Integrating R
## into your work with RStudio and the `tidyverse`

Thursday, June 18, 2020

https://bit.ly/2020-06-integratingR

Virtual Housekeeping and Your Zoom Controls

Select a Camera (Alt+N to switch)
✓ Logitech QuickCam Pro 9000
Integrated Webcam

Video Settings...
Choose a Virtual Background

Join Audio | Start Video | Invite | Manage Participants 1

Mute | Start Video | Invite | Participants 2 | Share Screen | Chat | Record | Reactions | Leave Meeting
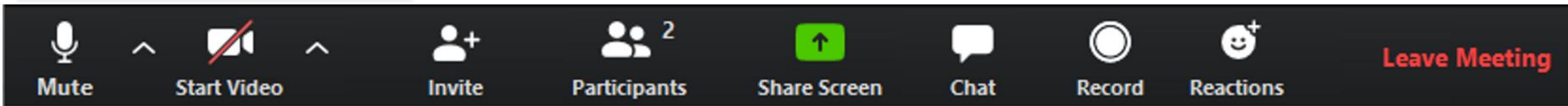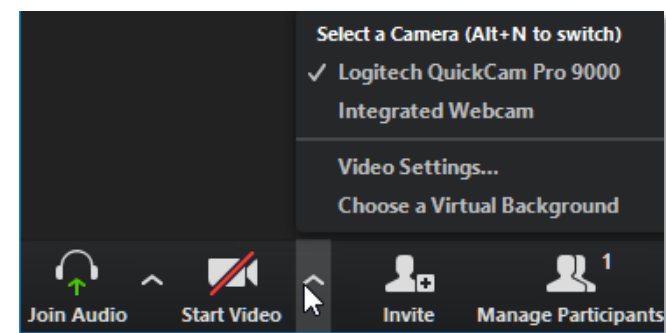
Please leave your **audio muted** while you are not speaking to help prevent background noises.

Click to open the **Participants** box. This will allow you to give nonverbal feedback as well as to raise your hand.

Click to open the **Chat** box. This will allow you to chat with Hosts and Participants.

raise hand | yes | no | go slower | go faster | more

You are viewing Jack Barker's screen   View Options ∨

Zoom Ratio   Fit to Window >

Request Remote Control

Annotate

Exit Full Screen

| Mouse | Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save |

Speaker View   Gallery View

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Introduction

at first I was like...
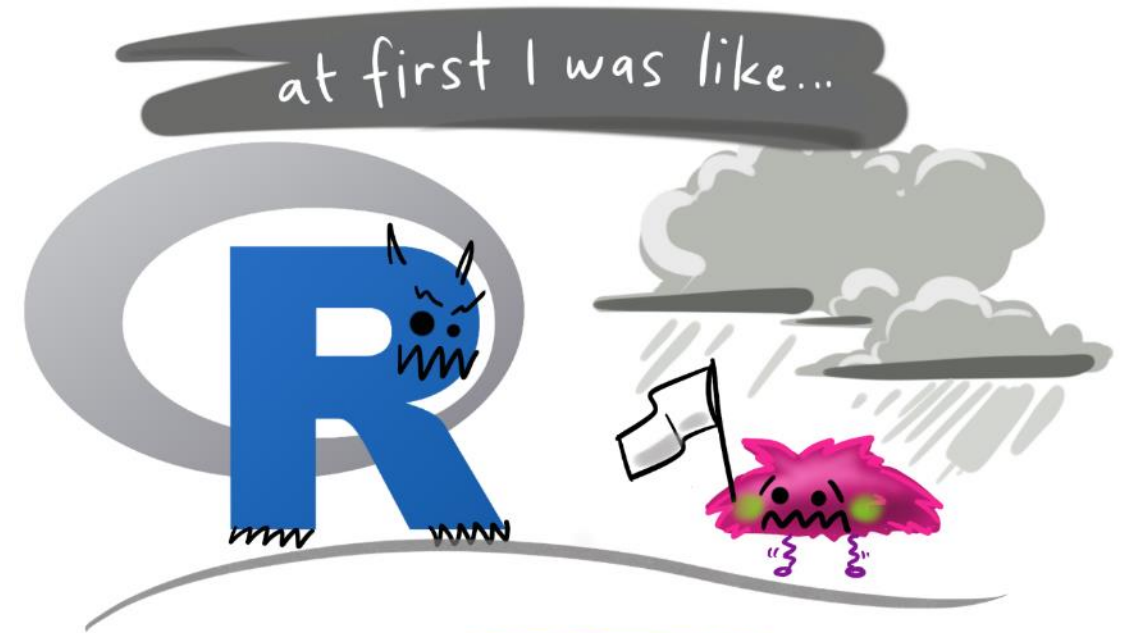
...but now it's like...

