

A LITTLE HELP FROM MY FRIENDS...

*Using an online and community-
based learning approach to
develop quantitative skills*

Dr Paul Mensink, School of Biological Sciences

QUB Annual Learning and Teaching Conference 2017




**“I've always been interested
in it from a child”**





“I’m extremely passionate about the environment and life on Earth.”



“7 years and I’m not
bored yet”

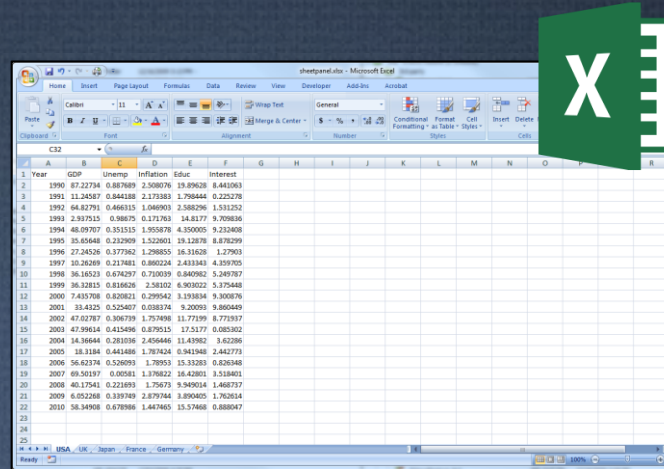
“The most interesting science to me personally and academically. Also the one I am best at!

Also science with the least maths.”

