

Contents

INTRODUCTION

Purpose	7
Why Bookdown?.....	7
Content in brief	7
Preface	8
Authors	8
Acknowledgement.....	9
Data.....	9
Note.....	10
R's Popularity	10
Setting up R for Windows.....	11

C H A P T E R 1

Basics.....	13
1.1 Functions.....	14
1.1.1 R as a Basic Calculator.....	14
1.1.2 R as a Programmable Calculator.....	16
1.1.3 Help!.....	19
1.2 R Data Types	20
1.2.2 Matrices	21
1.2.3 Variables.....	22
1.2.5 Missing Values	25
1.2.6 Data Frames.....	25
1.3 R Packages	26
1.4 The Workspace	27
Exercises.....	28

C H A P T E R 2

Data Sets.....	29
2.1 Import Data.....	30
2.1.1 CSV	30

2.1.2 SPSS	30
2.1.3 Rdata	31
2.1.4 Pull online	31
2.2 Basic Data Manipulation.....	31
2.3 Export Data	36
Exercises.....	38

C H A P T E R 3

Descriptive Statistics and Hypotheses Testing.....	39
3.1 Descriptive Statistics	40
3.1.1 Reporting descriptives	46
3.2 Basic graphics	47
3.3 Hypothesis testing introduction.....	52
3.3.1 The Sampling distribution	53
3.3.2 The Confidence Intervals (CI).....	53
3.3.3 The null hypothesis.....	55
3.3.4 The z score and the z test	56
3.3.5 The one-sample t test.....	58
3.3.6 The p-value.....	60
3.3.7 Statistical power.....	62
3.3.8 In case the z and the t distribution is not valid	65
Exercises.....	66

C H A P T E R 4

Comparing Two Means, the t-test.....	67
4.1 Introduction.....	68
4.2 Between-Subjects t-test (The Independent Groups t-test)	69
4.2.1 R codes for the independent groups t-test.....	71
4.2.2 Assumptions of the independent groups t-test	74
4.2.3 Using Welch's t test	75
4.2.4 Effect size for the independent groups t-test	77
4.2.5 Power calculations for the independent groups t-test	79
4.3 The dependent groups t-test (Within-subjects t-test).....	79

4.3.1 R codes for the dependent groups t-test	80
4.3.2 Assumption for the dependent groups t-test.....	82
4.3.3 Robust estimation for the dependent groups t-test.....	82
4.3.4 Effect size for the dependent groups t-test	83
4.3.5 Power calculations for the dependent groups t-test.....	84
4.4 Common Designs	84
4.4.1 Designs in which scores in the two treatments are correlated	85
4.4.2 Designs in which scores in the two treatments are independent	88
Exercises.....	89
 C H A P T E R 5	
5.1 Terminology.....	92
5.2 Between Subjects ANOVA	93
5.2.1 One-way Between Subjects ANOVA	93
5.3 Two-Factor Between Subjects ANOVA	105
5.4 Within Subjects ANOVA	112
5.4.1 One-way Within-Subjects ANOVA.....	112
Exercises.....	122
 C H A P T E R 6	
6.1 Introduction.....	124
6.2 Pearson correlation coefficient	125
6.2.1 Inference on a Pearson correlation coefficient.....	125
6.2.2 R codes for Pearson Correlation coefficient	126
6.3 Spearman's rho and Kendall's tau.....	131
6.3.1 The R code for Spearman's rho and Kendall's tau	131
6.4 Biserial and Point-Biserial Correlation Coefficients with R	132
6.5 Phi Correlation Coefficient with R.....	133
6.6 Tetrachoric and Polychoric Correlation Coefficients with R.....	133
6.7 Issues in Interpreting Correlation Coefficients	134
Exercises.....	136
 C H A P T E R 7	
7.1 Matricies and Least Square Estimation.....	137

7.1.1 "Essentially, all models are wrong, but some are useful."	140
7.1.2 Strength of relationship between the dependent and independent variables	140
7.1.3 Residuals and influential data points	142
7.1.4 <i>Equal variance assumption</i>	147
7.1.5 Hypothesis testing	150
7.1.6 Variable Selection.....	151
7.1.7 Collinearity	153
7.1.8 Non-linearity	154
7.1.9 Correlated errors and non-independent errors	154
7.1.10 Centering and Scaling	155
7.1.11 Standardized coefficients.....	155
7.1.12 Interactions	155

C H A P T E R 8

More on the apaStyle package.....	164
References.....	165