

# Where do I go from here?

Melbourne Statistical Consulting Platform  
University of Melbourne  
April 2024

# Reproducibility tip: recording package versions

I have found it helpful to record the version of R and all package used to knit a document. The `sessionInfo()` function displays this. I also usually record the time a document was knitted, using `Sys.time()`. The `renv` package allows you to e.g. revert to previous package versions for a particular project, if necessary.

```
Sys.time()
```

```
[1] "2024-04-05 08:54:25 AEDT"
```

```
sessionInfo()
```

```
R version 4.3.1 (2023-06-16 ucrt)
```

```
Platform: x86_64-w64-mingw32/x64 (64-bit)
```

```
Running under: Windows 10 x64 (build 19045)
```

```
Matrix products: default
```

```
locale:
```

```
[1] LC_COLLATE=English_Australia.utf8
```

```
[2] LC_CTYPE=English_Australia.utf8
```

```
[3] LC_MONETARY=English_Australia.utf8
```

```
[4] LC_NUMERIC=C
```

```
[5] LC_TIME=English_Australia.utf8
```

```
time zone: Australia/Sydney
```

```
tzcode source: internal
```

```
attached base packages:
```

```
[1] stats      graphics  grDevices  utils      datasets
```

```
[6] methods   base
```

# RStudio projects

When you have a number of R Markdown documents all relating to the same research project (and you will), it's time to look into using an RStudio project and the `here` package.

Further reading:

- *R for Data Science*, chapter 8.  
<https://r4ds.had.co.nz/workflow-projects.html>
- *I love the here package. Here's why.* by Jenny Bryan.  
[https://github.com/jennybc/here\\_here](https://github.com/jennybc/here_here)

# Revision control

- Software for keeping track of all of the changes you've made on a project (not just a single file), usually with tools to assist collaboration
- Not covered in this course, but a **very good idea**
- GitHub is a common choice: <https://www.github.com/>
- Lazy person's alternative: cloud storage platforms like OneDrive, Dropbox or Google Drive

# More resources for learning R

## **R for Data Science**

Online book by Hadley Wickham and Garrett Grolemund

<https://r4ds.had.co.nz/>

In particular, chapters 17 to 21 (programming) and chapter 25 (fitting many models) build on what we've learned here. Earlier chapters might help consolidate what we've covered.

## **psyTeachR**

<https://psyteachr.github.io/>

Free online short texts on using R, aimed at psychologists, from University of Glasgow.

## **R Markdown Cookbook**

Online book by Yihui Xie, Christophe Dervieux and Emily Riederer

<https://bookdown.org/yihui/rmarkdown-cookbook/>

Practical guide to doing things in R Markdown (look down the table of contents and find something that seems relevant to you).

## **R Markdown: The Definitive Guide**

Online book by Yihui Xie, J. J. Allaire and Garrett Grolemund

<https://bookdown.org/yihui/rmarkdown/>

More formal reference to R Markdown options.

# Statistics for Research Workers using R

**November 2024**

If you've enjoyed this course and want a foundation for the basic ideas and methods of statistics:

<https://scc.ms.unimelb.edu.au/statistics-courses/course-listing/srw-R>

- Descriptive statistics; graphs, tables, summary statistics.
- Introduction to estimation and confidence intervals.
- The normal distribution; means and variances of sums of random variables; the Central Limit Theorem; the normal approximation to the binomial distribution.
- Confidence intervals for means and proportions.
- Introduction to hypothesis testing.
- Tests for differences in location between two populations with matched samples: sign test, Wilcoxon signed-rank test, t-test. The relationship between confidence intervals and hypothesis testing.
- Tests for differences in location between two populations with independent samples: t-test.
- Testing for difference in location of more than two populations. Analysis of variance (F-test), multiple comparisons.
- Two-way classifications: analysis of variance (F-test), interaction.
- Determination of sample size.
- Design of experiments: randomization, blocking, replication, confounding. Standard designs.
- Correlation and straight line regression.
- Multiple regression.
- Analysis of categorical data; contingency tables.

# Design and Analysis of Experiments

**September 2024**

If you've enjoyed this course and want a foundation for experimental design and analysis:

<https://scc.ms.unimelb.edu.au/statistics-courses/course-listing/dae>

- choice of experimental units;
- importance of randomisation, and the practicalities;
- replication and sample size;
- blocking and matching;
- commonly used designs, including completely randomised designs, randomised block and matched pair designs, Latin square designs;
- treatments, including factorial structures;
- analysis of data from designed experiments;
- analysis of variance and covariance;
- special designs, including incomplete block designs, split-plot designs, and fractional factorial designs;
- transformations of data;
- practical and ethical issues arising in the conduct of experiments.

