Getting Started With R

Installation and Configuration of R for the
APSY510/511 Statistics Courses and
Other BCD classes/workshops

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8-28-17 version

What is R?

- An integrated programming language for
  - data handling
  - statistical analysis
  - graphics
- Open source (free) software
- A fast growing choice among statisticians, researcher, and educators
  - http://www.nytimes.com/2009/01/07/technology/business-computing/07program.html


R, the Software, Finds Fans in Data Analysts - NYTimes.com - Mozilla Firefox
http://www.nytimes.com/2009/01/07/technology/business-computing/07program.html
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Stuart Isett for The New York Times
R first appeared in 1996, when the statistics professors Robert Gentleman, left, and Ross Ihaka released the code as a free software package.
By ASHLEE VANCE
Published: January 6, 2009
To some people R is just the 18th letter of the alphabet. To others, it's the rating on racy movies, a measure of an attic's insulation or what pirates in movies say.
R is also the name of a popular
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What is R?

- A powerful core program that can do statistical analysis at levels ranging from simple introductory methods to advanced modern modeling and multivariate methods
- An object oriented programming language that has tremendous flexibility
- A program that gives the analyst complete control over all aspects of the analysis

What is R?

- The core program has extensive capabilities in statistics/graphics

- Add-on programs (called packages) provide tremendous versatility and extend the capabilities
  - over 8900 packages now available (as of 8-24-2016)

What is R?

- A multi-platform program
  - Unix
  - Linux
  - Macs
  - Windows PCs

- R can interact well with other software
  - for example, add-ins for MS Excel permit direct sharing of data and functions

What is R?

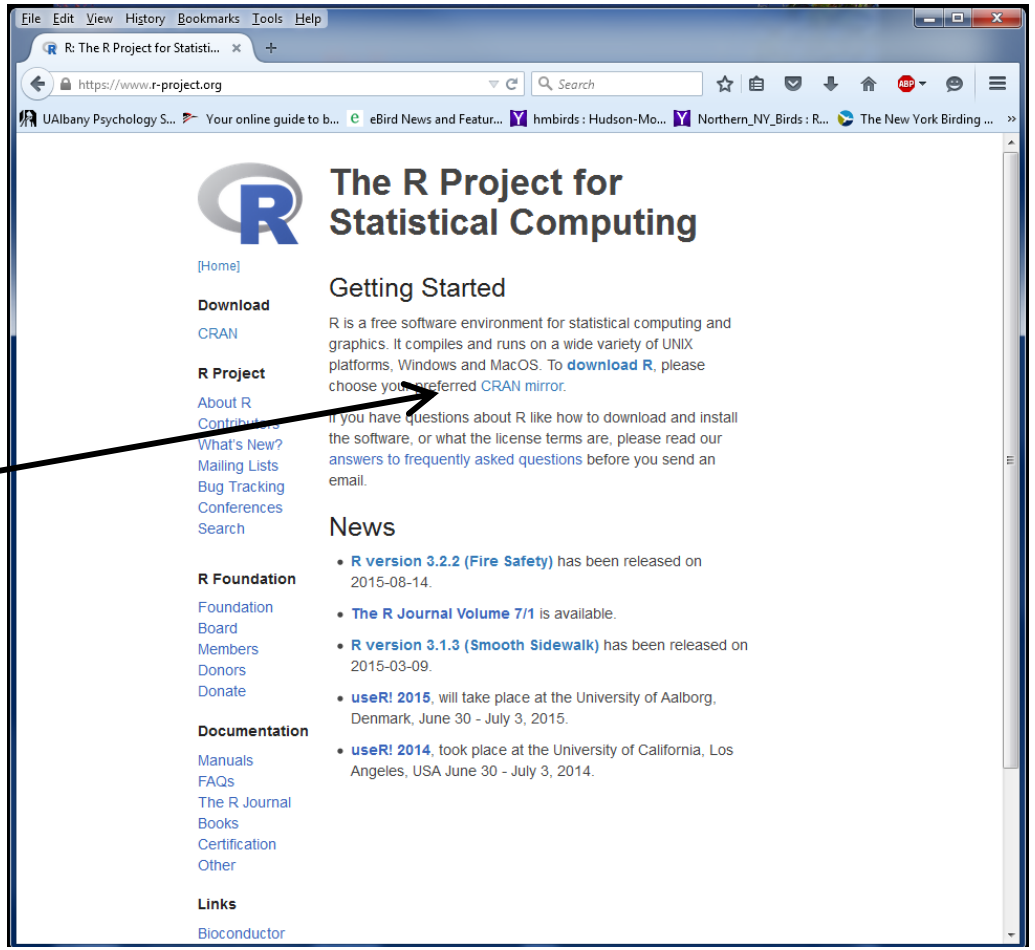
- A difficult program to learn?
  - if computer skills are limited to the menuing type of environment found in Microsoft software, perhaps
  - but ample help/tutorials are available
- A program that is worth the effort to learn since modern commercial statistical software is so expensive
- Did I say that R is free?

