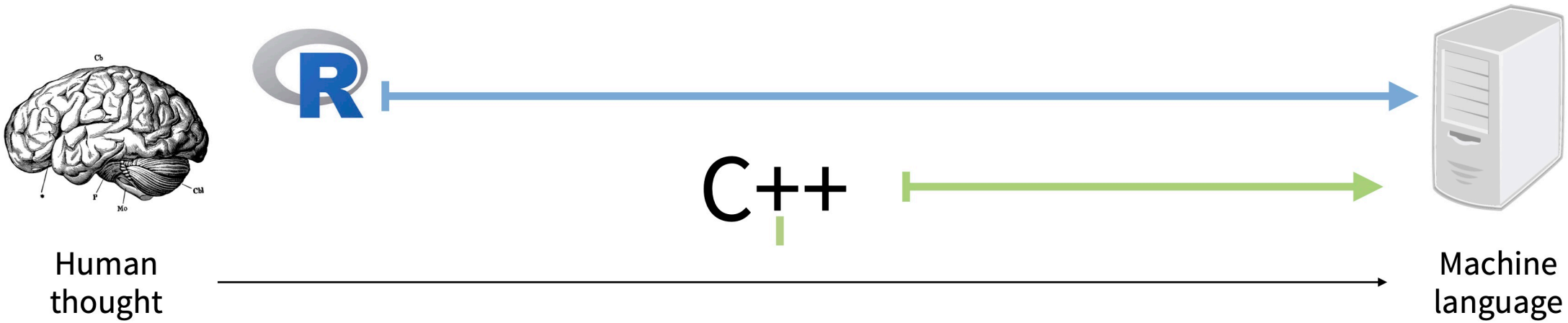
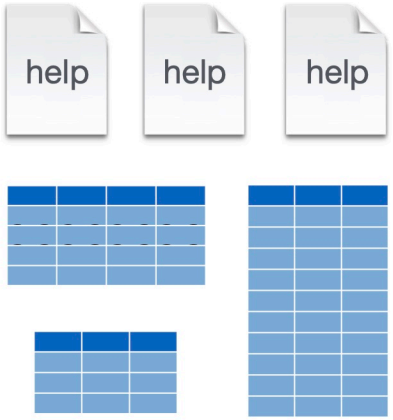
R, RStudio and RMarkdown

presented by: Jackson Hoffart

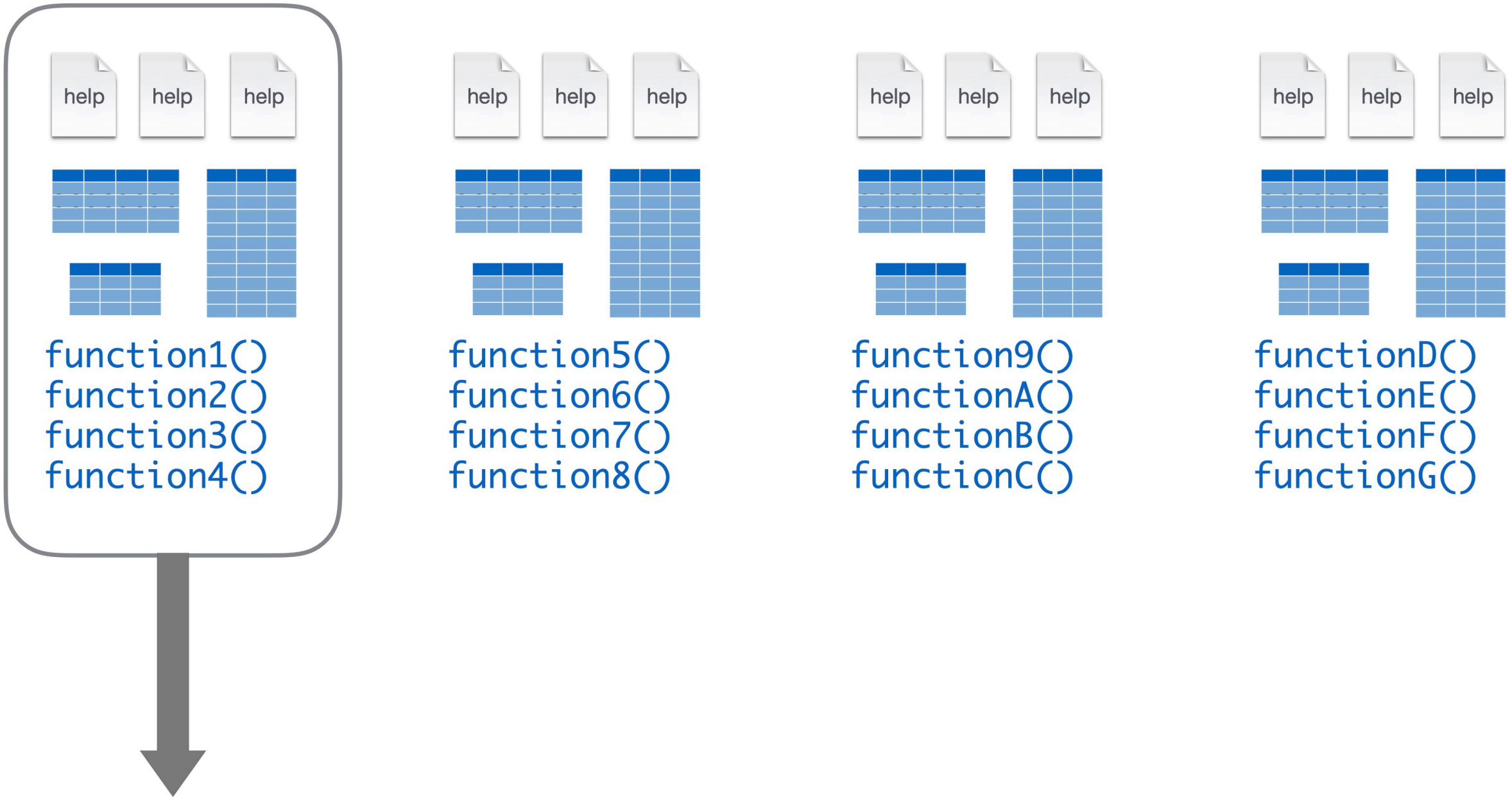
slides adapted from: https://github.com/rstudio-conf-2020/data-science-tidy

R - A computer language for scientists






```
function1()
function2()
function3()
function4()
```


