GSERM - Ljubljana 2023

R (and LaTeX)

More Materials:

https://github.com/PrisonRodeo/GSERM-Ljubljana-APD-git

December 28, 2022

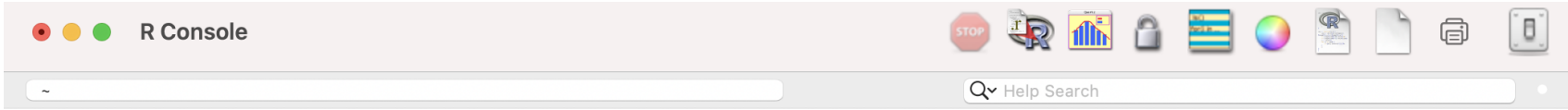
R (and RStudio)

- R
  - "R is a free software environment for statistical computing and graphics."
  - The R Project: https://www.r-project.org/
  - Comprehensive R Archive Network (CRAN): https://cran.r-project.org/

- RStudio
  - A free, open-source GUI for R
  - Website: https://www.rstudio.com/

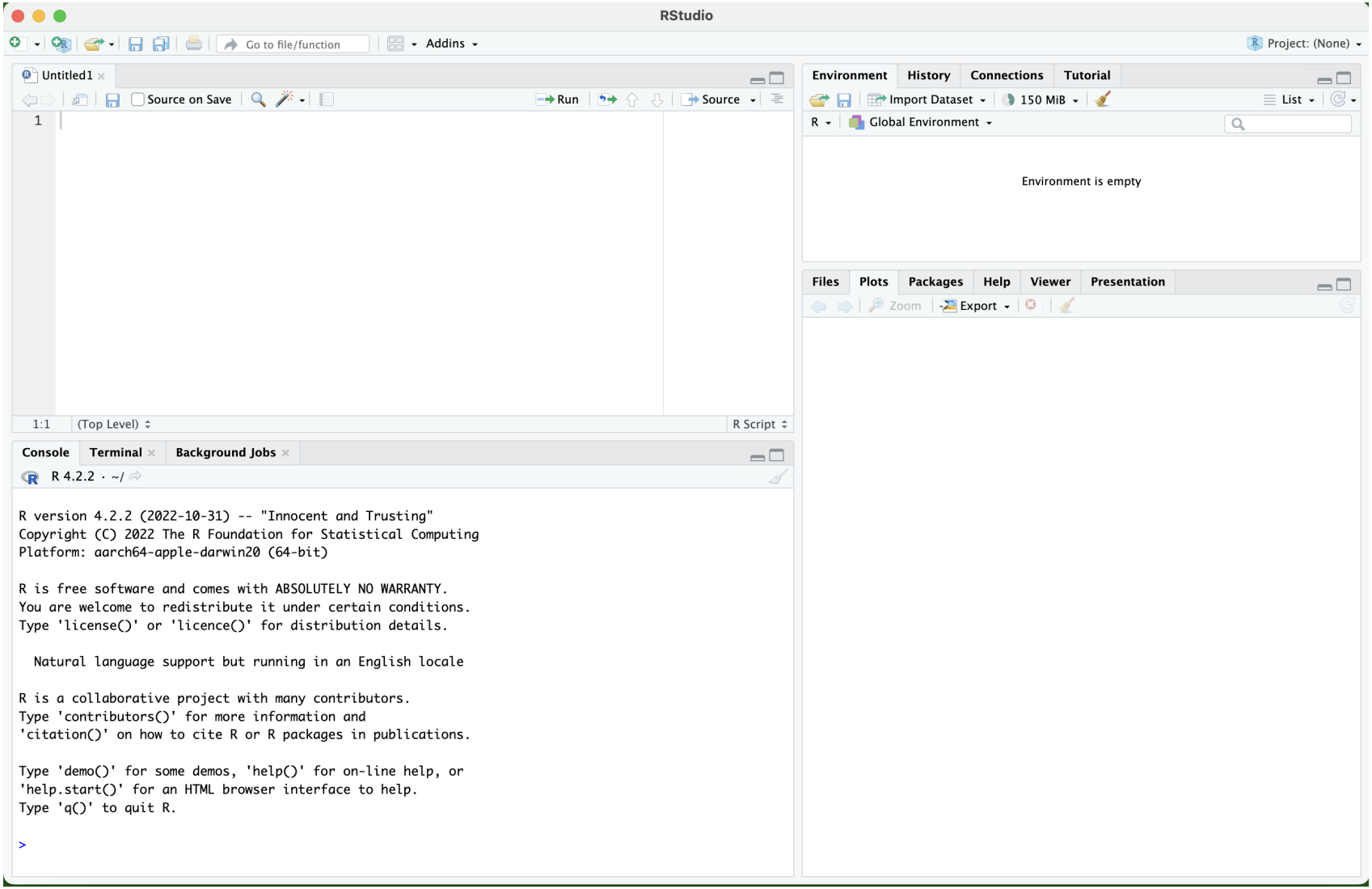
R:

- Is an **object-oriented** language
- Is made up of:
  - Objects
  - Functions
  - Classes (of objects and functions)
- Is **Turing complete**
- Is **modular**
  - User-created **packages**
  - Organized into **task views** (https://cran.r-project.org/web/views/)
- Runs on UNIX/Linux/OS-X/Windows




```
R version 4.2.2 (2022-10-31) -- "Innocent and Trusting"
Copyright (C) 2022 The R Foundation for Statistical Computing
Platform: aarch64-apple-darwin20 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
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.

[R.app GUI 1.79 (8160) aarch64-apple-darwin20]

[History restored from /Users/cuz10/.Rapp.history]

>
```

RStudio


RStudio
Go to file/function
Addins
Project: (None)
Untitled1
Source on Save
Run
Source
1
1:1
(Top Level)
R Script
Environment
History
Connections
Tutorial
Import Dataset
150 MiB
List
R
Global Environment
Environment is empty
Files
Plots
Packages
Help
Viewer
Presentation
Zoom
Export
Console
Terminal
Background Jobs
R 4.2.2 · ~/
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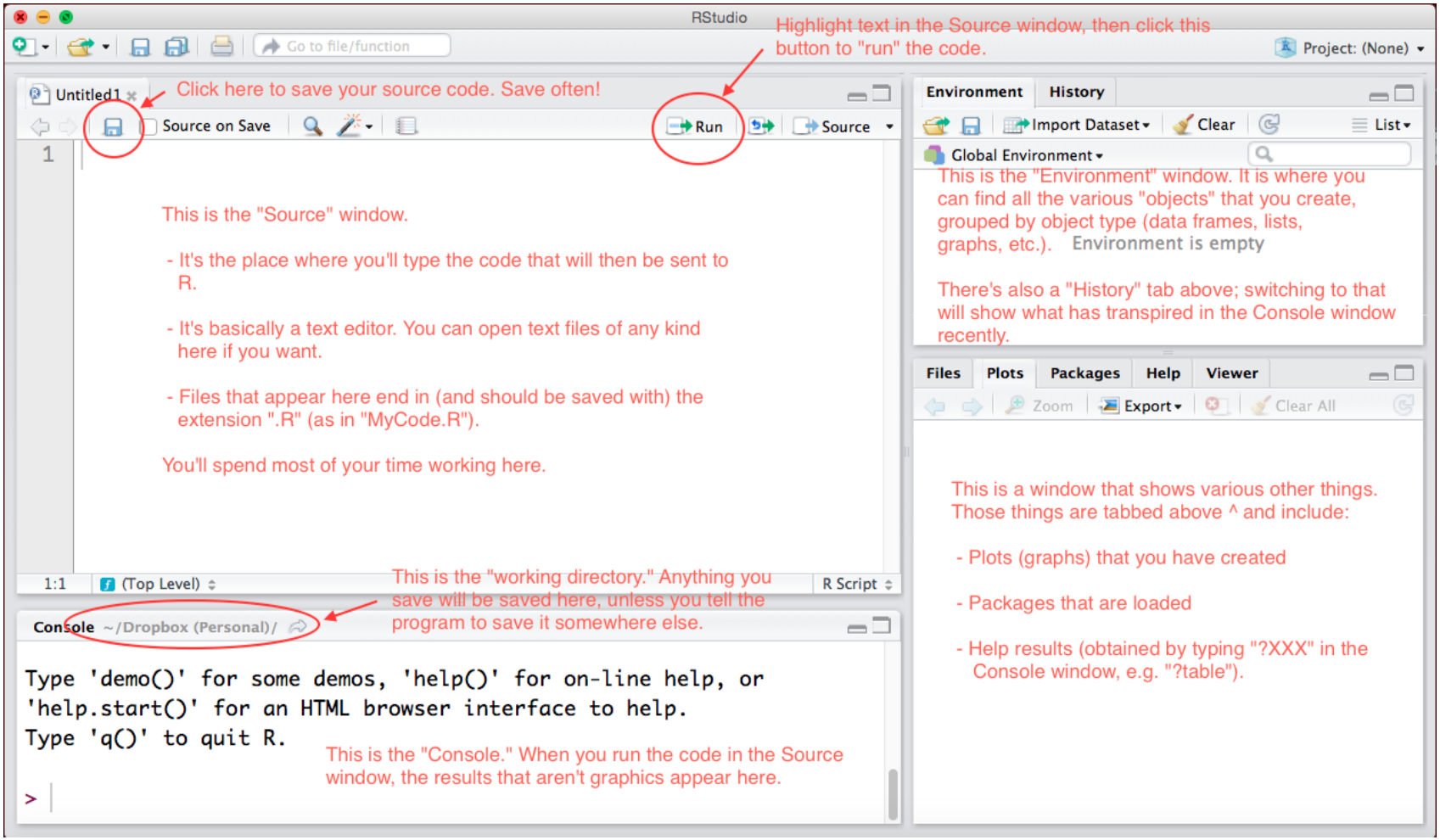
>