What is R?

- Much more than a Statistics program
- It is one of the central tools for modern data science
- Flexible capabilities for both the scientific researcher (like us) and the high level data scientist/programmer/coder

How do I obtain/install R?

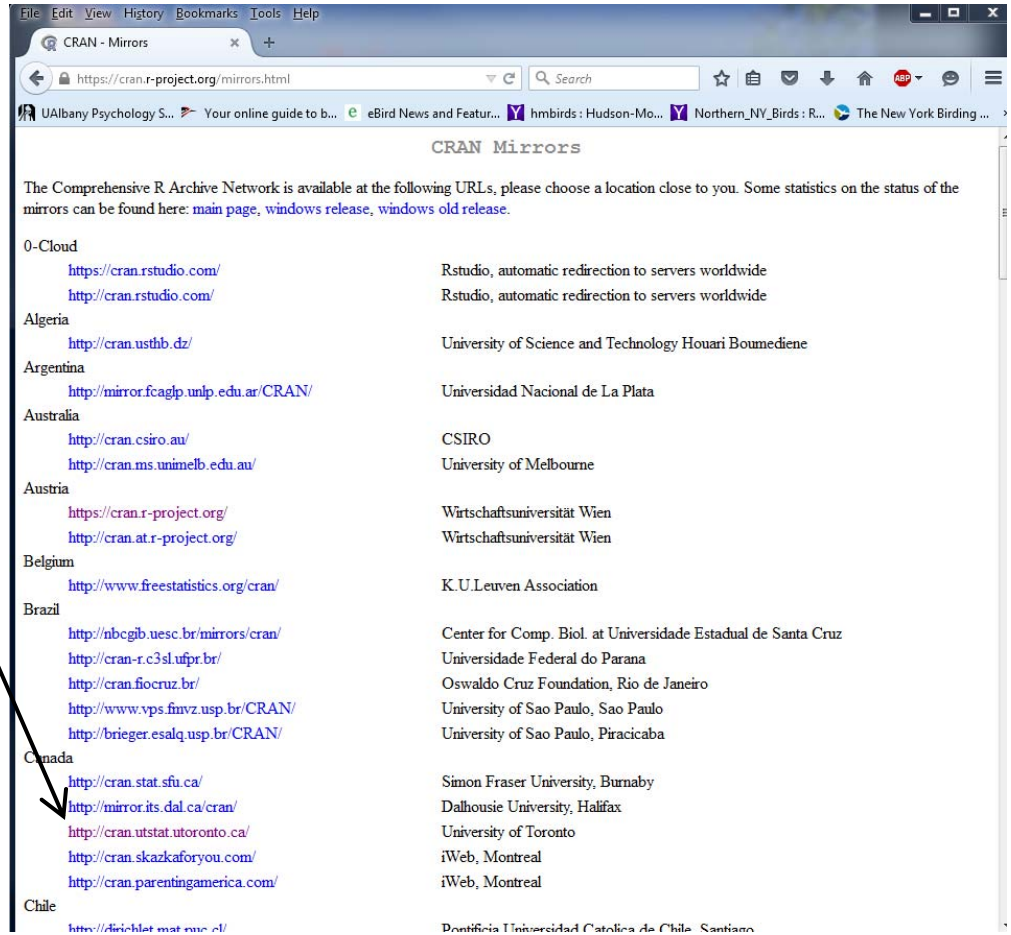
Download the program by choosing a mirror site of CRAN



R Project Home Page: http://www.r-project.org/

CRAN is an Archive Network for R

I usually use the Toronto Site



Note that as of this writing (Aug 2016), R repositories are switching to secure server capability. Only R version 3.2.2 and later can use https sites. Right now, cran mirrors are a mix of http and https sites. Best to use https going forward.

If your initial list shows only https sites, then use the USA (MI1) site.

http://cran.r-project.org/mirrors.html

Which Platform?

- We will only use the PC/Windows platform in the 510/511 class
- But you can install onto which ever platform you use on your own computer
  - virtually all functions are the same

Which Platform?