help
help
help
function1()
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function5()
function6()
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function8()
help
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function9()
functionA()
functionB()
functionC()
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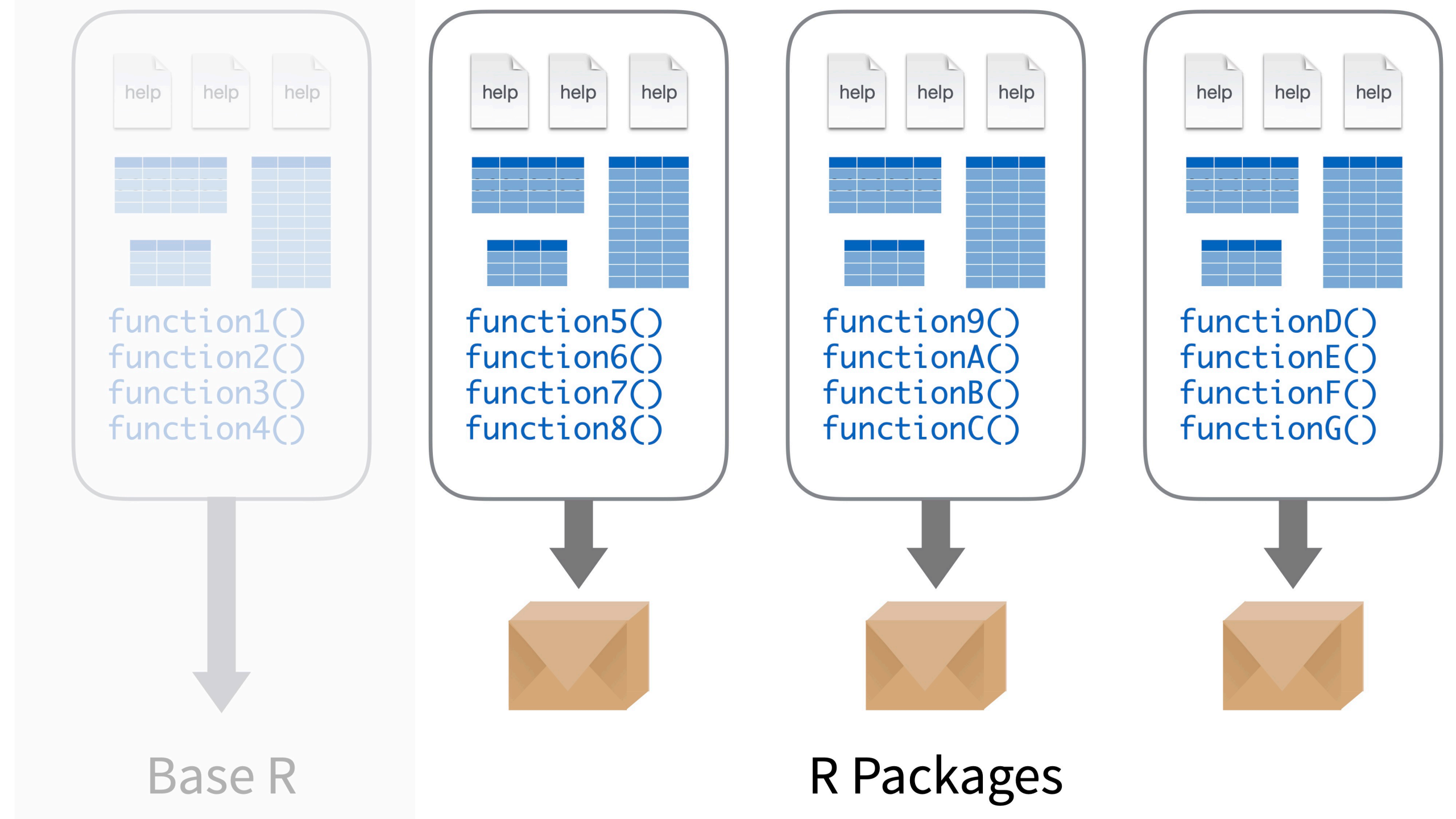
functionD()
functionE()
functionF()
functionG()

Base R


help
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function1()
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Base R
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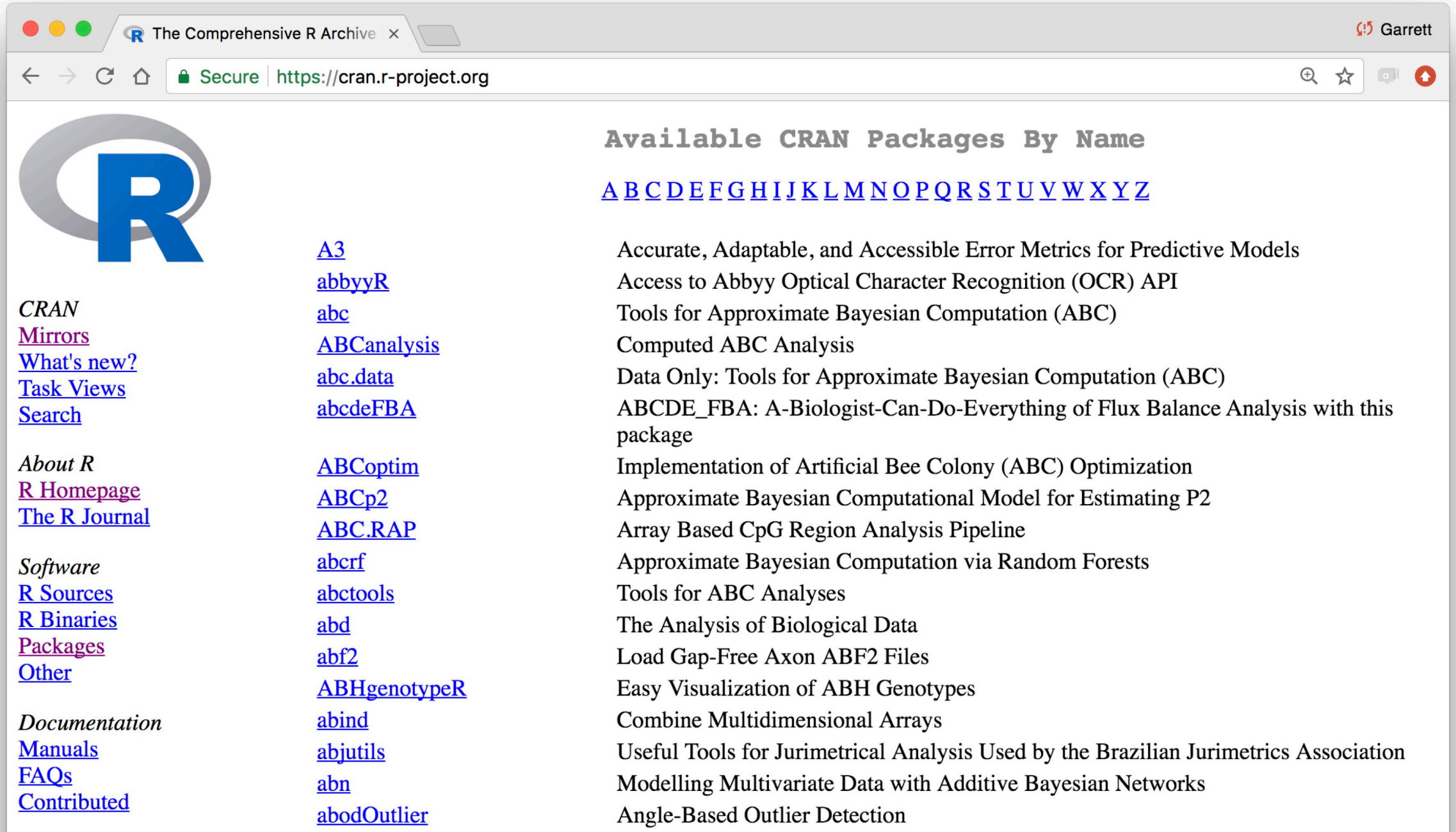
functionG()
R Packages



CRAN
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Available CRAN Packages By Name

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A3	Accurate, Adaptable, and Accessible Error Metrics for Predictive Models
abbyyR	Access to Abbyy Optical Character Recognition (OCR) API
abc	Tools for Approximate Bayesian Computation (ABC)
ABCanalysis	Computed ABC Analysis
abc.data	Data Only: Tools for Approximate Bayesian Computation (ABC)
abcdeFBA	ABCDE_FBA: A-Biologist-Can-Do-Everything of Flux Balance Analysis with this package
ABCoptim	Implementation of Artificial Bee Colony (ABC) Optimization
ABCp2	Approximate Bayesian Computational Model for Estimating P2
ABC.RAP	Array Based CpG Region Analysis Pipeline
abcrf	Approximate Bayesian Computation via Random Forests
abctools	Tools for ABC Analyses
abd	The Analysis of Biological Data
abf2	Load Gap-Free Axon ABF2 Files
ABHgenotypeR	Easy Visualization of ABH Genotypes
abind	Combine Multidimensional Arrays
abjutils	Useful Tools for Jurimetrical Analysis Used by the Brazilian Jurimetrics Association
abn	Modelling Multivariate Data with Additive Bayesian Networks
abodOutlier	Angle-Based Outlier Detection

Using packages

1

```
install.packages("foo")
```

Downloads files to "computer"

1 x per "computer"

