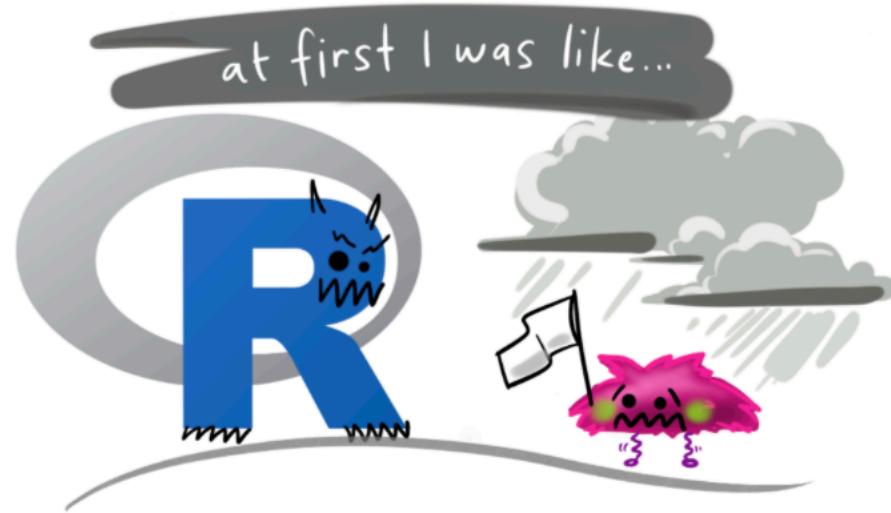
- Comment out an entire chunk of code by highlighting the chunk in your script and using:



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# Time for a practical!



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# Resources:



- **The big book of R** (a book of books – all relating to all things R). Freely available as e-book:  
<https://www.bigbookofr.com/>
- **R for data science** (get to grips with the tidyverse). Freely available as e-book:  
<https://r4ds.had.co.nz/>
- **R studio primers:**  
<https://rstudio.cloud/learn/primers>
- **R markdown – a definitive guide.** Free e-book:  
<https://bookdown.org/yihui/rmarkdown/>



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# Resources:



- **DataCamp**

*Costs - but you can sometimes get time-limited (6months) free access through King's*

<https://www.datacamp.com>

- **Kaggle**

<https://www.kaggle.com/>

- **TidyTuesday! !!FREE!!.** Such a fantastic, fantastic way to get to grips with data visualization and learning from others

*(happy to share more info on my experience with this if needed):*

<https://github.com/rfordatascience/tidytuesday/blob/master/README.md>

- A great couple of online workshops for data visualization using **GGPlot2 !!FREE!!:**

Part 1: <https://www.youtube.com/watch?v=h29g21z0a68&t=1s>

Part 2: <https://www.youtube.com/watch?v=0m4yywqNPVY&t=1435s>



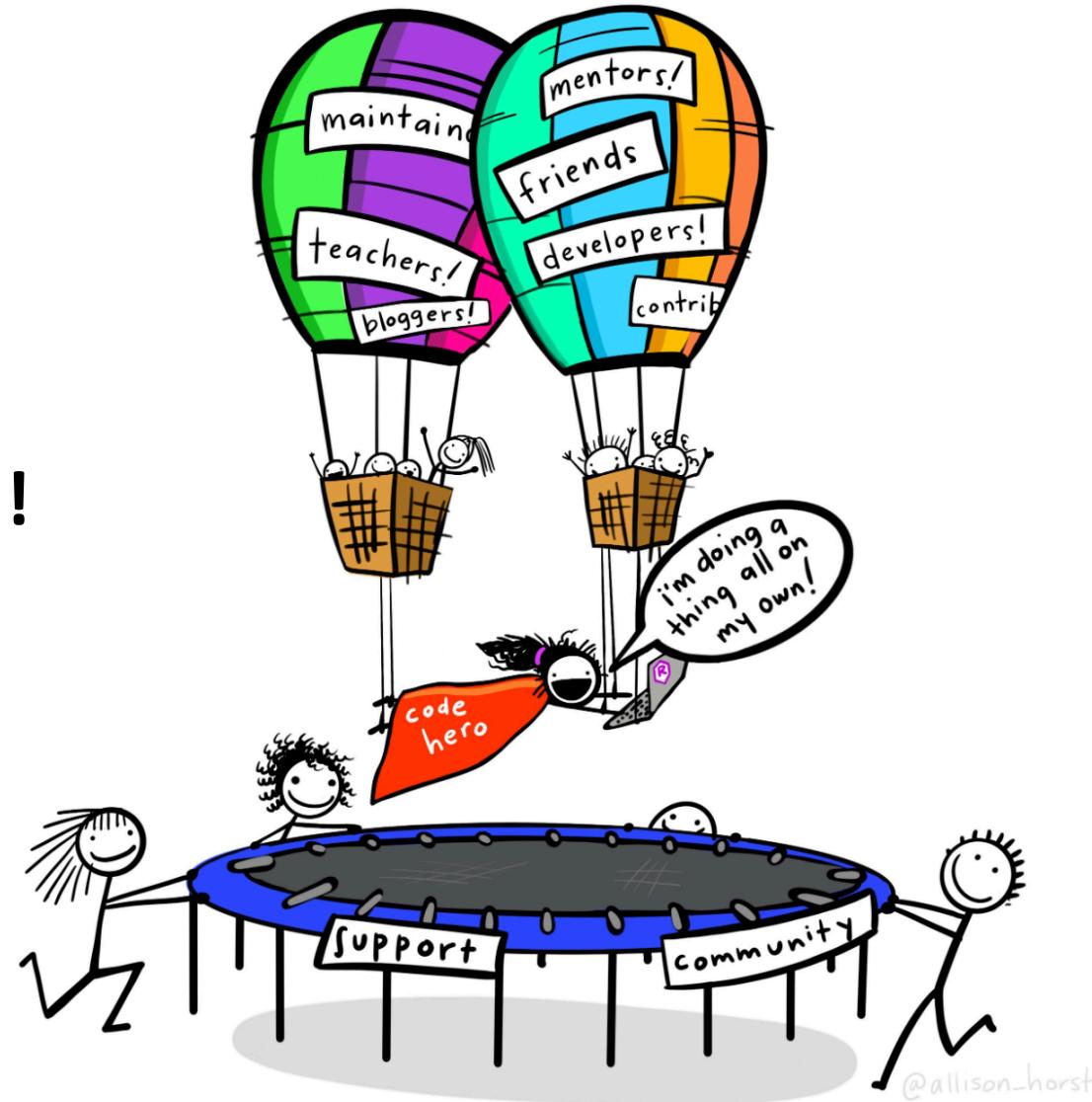
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# HAPPY LEARNING!



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