

# Brief introduction to R

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# Why learn R?

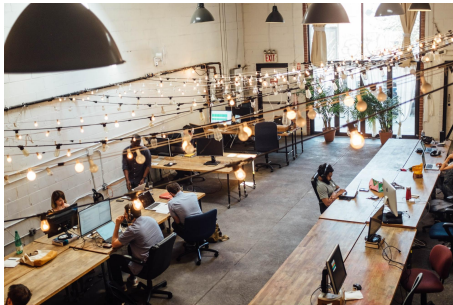


Figure 1: Office in 1960s



Figure 2: Office in 1990s

# Why learn R?










### Figure 3: Office in 2020s

You will work with a computer.. almost exclusively

# Why learn R?

## Data Analyst job postings in Barcelona

	Glovo Data Analyst - Pricing Barcelona 4.3 ★	Hiring Surge Easy Apply	14d
	Wind Mobility Data Analyst Barcelona 3.4 ★	Hot	14d
	Brainly Data Analyst Barcelona 4.5 ★	Easy Apply	10d
	Mur & Martí Data Analyst Barcelona		12d
	Adevinta in Spain Data Analyst Fotocasa Barcelona 4.7 ★		21d
	TravelPerk Data Analyst - Marketing Barcelona 4.7 ★	Easy Apply	6d
	Criteo Data Analyst, Mid-Market, Barcelona Barcelona 4.0 ★		1d

You have:

- Minimum 2 years of prior experience in a data-driven environment delivering actionable insights
- Strong quantitative background
- Excellent software development skills in one or more of Python, R, or similar.
- Experience working with large data sets
- Command line skills
- Strong presentation skills in communicating with experts and novices
- Fluent spoken and written English

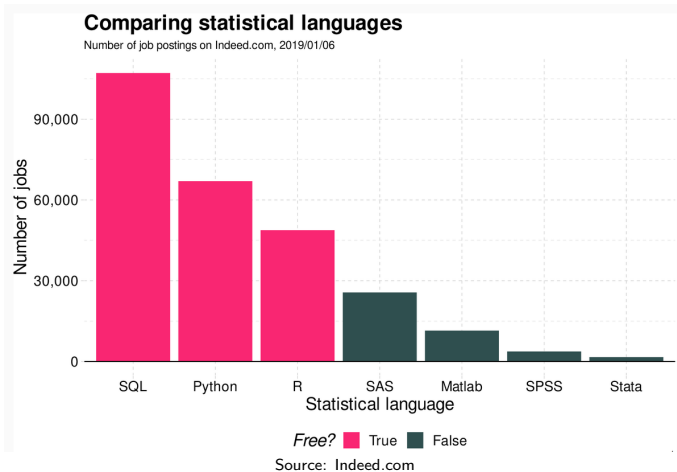
### Requisitos

- Experiencia mínimo 3 años en ecommerce o en una empresa online.
- Acostumbrado/a trabajar con equipos de producto, estrategia, finanzas, dirección general.
- Experiencia en definición, implementación y medición de producto online.
- Advanced user en digital analytics tools (adobe analytics, google analytics).
- Habitudo a trabajar con BBDD y conocimiento avanzado de SQL.
- Conocimiento avanzado de Excel.
- Conocimientos de R y/o Python.

Source: Glassdoor

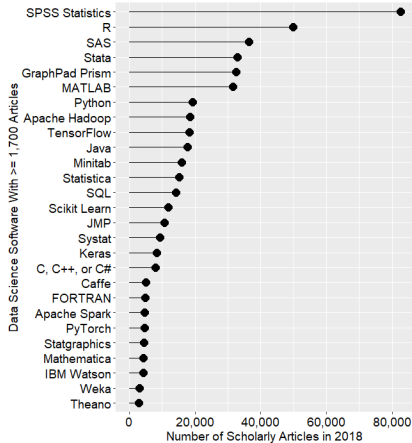
You will probably code

# Why learn R?



R is **not the only** coding language, but **is now a popular requirement** for Data Science/Analysis

# Why learn R?



Source: R4Stats

R is also popularly used for Research

# Introduction

## What is R?

R is an integrated suite of software facilities for

- data manipulation
- calculation
- graphical display

R is a **versatile** programming language, which can be used within diverse environments

