

RStudio

Introduction to R for Public Health Researchers

Working with R

- The R Console “interprets” whatever you type
 - Calculator
 - Creating variables
 - Applying functions
- “Analysis” Script + Interactive Exploration
 - Static copy of what you did (reproducibility)
 - Try things out interactively, then add to your script

R essentially is a command line with
a set of functions loaded

R Uses Functions, in Packages

- R revolves around functions
 - Commands that take input, performs computations, and returns results
 - When you download R, it has a “base” set of functions/packages (**base R**)
- Functions are enclosed in packages
 - These written by R users/developers (like us) - **some are bad**
 - Think of them as “R Extensions”

Using Packages

- You **need to know base R** - answers on Google commonly use it
- We will show you some newer and **more intuitive** ways to do things, not in base R
- RStudio (the company) makes a lot of great packages
- **Hadley Wickham** writes a lot of them (Employee and Developer at RStudio)
 - One authority on all things R
 - How to trust an R package: <http://simplystatistics.org/2015/11/06/how-i-decide-when-to-trust-an-r-package/>

RStudio (the software)

RStudio is an Integrated Development Environment (IDE) for R

- It helps the user effectively use R.
- Makes things easier
- Is NOT dropdown statistical tools (such as Stata)
 - See [Rcmdr](#) or [Radiant](#)
- All snapshots in these slides are taken from <http://ayeimanol-r.net/2013/04/21/289/>

RStudio

Easier working with R

- Syntax highlighting, code completion, and smart indentation
- Easily manage multiple working directories and projects

More information

- Workspace browser and data viewer
- Plot history, zooming, and flexible image and PDF export
- Integrated R help and documentation
- Searchable command history

RStudio

Super useful “cheat sheet”:

<https://github.com/rstudio/cheatsheets/raw/master/rstudio-ide.pdf>

RStudio

Let's start by making an RStudio "Project".

1. Helps you organize your work.
2. Helps with working directories (discussed later).
3. Allows you to easily know which project you're on.

Go to File → New Project → New Directory → New Project

Call your Project "Intro_to_R"

RStudio/R Console

The screenshot shows the RStudio interface with the following components:

- Source Editor:** A blank script titled "Untitled1" with a line number 1.
- Console:** Displays the following text:

```
~ /Dropbox/Packages/spant/
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

Natural language support but running in an English locale

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> |
```
- Environment:** Shows "Global Environment" and "Environment is empty".
- Files:** A file explorer showing the contents of the "spant" directory. The files and folders listed are:

| Name | Size | Modified |
|------------------------|---------|-----------------------|
| .. | | |
| .gitignore | 46 B | May 23, 2017, 1:32 PM |
| .Rbuildignore | 189 B | May 23, 2017, 1:32 PM |
| .Rhistory | 8.6 KB | Jun 16, 2017, 2:42 PM |
| .travis.yml | 372 B | Jun 7, 2017, 12:02 PM |
| cran-comments.md | 242 B | Jun 7, 2017, 12:02 PM |
| data | | |
| DESCRIPTION | 952 B | Jun 16, 2017, 2:22 PM |
| inst | | |
| man | | |
| NAMESPACE | 2.2 KB | Jun 16, 2017, 2:22 PM |
| NEWS.md | 732 B | Jun 16, 2017, 2:22 PM |
| R | | |
| README-basis_sim-1.png | 41.9 KB | Jun 16, 2017, 2:22 PM |