Agenda:

Week	Day 1	Day 2
Week 1	Welcome, Intros, Objectives	Day 1 recap
	Projects and RStudio	02 - Wrangling Data
	01 - Visualize Data	
Week 2	Welcome, Intros, Objectives	Day 1 recap
	03 - More Wrangling	05 - Functions
	04 - Statistical Outputs	06 - Loops
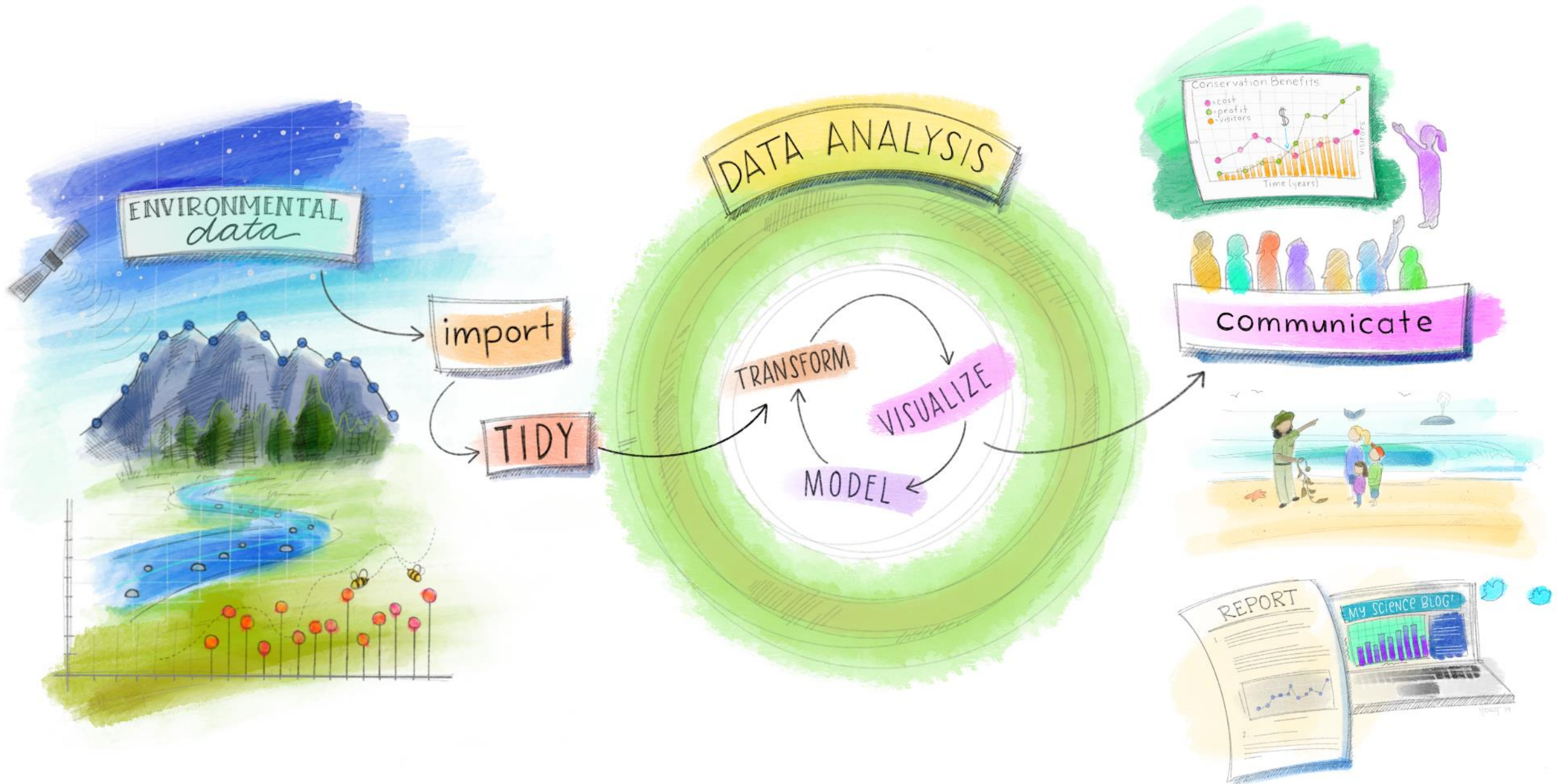
(Applied) Data Science
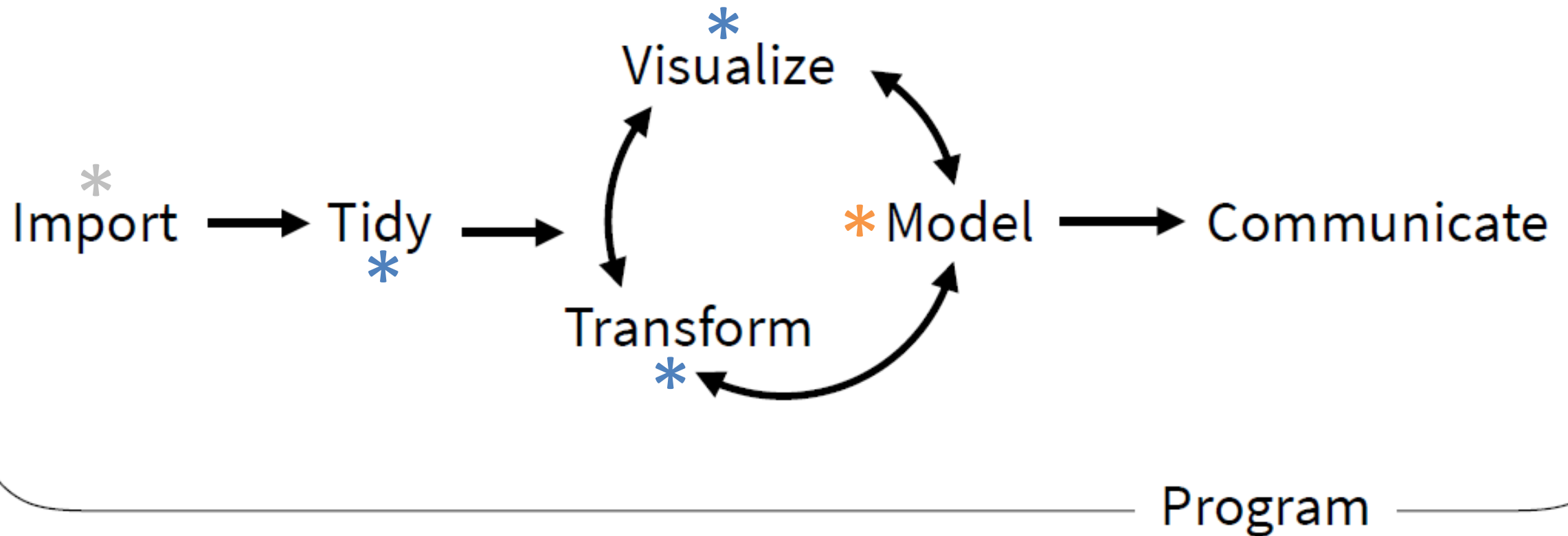
Workflow Basics

