introductoryR

Austin Haffenden

a.haffenden@keele.ac.uk
William Smith: WS1.16

www.github.com/ahaffenden

What is R?

An interpreted computer language.

- User-visible functions written in R
- Possible to interface with other programming languages
- System commands can be called from within R

Used for:

- data manipulation, statistics and graphics

Is made up of:

- Operators (+ - <- * %*% …) for calculations on arrays & matrices
- Large, coherent, integrated collection of functions
- Facilities for making unlimited types of publication quality graphics
- User written functions & sets of functions (packages); 800+ contributed packages so far & growing

Open Source

- Not just free:
  - Provides full access to code
  - Ability to fix bugs and extend software
  - Forum allowing researchers to explore and expand methods
  - Cutting Edge! Constant development
  - Ensures that scientists are the co-owners of software tools needed to carry out research
  - Promotes reproducible research by providing open and accessible tools
  - Most of R is written in… R! Making it (relatively) easy to see what functions are actually doing.

R Advantages

- Fast and free.
- State of the art
- 2nd only to MATLAB for graphics.
- Active user community
- Excellent for simulation, programming, computer intensive analyses, etc.
- Forces you to *think* about your analysis.
  – You need to understand what you are doing
- Interfaces with database storage software (SQL)

R Disadvantages

- Steep learning curve
- No commercial support; can be frustrating
  – (see above)
- Easy to make mistakes (= learning)
- Working with very large datasets is limited by RAM (physical memory)
  – Newer packages developed to deal with this
- Little, but improving, support for 3D or dynamic graphics

R Packages

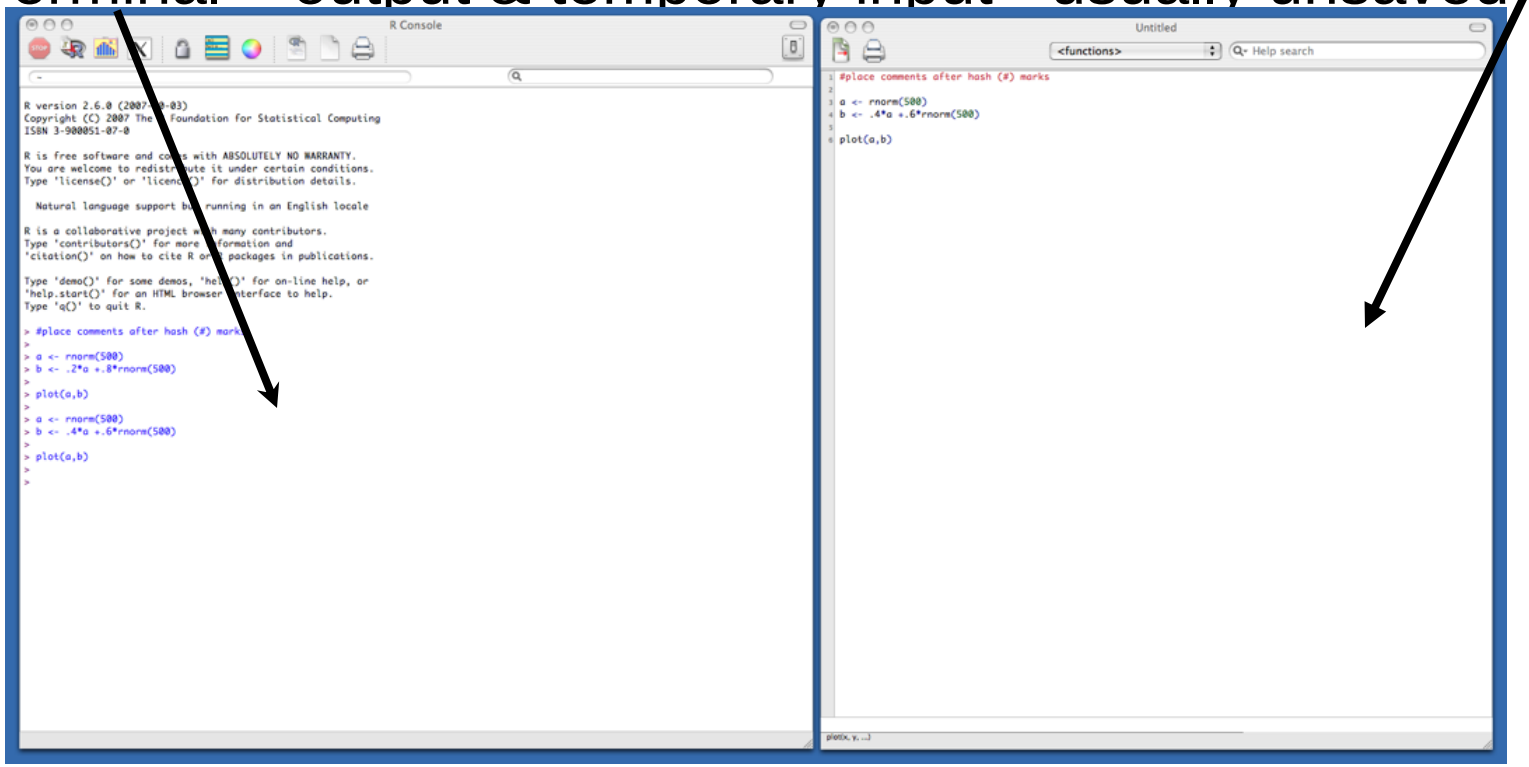
Repository:

