

An Organic R Textbook

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Chapter 1

About

This is textbook created during live discussion with the Squeglia Research Group of the Medical University of South Carolina.

Chapter 2

Getting Started

Placeholder

2.1 Overview of the R ecosystem

2.2 Installation

2.2.1 Step 1 - Download and install the R language

2.2.2 Step 2 - Download and install the RStudio IDE

2.2.3 Step 3 - Install the tidyverse package (optional)

2.3 A tour of RStudio

2.3.1 The console

2.3.2 The environment

2.3.3 The lower right pane

2.4 Your very first analysis

2.4.1 Step 1 - download the data

2.4.2 Step 2 - Make an RStudio Project

2.4.3 Step 3 - Get the data into your project folder

2.4.4 Step 4 - Open an Rmarkdown Notebook

2.4.5 Step 5 - Create a space to code

2.4.6 Step 6 - Write a command to import the data

2.4.7 Step 7 - Look inside the data

2.4.8 Step 8 - Make a histogram

2.4.9 Step 9 - Run a regression

2.4.10 Step 10 - Get a summary of your results

2.4.11 A Look forward

Chapter 3

Basic R

Placeholder

3.1 Writing in R and Rmarkdown

3.1.1 Chatting with R

3.1.2 Rmarkdown tricks

3.1.3 Code blocks

3.2 Variables

3.2.1 The assignment operator

3.2.2 Numerics

3.2.3 Characters

3.2.4 Booleans

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3.3 Vectors

3.4 Lists

3.5 Dataframes

3.5.1 Construction

3.5.2 Built-in dataframes

3.6 Functions

3.6.1 Getting help

3.6.2 Function parameters

3.7 Packages

3.8 Error messages

3.9 Coding Conventions

3.9.1 What should my code look like?

3.9.1.1 Common coding conventions in R

3.9.2 Official coding conventions

Chapter 4

Working with ABCD

Placeholder

4.1 Importing ABCD datafiles

4.1.1 What's different about ABCD?

4.1.2 Walking through ABCD data importation

4.1.3 Copy/paste-able code

4.2 A general-purpose ABCD dataset import function

4.2.1 Getting rid of import messages

4.3 Importing a whole folder of ABCD datasets

4.3.1 As easy strategy that unfortunately won't scale

Chapter 5

Visualization

Placeholder

5.1 Overview

5.2 ggplot Mappings

5.3 Adding geoms to the plot

5.4 Geom Options and Mappings

5.5 Saving plots

5.6 Other features to look for

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Data Wrangling

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6.1 Base R

6.2 The new way: dplyr

6.3 The only data verbs you'll ever need

6.3.1 `rename()`

6.3.2 `select()`

6.3.3 `mutate()`

6.3.4 `group_by()` and `summarize()`

Chapter 7

Basic hypothesis tests

Placeholder

7.1 Not your grandfather's statistical tests

7.2 Steps 1 & 2 - Load and clean data

7.3 Steps 3 & 4 - Create and unpack analysis objects

7.3.1 Independent samples t-test

7.3.2 Paired t-tests

7.3.3 Correlation

Chapter 8

Linear Regression

Placeholder

8.1 Steps 1 & 2 - Load and clean the data

8.2 Steps 3 & 4 - Fit the model and summarize it

8.2.1 Broom can help export the results

Chapter 9

Logistic Regression

Placeholder

9.1 Steps 1 & 2 - Import and clean data

9.2 Steps 3 & 4 - Fit the model and summarize it

9.2.1 Where are my odds ratios?

9.3 Plotting predicted values

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Introduction to machine learning

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- 10.1 Wait, aren't those the same thing?
- 10.2 The `tidymodels` framework
- 10.3 Steps 1 & 2 - Load data and do some very basic cleaning
- 10.4 Step 3 - Split training and test samples
- 10.5 Step 4 - Build a data processing recipe
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- 10.7 Step 6 - Fit a model
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Chapter 11

Multilevel Models

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11.2.1 Where are my p-values?

11.2.2 Where are my intraclass correlations (ICCs)?

11.3 Logistic multilevel models

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Structural Equation Modeling

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12.2.1 Steps 3 & 4

12.3 CFA

12.3.1 Step 3 & 4

12.4 SEM

12.4.1 Steps 3 & 4

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Chapter 13

Strings, should you care?

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13.3 Extract some information

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13.4.1 What about using `str_extract_all()`

13.5 String interpolation

Chapter 14

Simulations

Placeholder

14.1 Generating fake data

14.2 How is this useful?

14.3 Re-testing the t-test