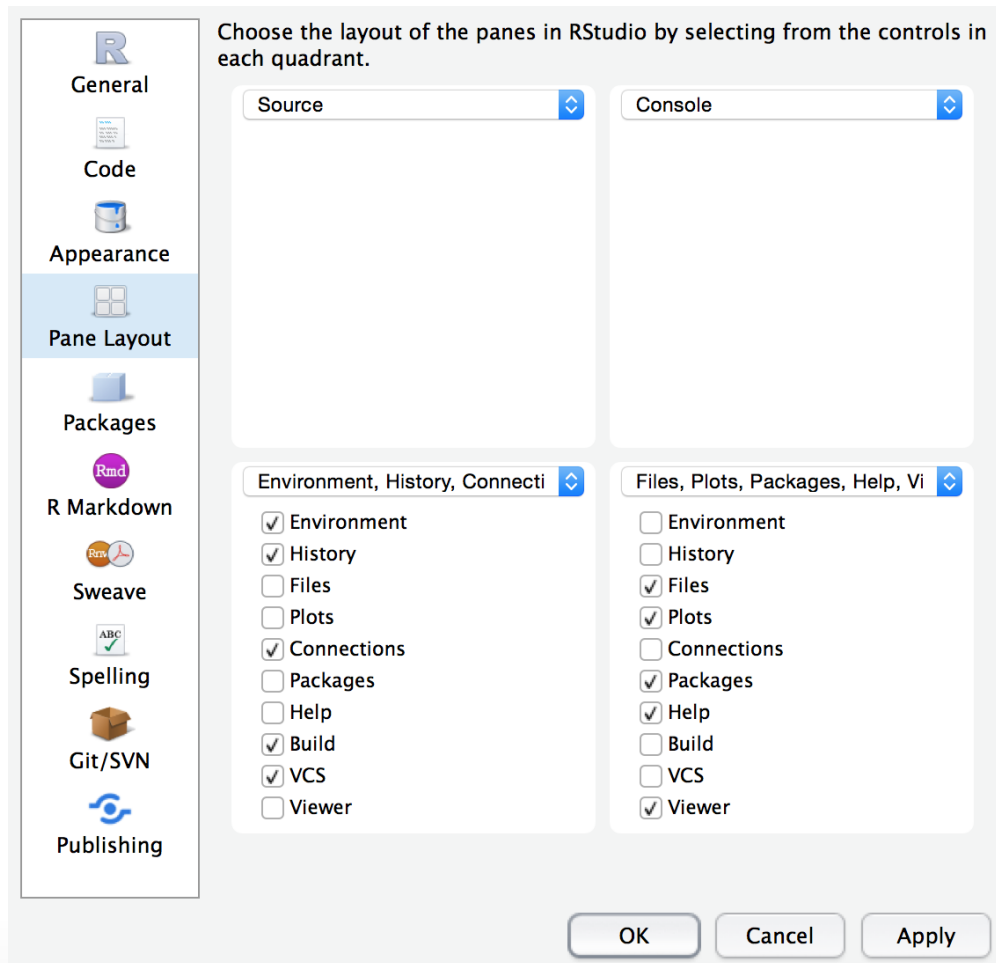
RStudio/R Console

- Where code is executed (where things happen)
- You can type here for things interactively
- Code is **not saved** on your disk

