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Advanced R

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Introduction to R Overview

Further Reference:

http://haschmi.github.io/2016-02-17-queens/

http://wiki.hpcvl.org/index.php/Training:SWC:Feb2016

Morning

- Key features of R & RStudio
- Basic objects
- Working with data
- Basic statistics
- Basic graphs with qplot()

Afternoon

- Elegant graphics with ggplot()
- Flow control
- Regular expressions
- Custom functions
- Custom packages

Vector vs Raster format

Vector

SVG
PDF
EPS
AI
PS

Raster

JPEG
PNG
TIFF
BMP

Easy, 'clean' conversion

Difficult conversion

Raster art

Pixel Dimension = Physical size x Resolution

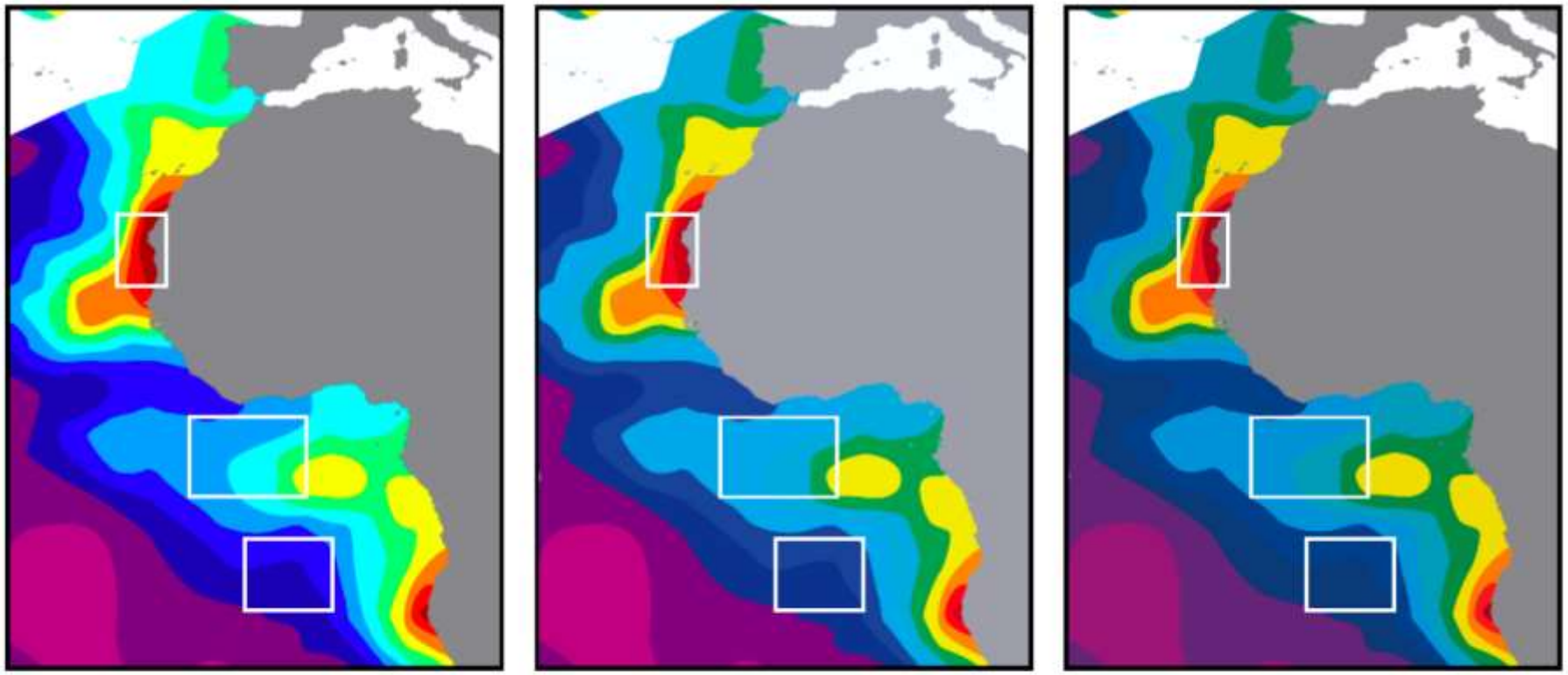
Same pixel dimension

Large size, low resolution

Small size, high resolution

RGB vs CMYK

Computer Screen | Printed page



Haddock & Dunn (2011)

Graphics software

DON'T USE POWERPOINT FOR PUBLICATION!