http://cran.r-project.org/src/contrib/PACKAGES.html

- Enormous advantage - new techniques available without delay and you already know the language
- Allows construction of customized statistical programs
- Around 4000 packages on CRAN

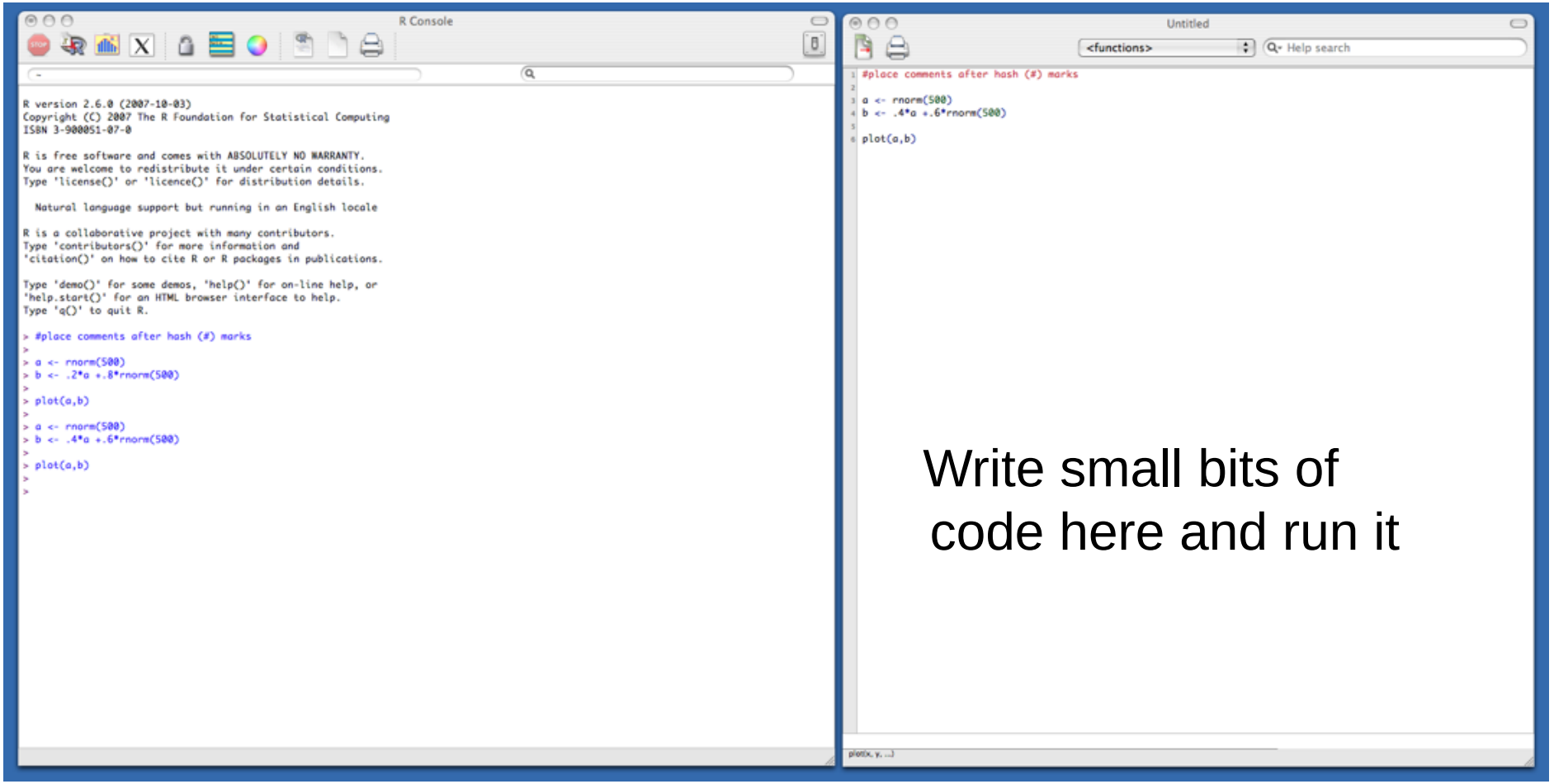
Typical R session