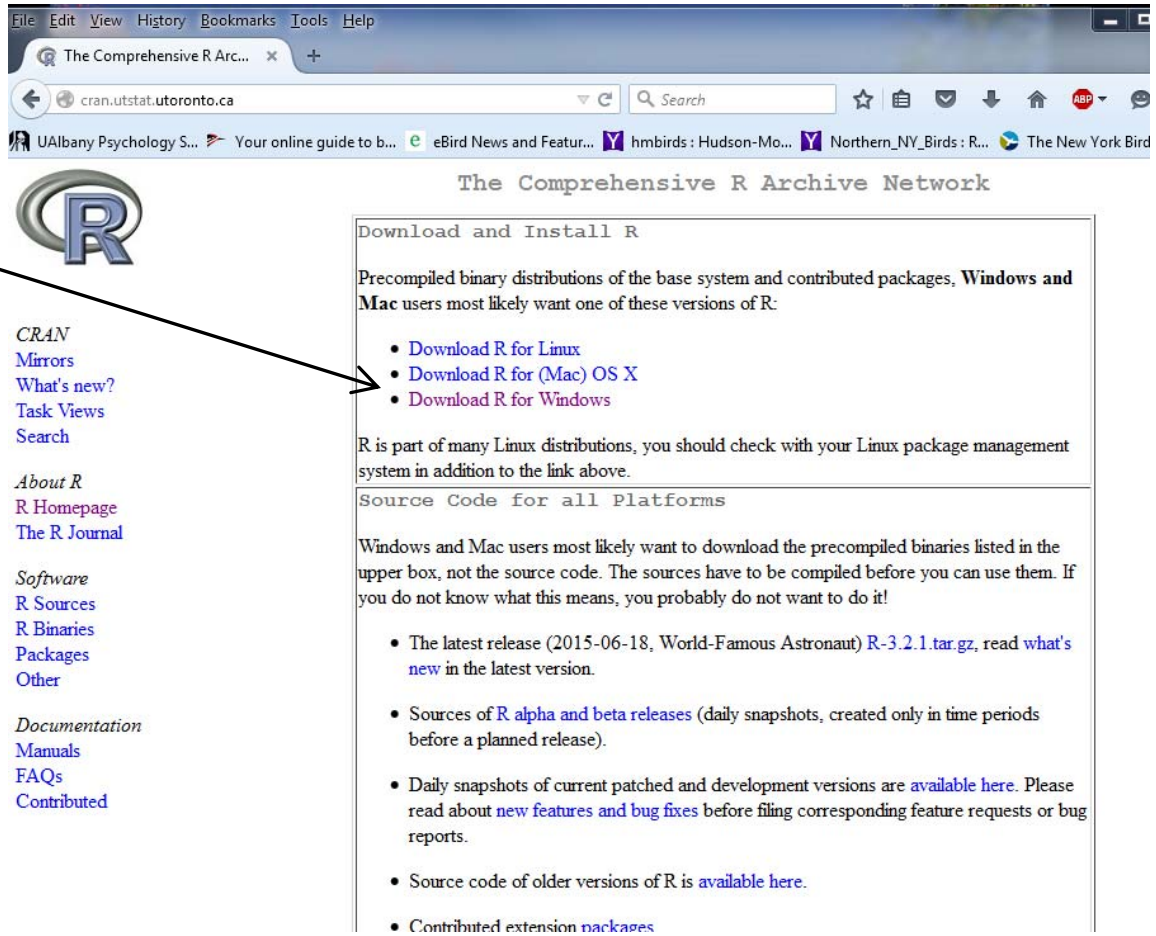
- The next few slides show Windows (7) installation
- Other OS's should be similar

- Later slides summarize some things for Mac OS installations.
- Mac OS users should look through the windows install slides to get a sense of the relevant steps