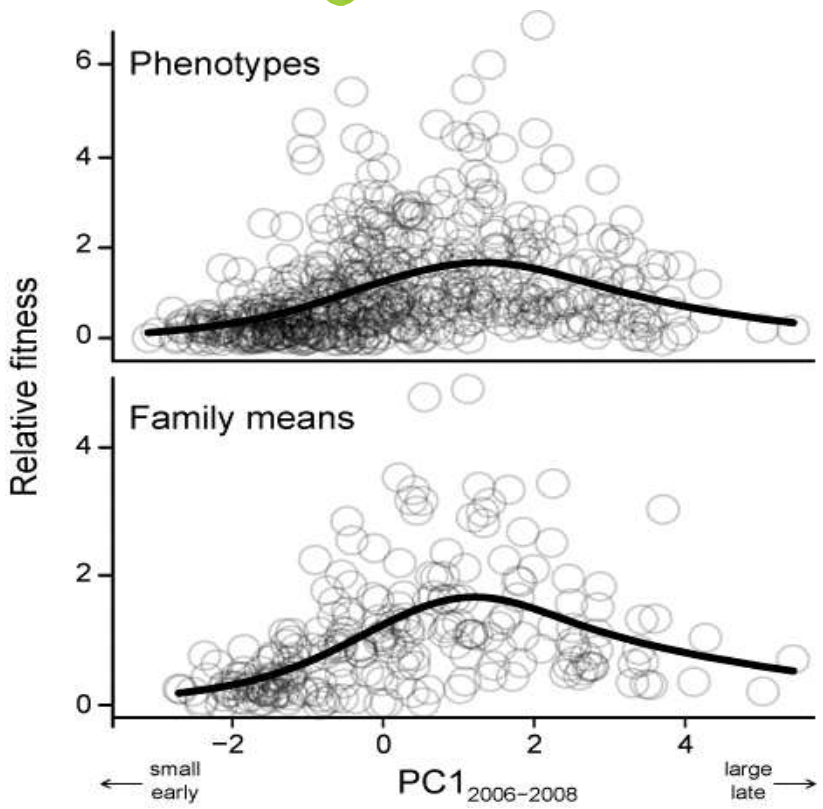
Powerful, expensive, steep learning curve:

- Adobe Photoshop (pixel)
- Adobe Illustrator (vector)

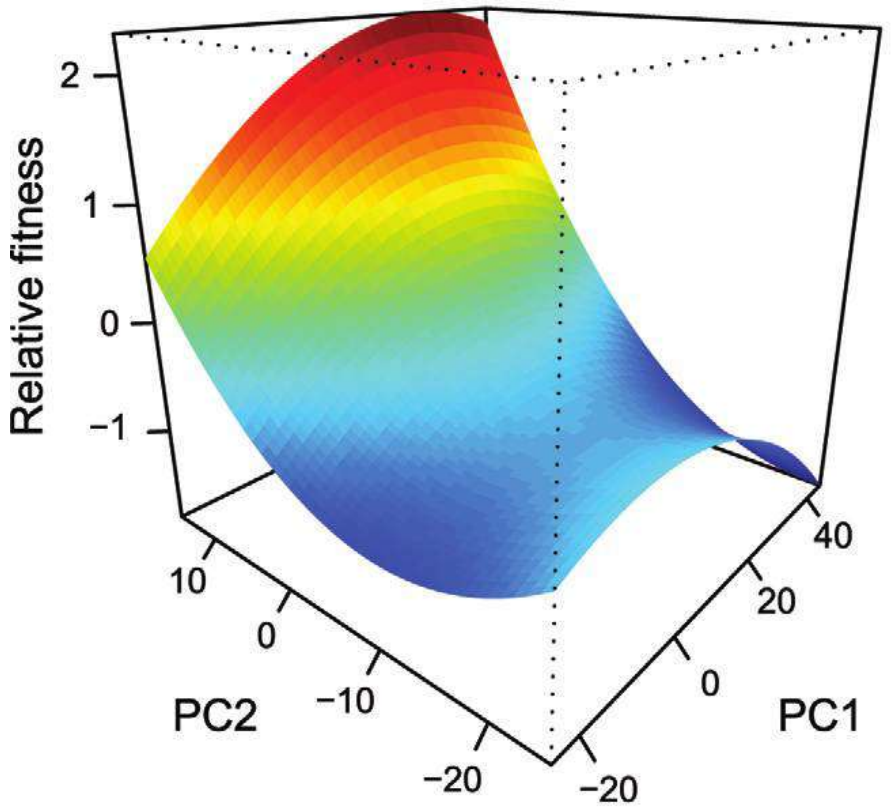
FREE Software:

- GIMP (pixel) http://www.gimp.org/
- Inkscape (vector) – NOTE: .svg format is commonly used https://inkscape.org/en/

Graphics in R – base functions

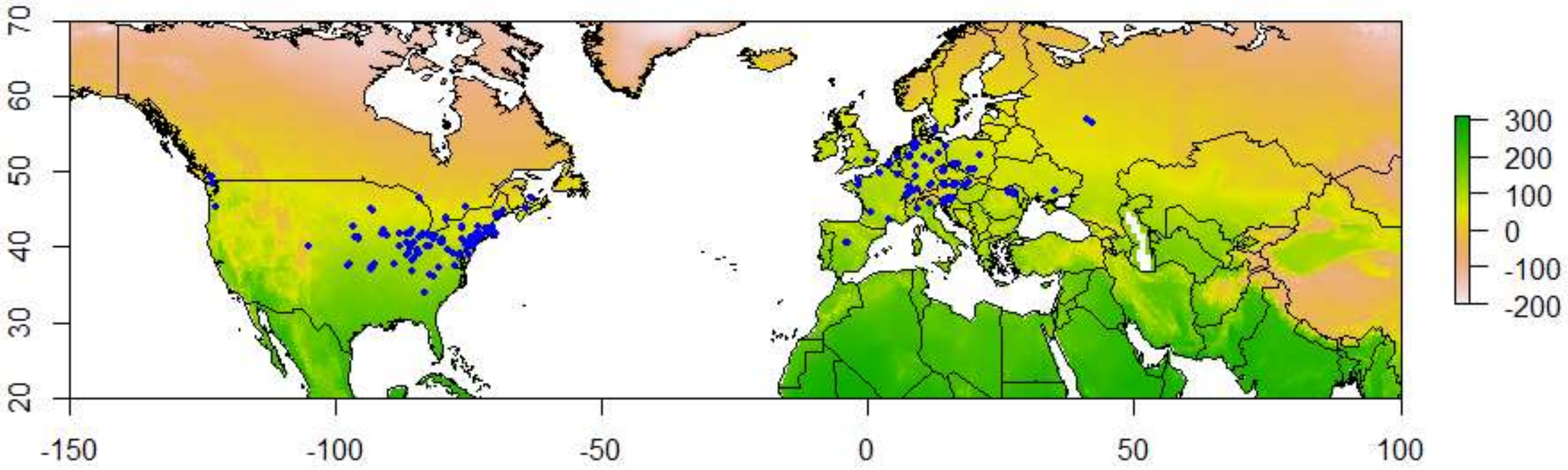


plot()



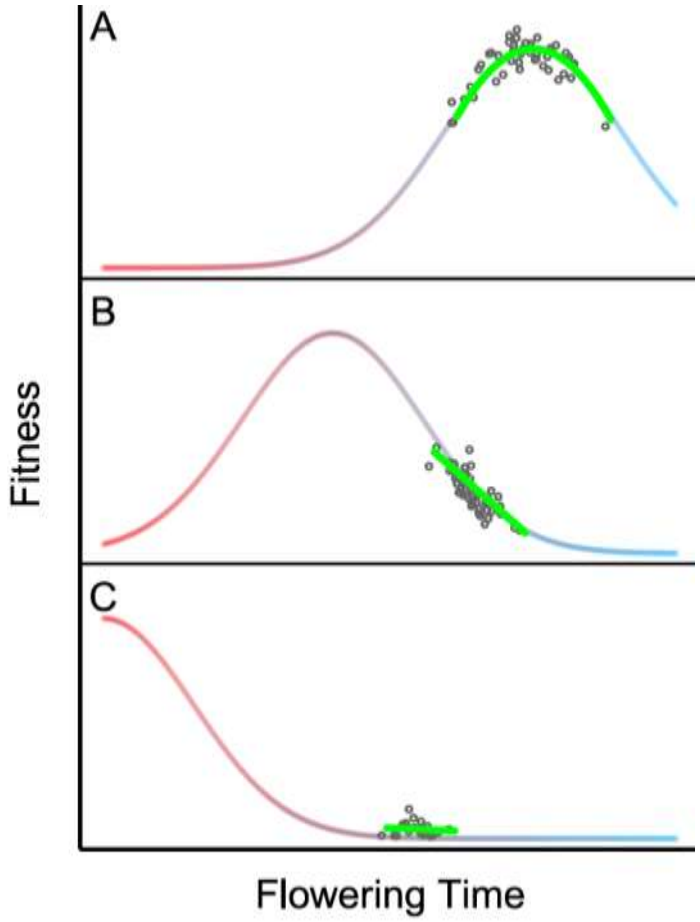
persp()