# Introduction

## First steps

### Two options

- Use R online: [RStudio cloud](#)
  - Good for **learning**
  - Not recommended for **working**
- Install R into your computer: [RStudio](#)
  - **Highly recommended**
  - Allows to gradually adjust to your preferences



# Introduction

## RStudio

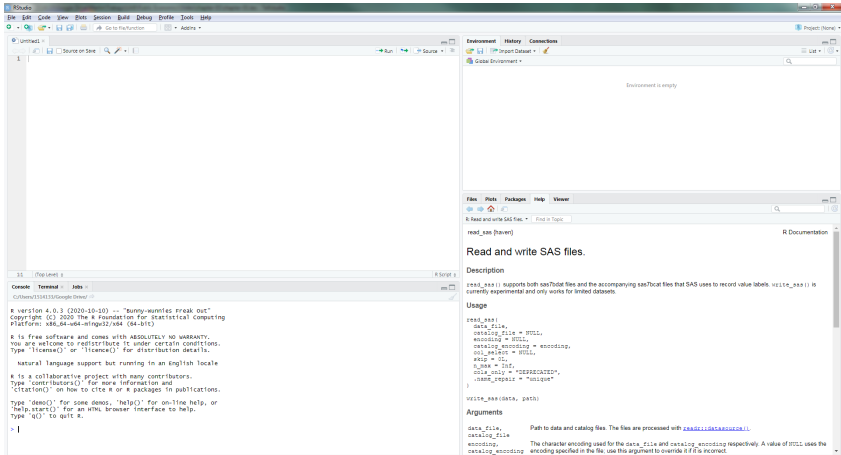
RStudio is an IDE (Integrated Development Environment)

It provides all the tools to use R language:

- code editor
- console
- help guides

# Introduction

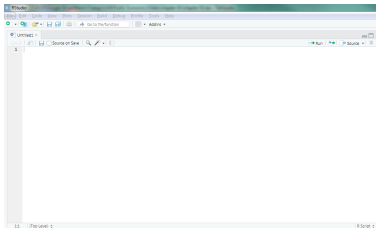
## RStudio



Initial view

# Introduction

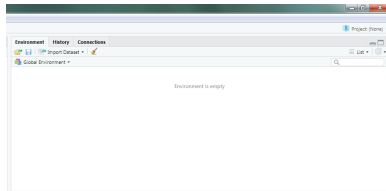
## RStudio



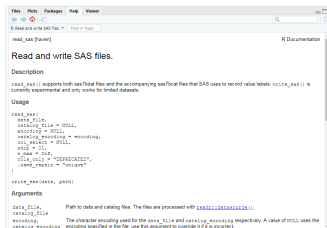
Code editor



Console



Environment



File explorer, Packages, Help, Viewer

# Introduction

## Scripts

Ideally, we want to be able to easily reproduce past analysis

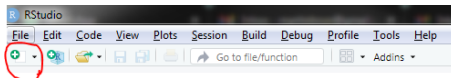
- yields accountability
- allows modifications
- facilitates cooperation

To do so, we will work with **Scripts**

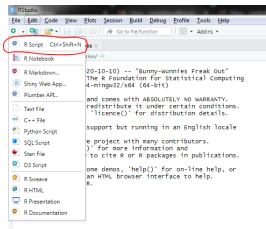
- text file containing a set of commands and comments
- can be used later to re-execute the saved commands
- can be edited to execute a modified version of the commands

# Introduction

## Scripts



Step 1



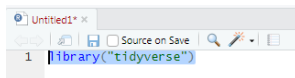
Step 2



# Introduction

## Scripts

Running a command:



Highlight text and press Ctrl+Enter

R is really punctilious

- you must **highlight all letters** in command to run it
- R is **case-sensitive** (i.e.  $a \neq A$ )

# Introduction

## Scripts

Comment your scripts!