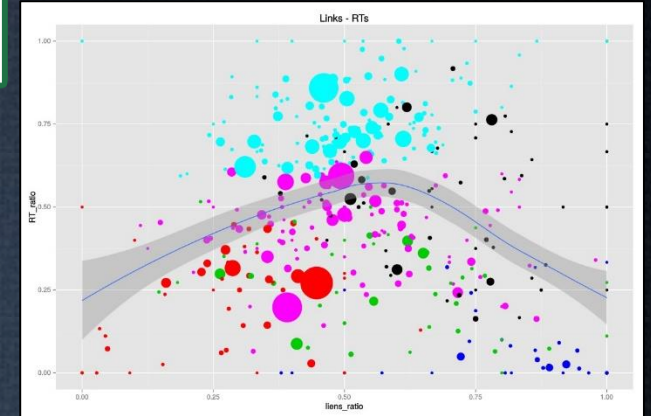


QUANTITATIVE SKILLS

- Required for degree progression

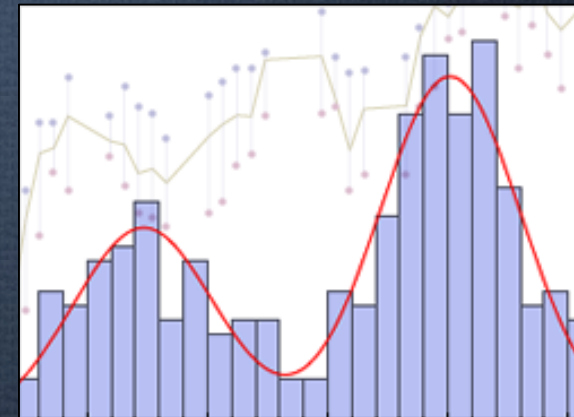


Data entry and processing



Data visualisation

- Valued by a range of employers



Statistical analysis and interpretation

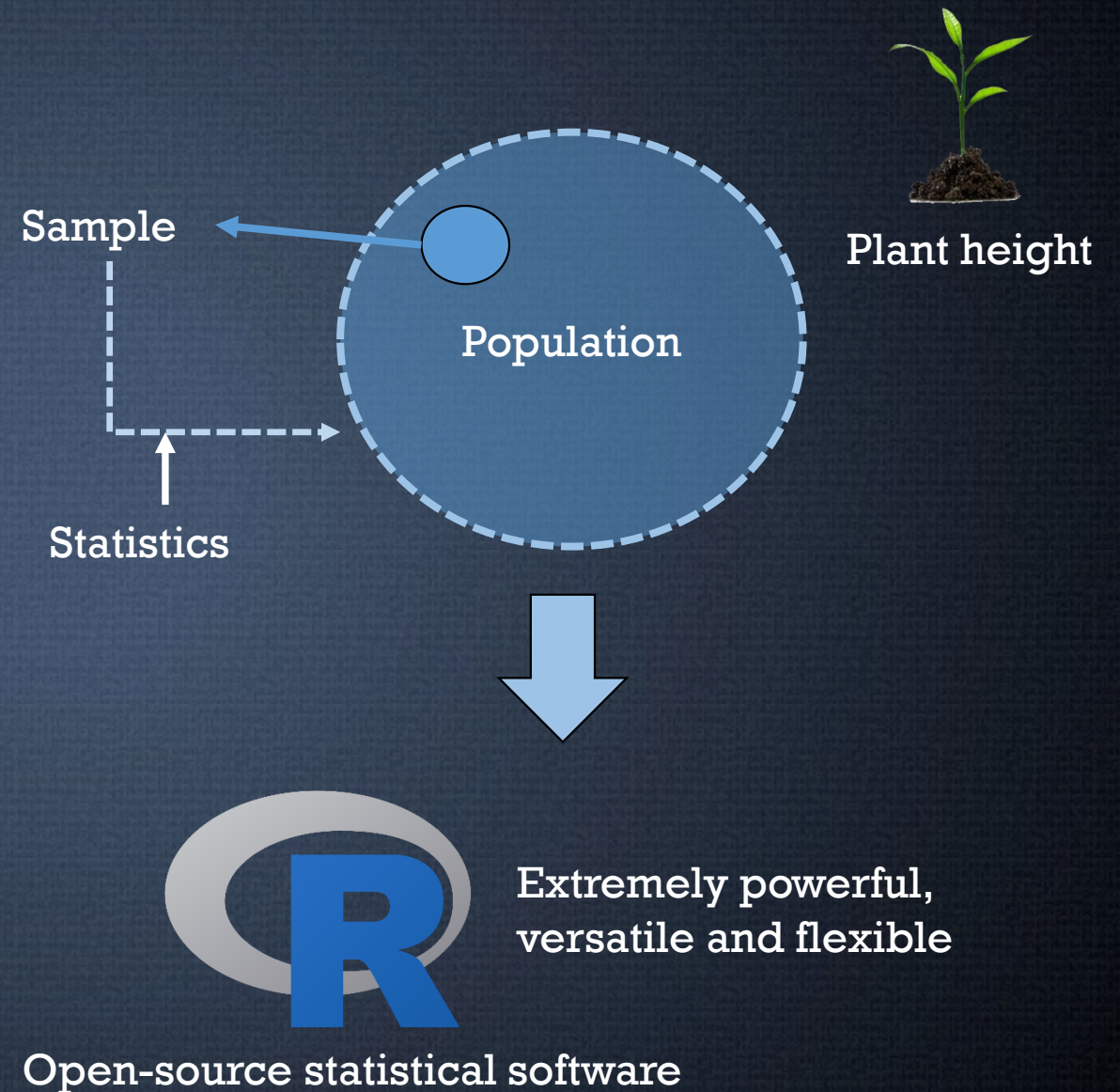
LEARNING OUTCOMES

Statistical theory

- Understand hypothesis testing
- Select appropriate statistics
- Interpret statistical results

Statistical programming

- Store and process data
- Conduct a range of statistical analyses
- Produce statistical results