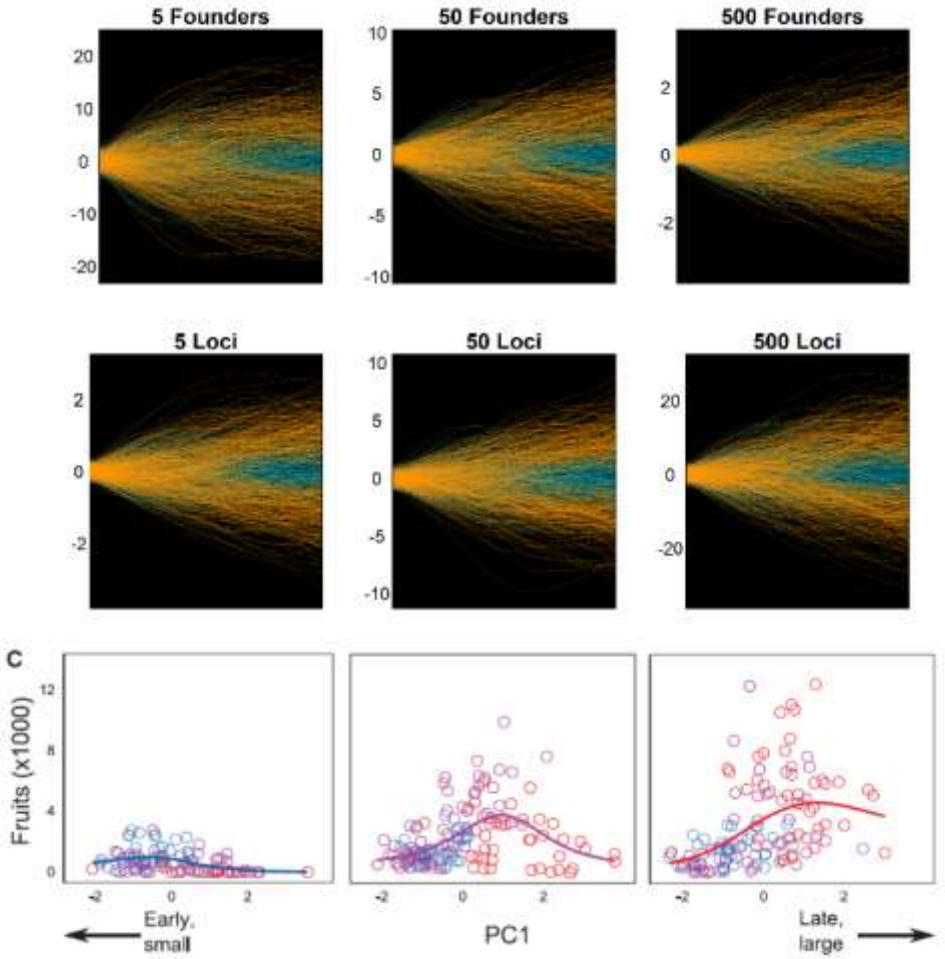
Graphics in R – GIS/Mapping

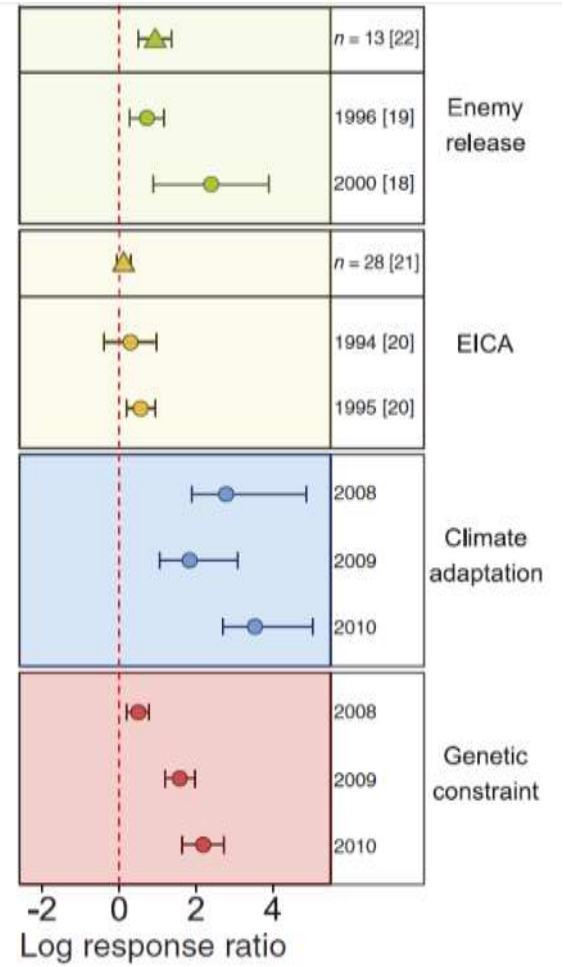


QGIS, dismo, raster, rgdal, maptools, leap, ggmap packages

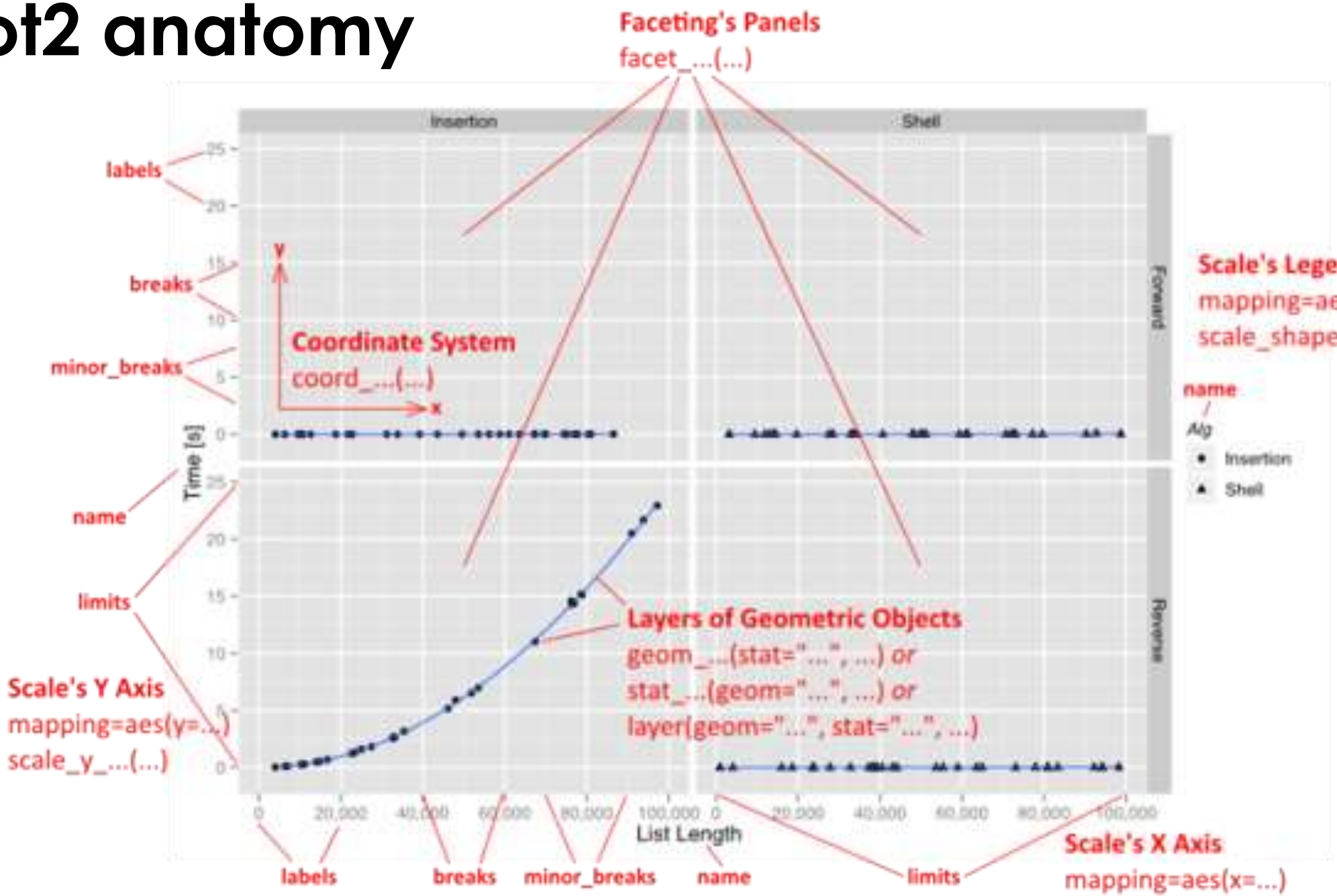
ggplot2 graphics for publication







ggplot2 anatomy



http://sape.inf.usi.ch/quick-reference/ggplot2

ggplot2 grammar

data

- any information you want to plot

geoms

- geometric objects (lines, points, polygons)

stats

- statistical transformations applied to the data (e.g. binning for histograms)

scale

- scales of conversion from data to visual space (e.g. legend, range and scale of axes)

ggplot2 grammar

coord

– coordinate system of the graph (e.g. Cartesian, polar, lat/long)

facet

– break up data into separate graphs

aes

– aesthetic mapping describes how data is mapped (e.g. x, y, colour)

theme

– fine-tune appearance (e.g. background colour, gridlines)

Basic plot: building layers

Begin with `ggplot()`

- define global variables (e.g. aes(),data)
- leave blank to have different data in different layers