- **code is re-used** several times
- you may know now **what you intend** to do, but **you will probably forget** that in the future
- all text following a `#` is understood as a comment
- comments are **not read as code**

```
1 library(tidyverse) #Loads tidyverse library
```

Comment on a script

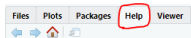


# Introduction

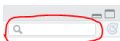
## Help

R has built-in help documents

- provide a complete **summary of each function**
- details of **arguments necessary to run** function



Help menu



Search a function

?

or

help()

# Introduction

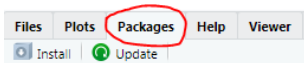
## Packages

We will work with functions

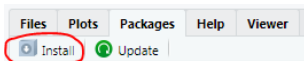
- most are pre-loaded into R
- but, there are lots of useful user-written functions, built-into **packages**

# Introduction

## Packages

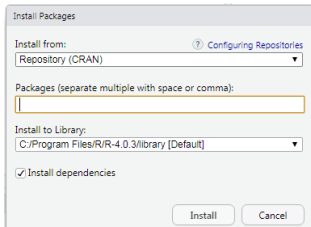


Packages menu



Installing a Package -Step 1

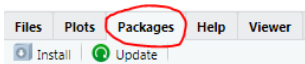
`install.packages()`



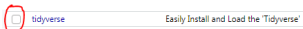
Installing a Package - Step 2

# Introduction

## Packages



Packages menu



Loading a library

`library()`

# Data Manipulation

## Objects:

- Vectors: group of elements, all from the same type
- Array/Matrices: vectors with more than one dimension
- Data Frames: to store datasets
- Lists: contain different objects

## Data types:

- Numeric: numbers
- Character: string variables
- Logical: TRUE or FALSE
- Factor: string variables for categorization

# Data Manipulation

## Imputing data:

- ③ Assign a value (i.e. 1)

We can also input vectors:

- function seq is used to specify a sequence of values

# Reading data from files

Many times you will want to analyze data already compiled

`read_excel(path, sheet=NULL, range=NULL)`

- we need to specify the path for the dataset
- we can select a specific sheet and/or range to import

# Basic summary statistics

## Some basic summary statistics

- Sum: `sum, rowSums, colSums`
- Mean: `mean, rowMeans, colMeans`
- Standard Deviation: `sd`
- Range: `range`
- Quantiles: `quantile`



# Plotting data

- R has a basic built-in package for plotting data
- `ggplot2` is a powerful and commonly used package

```
plot(x,y,type="p")
```

- we need to specify the variable depicted at the x-axis and the y-axis
- we can select a specific type of graph (i.e. "p" for points, "l" for lines)
- we can then add several features for the graph
  - title
  - axis labels
  - axis ranges
  - lines/points aesthetics
  - legend

# Bibliography

There are tons of excellent guides for learning R. Feel free to explore for yourself and find the one that suits you.

I include (with link!) a few that have been useful for me:

- [An Introduction to R](#)

*Short official introduction to R. Complete, but an arid read.*

- [R for Data Science](#)

*Manual covering everything from getting data to communicating results.*

- [Introduction to Econometrics with R](#)

*Empirical companion for 'Introduction to Econometrics' by Stock & Watson (2015). Provides interactive scripts to reproduce results.*

- [RStudio cheatsheets](#)

*Cheatsheets are concise set of notes for quick reference.*

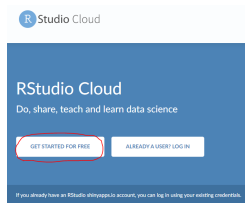
- [Datacamp](#)

*Datacamp is a non-free interactive learning platform. Lessons include exercises with instant correction. Mostly useful for initial learning.*