Tips and tricks to making your R work more productive

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1. Save the source, not the workspace

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4. Use projects and the `here` package

https://github.com/jennybc/here_here

Workflow Basics:
Tips and tricks to making your R work more productive

1. Save the source, not the workspace

2. Use an IDE (integrated development environment), like RStudio

3. Project-oriented workflow

4. Use projects and the `here` package

5. Use standardized naming conventions

> TL;DR - machine and human readable and plays well with default ordering (put something numeric first).
> *Left pad other numbers with zeros (to avoid the '10' coming before '01'). Avoid spaces in file names, punctuation, and accented characters.*

Workflow Basics:
Tips and tricks to making your R work more productive

1. Save the source, not the workspace

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3. Project-oriented workflow

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5. Use standardized naming conventions

6. Coding review

```
package::function()
<-
```

Pipes! `%>%` from the `magrittr` package

Workflow Basics:

Tips and tricks to making your R work more productive

1. Save the source, not the workspace
2. Use an IDE (integrated development environment), like RStudio
3. Project-oriented workflow
4. Use projects and the `here` package
5. Use standardized naming conventions
6. Coding review

7. **Keyboard Shortcuts: there's an RStudio Cheatsheet for that!**

We love:
```
alt+-    :for <-
ctrl+enter :to run one or more lines
ctrl+shift+m :for %>%
ctrl+shift+c  :to
comment/uncomment
ctrl+i    :to indent prettily
```

RStudio IDE : : CHEAT SHEET

Documents and Apps

Open Shiny, R Markdown, knitr, Sweave, LaTeX, .Rd files and more in Source Pane

Check spelling · Render output · Choose output format · Choose output location · Insert code chunk

Jump to previous chunk · Jump to next chunk · Run selected lines · Publish to server · Show file outline

Access markdown guide at **Help > Markdown Quick Reference**

Jump to chunk · Set knitr chunk options · Run this and all previous code chunks · Run this code chunk

RStudio recognizes that files named **app.R, server.R, ui.R,** and **global.R** belong to a shiny app

Run app · Choose location to view app · Publish to shinyapps.io or server · Manage publish accounts

Write Code

Navigate tabs · Open in new window · Save · Find and replace · Compile as notebook · Run selected code

Cursors of shared users · Re-run previous code · Source with or without Echo · Show file outline

Multiple cursors/column selection with **Alt + mouse drag**.

Code diagnostics that appear in the margin. Hover over diagnostic symbols for details.

Syntax highlighting based on your file's extension

Tab completion to finish function names, file paths, arguments, and more.

Multi-language code snippets to quickly use common blocks of code.

Jump to function in file · Change file type

Working Directory · Maximize, minimize panes
Press ↑ to see command history · Drag pane boundaries

R Support

Import data with wizard · History of past commands to run/copy · Display .RPres slideshows **File > New File > R Presentation**

Load workspace · Save workspace · Delete all saved objects · Search inside environment

Choose environment to display from of parent environments · Display objects as list or grid

Displays saved objects by type with short description · View in data viewer · View function source code

Navigate recent plots · Open in window · **Export plot** · Delete plot · Delete all plots

GUI Package manager lists every installed package

Install Packages · Update Packages · Create reproducible package library for your project

Click to load package with **library()**. Unclick to detach package with **detach()**

RStudio opens documentation in a dedicated Help

Home page of helpful links · Search within help file · Search for help file

Viewer Pane displays HTML content, such as Shiny RMarkdown reports, and interactive visualizations

Stop Shiny app · Publish to shinyapps.io, rpubs, RSConnect, …

View(<data>) opens spreadsheet like view of data

Pro Features

Share Project with Collaborators · Active shared collaborators

Start **new R Session** in current project · Close R Session in project · **Select R Version**

PROJECT SYSTEM
File > New Project

RStudio saves the call history, workspace, and working directory associated with a project. It reloads each when you re-open a project.

Debug Mode

Open with **debug(), browse()**, or a breakpoint. RStudio will open the debugger mode when it encounters a breakpoint while executing code.

Click next to line number to add/remove a breakpoint.

Launch debugger mode from origin of error · Open traceback to examine the functions that R called before the error occurred

Highlighted line shows where execution has paused

Run commands in environment where execution has paused · Examine variables in executing environment · Select function in traceback to debug · Step through code one line at a time · Step into and out of functions to run · Resume execution · Quit debug execution mode

Version Control with Git or SVN

Turn on at **Tools > Project Options > Git/SVN**

Stage files · Show file diff · Commit staged files · Push/Pull to remote · View History

Added · Deleted · Modified · Renamed · Untracked

Open shell to type commands · current branch

Next · Continue · Stop

Package Writing

File > New Project > New Directory > R Package

Turn project into package, Enable roxygen documentation with **Tools > Project Options > Build Tools**

Roxygen guide at **Help > Roxygen Quick Reference**

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1 LAYOUT

	Windows/Linux	Mac
Move focus to Source Editor	Ctrl+1	Ctrl+1
Move focus to Console	Ctrl+2	Ctrl+2
Move focus to Help	Ctrl+3	Ctrl+3
Show History	Ctrl+4	Ctrl+4
Show Files	Ctrl+5	Ctrl+5
Show Plots	Ctrl+6	Ctrl+6
Show Packages	Ctrl+7	Ctrl+7
Show Environment	Ctrl+8	Ctrl+8
Show Git/SVN	Ctrl+9	Ctrl+9
Show Build	Ctrl+0	Ctrl+0

