Topic 3: Basics of R Packages

1. What are R packages
2. Installing Packages
3. Loading Packages
4. General notes on R Packages

1. What are packages

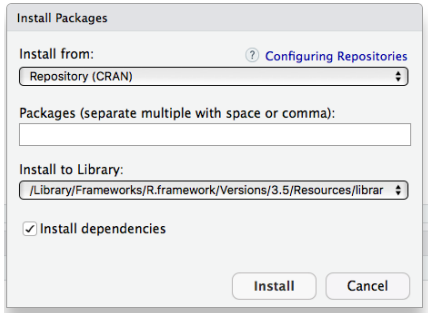
- The best thing AND the worst thing about R (2 sides of same coin)
- Best:
  - Packages are Free
  - Packages provide functions for most any type of analytical need
  - Packages may include useful datasets
  - Functions from packages are ‘often’ easy to implement in R code
  - Packages contribute to more universal use of R
  - Packages compartmentalize functions
  - Anyone can create R packages
- Worst
  - The are many, many R packages ~ 15,000
  - **Anyone can create R packages**
  - Must to install and load packages

2. Installing R Packages

- Beyond ‘base-R’ functions (stat package)
- Installing = Downloading file of R code (that contain functions)
  - ‘Adds ‘books’ of R code to version of R that was installed
  - Some packages come with R
  - **You only need to install a package once!**
- View names of packages
  - RStudio in lower right window under Packages tab
  - Names appearing are already **Installed**
  - Names themselves are not always informative for what they contain
- How do you know what packages and what they do?
  - Colleagues, Coursework, **Google**
  - https://cran.r-project.org/web/packages/

Easiest way to Install R Packages

- Use RStudio lower-right Window with Packages tab
- Click the Install  button
- You'll see the following window



- Start to type the name of the package you wish to install
  - RStudio will start to fill in package names
  - Hit return or click Install button
- Note the Install dependencies is checked... This is what you want!
- Code runs in console as dependent packages take time to install

`install.packages()` function (FYI)

- **Not used as part of coursework**
- Allows code to be shared more easily
- Can use if not using RStudio to run R code
- Can quickly list multiple packages to install
- Will need to specify or be sure to include dependent packages
- Will still need to access network to download packages
- Note: other than viewing in RStudio packages window, can view installed packages using `installed.packages()` or `library()`

3. Loading Packages

- An installed package must be LOADED in to an R session to use functions
- Loading packages:
  - **`require`**`(package_name)` or **`library`**`(package_name)`
  - Can click on check box in Packages window (not recommended)
- In order to access functions in a package
  - The package must be installed (keep this in mind when using different computers)
  - The package must be loaded in to the current active R session (typically)
  - If not installed AND loaded
    - An error like: could not find function “leveneTest”
    - You will likely see an error like this... It’s easy to forget that for example `leveneTest()` is in the ‘car’ package

4. General Notes on R packages

- Install to current version of R library, updating version of R means re-installing any packages previously installed

- Some packages may not work under previous/old versions of R

- Referencing a package (remember this for your future work with R)
  - Authors create packages basically for free, we should reference their work
  - Use this code: `citation("car")` note that the citation function requires quotes

More Notes on R packages

- Have function, need package
  - If many packages loaded ...
  - type the function name and run (no parens)
  - for Base-R function, also get source code (nice to know for future R coding)
  - note the environment at end of output, includes package for function

- Have package, need function syntax
  - Install/Load package first
  - Then use help as you would with any function

More Notes on coding with R packages

- Typically, required packages loaded at beginning of R code
- Possible to have same function names in different loaded packages
- Use double colons to call function from specific package
  - Example, `car::leveneTest`
  - Can use double colons to demonstrate which package function belongs

- Which packages are **loaded** in current R session?
  - `search()`