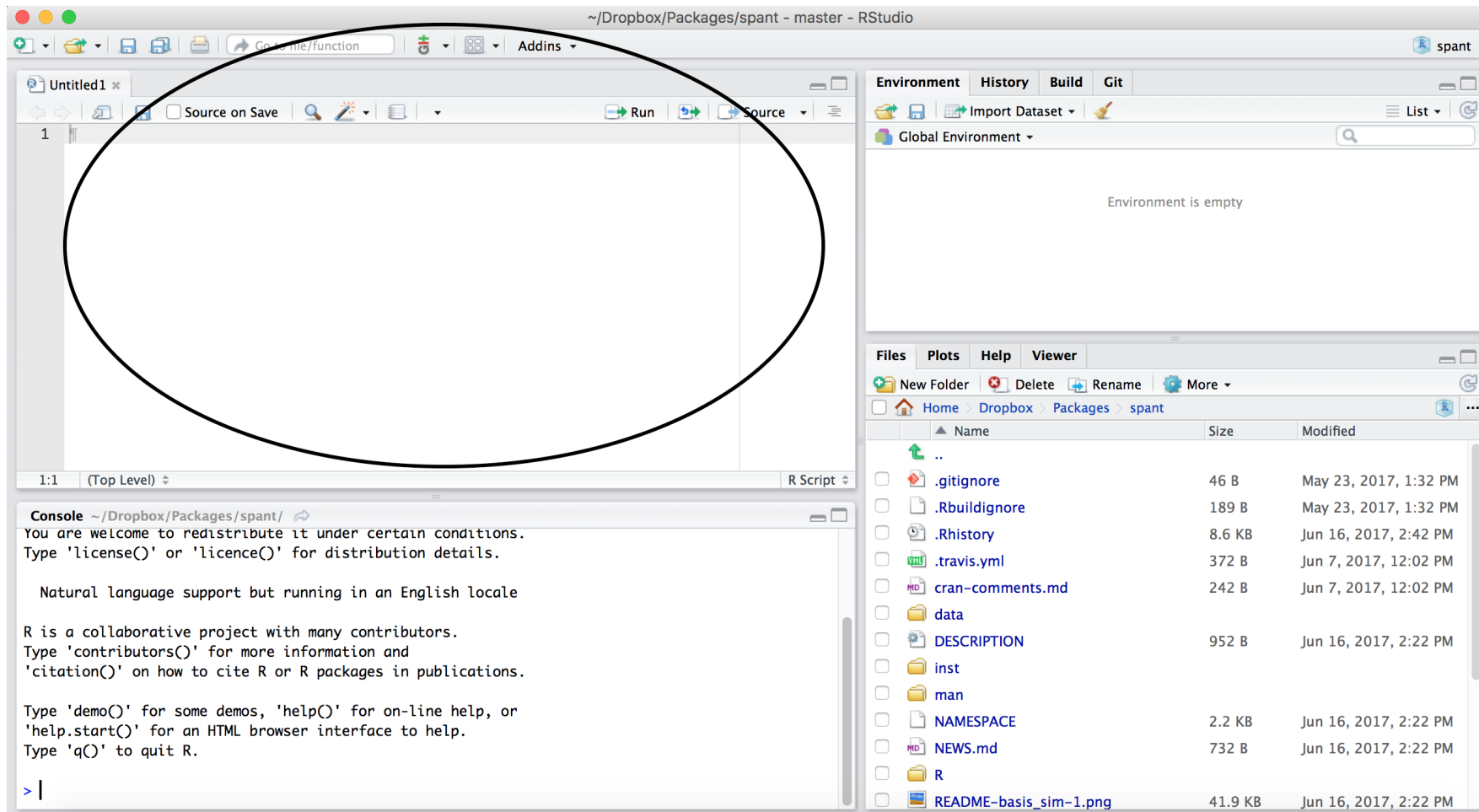
RStudio Layout

If RStudio doesn't look like this (or our RStudio), then do:

RStudio → Preferences → Pane Layout



Source/Editor



The screenshot shows the RStudio interface with the Source/Editor window active. The main editor area is empty and circled in black. The console shows the R startup message. The file explorer on the right shows the project structure.

Console Output:

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> |
```

File Explorer:

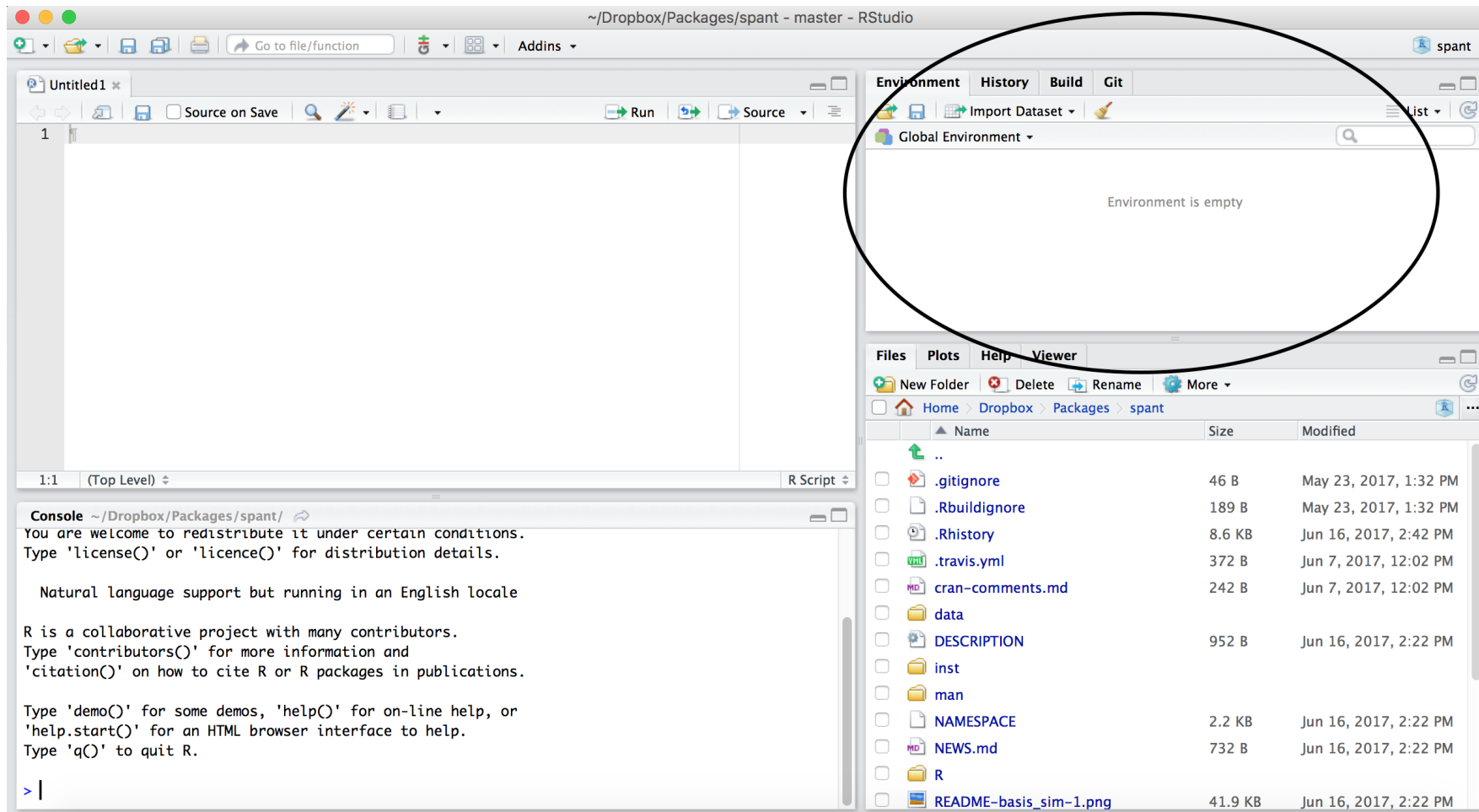
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Source

- Where files open to
- Have R code and comments in them
- Can highlight and press (CMD+Enter (Mac) or Ctrl+Enter (Windows)) to run the code

In a .R file (we call a script), code is saved on your disk

Workspace/Environment



The screenshot shows the RStudio interface with the title bar indicating the project path: `~/Dropbox/Packages/spant - master - RStudio`. The main editor window is titled "Untitled1" and contains a single line of code. The Environment pane, located in the top right, is circled and displays "Global Environment" and "Environment is empty". The Files pane in the bottom right shows the project structure:

| Name | Size | Modified |
|------------------------|---------|-----------------------|
| .. | | |
| .gitignore | 46 B | May 23, 2017, 1:32 PM |
| .Rbuildignore | 189 B | May 23, 2017, 1:32 PM |
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| R | | |
| README-basis_sim-1.png | 41.9 KB | Jun 16, 2017, 2:22 PM |

The Console pane at the bottom left shows the following output:

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> |
```

Workspace/Environment

- Tells you what **objects** are in R
- What exists in memory/what is loaded?/what did I read in?

History

- Shows previous commands. Good to look at for debugging, but **don't rely** on it as a script. Make a script!
- Also type the “up” key in the Console to scroll through previous commands

Other Panes

- **Files** - shows the files on your computer of the directory you are working in
- **Viewer** - can view data or R objects
- **Help** - shows help of R commands
- **Plots** - pretty pictures
- **Packages** - list of R packages that are loaded in memory

Useful R Studio Shortcuts

- `Ctrl + Enter` (`Cmd + Enter` on OS X) in your script evaluates that line of code
 - It's like copying and pasting the code into the console for it to run.
- `Ctrl+1` takes you to the script page
- `Ctrl+2` takes you to the console
- http://www.rstudio.com/ide/docs/using/keyboard_shortcuts

Starting with R and RMarkdown

[Starting with R](#)

Using the Viewer

The `view` command allows you to view data in a spreadsheet format. Run the following command:

```
View(mtcars)
```

Website

[Website](#)