2 RUN CODE

	Windows/Linux	Mac
Search command history	Ctrl+↑	Cmd+↑
Navigate command history	↑/↓	↑/↓
Move cursor to start of line	Home	Cmd+←
Move cursor to end of line	End	Cmd+→
Change working directory	Ctrl+Shift+H	Ctrl+Shift+H
Interrupt current command	Esc	Esc
Clear console	Ctrl+L	Ctrl+L
Quit Session (desktop only)	Ctrl+Q	Cmd+Q
Restart R Session	Ctrl+Shift+F10	Cmd+Shift+F10
Run current line/selection	Ctrl+Enter	Cmd+Enter
Run current (retain cursor)	Alt+Enter	Option+Enter
Run from current to end	Ctrl+Alt+E	Cmd+Option+E
Run the current function	Ctrl+Alt+F	Cmd+Option+F
Source a file	Ctrl+Alt+G	Cmd+Option+G
Source the current file	Ctrl+Shift+S	Cmd+Shift+S
Source with echo	Ctrl+Shift+Enter	Cmd+Shift+Enter

3 NAVIGATE CODE

	Windows /Linux	Mac
Goto File/Function	Ctrl+.	Ctrl+.
Fold Selected	Alt+L	Cmd+Option+L
Unfold Selected	Shift+Alt+L	Cmd+Shift+Option+L
Fold All	Alt+O	Cmd+Option+O
Unfold All	Shift+Alt+O	Cmd+Shift+Option+O
Go to line	Shift+Alt+G	Cmd+Shift+Option+G
Jump to	Shift+Alt+J	Cmd+Shift+Option+J
Switch to tab	Ctrl+Shift+.	Ctrl+Shift+.
Previous tab	Ctrl+F11	Ctrl+F11
Next tab	Ctrl+F12	Ctrl+F12
First tab	Ctrl+Shift+F11	Ctrl+Shift+F11
Last tab	Ctrl+Shift+F12	Ctrl+Shift+F12
Navigate back	Ctrl+F9	Cmd+F9
Navigate forward	Ctrl+F10	Cmd+F10
Jump to Brace	Ctrl+P	Ctrl+P
Select within Braces	Ctrl+Shift+Alt+E	Cmd+Shift+Option+E
Use Selection for Find	Ctrl+F3	Cmd+E
Find in Files	Ctrl+Shift+F	Cmd+Shift+F
Find Next	Win: F3, Linux: Ctrl+G	Cmd+G
Find Previous	W: Shift+F3, L:	Cmd+Shift+G
Jump to Word	Ctrl+←/→	Option+←/→
Jump to Start/End	Ctrl+↑/↓	Cmd+↑/↓
Toggle Outline	Ctrl+Shift+O	Cmd+Shift+O