- Start up R via the GUI or favorite text editor
- Two windows:
  - 1+ new or existing scripts (text files) - these will be saved
  - Terminal – output & temporary input - usually unsaved



Typical R session

- R sessions are *interactive*



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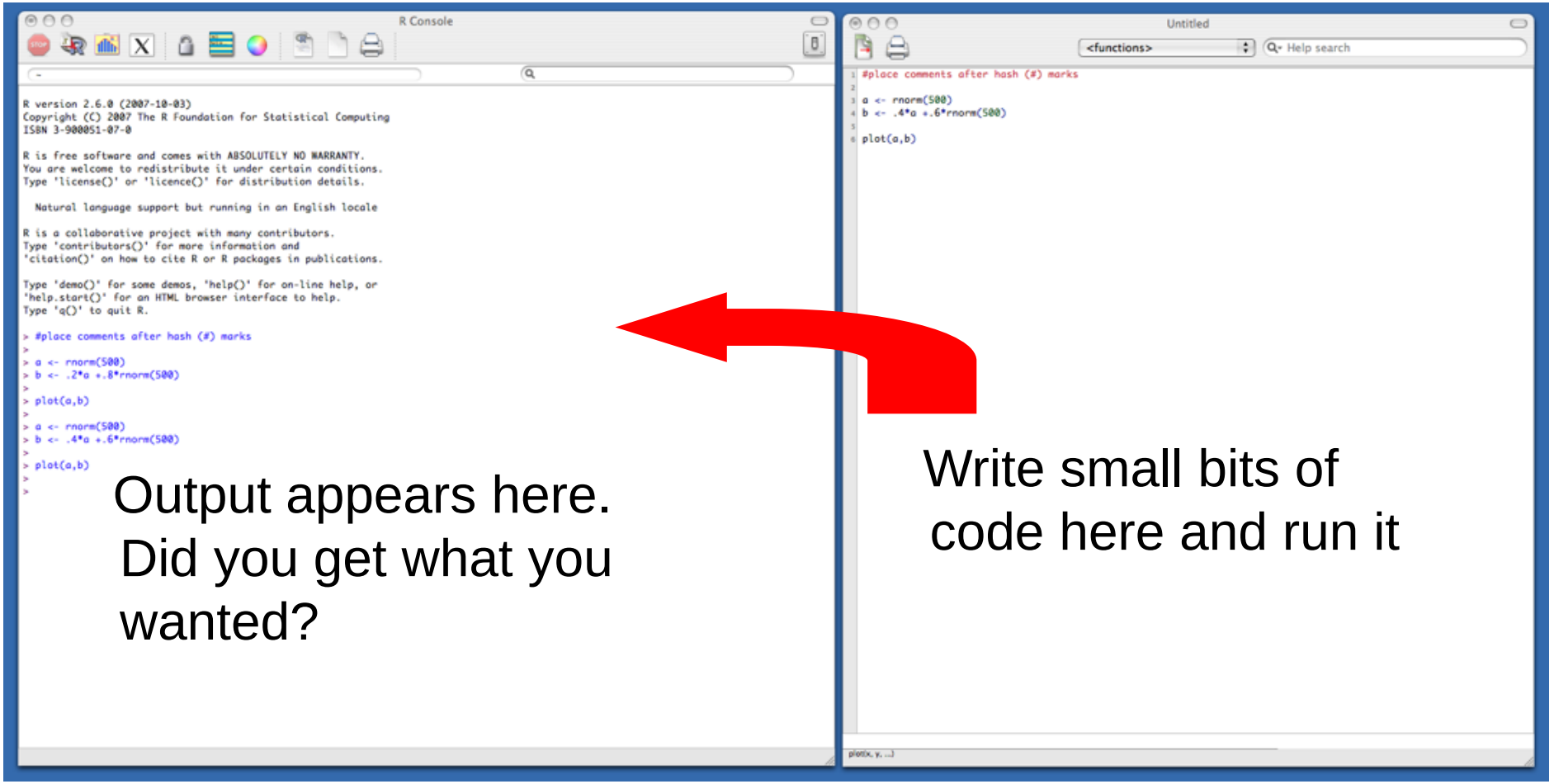