2

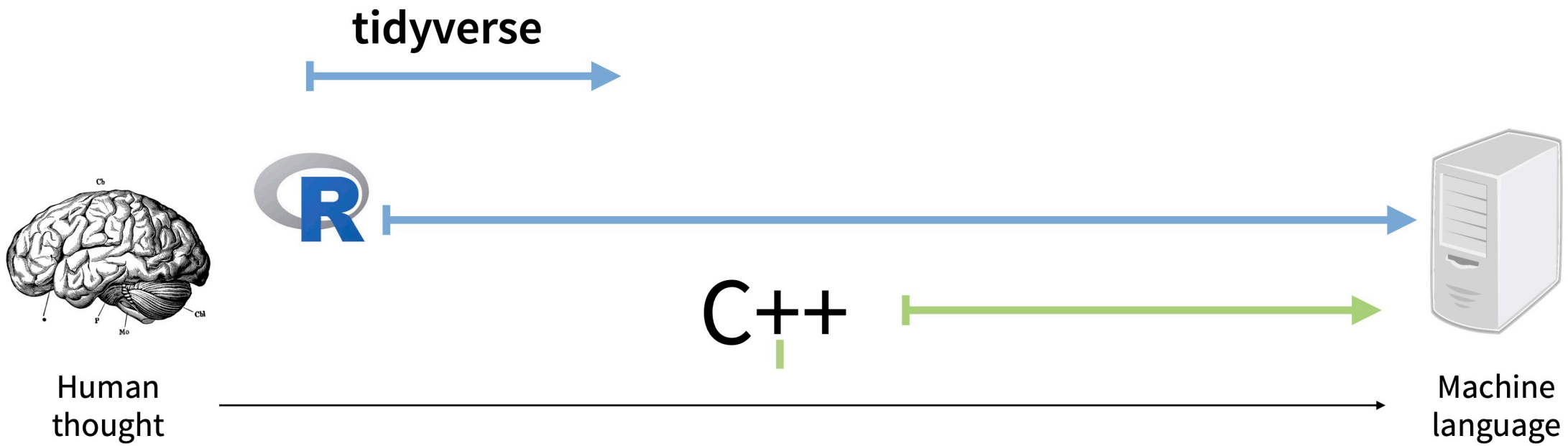
```
library("foo")
```

Loads package

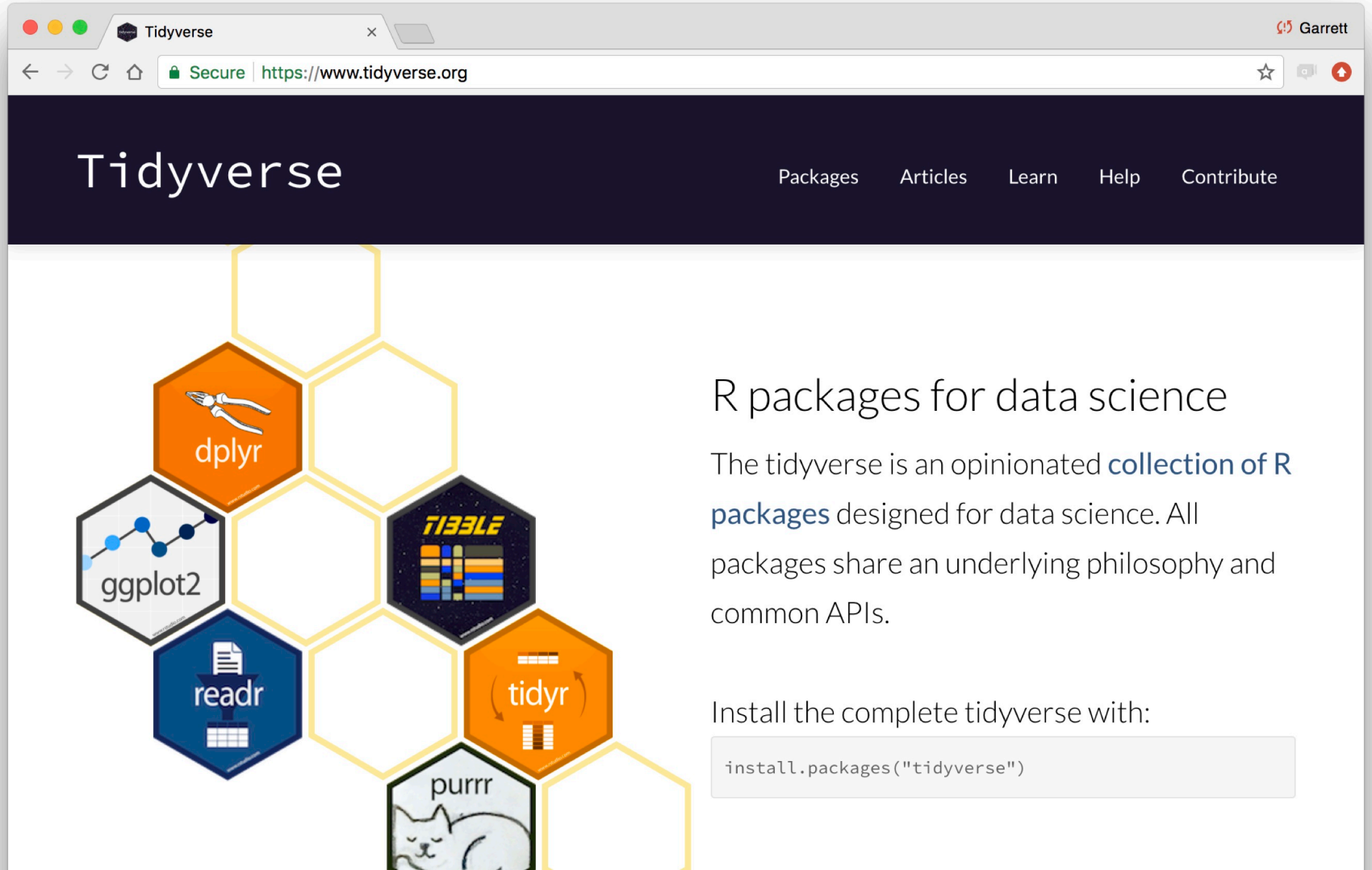
1 x per R Session

I've done this for you for this workshop

The tidyverse - A set of R packages to unify some data science tasks

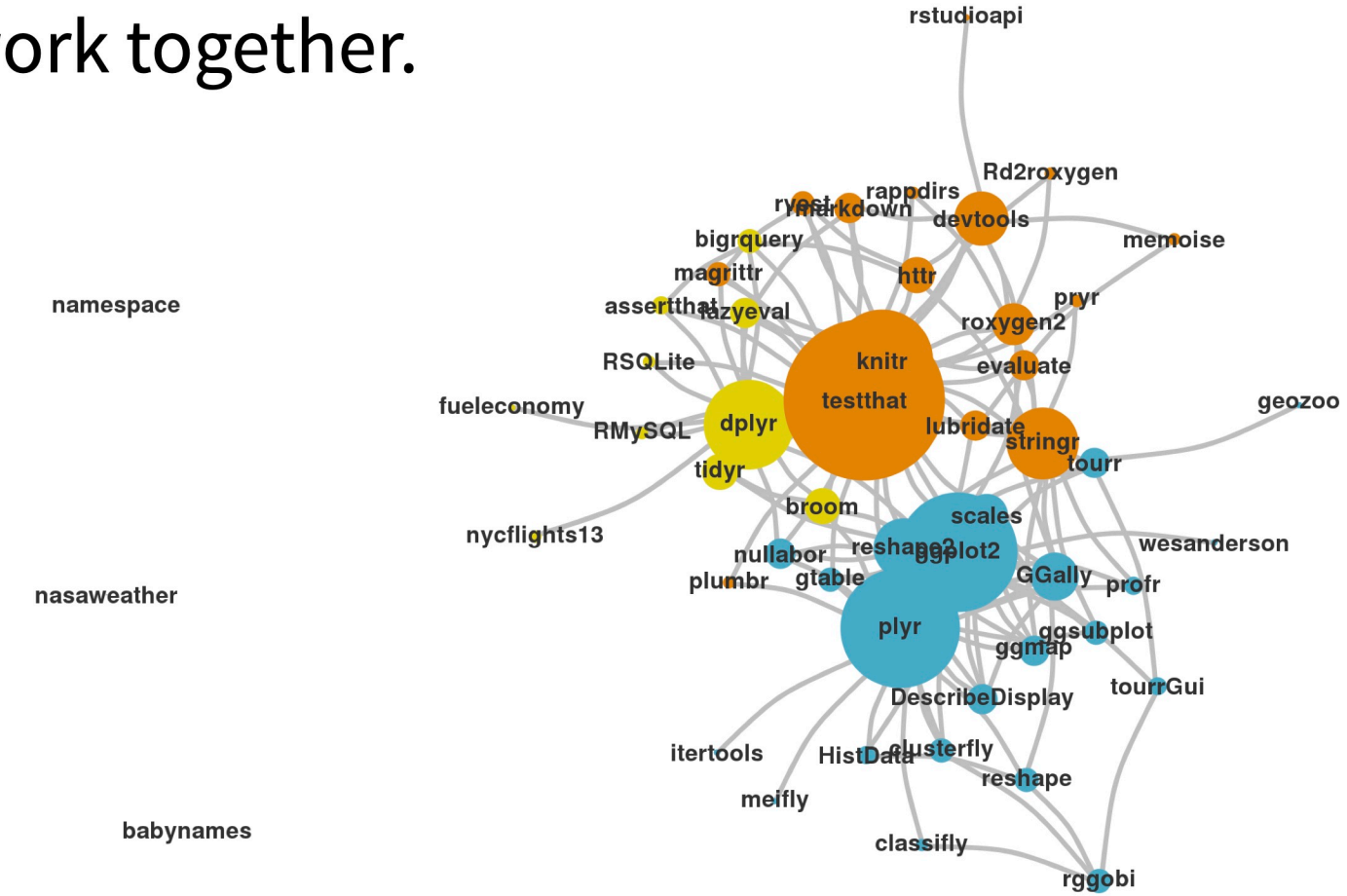


tidyverse.org



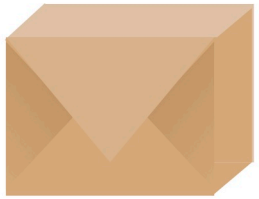
The Tidyverse

A collection of modern R packages that share common philosophies, embed best practices, and are designed to work together.



Display by Adolfo Álvarez

tidyverse



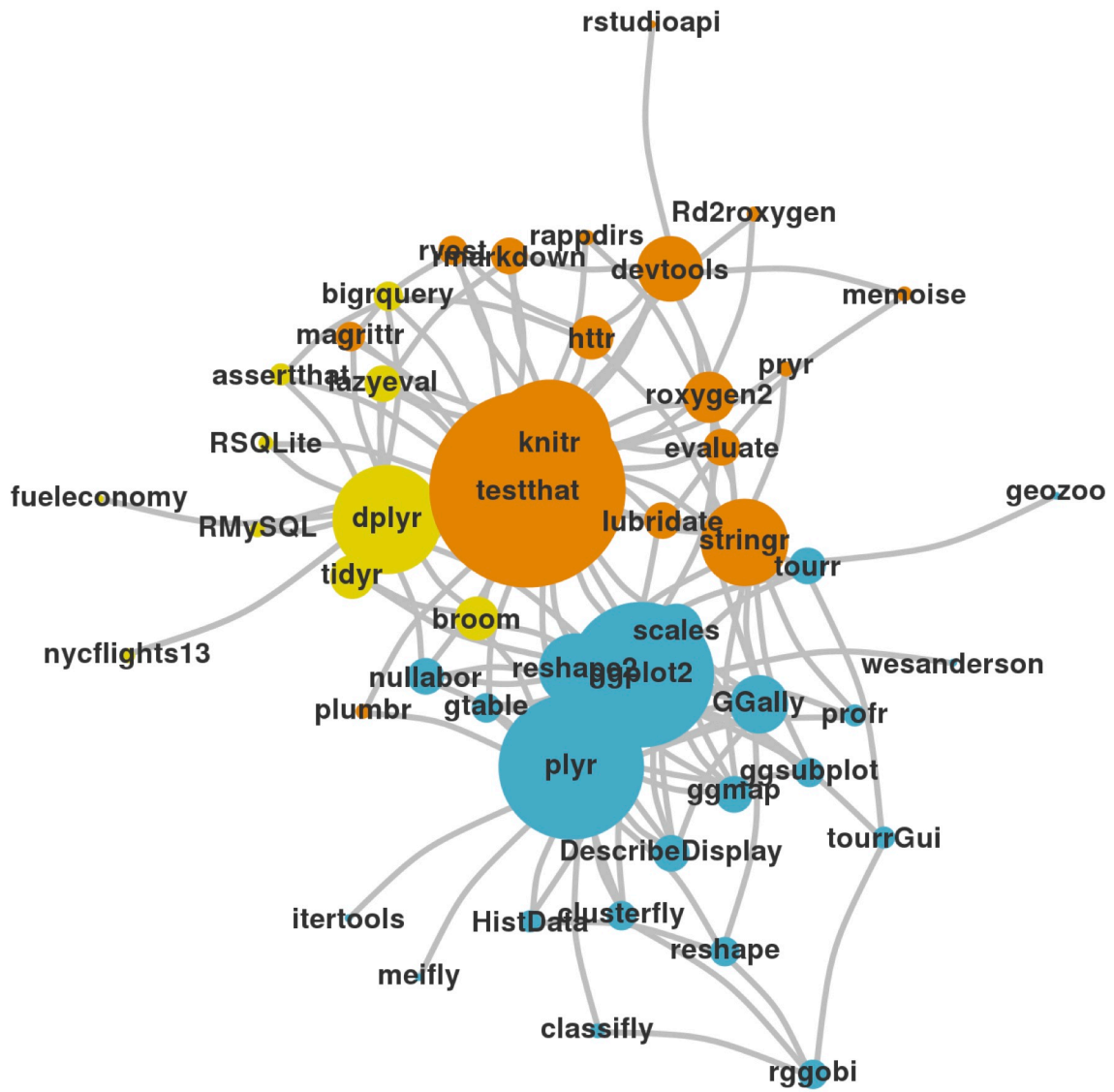
An R package that serves as a short cut for installing and loading the components of the tidyverse.

```
library("tidyverse")
```

```
install.packages("tidyverse")
```

does the equivalent of

```
install.packages("ggplot2")
install.packages("dplyr")
install.packages("tidyr")
install.packages("readr")
install.packages("purrr")
install.packages("tibble")
install.packages("hms")
install.packages("stringr")
install.packages("lubridate")
install.packages("forcats")
install.packages("DBI")
install.packages("haven")
install.packages("httr")
install.packages("jsonlite")
install.packages("readxl")
install.packages("rvest")
install.packages("xml2")
install.packages("modelr")
install.packages("broom")
```



```
install.packages("tidyverse")
```

does the equivalent of

```
install.packages("ggplot2")
install.packages("dplyr")
install.packages("tidyr")
install.packages("readr")
install.packages("purrr")
install.packages("tibble")
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install.packages("lubridate")
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install.packages("DBI")
install.packages("haven")
install.packages("httr")
install.packages("jsonlite")
install.packages("readxl")
install.packages("rvest")
install.packages("xml2")
install.packages("modelr")
install.packages("broom")
```

```
library("tidyverse")
```

