scholaRship

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Contents

Overview

`scholaRship` is a collection of tutorials on how to engage in the scholarship of teaching and learning using quantitative methods and R. It is written by Learning, Teaching, and Scholarship focused academics in the School of Psychology and Neuroscience and the School of Mathematics and Statistics at the University of Glasgow.

This book should be considered a living document. The tutorials will be added over time as they are developed and both the content and structure of new and existing tutorials may be updated.

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Chapter 1

Introduction

Getting started with the scholarship of teaching and learning can be difficult. For the majority of academics whose subject expertise does not involve learning and teaching, the first hurdle of figuring out what questions you can ask and answer (and indeed are interested in) can be the toughest one to push past.

Once you have settled on an area of enquiry, you may find that the most appropriate methodologies to investigate your questions are not ones you have been trained in. For quantitatively-minded researchers, the availability of data can feel like simultaneous feast and famine - you may have access to huge amounts of data through learning analytics and standard student records but will be able to use almost none of it for research purposes due to the need for opt-in consent. Where such consent has been obtained, you may have small, non-representative samples and/or non-random attrition.

Finally, the data you do have can be seriously messy: missing data, data from multiple sources with different structures and labels, data from different academic years where course structures and assessments have changed, anonymised data, or aggregated data.

If any of this sounds familiar, this book is for you.

Each tutorial in this book will contain:

- A short summary of the **evidence-base** for the problem under investigation to promote engagement with the SoTL literature;
- **Real**[1] messy, imperfect data drawn from commonly available sources such as Moodle, Turnitin, Microsoft Forms, and Echo360;
- A walkthrough of how to **clean and wrangle** the data using a predominantly `tidyverse` approach;
- A walkthrough of how to **analyse**, **interpret, and**, and **write-up** the analysis, alongside an honest discussion of the limitations of the approach used.

1.1 Expectations of prior knowledge

1.1.1 R and RStudio

Minimal prior knowledge of R and RStudio is assumed throughout this book. All functions and code used will be explained, however, we assume that the reader understands how to:

- Install R and RStudio

[1] **Due to the need for ethical approval, the data we use in this book won't be strictly real data, instead, it will be a simulated, synthetic copy of real data. All the mess, none of the consent issues.**

- Navigate RStudio
- Set the working directory appropriately
- Install and load packages
- Write and execute code

For any reader that wishes to recap these skills, the appendix contains resources on how to install R and RStudio, and an introduction to R and RStudio.

1.1.2 Research methods and statistics

We assume a basic level of competency in research methods and statistics. However, we also recognise that many researchers are still less familiar with more modern approaches such as mixed effects models and will provide an appropriate level of explanation and further resources where necessary.

Appendix A

Installing `R`

Installing R and RStudio is usually straightforward. The sections below explain how and there is a helpful YouTube video here.

A.1 Installing Base R

Install base R. Choose the download link for your operating system (Linux, Mac OS X, or Windows).

If you have a Mac, install the latest release from the newest `R-x.x.x.pkg` link (or a legacy version if you have an older operating system). After you install R, you should also install XQuartz to be able to use some visualisation packages.

If you are installing the Windows version, choose the "base" subdirectory and click on the download link at the top of the page. After you install R, you should also install RTools; use the "recommended" version highlighted near the top of the list.

If you are using Linux, choose your specific operating system and follow the installation instructions.

A.2 Installing RStudio

Go to rstudio.com and download the RStudio Desktop (Open Source License) version for your operating system under the list titled **Installers for Supported Platforms**.

A.3 RStudio Settings

There are a few settings you should fix immediately after updating RStudio. Go to **`Global Options...`** under the **`Tools`** menu (,), and in the General tab, uncheck the box that says **`Restore .RData into workspace at startup`**. If you keep things around in your workspace, things will get messy, and unexpected things will happen. You should always start with a clear workspace. This also means that you never want to save your workspace when you exit, so set this to **`Never`**. The only thing you want to save are your scripts.

You may also want to change the appearance of your code. Different fonts and themes can sometimes help with visual difficulties or dyslexia.

You may also want to change the settings in the Code tab. Foe example, Lisa prefers two spaces instead of tabs for my code and likes to be able to see the whitespace characters. But these are all a matter of personal preference.

