A gentle introduction to R and RStudio

Stephen Cook*

R is a programming language that is used by scientists in a wide variety of fields. It is open source (free to use and driven by community development) and installable on all major operating systems. RStudio is a separate installation from the R language, and is a desktop program that provides a graphical wrapper to the R language. The technical term for this type of program is *integrated development environment* (IDE), and it makes life much easier when using R. This document will get you up and running in R and RStudio on your personal machine. You will need installation permission on your computer (if installing on your home computer you will almost certainly have this).

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1 Installation

Depending on download and computer speed, you should plan to spend about 15 minutes installing both R and RStudio. The LaTeX download is much larger, and could take longer if you are not on fast internet.

1.1 R

We will use R for calculations, statistical analyses, and plotting data. R is generally more powerful than Excel or other 'point-and-click' programs, and once you generate code to perform a certain calculation or generate a graph, you may quicly reuse that code throughout the semester.

There are numerous online resources (including YouTube videos) that outline how to install R. Below are general instructions for a normal installation in Windows 10.

1. Navigate to the R project homepage.
2. Click on the **CRAN** link under the **Download** header on the left side of the page. **CRAN** is an archival network that stores R and the majority of 3rd-party packages.
3. Choose your operating system, and then click through using either the **base** hyperlink or the **install R for the first time** hyperlink (they take you to the same place).
4. Click **Download R**, which will download an executable into your downloads folder.
5. Run this executable file, which will take you through the R installation process. Keep all defaults.

You now have the R language installed on your computer. If you were to open R, and base R terminal would appear (Fig. 1) At its simplest, R is run from this command line window. You could dive in and start scripting immediatly, but there are programs that make navigating and writing in the R language a much more pleasant experience (i.e. R Markdown).

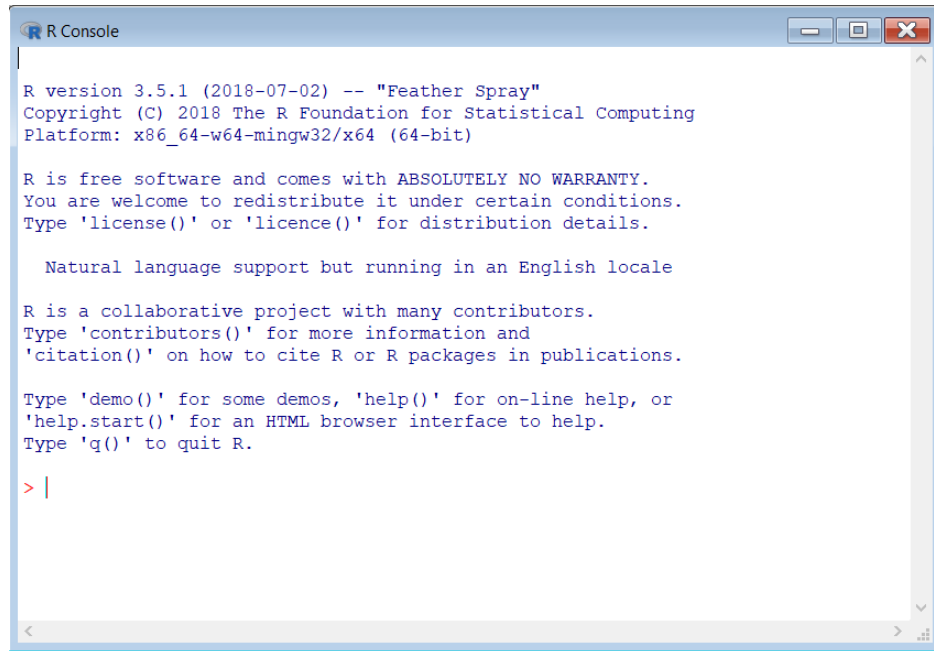*Baylor University, Department of Biology

Figure 1: This is the R console, which you may open after installing R. The text that appears is non-editable, and includes some basic information about the current version of R you have installed (the R team gets creative with their version names). You may start scripting by typing next to the red greater-than sign. While completely functional, the R console lacks many 'bells-and-whistles' that a full IDE provides.

1.2 RStudio

RStudio is a free, open-source **integrated development environment** (IDE) that significantly improves the R experience. It is a excellent text-editor, provides ways to import data into the R environment without writing code, and exports figures and documents. And again, if you prefer a visual walkthrough, there are many good YouTube videos that cover this installation.

1. Navigate to the R Studio homepage.
2. Click **Download R Studio**
3. **Download** the free RStudio open source license. The other options add functionality for large teams of researchers, which we do not need for this lab.
4. Choose your operating system under **Installers for Supported Platforms**, which will download an executable file to your downloads folder.
5. Run this executable file, which will take you through the RStudio installation. Keep all defaults.

2 Getting started in RStudio

2.1 Obligatory 'hello world' example

Programming tutorials have a ubiquitous and questionably useful history of including the 'hello-world' example as the first venture into whatever language the tutorial is presenting. Far be it from me to rob you of this experience.

Congratulations, you have sucessfully convinced the computer to do your bidding.