does the equivalent of

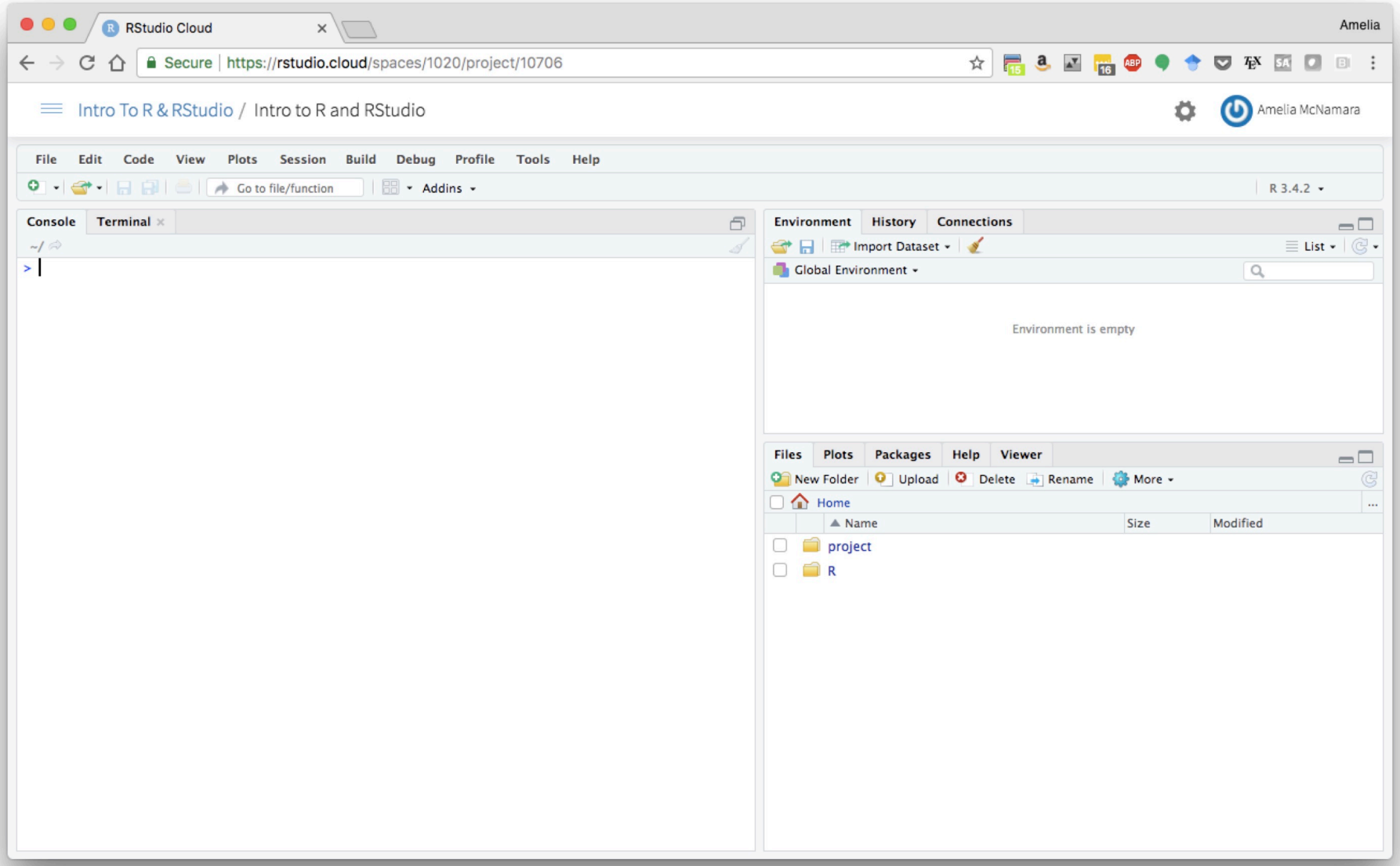
```
library("ggplot2")
library("dplyr")
library("tidyr")
library("readr")
library("purrr")
library("tibble")
```


R

RStudio: a software program

1. like Microsoft Word, Excel, etc.
2. built to help you write R code, run R code, and analyze data with R
3. text editor, version control, keyboard shortcuts, debugging tools, and much more

RStudio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Terminal
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Global Environment
Environment is empty
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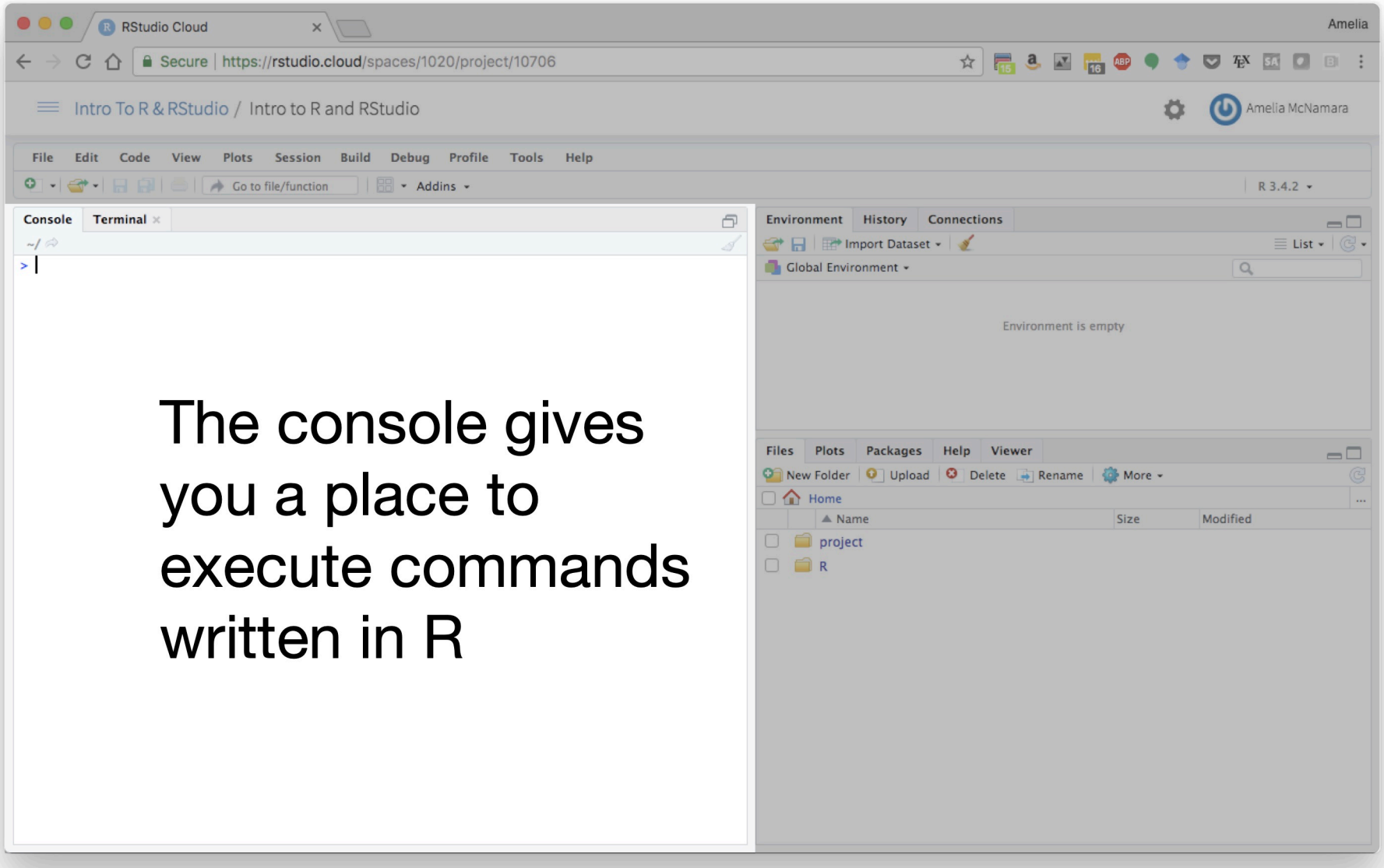
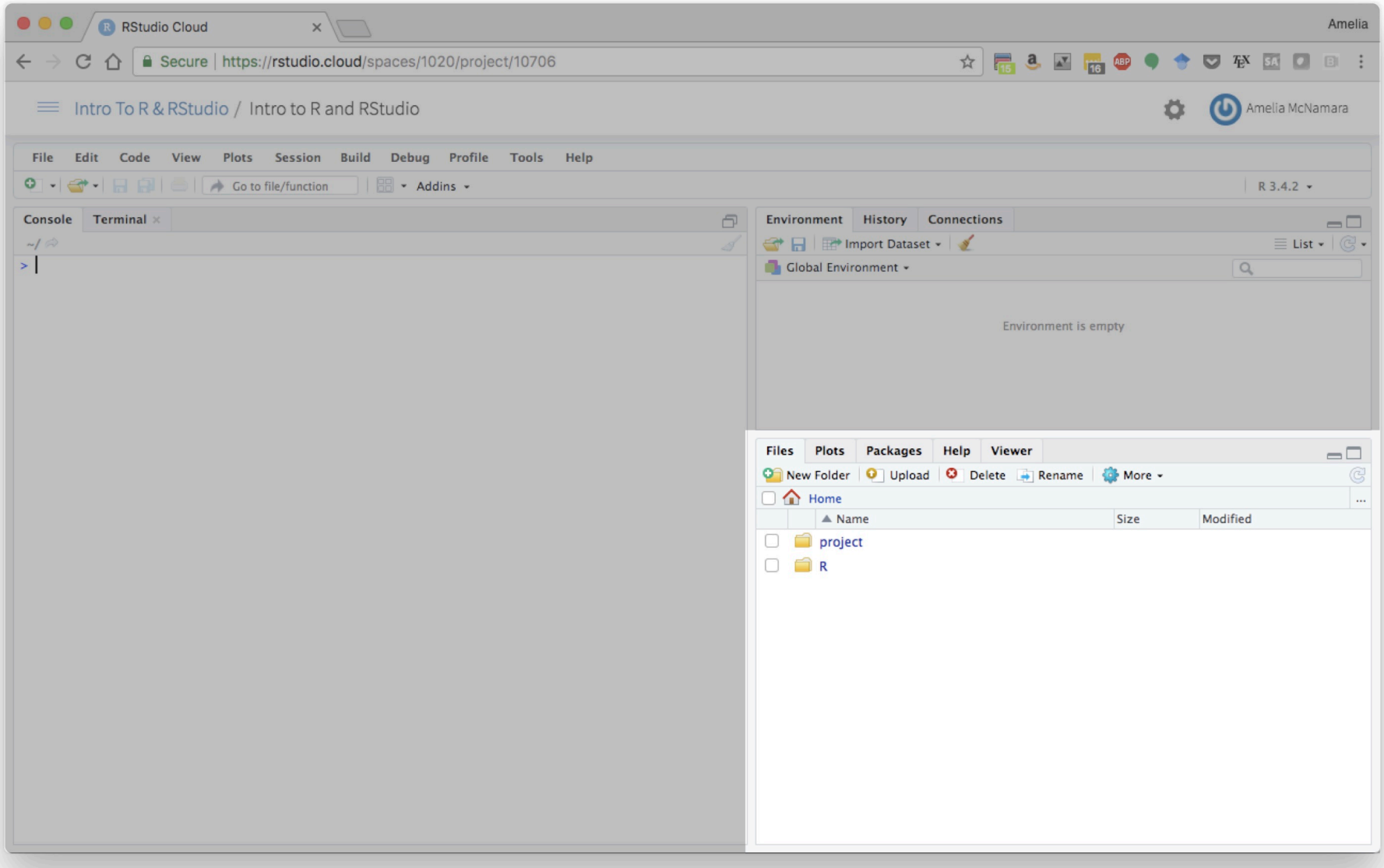
Plots
Packages
Help
Viewer
New Folder
Upload
Delete
Rename
More
Home
Name
Size
Modified
project
R