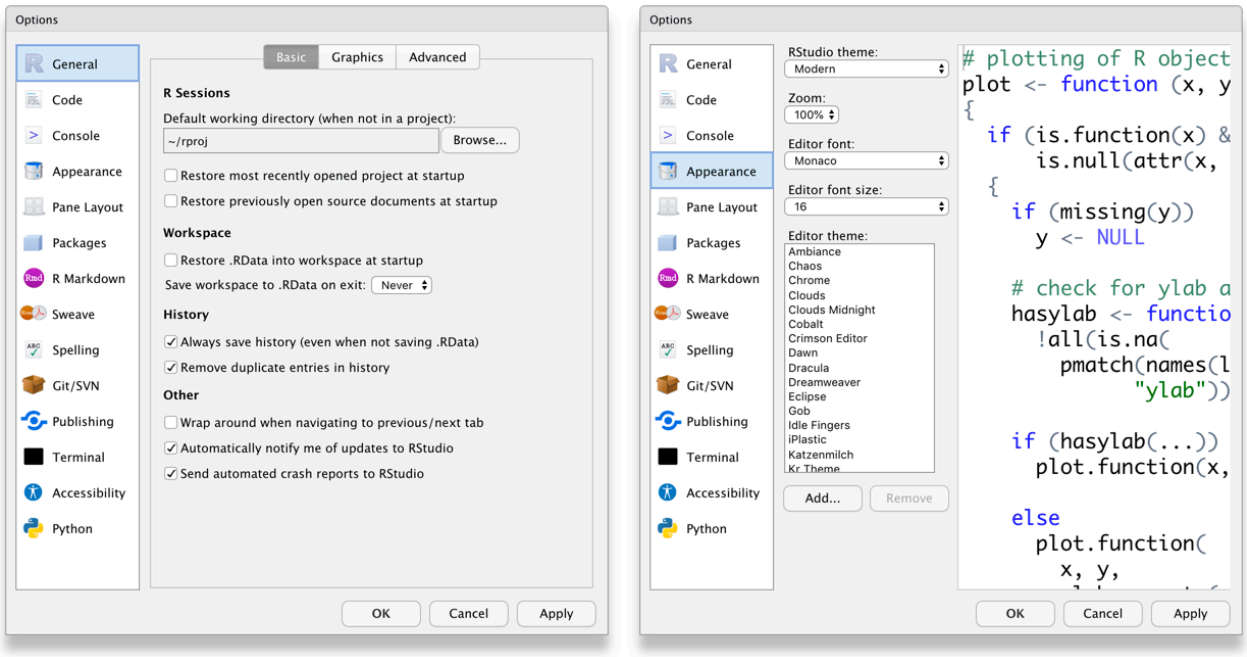

Figure A.1: RStudio General and Appearance settings

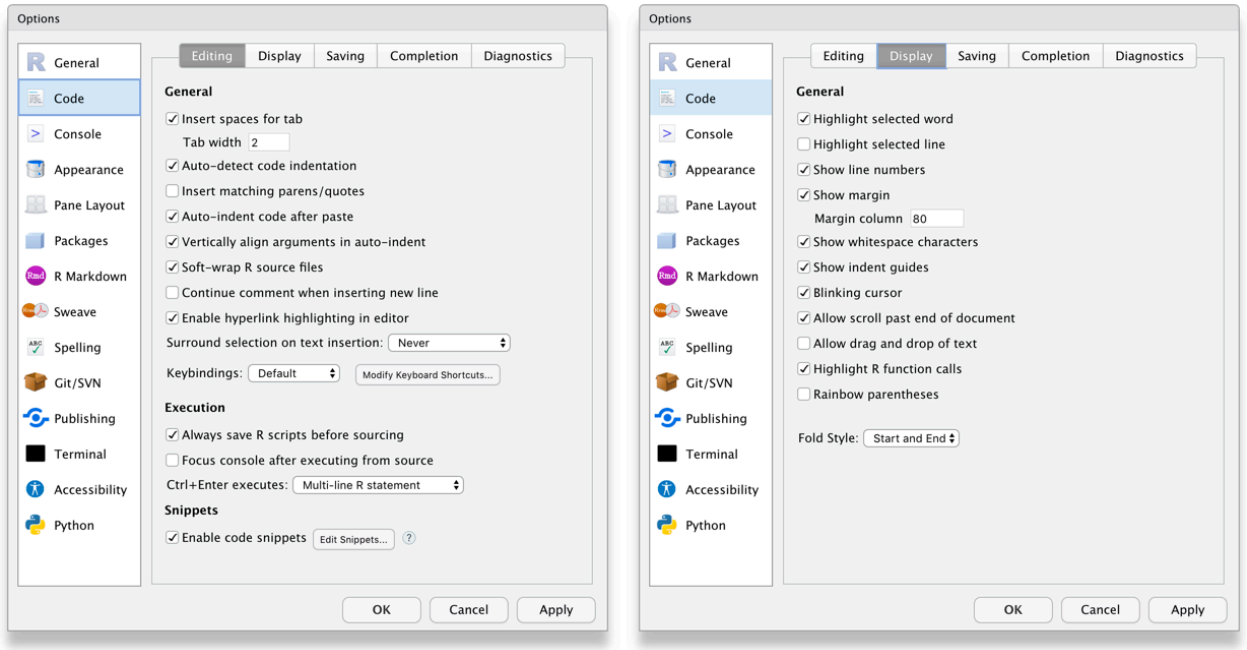

Figure A.2: RStudio Code settings

A.4 Installing LaTeX

You can install the LaTeX typesetting system to produce PDF reports from RStudio. Without this additional installation, you will be able to produce reports in HTML but not PDF. This course will not require you to make PDFs. To generate PDF reports, you will additionally need to install tinytex [Xie, 2021] and run the following code:

```
tinytex::install_tinytex()
```