4 WRITE CODE

	Windows /Linux	Mac
Attempt completion	Tab or Ctrl+Space	Tab or Cmd+Space
Navigate candidates	↑/↓	↑/↓
Accept candidate	Enter, Tab, or →	Enter, Tab, or →
Dismiss candidates	Esc	Esc
Undo	Ctrl+Z	Cmd+Z
Redo	Ctrl+Shift+Z	Cmd+Shift+Z
Cut	Ctrl+X	Cmd+X
Copy	Ctrl+C	Cmd+C
Paste	Ctrl+V	Cmd+V
Select All	Ctrl+A	Cmd+A
Delete Line	Ctrl+D	Cmd+D
Select	Shift+[Arrow]	Shift+[Arrow]
Select Word	Ctrl+Shift+←/→	Option+Shift+←/→
Select to Line Start	Alt+Shift+←	Cmd+Shift+←
Select to Line End	Alt+Shift+→	Cmd+Shift+→
Select Page Up/Down	Shift+PageUp/Down	Shift+PageUp/Down
Select to Start/End	Shift+Alt+↑/↓	Cmd+Shift+↑/↓
Delete Word Left	Ctrl+Backspace	Ctrl+Opt+Backspace
Delete Word Right		Option+Delete
Delete to Line End		Ctrl+K
Delete to Line Start		Option+Backspace
Indent	Tab (at start of line)	Tab (at start of line)
Outdent	Shift+Tab	Shift+Tab
Yank line up to cursor	Ctrl+U	Ctrl+U
Yank line after cursor	Ctrl+K	Ctrl+K
Insert yanked text	Ctrl+Y	Ctrl+Y
Insert <-	Alt+-	Option+-
Insert %>%	Ctrl+Shift+M	Cmd+Shift+M
Show help for function	F1	F1
Show source code	F2	F2
New document	Ctrl+Shift+N	Cmd+Shift+N
New document (Chrome)	Ctrl+Alt+Shift+N	Cmd+Shift+Opt+N
Open document	Ctrl+O	Cmd+O
Save document	Ctrl+S	Cmd+S
Close document	Ctrl+W	Cmd+W
Close document (Chrome)	Ctrl+Alt+W	Cmd+Option+W
Close all documents	Ctrl+Shift+W	Cmd+Shift+W
Extract function	Ctrl+Alt+X	Cmd+Option+X
Extract variable	Ctrl+Alt+V	Cmd+Option+V
Reindent lines	Ctrl+I	Cmd+I
(Un)Comment lines	Ctrl+Shift+C	Cmd+Shift+C
Reflow Comment	Ctrl+Shift+/	Cmd+Shift+/
Reformat Selection	Ctrl+Shift+A	Cmd+Shift+A
Select within braces	Ctrl+Shift+E	Ctrl+Shift+E
Show Diagnostics	Ctrl+Shift+Alt+P	Cmd+Shift+Opt+P
Transpose Letters		Ctrl+T
Move Lines Up/Down	Alt+↑/↓	Option+↑/↓
Copy Lines Up/Down	Shift+Alt+↑/↓	Cmd+Option+↑/↓
Add New Cursor Above	Ctrl+Alt+Up	Ctrl+Option+Up
Add New Cursor Below	Ctrl+Alt+Down	Ctrl+Option+Down
Move Active Cursor Up	Ctrl+Alt+Shift+Up	Ctrl+Option+Shift+Up
Move Active Cursor Down	Ctrl+Alt+Shift+Down	Ctrl+Opt+Shift+Down
Find and Replace	Ctrl+F	Cmd+F
Use Selection for Find	Ctrl+F3	Cmd+E
Replace and Find	Ctrl+Shift+J	Cmd+Shift+J

5 DEBUG CODE

	Windows/Linux	Mac
Toggle Breakpoint	Shift+F9	Shift+F9
Execute Next Line	F10	F10
Step Into Function	Shift+F4	Shift+F4
Finish Function/Loop	Shift+F6	Shift+F6
Continue	Shift+F5	Shift+F5
Stop Debugging	Shift+F8	Shift+F8

6 VERSION CONTROL

	Windows/Linux	Mac
Show diff	Ctrl+Alt+D	Ctrl+Option+D
Commit changes	Ctrl+Alt+M	Ctrl+Option+M
Scroll diff view	Ctrl+↑/↓	Ctrl+↑/↓
Stage/Unstage (Git)	Spacebar	Spacebar
Stage/Unstage and move to next	Enter	Enter

7 MAKE PACKAGES

	Windows/Linux	Mac
Build and Reload	Ctrl+Shift+B	Cmd+Shift+B
Load All (devtools)	Ctrl+Shift+L	Cmd+Shift+L
Test Package (Desktop)	Ctrl+Shift+T	Cmd+Shift+T
Test Package (Web)	Ctrl+Alt+F7	Cmd+Opt+F7
Check Package	Ctrl+Shift+E	Cmd+Shift+E
Document Package	Ctrl+Shift+D	Cmd+Shift+D