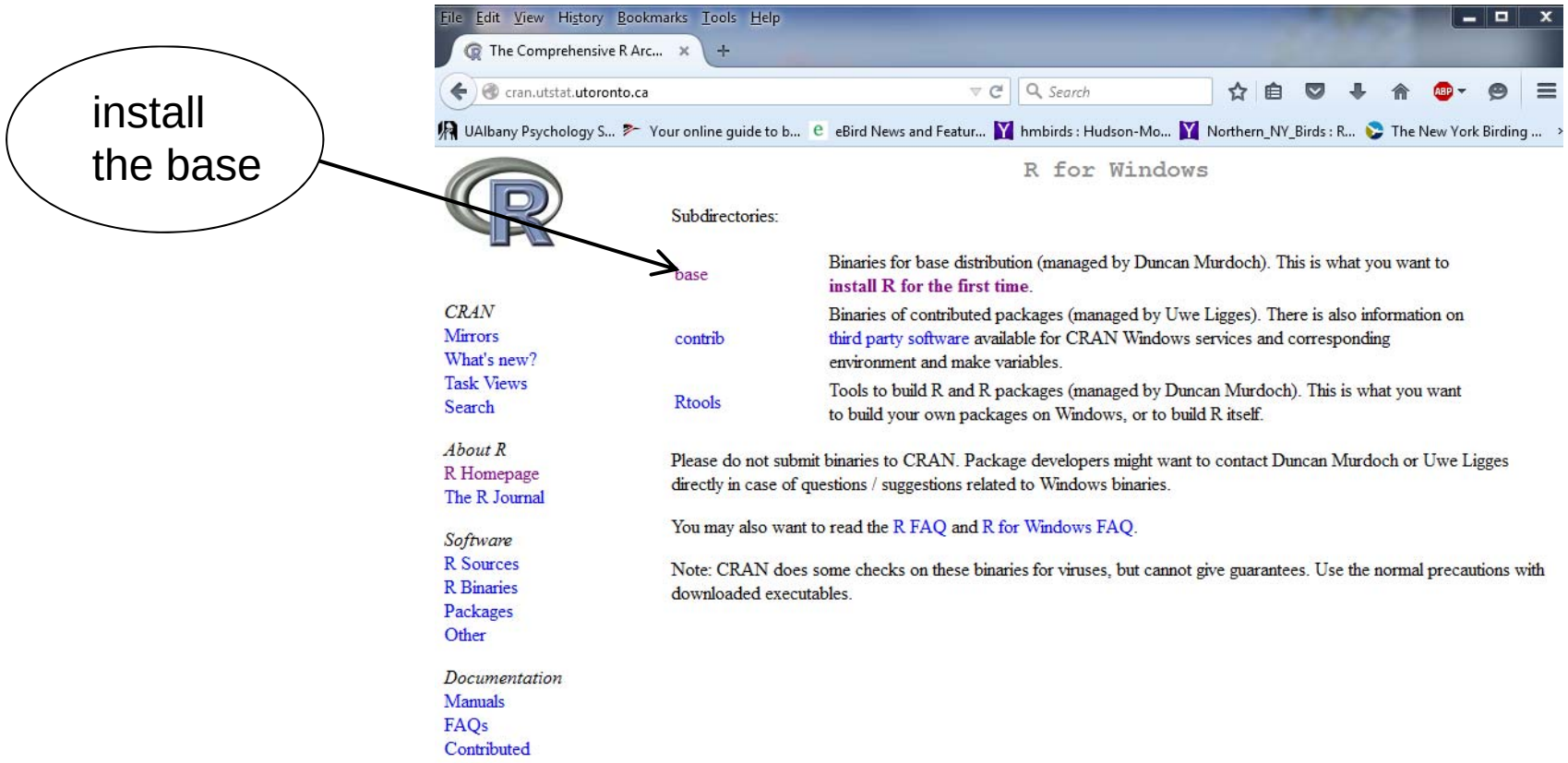
R is updated every few months
The Windows version is a full version

Choose the windows version

http://cran.utstat.utoronto.ca



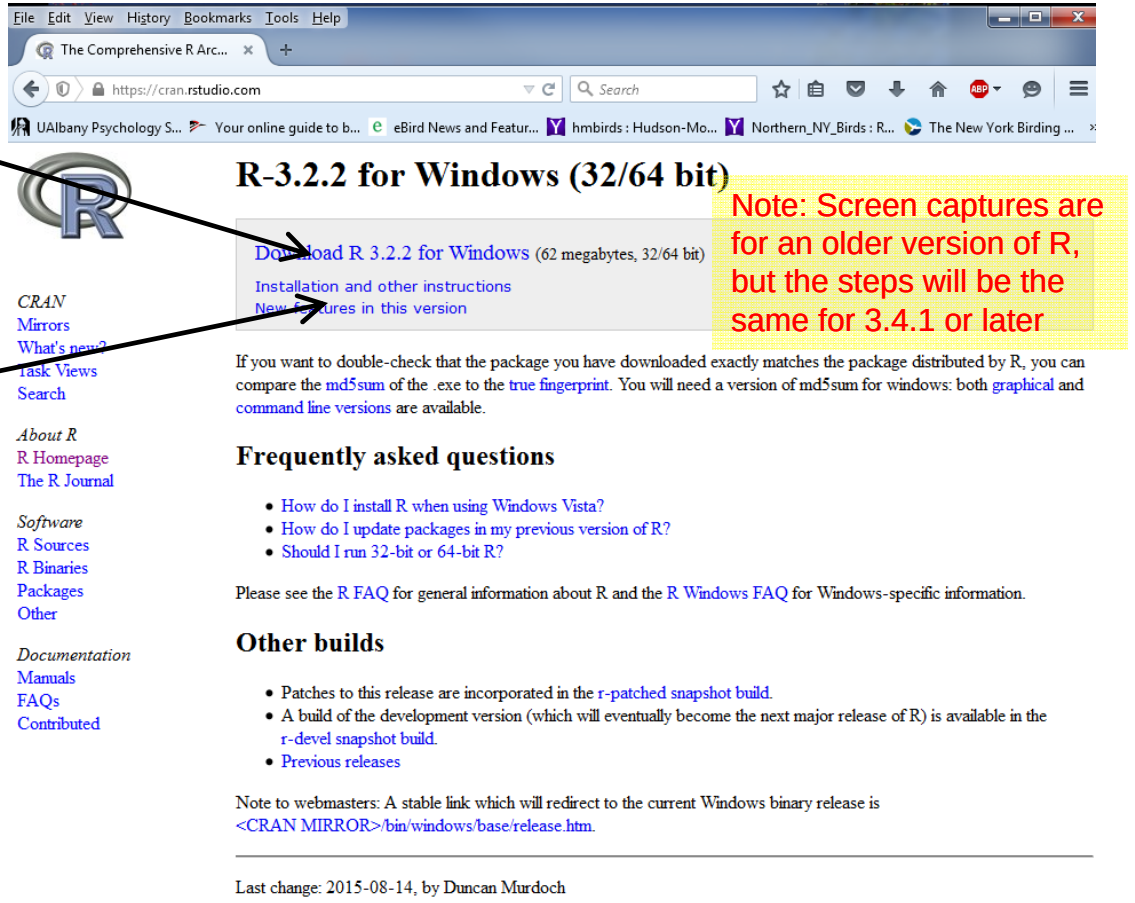
The Base R Program can be downloaded as one install file here