Appendix B

Symbols

Symbol	psyTeachR Term	Also Known As
()	(round) brackets	parentheses
[]	square brackets	brackets
{}	curly brackets	squiggly brackets
<>	chevrons	angled brackets / guillemets
<	less than	
>	greater than	
&	ampersand	"and" symbol
#	hash	pound / octothorpe
/	slash	forward slash
\	backslash	
-	dash	hyphen / minus
_	underscore	
*	asterisk	star
^	caret	power symbol
~	tilde	twiddle / squiggle
=	equal sign	
==	double equal sign	
.	full stop	period / point
!	exclamation mark	bang / not
?	question mark	
'	single quote	quote / apostrophe
"	double quote	quote
%>%	pipe	magrittr pipe
|	vertical bar	pipe
,	comma	
;	semi-colon	
:	colon	
@	"at" symbol	various hilarious regional terms
...	`glossary("ellipsis")`	dots

Figure B.1: [Image by James Chapman/Soundimals](https://soundimals.tumblr.com/post/167354564886/chapmangamo-the-symbol-has-too-many-names)

Appendix C

Conventions

This book will use the following conventions:

- Generic code: `list(number = 1, letter = "A")`
- Highlighted code: dplyr::slice_max()
- File paths: data/sales.csv
- R Packages: tidyverse
- Functions: paste()
- Strings: "psyTeachR"
- Numbers: 100, 3.14
- Logical values: TRUE, FALSE
- Glossary items: ordinal
- Citations: Wickham [2021]
- Internal links: Chapter 1
- External links: R for Data Science
- Menu/interface options: **`New File...`**

C.1 Webexercises

See webexercises for more details about how to use this in your materials.

- Type an integer:
- I am going to learn a lot: TRUEFALSE
- What is a p-value?
  the probability that the null hypothesis is true the probability of the observed (or more extreme) data, under the assumption that the null-hypothesis is true the probability of making an error in your conclusion

Hidden Text

You found some hidden text!

Hidden Code

```
print("You found some hidden code!")
```

```
## [1] "You found some hidden code!"
```

C.2 Alert boxes

Informational asides.

Notes to warn you about something.

Notes about things that could cause serious errors.

Try it yourself.

C.3 Code Chunks

```
# code chunks
paste("Applied", "Data", "Skills", 1, sep = " ")
```

```
## [1] "Applied Data Skills 1"
```

```
# code chunks with visible r headers
library(tidyverse)
```

C.4 Glossary

term	definition
ordinal	Discrete variables that have an inherent order, such as number of legs

Appendix D

Glossary

You can use the `glossary()` function to automatically link to a term in the psyTeachR glossary or make your own project-specific glossary.

This will create a link to the glossary and include a tooltip with a short definition when you hover over the term. Use the following syntax in inline r: `glossary("word")`. For example, common data types are integer, double, and character.

If you need to link to a definition, but are using a different form of the word, add the display version as the second argument (`display`). You can also override the automatic short definition by providing your own in the third argument (`def`). Add the argument `link = FALSE` if you just want the hover definition and not a link to the psyTeachR glossary.

```
glossary("data type",
         display = "Data Types",
         def = "My custom definition of data types",
         link = FALSE)
```

[1] "Data Types"

You can add a glossary table to the end of a chapter with the following code. It creates a table of all terms used in that chapter previous to the `glossary_table()` function. It uses `kableExtra()`, so if you use it in a code chunk, set `results='asis'`.

```
glossary_table()
```

term	definition
character	A data type representing strings of text.
data-type	My custom definition of data types
double	A data type representing a real decimal number
integer	A data type representing whole numbers.

If you want to contribute to the glossary, fork the github project, add your terms and submit a pull request, or suggest a new term at the issues page.

License

Bibliography

Lisa DeBruine. psyteachr book template, 2021. URL https://github.com/psyteachr/template/.

Hadley Wickham. *tidyverse: Easily Install and Load the Tidyverse*, 2021. URL https://CRAN.R-project.org/package=tidyverse. R package version 1.3.1.

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