Add each 'layer' (usually a `geom_`) with `+`

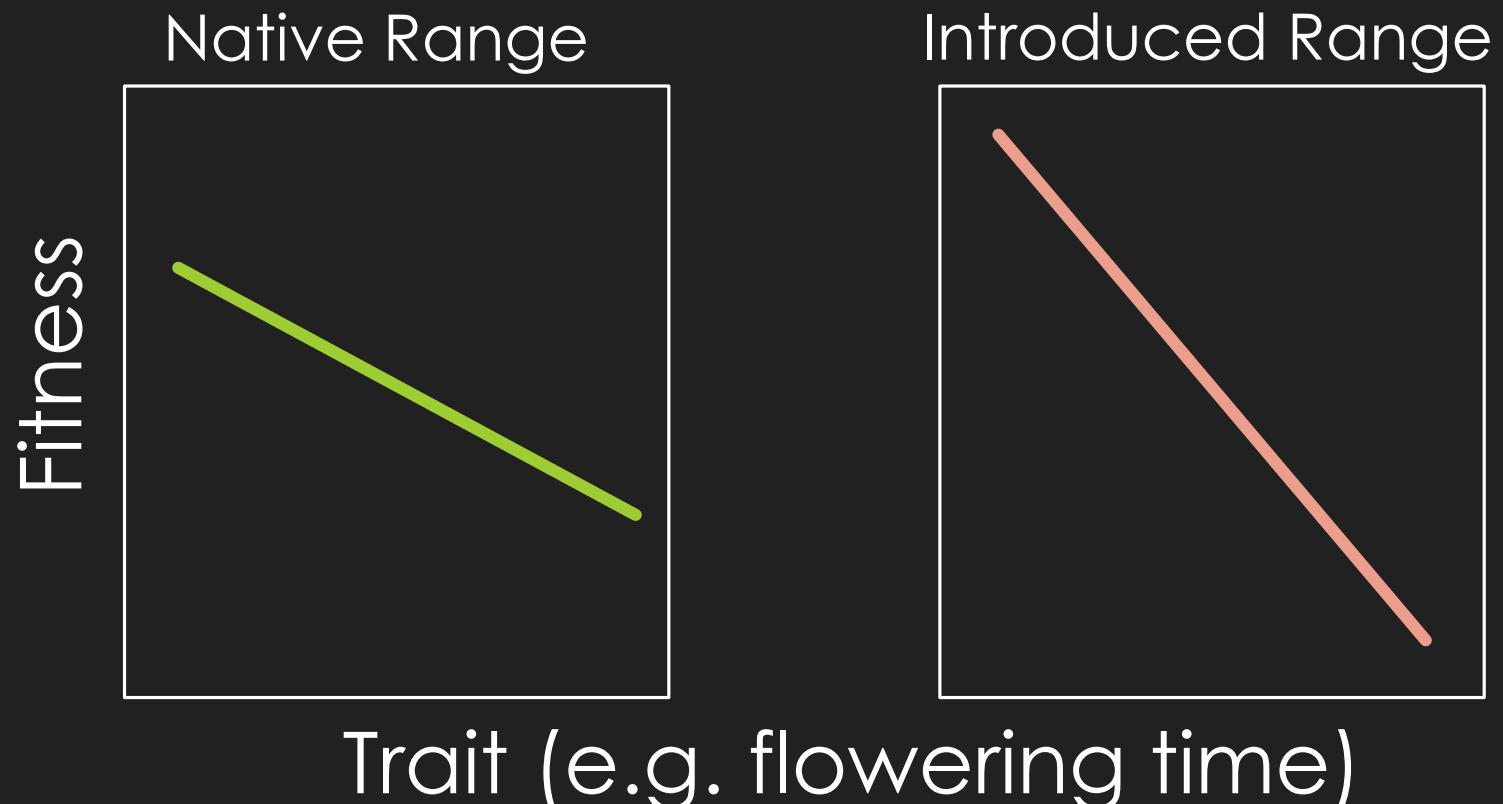
Fine-tune appearance with themes

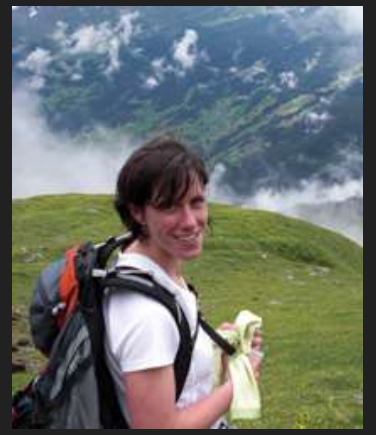
Dreissena polymorpha

Is natural selection stronger in introduced species?

gbif.org

Meta-analysis of selection differentials (s)