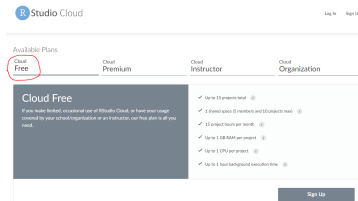
## Annex

# Introduction

## First steps - Online



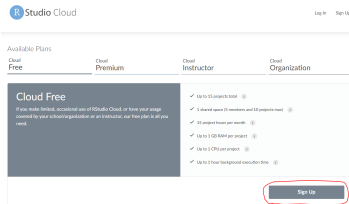
### Step 1



### Step 2

# Introduction

## First steps - Online



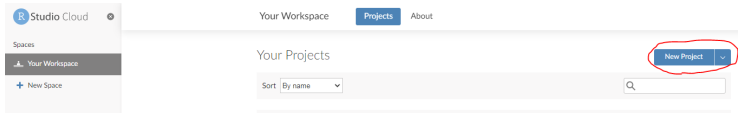
### Step 3

You can register as a new user, use your Google user, or use your Github user

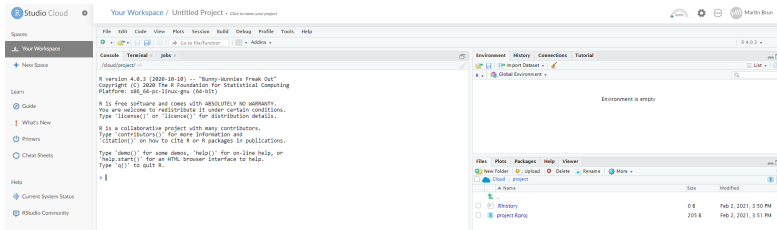
# Introduction

## First steps - Online

After registration, you enter the platform:



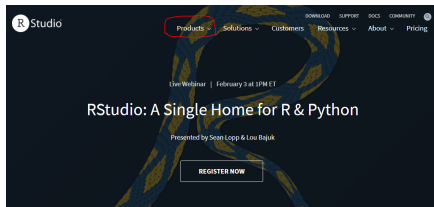
### Step 4



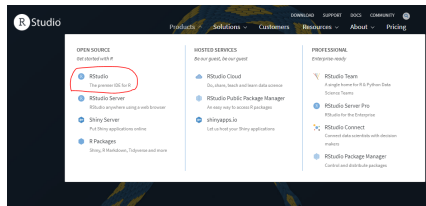
Ready to Start!

# Introduction

## First steps - Desktop



### Step 1



### Step 2

# Introduction

## First steps - Desktop



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### RStudio

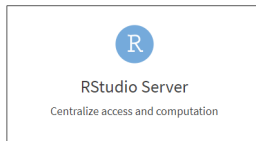
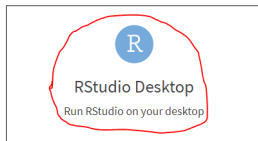
#### Take control of your R code

RStudio is an integrated development environment (IDE) for R. It includes a console, syntax-highlighting editor that supports direct code execution, as well as tools for plotting, history, debugging and workspace management. [Click here to see more RStudio features.](#)

RStudio is available in **open source** and **commercial** editions and runs on the desktop (Windows, Mac, and Linux) or in a browser connected to RStudio Server or RStudio Server Pro (Debian/Ubuntu, Red Hat/CentOS, and SUSE Linux).

### Step 3

There are two versions of RStudio:



### Step 4



# Introduction

## First steps - Desktop

RStudio Desktop	
Open Source Edition	RStudio Desktop Pro
<ul style="list-style-type: none"><li>Access RStudio locally</li><li> syntax highlighting, code completion, and smart indentation</li><li>Execute R code directly from the source editor</li><li>Quickly jump to function definitions</li><li>View source changes in real time within the Visual Studio Editor</li><li>Easily manage multiple working directories including projects</li><li>Integrated R help and documentation</li><li>Interactive debugger to diagnose and fix errors</li><li>Extensive package development tools</li></ul>	<ul style="list-style-type: none"><li>Access RStudio locally</li><li>about the features of open source plan</li><li>A commercial license for organizations not able to use GPL, software</li><li>Access to priority support</li><li>RStudio Professional Services</li><li>Connect directly to your RStudio Server Pro instance remotely</li></ul>
<b>Support</b>	Community forums only
<b>License</b>	AGPL v3
<b>Pricing</b>	Free
<a href="#">Download RStudio Desktop</a>	
<a href="#">RStudio Desktop Pro Trial</a>	
<a href="#">Purchase</a>   <a href="#">Contact Sales</a>	

### Step 5

#### RStudio Desktop

Open Source License

**Free**[DOWNLOAD](#)[Learn more](#)

#### RStudio Desktop Pro

Commercial License

**\$995**

/year

[BUY](#)[Learn more](#)

#### RStudio Server

Open Source License

**Free**[DOWNLOAD](#)[Learn more](#)

#### RStudio Server Pro

Commercial License

**\$4,975**

/year

(5 Named Users)