R is up to Ver 3.4.1 now, and possibly higher by the time you read this. For windows, both 32 bit and 64 bit versions are installed if the machine is running a 64 bit operating system. Apple products should all be 64 bit. If you are in a 32 bit windows machine, the R Installation should detect that.

Download file to local PC (see next pg)

Read Instructions



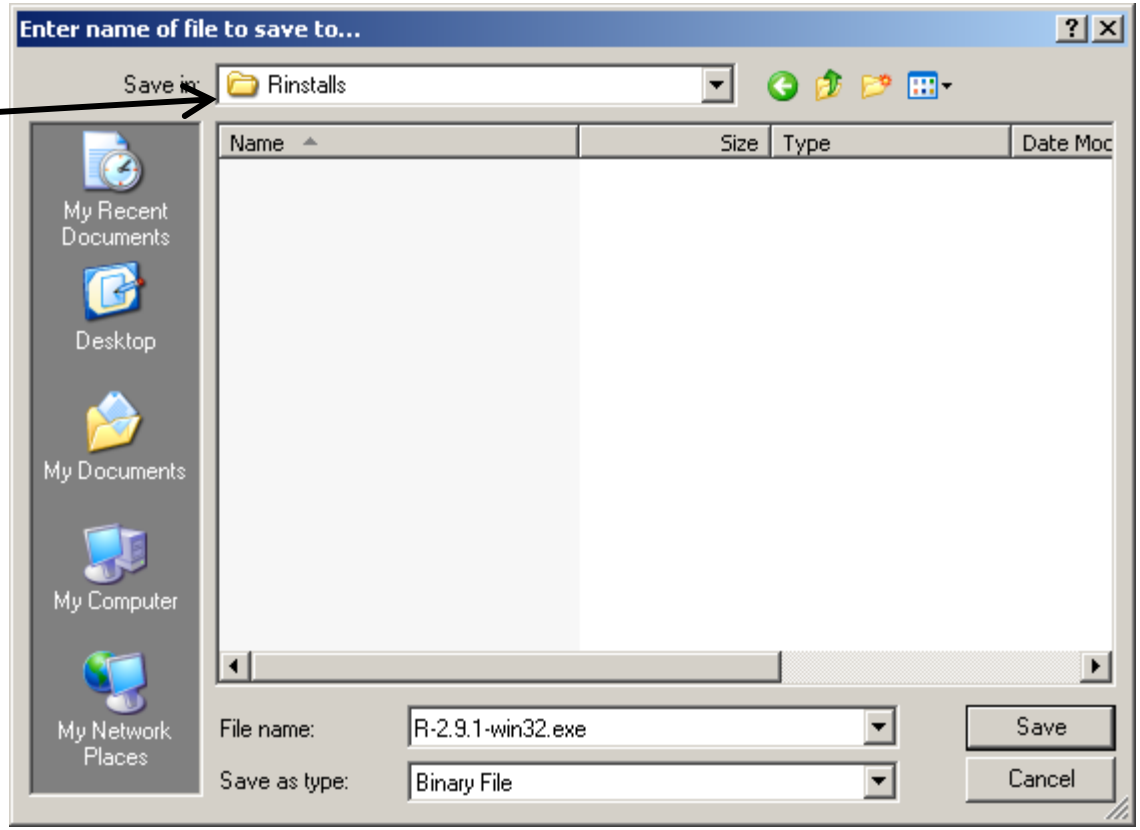
Note: Screen captures are for an older version of R, but the steps will be the same for 3.4.1 or later

Make sure the mirror site you chose provides R version 3.4.1 for the Fall semester 510 course to match what is in the classroom!