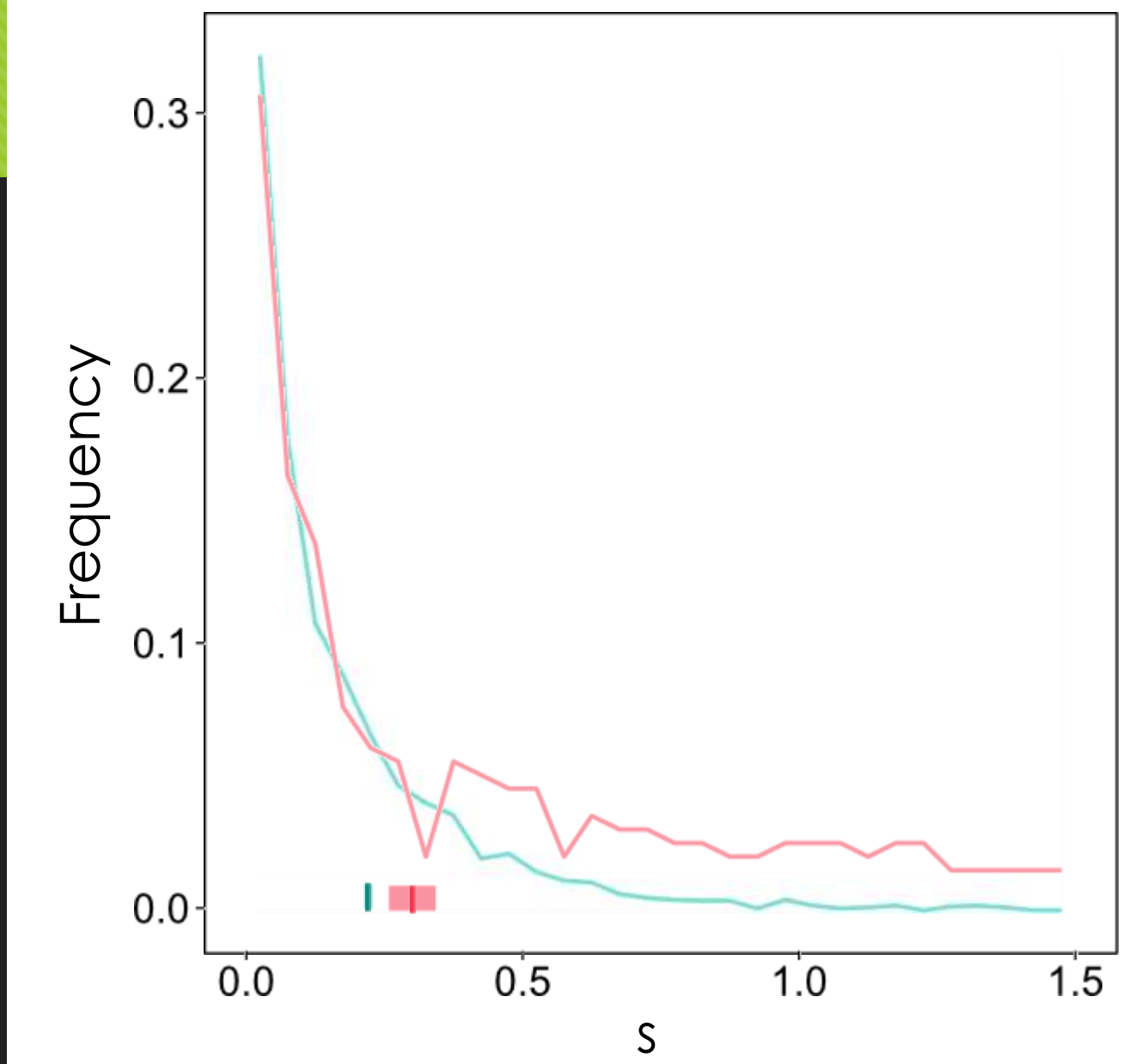




Jen Lau

Build graphics as layers in ggplot

```
ggplot() + theme_basic() +
geom_line() +
geom_line() +
geom_rectangle() +
geom_rectangle() +
geom_rect() +
geom_rect() +
xlim() + ylim() +
xlab() + ylab()