8 DOCUMENTS AND APPS

	Windows/Linux	Mac
Preview HTML (Markdown, etc.)	Ctrl+Shift+K	Cmd+Shift+K
Knit Document (knitr)	**Ctrl+Shift+K**	**Cmd+Shift+K**
Compile Notebook	Ctrl+Shift+K	Cmd+Shift+K
Compile PDF (TeX and Sweave)	Ctrl+Shift+K	Cmd+Shift+K
Insert chunk (Sweave and Knitr)	Ctrl+Alt+I	Cmd+Option+I
Insert code section	Ctrl+Shift+R	Cmd+Shift+R
Re-run previous region	Ctrl+Shift+P	Cmd+Shift+P
Run current document	Ctrl+Alt+R	Cmd+Option+R
Run from start to current line	**Ctrl+Alt+B**	**Cmd+Option+B**
Run the current code section	**Ctrl+Alt+T**	**Cmd+Option+T**
Run previous Sweave/Rmd code	Ctrl+Alt+P	Cmd+Option+P
Run the current chunk	Ctrl+Alt+C	Cmd+Option+C
Run the next chunk	Ctrl+Alt+N	Cmd+Option+N
Sync Editor & PDF Preview	Ctrl+F8	Cmd+F8
Previous plot	Ctrl+Alt+F11	Cmd+Option+F11
Next plot	Ctrl+Alt+F12	Cmd+Option+F12
Show Keyboard Shortcuts	Alt+Shift+K	Option+Shift+K

WHY RSTUDIO SERVER PRO?
RSP extends the the open source server with a commercial license, support, and more:
- open and run multiple R sessions at once
- tune your resources to improve performance
- edit the same project at the same time as others
- see what you and others are doing on your server
- switch easily from one version of R to a different version
- integrate with your authentication, authorization, and audit practices

Download a free 45 day evaluation at **www.rstudio.com/products/rstudio-server-pro/**

Write Code

R Support

Navigate tabs

Open in new window

Save

Find and replace

Compile as notebook

Run selected code

Import data with wizard

History of past commands to run/copy

Display .RPres slideshows **File > New File > R Presentation**

File Edit Code View Plots Session Build Debug Tools Help

garrett Sessions ▾

IDEcheatsheet ▾   R 3.2.2 ▾

Go to file/function   Addins ▾

RMarkdown.Rmd   app.R   Script.R

Environment History Build Git Presentation

Source on Save   → Run   → Source ▾

Import Dataset ▾

List ▾

Global Environment ▾

```
1  # Good Start...
2
3
4
5
6  "P0030001"
7  "P0030002"
8  "P0030003"
9  "P0030004"
10
11
12  get_digit <-function() {
13    ("num" %% (10 ^ n))
14    %/% (10 ^ (n - 1))
15  }}
16
17  fo
18    for       {snippet}
19    foo     {.GlobalEnv}
20    force      {base}
21
22
```

Cursors of shared users

Re-run previous code

Source with or without Echo

Show file outline

Load workspace

Save workspace

Delete all saved objects

Search inside environment

Multiple cursors/column selection with **Alt + mouse drag**.

Choose environment to display from list of parent environments

Display objects as list or grid

Code diagnostics that appear in the margin. Hover over diagnostic symbols for details.

Syntax highlighting based on your file's extension

Data
iris   150 obs. of 5 variables
Values
a   1
Functions
foo   function (x)

Tab completion to finish function names, file paths, arguments, and more.

Displays saved objects by type with short description

View in data viewer

View function source code

Multi-language code snippets to quickly use common blocks of code.

Jump to function in file

Change file type

1:1   (Top Level) ▾   R Script ▾

Files Plots Packages Help Viewer

New Folder   Upload   Delete   Rename   More ▾

Home   IDEcheatsheet

▲ Name

Copy...
Move...
Export...
Set As Working Directory
Go To Working Directory

Create folder

Upload file

Delete file

Rename file

Change directory

Console Compile PDF R Markdown

~/IDEcheatsheet/

```
> foo(1)
[1] 2
> foo <- function(x) x + 1
> foo(2)
foo(2)
> foo(1)
```

Path to displayed directory

..

hello.R   19 B   Apr 13, 2016, 11:17 AM

Working Directory

Maximize, minimize panes

A File browser keyed to your working directory. Click on file or directory name to open.

Press ↑ to see command history

Drag pane boundaries

19

Documents and Apps

Open Shiny, R Markdown, knitr, Sweave, LaTeX, .Rd files and more in Source Pane

Check spelling

Render output

Choose output format

Choose output location

Insert code chunk

Jump to previous chunk

Jump to next chunk

Run selected lines

Publish to server

Show file outline

Access markdown guide at
Help > Markdown Quick Reference

Jump to chunk

Set knitr chunk options

Run this and all previous code chunks

Run this code chunk

```
17  ```{r pressure, echo=FALSE}
18  plot(pressure)
19  ```
```

"Data comes in many formats, but R prefers just one: tidy data."