RStudio



The console gives you a place to execute commands written in R

RStudio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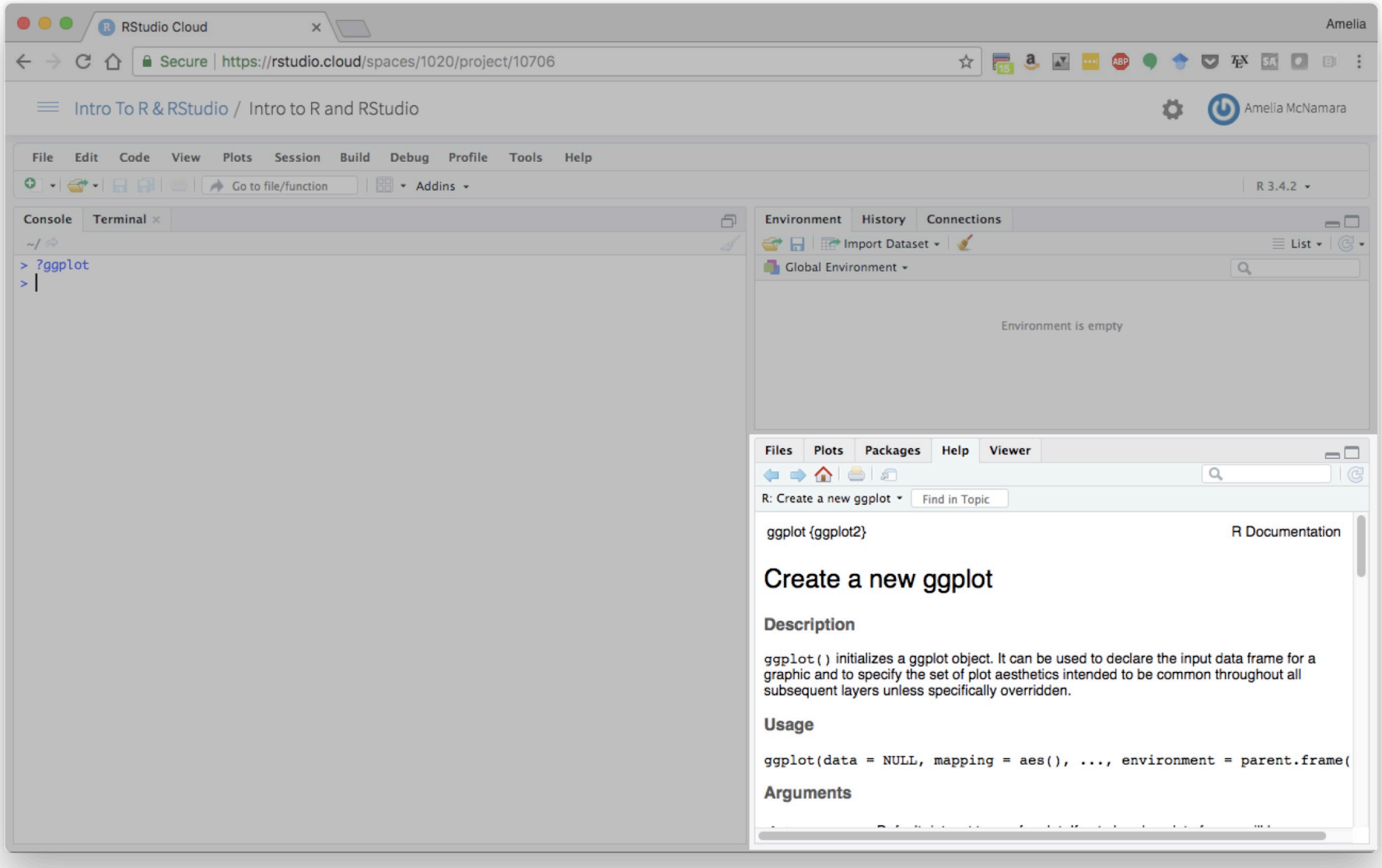
RStudio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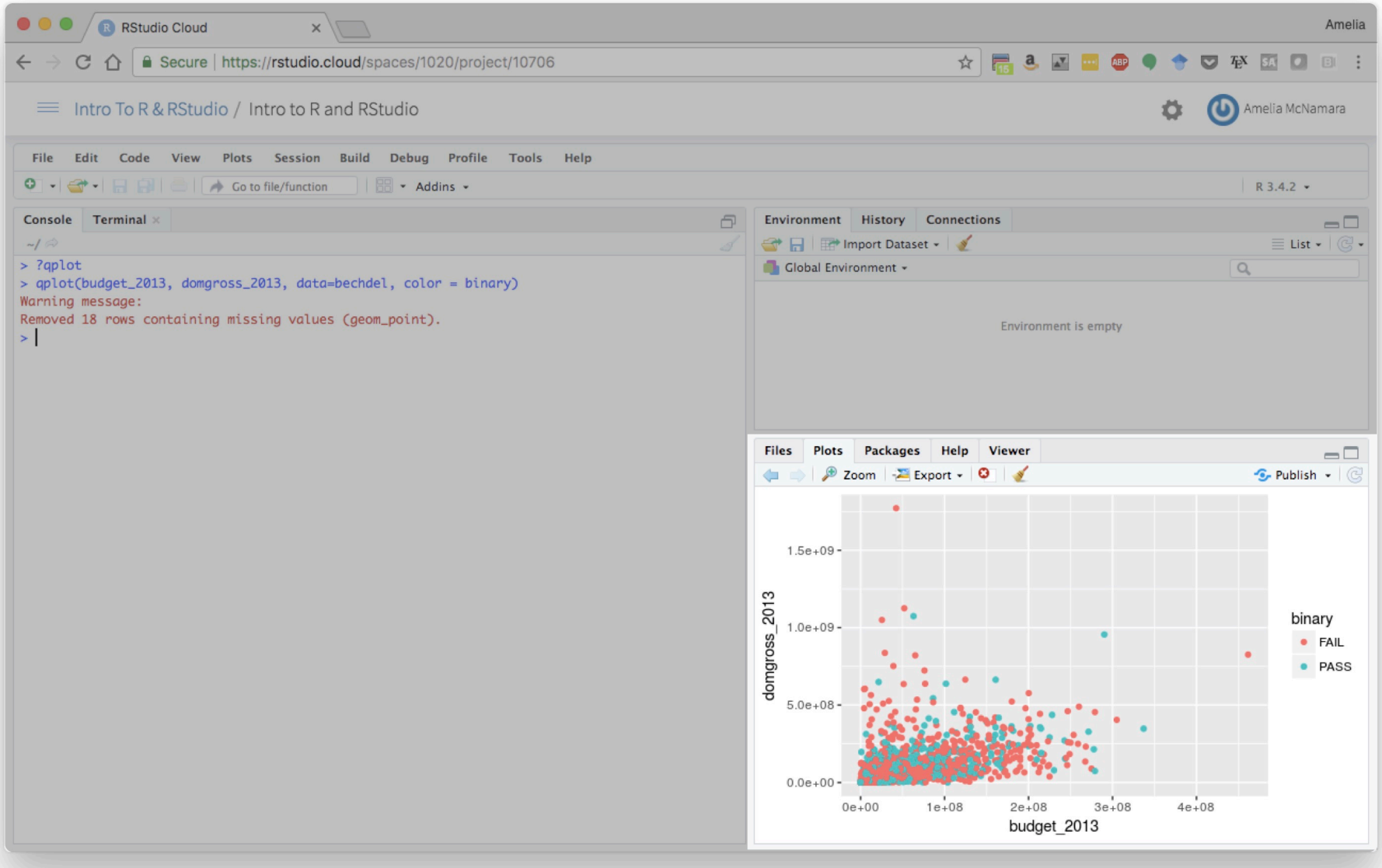
Addins
R 3.4.2
Console Terminal
~/
> ?ggplot
>
Environment History Connections
Import Dataset
List
Global Environment
Environment is empty
Files Plots Packages Help Viewer
R: Create a new ggplot
Find in Topic
ggplot {ggplot2}
R Documentation
Create a new ggplot
Description
ggplot() initializes a ggplot object. It can be used to declare the input data frame for a graphic and to specify the set of plot aesthetics intended to be common throughout all subsequent layers unless specifically overridden.
Usage
ggplot(data = NULL, mapping = aes(), ..., environment = parent.frame(
Arguments