```

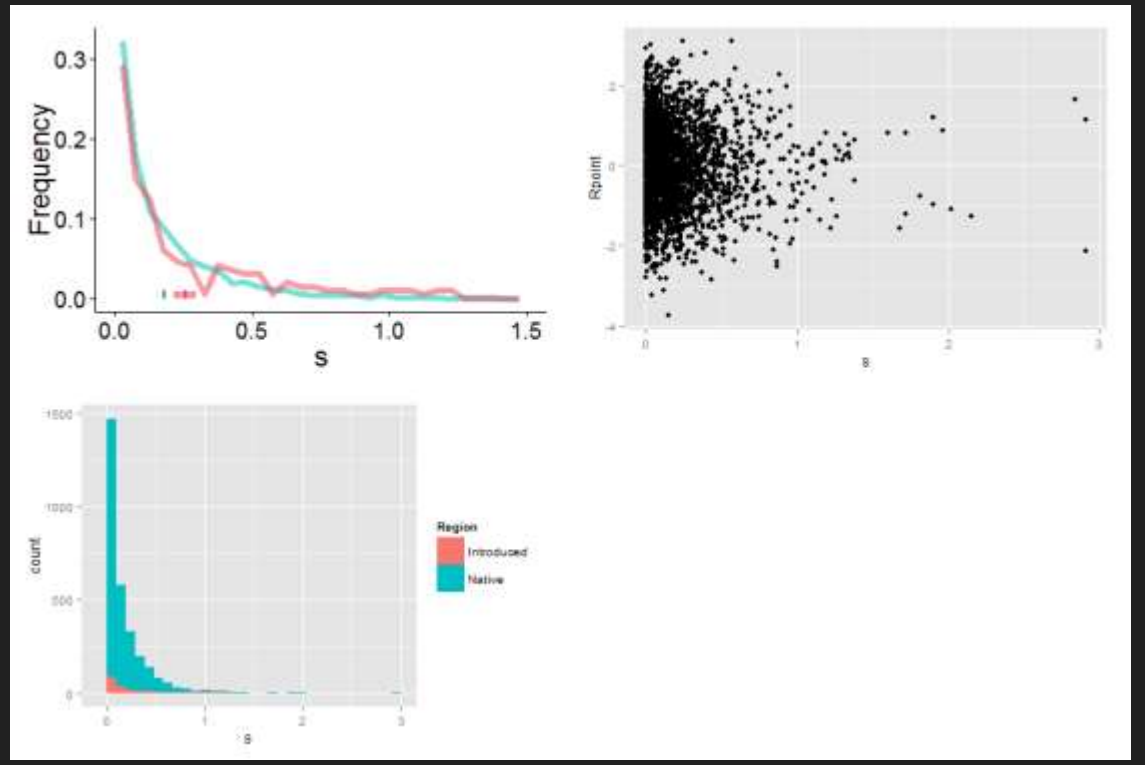


Multiple plots with (gridExtra)

Requires `library(gridExtra)`

`grid.arrange(plot1,plot2,…,plotn,nrow,ncol)`

```
grid.arrange(p1,p2,p3,nrow=2)
```



grid.layout() for complicated layout