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### Step 6

# Introduction

## First steps - Desktop

First, we will install the R **language**

RStudio Desktop 1.4.1103 - [Release Notes](#)

1. Install R. RStudio requires **R 3.0.1+**.
2. Download RStudio Desktop. Recommended for your system:



Requires Windows 10/8/7 (64-bit)

## Step 7

The Comprehensive R Archive Network

### 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.

## Step 8

# Introduction

## First steps - Desktop

### R for Windows

Subdirectories:

[base](#)

Binaries for base distribution. This is what you want to [install R for the first time](#)

[contrib](#)

Binaries of contributed CRAN packages (for R  $\geq$  2.13.x; managed by Uwe Ligges). There is also information on [third party software](#) available for CRAN Windows services and corresponding environment and make variables.

[old.contrib](#)

Binaries of contributed CRAN packages for outdated versions of R (for R  $<$  2.13.x; managed by Uwe Ligges).

[Rtools](#)

Tools to build R and R packages. This is what you want to build your own packages on Windows, or to build R itself.

Please do not submit binaries to CRAN. Package developers might want to contact Uwe Ligges directly in case of questions / suggestions related to Windows binaries.

You may also want to read the [R FAQ](#) and [R for Windows FAQ](#).

Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables.

## Step 9

### R-4.0.3 for Windows (32/64 bit)

[Download R 4.0.3 for Windows](#) (85 megabytes, 32/64 bit)

[Installation and other instructions](#)

[New features in this version](#)

## Step 10

# Introduction

## First steps - Desktop

Second, we will install the R **environment**

RStudio Desktop 1.4.1103 - [Release Notes](#)

1. Install R. RStudio requires R 3.0.1+.
2. Download RStudio Desktop. Recommended for your system:



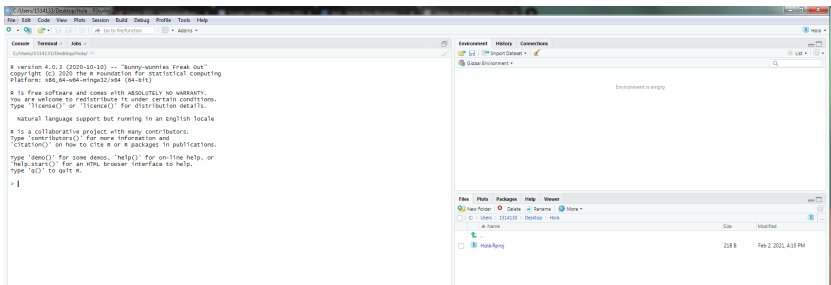
Requires Windows 10/8/7 (64-bit)

Step 11

# Introduction

## First steps - Desktop

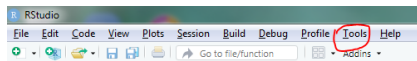
After all installations, open RStudio



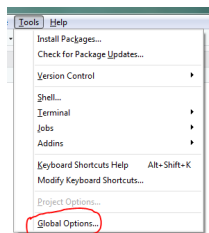
Ready to Start!

# Do your eyes a favor!

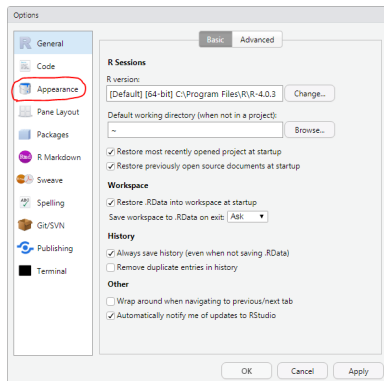
Use a Dark Mode



Step 1



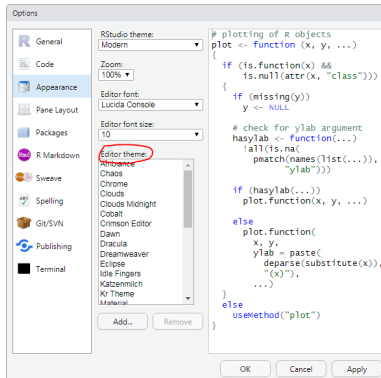
Step 2



Step 3

# Introduction

## First steps - Online



You can choose among many dark mode themes.

I recommend: "Idle Fingers" "):