

Lab 1  
Getting Started with R

BIOL 534  
F 2011

What is R?  
Why use it?

## What is R?

Ellner and Guckenheimer (2006) describe R as follows:

“R is an **object-oriented** scripting language that combines the programming language S developed by John Chambers (Chambers and Hastie 1988, Chambers 1998) with.

- a user interface with a few basic menus and extensive help facilities.
- an enormous set of functions for classical and modern statistical data analysis and modeling.
- graphics functions for visualizing data and model output.”

We will use R in this class because it is **free**, **powerful**, **rapidly developing (extensible)**, and **relatively easy** to use.

*yauh peng, yauh leng* (Cantonese)  
“both inexpensive and beautiful”

In Matloff 2011  
The Art of R Programming

## What can R do?

- Math
- Basic statistics
- Publication quality figures
- Simulations
- Database interface
- GIS
- Phylogenetics
- Multivariate Statistics
- Network analysis
- Bayesian statistics
- Animations
- ...

R is **extensible**, so its capabilities are growing with its users

## Advantages and Disadvantages

### Advantages

- Free
  - No cost
  - Open source
- Very capable software
- Large user base
- Software has few limits (extensible)
- Scripting allows work to be easily re-run, audited, repeated. Faster than point and click

### Disadvantages

- More difficult to learn initially.
- No corporation guaranteeing that algorithms are
  - correct or
  - Speed optimized

## Installing R and Getting Started

<http://cran.r-project.org/>

Download and install current version on your machine

- lab machines have it installed.

## Basics

## Saying Hello

Welcome to the command line

```
R version 2.13.1 (2011-07-08)
Copyright (C) 2011 The R Foundation for Statistical Computing
ISBN 3-900051-07-8
Platform: x86_64-apple-darwin9.8.0/x86_64 (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 1.41 (5874) x86_64-apple-darwin9.8.0]
[History restored from /Users/borretts/.Rapp.history]
>
```

...a fancy calculator

Try adding 2 and 2

May not be how you are used to interacting with your computer, but use your intuition.

Experiment, Try it – you wont break it

## Getting Help

- ?, ??, help()
- Internet search (aka google)
- Manuals and Books
- Some useful links

R Homepage

<http://www.r-project.org/>

Reference Card

<http://cran.r-project.org/doc/contrib/Short-refcard.pdf>

Kickstarting R

<http://cran.r-project.org/doc/contrib/Lemon-kickstart/index.html>

Getting Started with R

<http://cran.r-project.org/doc/manuals/R-intro.pdf>

R Graphics

<http://addictedtor.free.fr/>

Ecological Models and Data in R

<http://www.math.mcmaster.ca/~bolker/emdbook/>

## R Studio

- An IDE – Integrated Development Environment
- <http://www.rstudio.com>

## Common Data Structures

- Vectors  
Example:  $x = [1, 3, 5, 7]$   
Scalars are a special case of vectors
- Character Strings
- Matrices
- Lists
- Data Frames
- Classes

## Activity

- Work through [Lab 1: Introduction to R for Ecological Modelling](#) from Dr. Ben Bolker's website.
- Complete the follow problems
  - 2.1, 3.1, 5.1, 5.2, 5.3, 5.4, 8.2, 8.3, 8.4, 8.5, 8.6, 9.2
- Turn in Solutions – concise summary of problem answers