RStudio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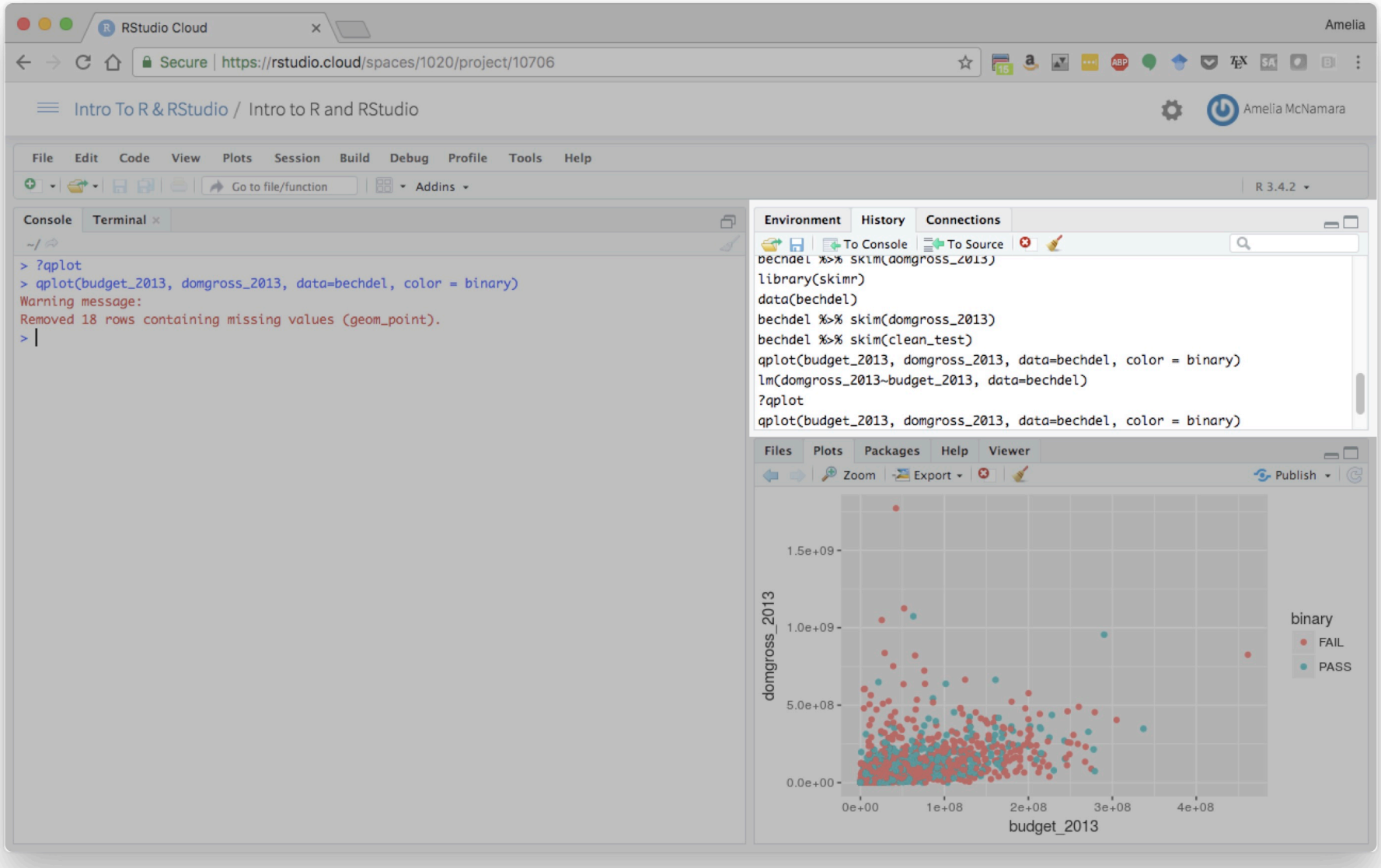
R 3.4.2
Console Terminal
~/
> ?qplot
> qplot(budget_2013, domgross_2013, data=bechdel, color = binary)
Warning message:
Removed 18 rows containing missing values (geom_point).
>
Environment History Connections
Import Dataset
List
Global Environment
Environment is empty
Files Plots Packages Help Viewer
Zoom
Export
Publish
1.5e+09
1.0e+09
5.0e+08
0.0e+00
domgross_2013
0e+00
1e+08
2e+08
3e+08
4e+08
budget_2013
binary
FAIL
PASS