Save the executable to your local machine

Save the installer executable to a folder you can remember

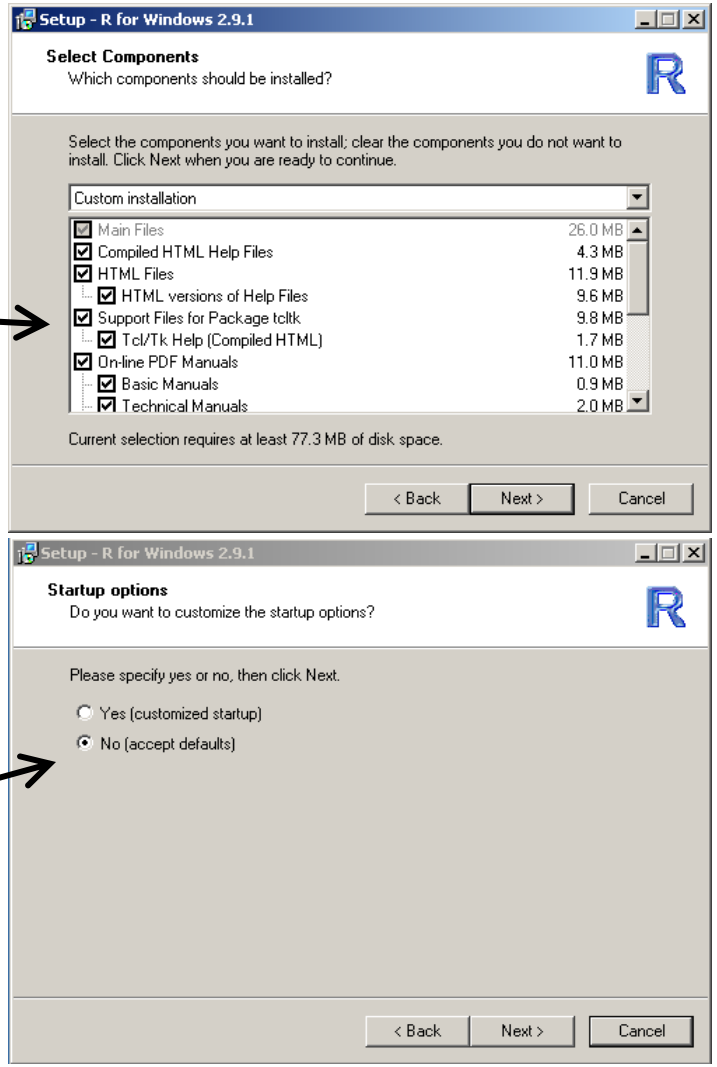
Then, run the installer.



Run the install program you saved

Install all components

Use the default configuration



When the installation is finished…

- An R icon should be on the desktop
  - run it
- If the icon is not on the desktop, run R from the start menu

A few pointers for Mac OS Installation

- As of version R 3.2.2, R requires Mac OS X version 10.9 (Mavericks) or higher.

- R 3.2.1 supports Mac OS X version 10.6 (Snow Leopard) or higher.

- It is strongly recommended that you update the OS and install the latest version of R

General steps for Mac OS Installation

1. Go to https://www.r-project.org/
2. In order to download the R installer, choose a preferred CRAN mirror.
   - For the https sites, I recommend USA (MI1), which is https://cran.mtu.edu/
   - For http sites, I typically use the Univ Toronto Statistics Dept. site, which is http://cran.utstat.utoronto.ca/
3. Download the newest version of R for (Mac) OS X
   - Currently the R-3.4.1.pkg
4. Open the installer and proceed following instructions
5. Ensure that the R program is available via Applications within Finder or on your desktop dock