CHALLENGES TO PROGRESSION

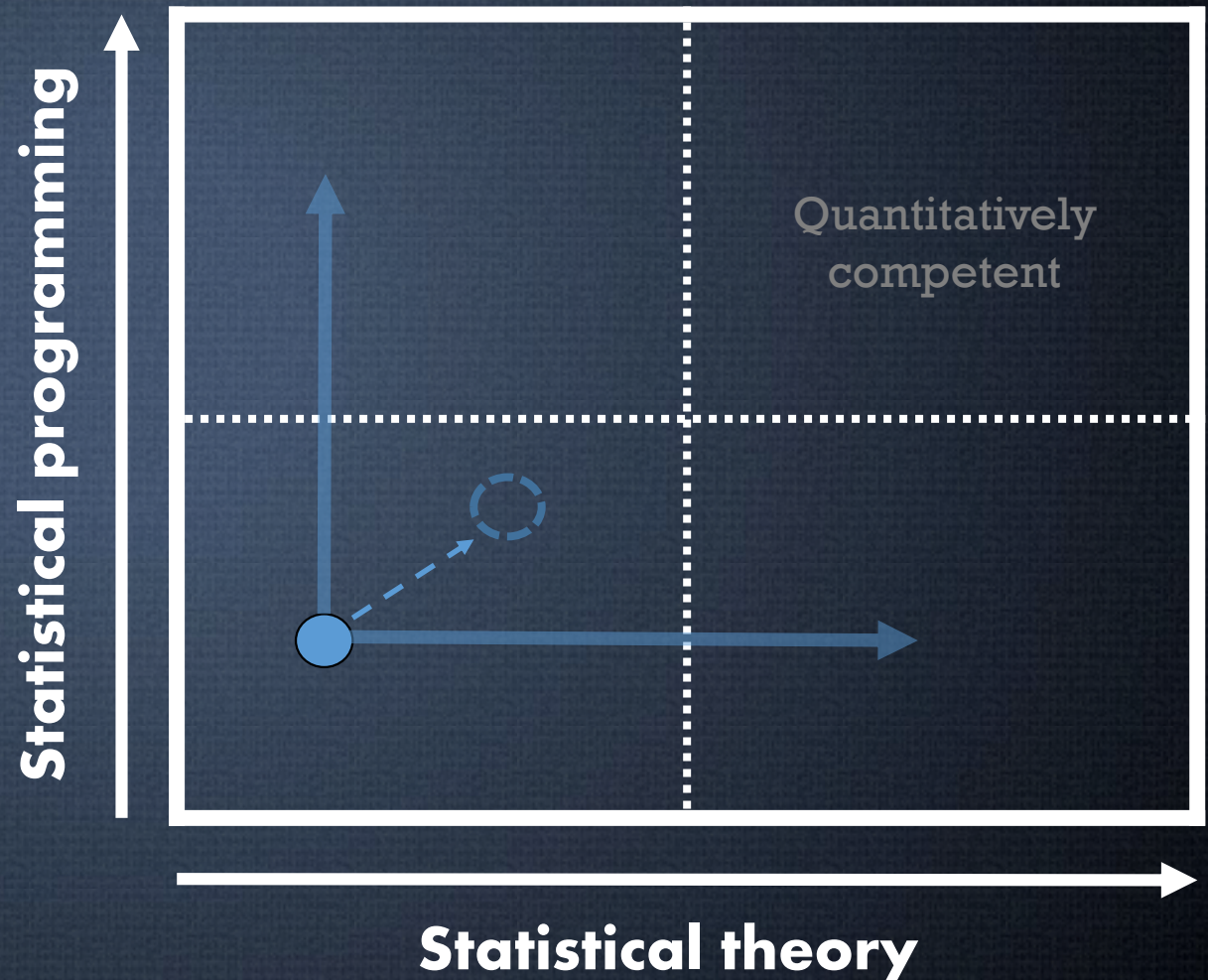
56% say that statistics or R is their least favourite part of the module

Statistical theory

- Lack of math skills
- Confusion about application
- Slow and incremental

Statistical programming

- Moderately advanced computer skills required
- Language syntax difficult to master
- Requires specific expertise to troubleshoot



How can we best leverage the time we have to teach statistics while ensuring students are competent in statistical software?

1. Blended-learning approach

- online statistics lectures via walk-through programming videos
- face-to-face tutorials for extra support

2. Online support structure (a little help from my friends)

- dynamic question and answer portal
- a one-stop resource hub



BLENDED-LEARNING APPROACH

STATISTICAL PROGRAMMING

The screenshot displays the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Tools, and Help. The toolbar contains icons for Pause, Run, Select Area, Audio, and Record Pointer. The main editor window shows a script titled 'Data analysis tutorial 1 (2).R*' with the following code:

```
18 library(RcmdrPlugin.EZR)
19 library(car)
20 library(datasets)
21 library(plyr)
22
23
24 ## when you put a hash tag (#) in front of text it turns it into a comment. You can then make comments all the way along
25
26
27 ##1. Set your working file directory
28
29 setwd("C:/Users/Paul")
30
31 # 2. load your data into R
32
33 data <-read.csv("data.csv") # don't forget to add in the csv bit
34
35
```

The console window at the bottom shows the execution of the code, including warnings about packages built under R version 3.3.3 and the successful loading of the 'car' package.