# Other upcoming courses

## **May 2024: Producing Quality Graphs**

Provides an introduction to making high-quality graphs using *MiniTab* (not R)

<https://scc.ms.unimelb.edu.au/statistics-courses/course-listing/mscp-workshops>

## **MAST90130 Critical Thinking with Analytics (Term 3)**

Covers dealing with data, including measurement scales, data organisation, summaries, study design and inference. Think critically about the use of data in the various contexts.

<https://handbook.unimelb.edu.au/2024/subjects/mast90130>

## **Academic subject: MAST90007 Statistics for Research Workers (Winter semester)**

Similar content to the 6-day paid intensive, except assessed.

<https://handbook.unimelb.edu.au/2024/subjects/mast90007>



# Statistical Consulting Centre

## Free consulting for students

Graduate researchers at the University of Melbourne (including **PhD students**) are entitled to 10 hours of free statistical advice.

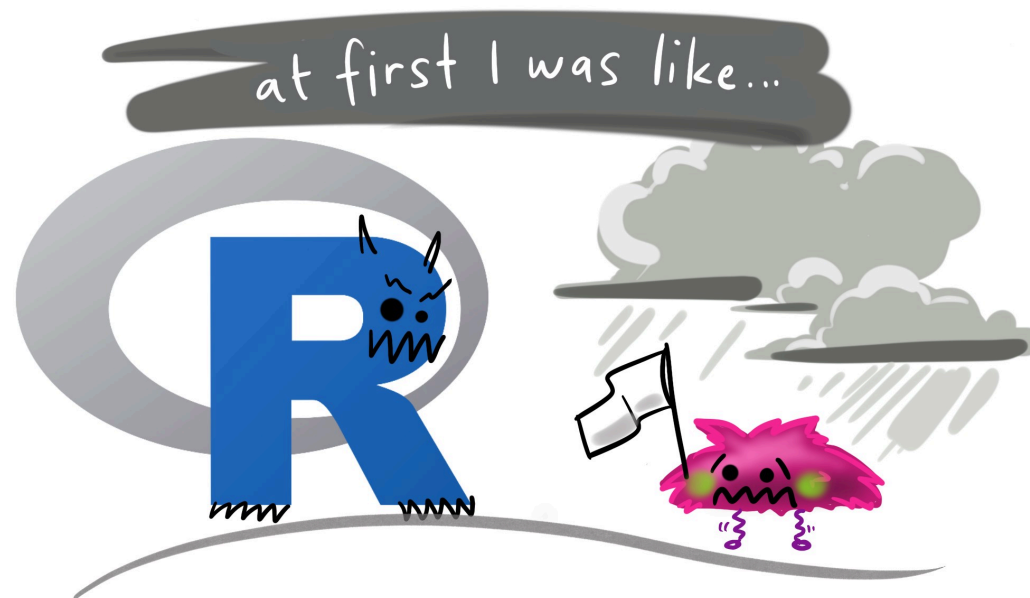
## Paid consulting for staff and external clients

We provide consulting services University of Melbourne staff at a discounted rate.

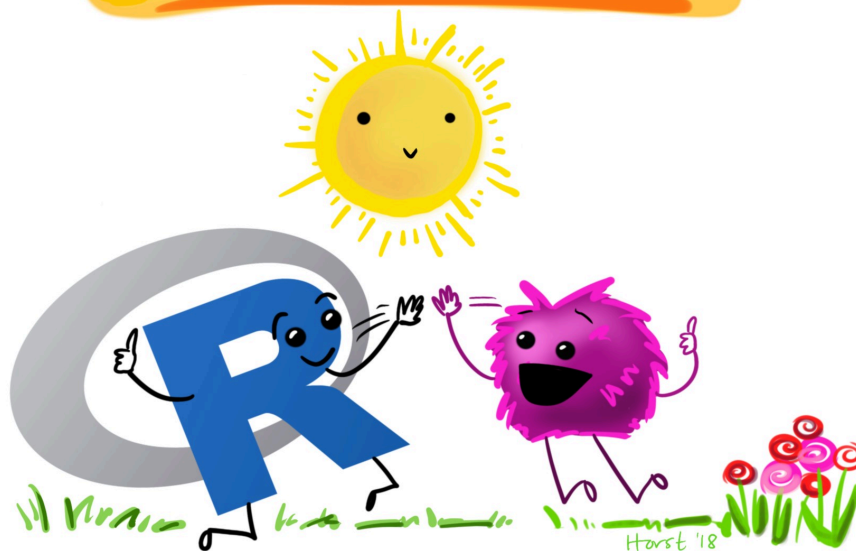
We can provide advice on any quantitative aspects of your research, with an emphasis on education and training, including:

- Design of experiments; sample size calculation; ethics applications
- Questionnaire design and data collection methods
- Selecting appropriate methods for analysing data
- Interpreting results from statistical analysis
- Communication of statistical findings
- Responding to reviewer feedback

Book an appointment: <https://scc.ms.unimelb.edu.au/enquiries>



...but now it's like...



One final secret...