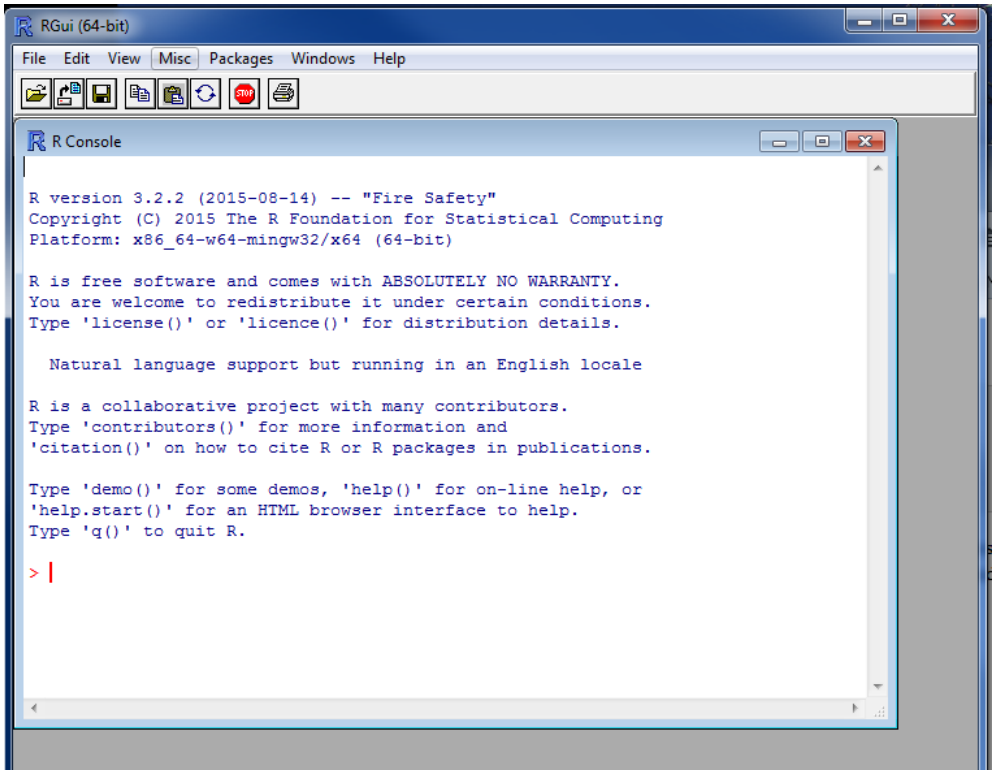
General steps for Mac OS Installation

- Current versions of Mac OS may not have native x11 capability, unlike previous versions.
- Mac users should always have the most up to date version of XQuartz
- See the Mac installation page at:
- https://cran.r-project.org/bin/macosx/

- Another link the provides a nice outline of Mac installation steps can be found at http://rud.is/b/2015/10/20/installing-r-on-os-x/
  - This page also describes the XQuartz installation issue
  - Also see the notes on R Commander installation on Mac a few pages down in this document

The R GUI (screen captures from Windows)

- The Main R interface is called RGUI
  - but it is not really a full graphic interface
  - At the R Console prompt you write code/functions
  - Later we will work in an integrated development environment called RStudio



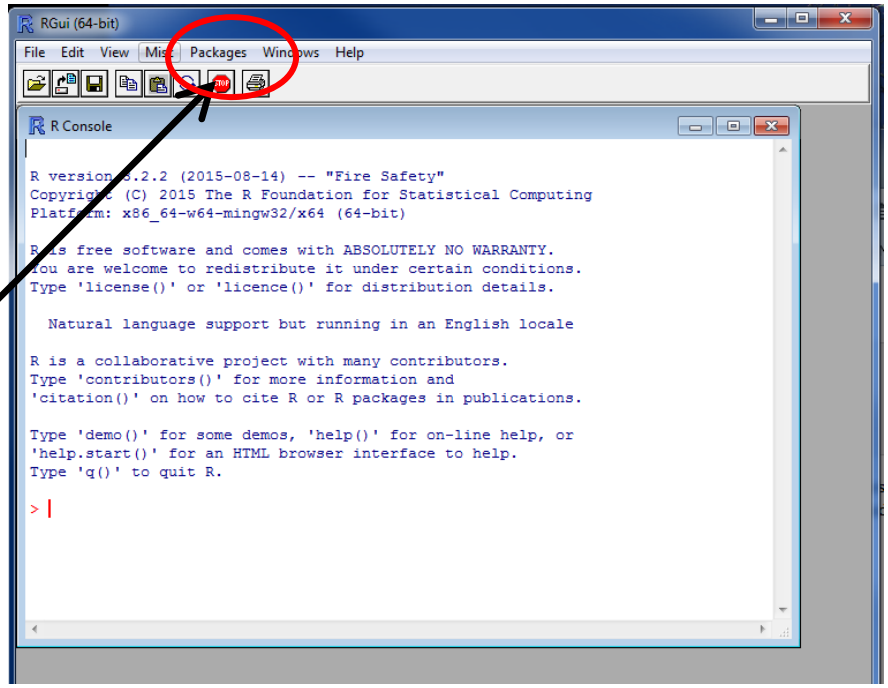
R Programming

- Addressed in other documents at other times in the course or workshop

You will need to install some add on “packages”

Either use this menu, or “source” a syntax file that I provide.

Recommended packages are discussed below



Some Packages are already Installed with the base program

- base
- boot
- class
- cluster
- codetools
- datasets
- foreign
- graphics
- grDevices
- grid
- KernSmooth
- lattice
- MASS
- Matrix
- methods
- mgcv
- nlme
- nnet
- rpart
- spatial
- splines
- stats
- stats4
- survival
- tcltk
- tools
- utils

Additional Packages Suggested for APSY510/511

- A partial list of these is available via the “Learning R” link on the Dudek Class Web Pages: http://www.albany.edu/psy/bcd/dudekclass.htm

- You can install them via the menus as indicated above,
  - OR,
- Preferably, you can run (“source”) the script file provided (bcd_recommended_510.R)
  - OR,
- R determines which packages it has available on the local installation by scanning the sub-folders in its library folder. So, you can install additional libraries either from the program as indicated above, or by copying folders of already-installed libraries from someone else (such as BCD). This may not work well across differing platforms.
- More package installation info would probably be proved in class or in workshops.