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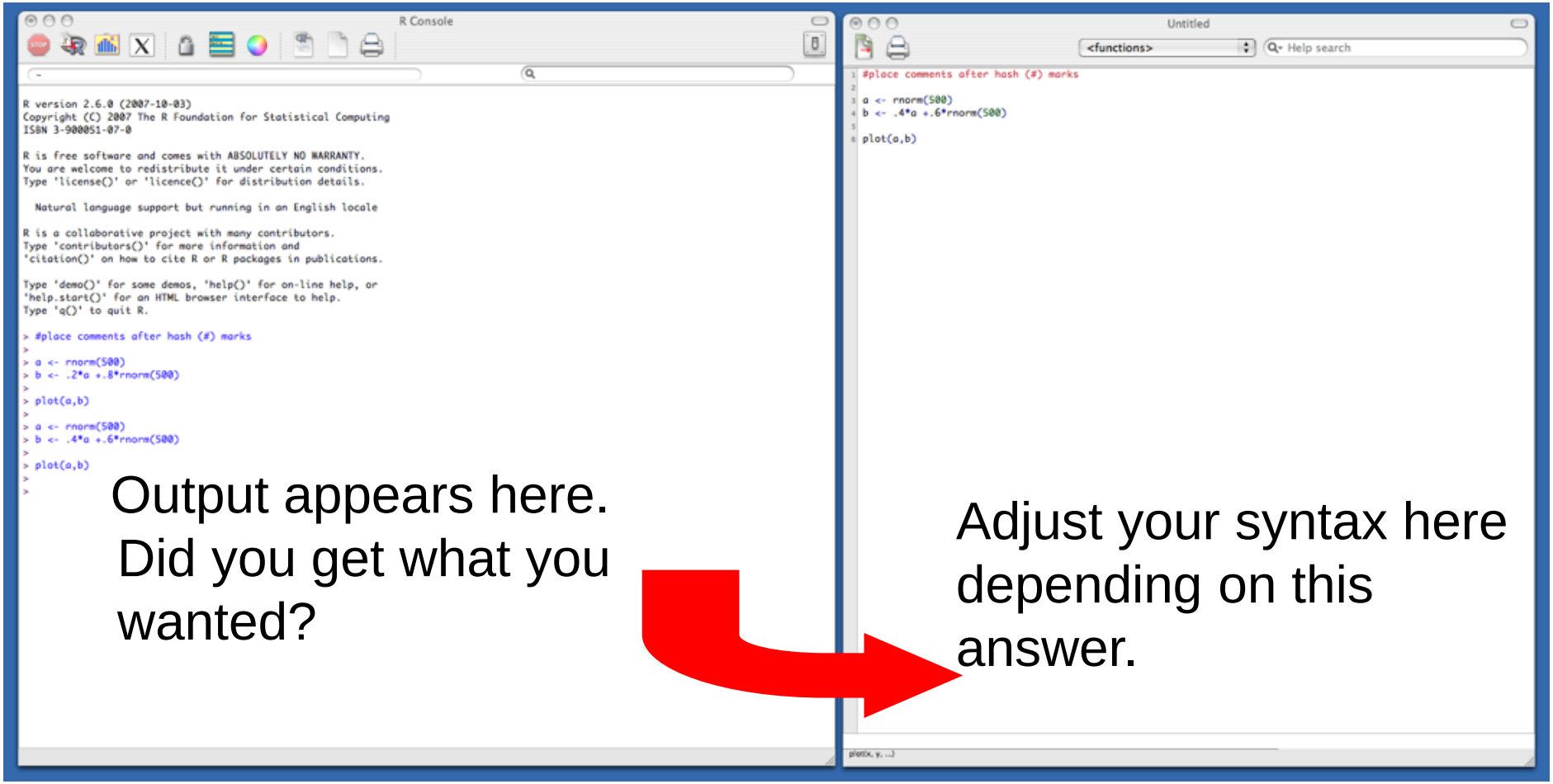