- Garrett Grolemund

Tidy data

A data set is **tidy** iff:
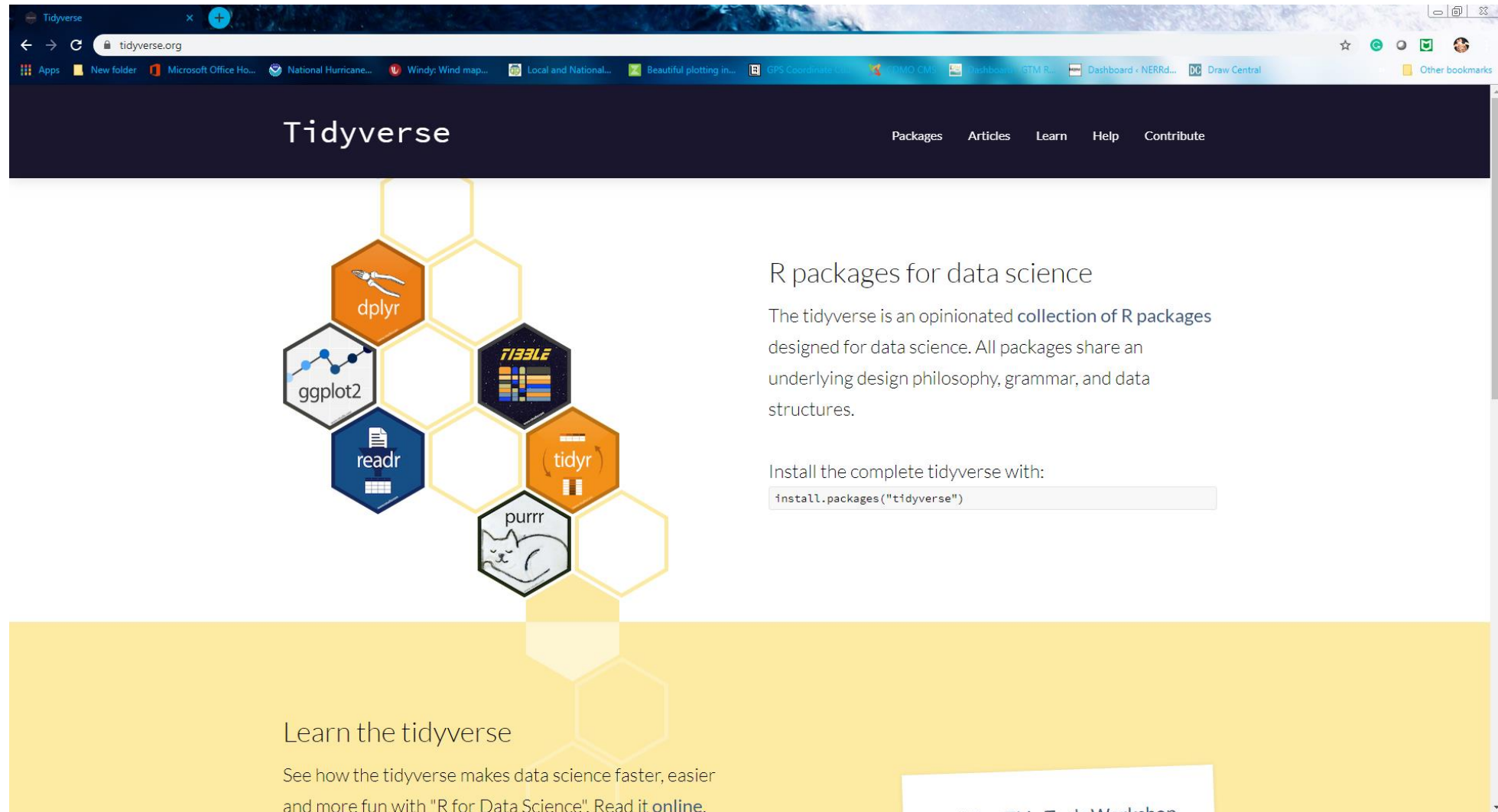
1. Each **variable** is in its own **column**

2. Each **observation** is in its own **row**

3. Each **value** is in its own **cell**

Also see these papers, in your "other resources" folder:
Wickham, 2014: *Tidy Data*
Broman and Woo, 2017: *Data Organization in Spreadsheets*

www.tidyverse.org