The Environment pane on the right shows the Global Environment, which is currently empty. The Packages pane on the right shows a list of installed packages, including 'car' which is checked.

Name	Description	Version
<input type="checkbox"/> abind	Combine Multidimensional Arrays	1.4-5
<input type="checkbox"/> acepack	ACE and AVAS for Selecting Multiple Regression Transformations	1.4.1
<input type="checkbox"/> ape	Analyses of Phylogenetics and Evolution	3.5
<input type="checkbox"/> aplpack	Another Plot PACKage: stem.leaf, bagplot, faces, spin3R, plotsummary, plothulls, and some slider functions	1.3.0
<input type="checkbox"/> arm	Data Analysis Using Regression and Multilevel/Hierarchical Models	1.9-3
<input type="checkbox"/> assertthat	Easy pre and post assertions.	0.1
<input type="checkbox"/> backports	Reimplementations of Functions Introduced Since R-3.0.0	1.0.5
<input type="checkbox"/> base64enc	Tools for base64 encoding	0.1-3
<input type="checkbox"/> bitops	Bitwise Operations	1.0-6
<input checked="" type="checkbox"/> car	Companion to Applied Regression	2.1-3
<input type="checkbox"/> caTools	Tools: moving window statistics, GIF, Base64, ROC AUC, etc.	1.17.1
<input type="checkbox"/> checkmate	Fast and Versatile Argument Checks	1.8.2
<input type="checkbox"/> chron	Chronological Objects which can Handle Dates and Times	2.3-48
<input type="checkbox"/> coda	Output Analysis and Diagnostics for MCMC	0.18-1

A lack of real-time support for students

QUBSTATS.COM

- Dynamic question and answer portal
- Anonymous posting
- Peer teaching and learning
- Scalable within and between levels
- Lasting resource

Home Activity Ask a question Groups Members Questions and Answers R installation guide

Questions and Answers

What do you want to know?

Filter: [All](#) [Open](#) [Resolved](#) [Closed](#) [Unanswered](#) [My questions](#) [My subscribes](#) Views ▾

	Getting a dataset of certain tree heights Open DrPaul asked 1 month ago • R	25 views	0 answers	0 votes
	Range? Open notdavidattenborough asked 1 month ago • R	24 views	0 answers	1 votes
	How to subset a dataframe Answered DrPaul asked 1 month ago • R	21 views	1 answers	1 votes
	Data Open YoureGonnaNeedABiggerBoat asked 1 month ago • R	20 views	0 answers	0 votes
	When to use square brackets Answered Sammy the Seal asked 2 months ago • R	18 views	1 answers	0 votes

1 2 3 [Next »](#) [Ask Question](#)

Latest Questions

- [Animals2 dataset help](#) asked by Zoology?So-you-wanna-work-in-a-zoo
- [Changing Column Names](#) asked by Vincent Van Sloth
- [How do I create and label a graph?](#) asked by Zoology?So-you-wanna-work-in-a-zoo
- [How do I create a histogram?](#) asked by DrPaul
- [For the mean length of the rivers, how do you create a title for the actual lengths and not river number?](#) asked by TerryTarantula

Popular Questions

- [Getting a dataset of certain tree heights](#) asked by DrPaul
- [Range?](#) asked by notdavidattenborough
- [How to subset a dataframe](#) asked by DrPaul
- [Data](#) asked by YoureGonnaNeedABiggerBoat
- [When to use square brackets](#) asked by Sammy the Seal

Notices

Useful links

R graphs - <http://www.statmethods.net/graphs>

CURRENT RESULTS

By the numbers

- **98** registrations on the site
- **617** page views
- **Over 200** views of questions and answers

Issues

- Students forget their passwords
- Questions are specific to individual assignments
- Integrating use into module curriculum

Site views

Months and Years

	Jan	Feb	Mar	Apr
2017	105	467	41	4



What are the most frequently asked/viewed questions?



How can we teach those topics more effectively?

FUTURE CHALLENGES

- Designing coherent **modular structure** aligned to learning objectives
- Facilitating **student revision** using QuestionMark placement quizzes
- Integrated roll-out across **different modules** within the School
- **Faculty-level** resource for multiple degrees
- **Distance learning** potential?