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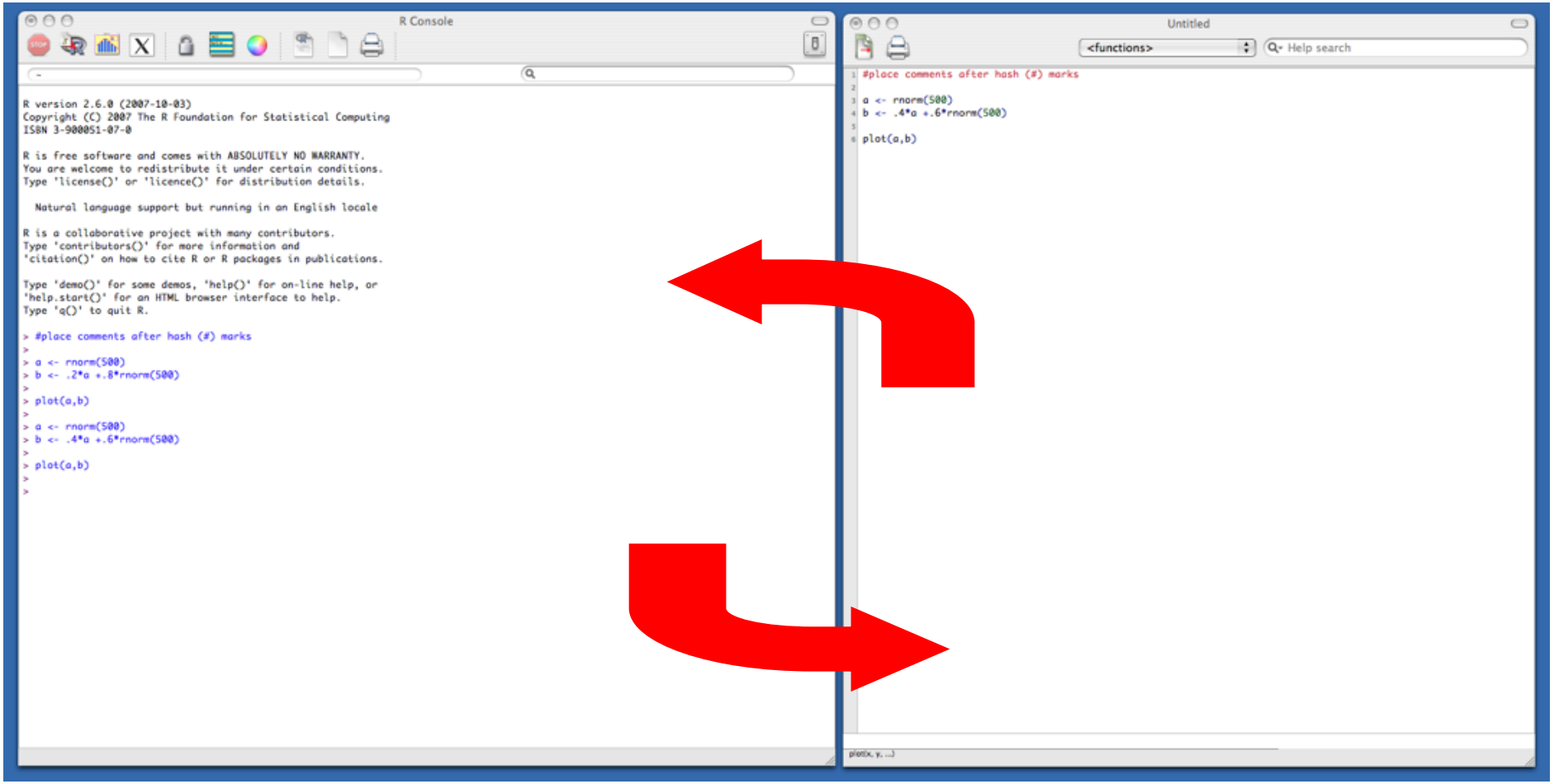