RStudio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Warning message:
Removed 18 rows containing missing values (geom_point).
>
Environment
History
Connections
To Console
To Source
bechdel %>% skim(domgross_2013)
library(skimr)
data(bechdel)
bechdel %>% skim(domgross_2013)
bechdel %>% skim(clean_test)
qplot(budget_2013, domgross_2013, data=bechdel, color = binary)
lm(domgross_2013~budget_2013, data=bechdel)
?qplot
qplot(budget_2013, domgross_2013, data=bechdel, color = binary)
Files
Plots
Packages
Help
Viewer
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Export
Publish
1.5e+09
1.0e+09
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0.0e+00
domgross_2013
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3e+08
4e+08
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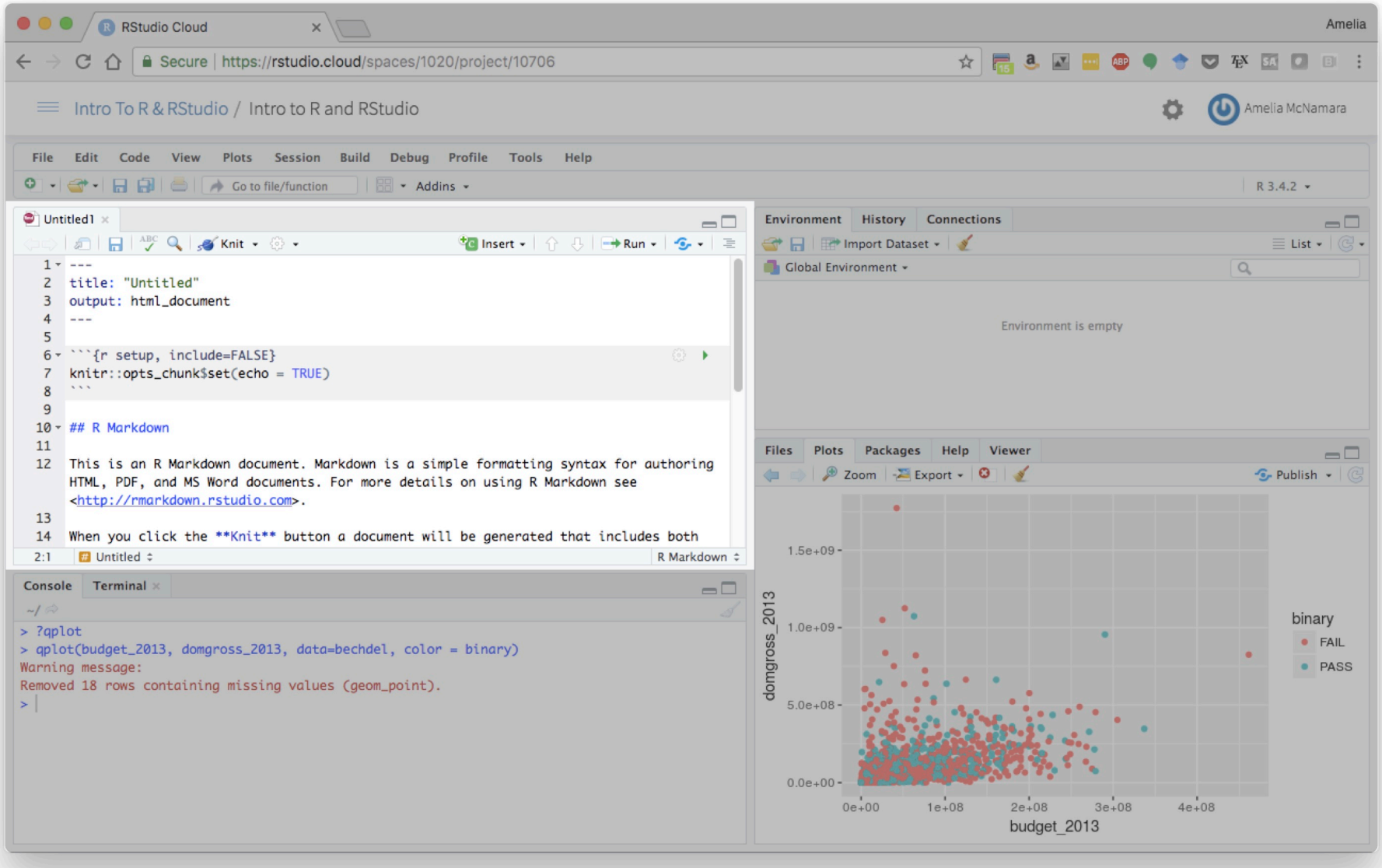
FAIL
PASS

RStudio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Addins
R 3.4.2
Untitled1
Knit
Insert
Run
1 ---
2 title: "Untitled"
3 output: html_document
4 ---
5
6 ```{r setup, include=FALSE}
7 knitr::opts_chunk$set(echo = TRUE)
8 ```
9
10 ## R Markdown
11
12 This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.
13
14 When you click the **Knit** button a document will be generated that includes both
2:1 Untitled R Markdown
Console Terminal
~/
> ?qplot
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0.0e+00
domgross_2013
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2e+08
3e+08
4e+08
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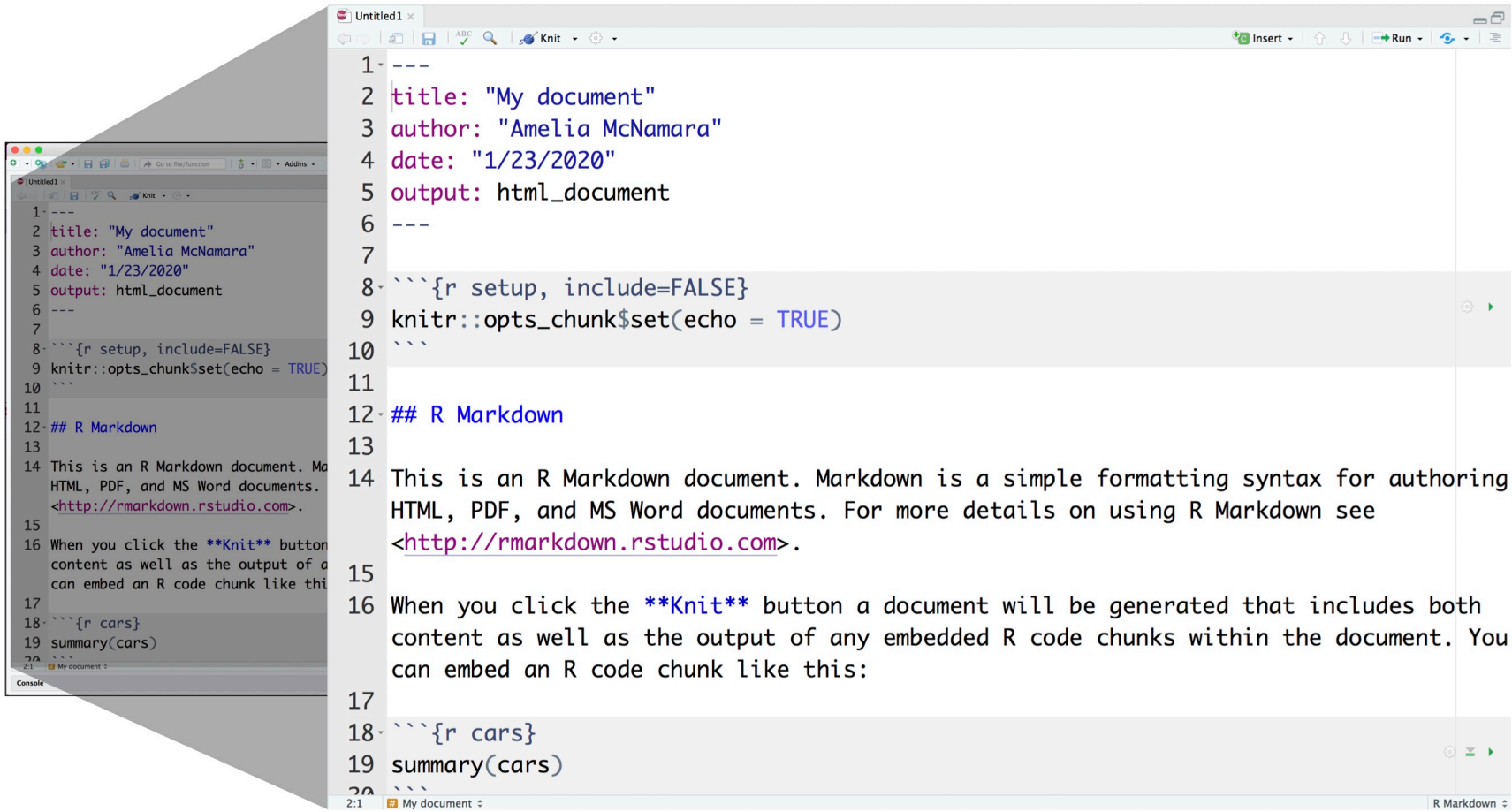
PASS

RMarkdown

An authoring format for Data Science.



RMarkdown (let's start!)