RStudio (annotated)



Inside the Source Window

This:

```
> table(df$X)
```

... means "Type the phrase 'table(df$X)' on the command line," or – equivalently – "Type the phrase 'table(df$X)' into your Source code, and then run it."

Inside the Source Window

More often, you'll see:

```
with(df, plot(Y~X,pch=19,col="red")) # draw a scatterplot
abline(h=0,lty=2) # add a horizontal line at zero
abline(v=0,lty=2) # add a vertical line at zero
text(df$X,df$Y,labels=df$names,pos=1) # add labels
```

... which means "Put this block of text into your Source code, and then run it."

Note:

- R / RStudio ignores line breaks
- Anything to the right of a "#" is a comment

Very basic R examples...

(see the file named `GSERM-2023-R-Intro.R` in the `Code` folder in the github repo)

Help For Learning R(Studio)

In rough order of preference:

- Quick-R (`http://www.statmethods.net/`)
- The "Level-Zero" R Tutorial (doesn't integrate RStudio, but is otherwise very good)
- Statistics with R
- The Do It Yourself Introduction to R
- Also be sure to consult the GSERM / RfP "Useful R Resources" guide (on GitHub)

R + LaTeX: Sweave, `knitr`, and RMarkdown

- Sweave "...enables the embedding of R code within LaTeX documents to generate a PDF file that includes narrative and analysis, graphics, code, and the results of computations."
- `knitr` is an R package that expands the capabilities of Sweave
- RMarkdown integrates R into Markdown (using `knitr` and Pandoc)
- Key point: **Integrates data analysis and document creation**
  - Analysis and text are in the same document
  - Documents are *dynamic*: When the data changes, the document changes

R + LaTeX: Resources

- The Sweave User Manual
- The homepage of the `knitr` package
- RMarkdown: The Definitive Guide
- The RMarkdown Gallery (many examples, with code!)