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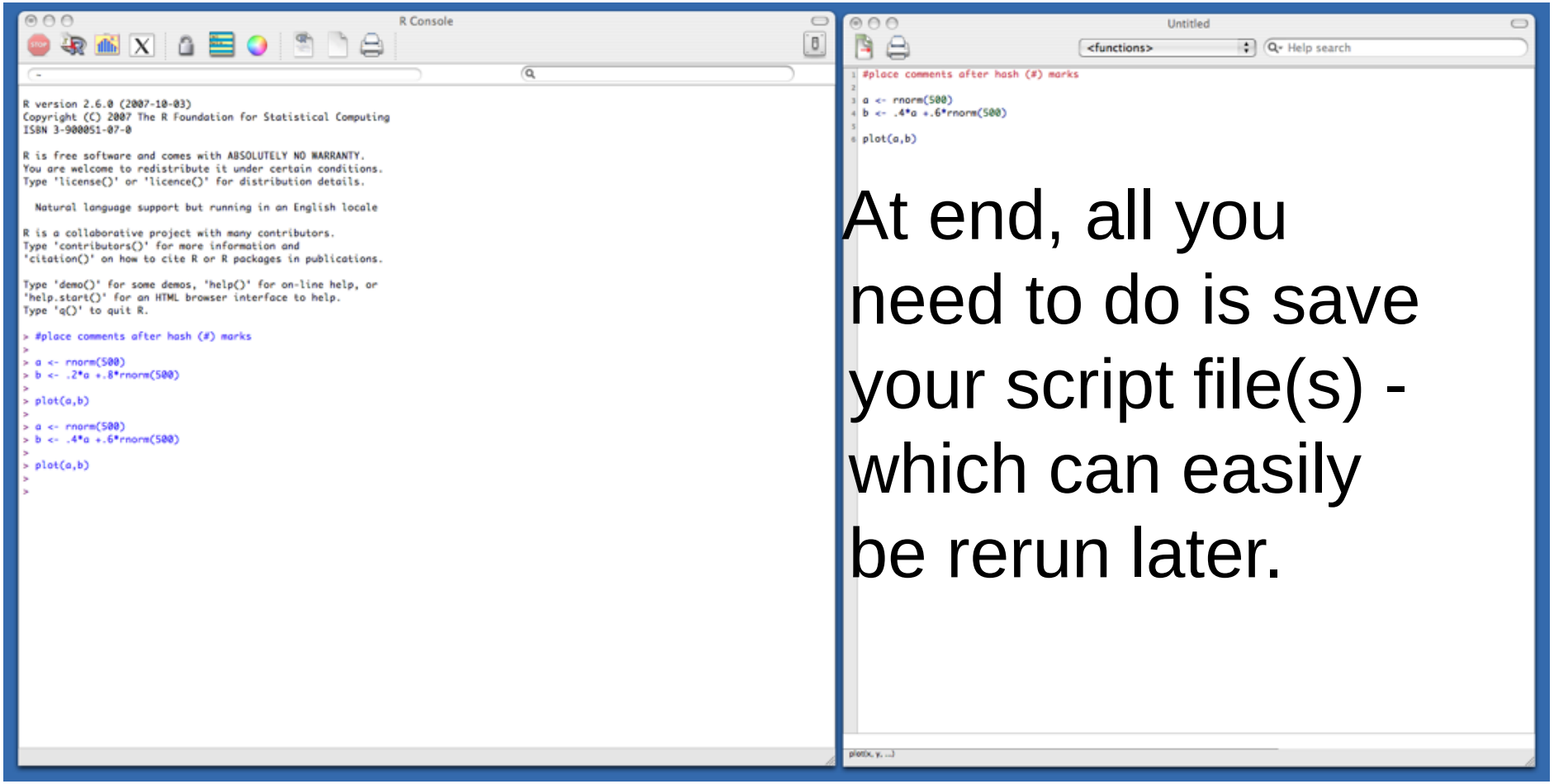

Learning R

- Swirl package
- Search for answers on Google
- Play with your data and make mistakes
- help(lm) or ?lm gives you help on lm function.
  - Read the help files.
  - Try the example code provided
- Subscribe to r-help and ask questions (politely)
  - https://stat.ethz.ch/mailman/listinfo/r-help
- The more time that you spend using R the easier it gets.

R Document Resources

- Available from CRAN (https://cran.r-project.org
  - An Introduction to R
  - Writing R Extensions – package development
  - R Data Import/Export
- A multitude of tutorials, cheat sheets, scripts etc. available on the web.

For next session

- Continue with the swirl package
- ‘**Open Intro**: A very basic introduction to statistics, data analysis, and data visualization’

```
library(swirl)
install_from_swirl("Open Intro")
swirl()
```