A few tips on Managing the R Installation

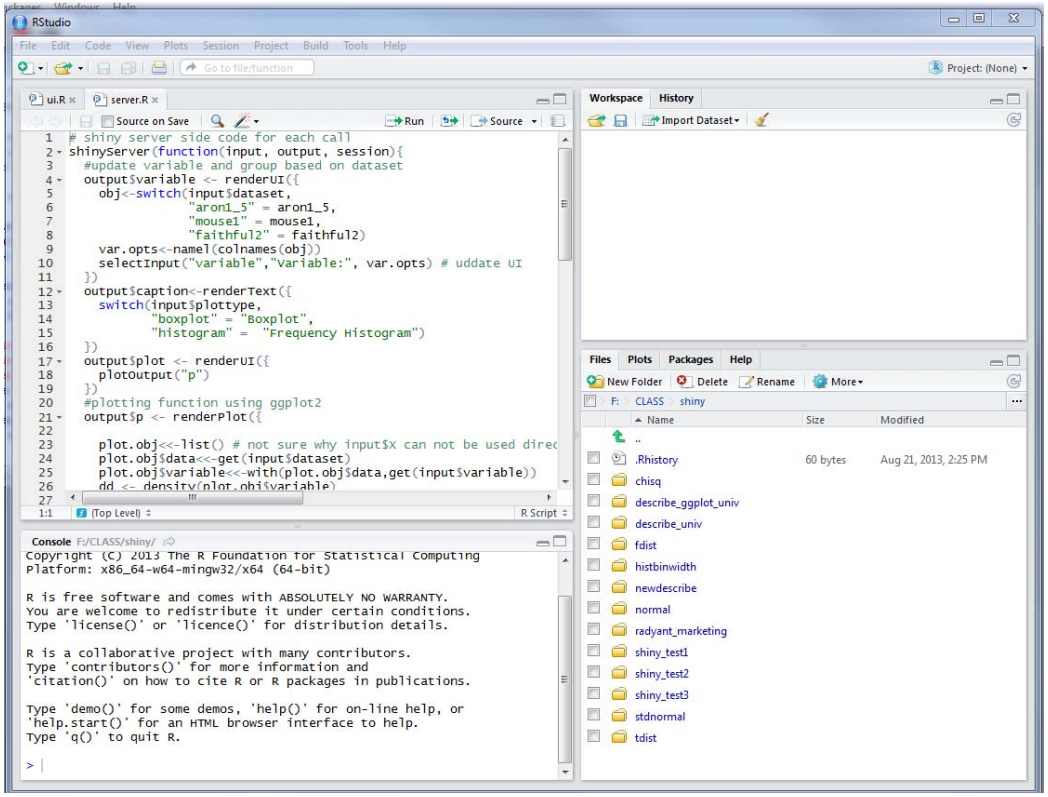
- R versions are upgraded every few months.
  - Upgrades should be done by uninstalling your current version and then installing the new
  - old collections of installed libraries will not be deleted and can usually be used in their same location. It is important to keep package versions up to date with the `update.packages()` function.
  - **A better approach to package installation in a new installation is to use the bcd_recommend_510.R script described above. But you will need to also install other packages that you might have added on your own**
- You can also update your currently installed libraries to more recent releases by using the “update packages” option in the “Packages” menu in RGUI.
- All analyses done in R should be recorded has having been done by the specific versions of the base program and libraries that you use. This information should go into methods sections of your papers.

A few tips on Managing the R Installation

- Since much R programming is done by writing functions/code, a good text editor is useful
- the Script Editor in R is ok, but alternatives should be considered
- **I strongly recommend Notepad++ (do a google search for it)**
- **We will emphasize learning R Studio (open source IDE for R), an important and developing part of the R programmer's skillset**

R Studio

- http://www.rstudio.com/



Info for MAC users

- A few differences in the installation procedure from those in this doc will become apparent. None are major and you should be able to sort them out with the text instructions from the two slides above
- One important difference may be the creation of the capability to run the package called R Commander. MAC OS will need an X11 or XQuartz capability. Before installing R Commander, see the relevant section of the following instructions:
  - http://socserv.socsci.mcmaster.ca/jfox/Misc/Rcmdr/installation-notes.html

Learning R

- Many tutorials are available on the web.
- See the main link on the Dudek class web pages for pointers to those tutorials. You can find it in the left-hand menu bar for extensive help on working through the initial learning curve in R
  - http://www.albany.edu/psy/bcd/dudekclass.htm