

R Introduction

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What the heck *is* R?

- R is a programming language designed specifically for statistical computing and graphics.
- R is an interactive interface to many different tools.
- R is based on the S language, which was developed by Bell laboratories.
- R is free, specifically open source.
 - “Think free as in free speech, not free beer.”
 - R and RStudio are actually both.
- R is cool.

Learning is HARD!



Help?

The only way to learn R (or anything), is to fail. Then, get help.

- `?name_of_thing`
- Google!!!
- Stack Overflow
- R Resources
- Ask!

The screenshot displays the RStudio environment with the following components:

- Script Editor:** Contains a comment-based script with the following content:

```
1 # (Top-Left) is the home of the program editor for writing RScripts
2
3 # (Bottom-Left) is where commands are submitted to console.
4
5 # (Top-Right)
6 # Environment listing active objects in memory
7 # History shows a list of executed R commands
8 # Build tools to create packages
9 # Git tab for version control
10
11 # (Bottom-Right)
12 # Mini file manager for project files.
13 # Plots containing rendered graphs
14 # Packages list installed libraries
15 # Help displays command documentation
16 # Viewer is an active HTML/Shiny previewer
```
- Console:** Shows the execution of the `?help` command and its output:

```
> ?help
> x = 3
> y = 5
> x + y; x - y; x*y; x/y
[1] 8
[1] -2
[1] 15
[1] 243
[1] 0.6
> |
```
- Global Environment:** A table showing active objects in memory:

Name	Type	Length	Size	Value
x	numeric	1	48 B	3
y	numeric	1	48 B	5
- Documentation Pane:** Displays the help page for the `help` function, including sections for Description, Usage, and Arguments.

Know thine RStudio Environment

There are a *lot* of keyboard shortcuts in RStudio. These shortcuts are meant to speed up your work.

To view all the options, you must engage the keyboard shortcut that rules them all:

- Windows: **Alt + Shift + K**
- macOS: **Option + Shift + K**

The screenshot shows the 'Keyboard Shortcut Quick Reference' window in RStudio. It is organized into several columns and sections:

- Source Navigation:** Includes shortcuts for Back (⌘F9), Forward (⌘F8), Find Usages (⌘F0), Use Selection for Find (⌘E), Find... (⌘F), Find Next (⌘G), Find Previous (⌘G), Replace and Find (⌘R), Go to the Function... (⌘T), Go to Line... (⌘T), Jump To... (⌘T), Jump to Matching (⌘P), Expand to Matching (⌘E), Show Document Outline (⌘O), Expand Selection (⌘T), Show Selection (⌘T), Go to Next Section (⌘G), Go to Previous Section (⌘G), Split Into Lines (⌘A), Add cursor above current cursor (⌘T), Add cursor below current cursor (⌘T), Move active cursor up (⌘T), Move active cursor down (⌘T).
- Source Editor:** Includes shortcuts for Insert Chunk (⌘I), Insert Section... (⌘IR), Extract Function (⌘EX), Extract Variable (⌘EV), Comment/Uncomment Lines (⌘C), Reindent Lines (⌘I), Reflow Comment (⌘M), Reformat Code (⌘A), Show Diagnostics (Project) (⌘D), Collapse Fold (⌘M), Expand Fold (⌘M), Collapse All Folds (⌘O), Expand All Folds (⌘O), Delete to Line End (⌘K), Move Lines Up (⌘T), Move Lines Down (⌘T), Delete Line (⌘D), Yank Line Up to Cursor (⌘U), Yank Line After Cursor (⌘K), Insert Yanked Text (⌘Y), Transpose Letters (⌘T), Insert Assignment Operator (⌘=), Insert Pipe Operator (⌘M), Rename to File (⌘R), Insert Rxygen Skeleton (⌘R), Insert Snippet (⌘=), Debug (⌘D).
- Source Control:** Includes shortcuts for Diff Files (⌘D), Commit... (⌘M), Compile PDF (⌘BK), Preview (⌘BK), Knit Document (⌘KB), Build and Reload (⌘WB), Load All (⌘ML), Check Package (⌘ME), Test Package (⌘WF), Document (⌘MD).
- Console:** Includes shortcuts for Clear Console (⌘C), PopUp Command History (⌘H), Analyze Objects into Tidy Data Frames (⌘A), Show Function Help (⌘F), Go to Function / File (⌘F), Complete Code / Name and Generator for R (⌘C), Restart R (⌘R), Previous Plot (⌘P), Next Plot (⌘N), Request Log (⌘L), Log focused element (⌘L).
- Other:** Includes shortcuts for Show Function Help (⌘F), Go to Function / File (⌘F), Complete Code / Name and Generator for R (⌘C), Restart R (⌘R), Previous Plot (⌘P), Next Plot (⌘N), Request Log (⌘L), Log focused element (⌘L).

Some Favorites

1. Autocomplete command
 - Both: `Tab`
2. Runs the current line or selection from the editor to the console and runs it
 - Windows: `Ctrl + Enter`
 - macOS: `Cmd + Enter`
3. Comment multiple lines.
 - Windows: `Ctrl + Shift + C`
 - macOS: `Command + Shift + C`
4. "Reformat" Code:
 - Windows: `Ctrl + Shift + A`
 - macOS: `Command + Shift + A`

More to come when we introduce `rmarkdown`...

Objects and Functions

*To understand computations in R, two slogans are helpful:
Everything that exists is an object. Everything that
happens is a function call. — John Chambers*

And when we say everything, we mean **everything**. Even a *function* is an *object*.

`<-` or `=` ?

That is the question.

```
attach(dataset)
```

Do not ever do this.

You might curse me now, but you'll thank me later.

- There is no scalar.
- Be aware of vectorization!

Use them!

They are what makes R great.

Have one!

- Spaces around binary operators!
- Indent two spaces!
- Pick an assignment operator and stick to it.
- Get some inspiration from Hadley or Google.

Be consistent!

- With yourself!
- With your group!
- With your company!

Next Time

- Lists?
- Importing Data?
- Frames vs Tibbles?
- `rmarkdown!`

Lab!