
Contents

| | | |
|----------|--|----|
| 1 | Basics | 1 |
| 1.1 | Introduction | 2 |
| 1.2 | Variance and Covariance | 7 |
| 1.3 | Partitioning Variation | 8 |
| 1.4 | Contrasts | 11 |
| 1.5 | Randomization, Layouts, and Designs | 16 |
| 1.6 | Replication: True and Technical | 23 |
| 1.7 | Exercises | 27 |
| 1.8 | Technical Notes | 37 |
| 1.9 | Miscellanea | 40 |
| 2 | Completely Randomized Designs | 43 |
| 2.1 | Introduction | 43 |
| 2.1.1 | A Oneway CRD Model | 44 |
| 2.1.2 | CRD and the Two-sample t -test | 44 |
| 2.1.3 | CRD Anova | 46 |
| 2.2 | Model and Distribution Assumptions | 48 |
| 2.3 | Expected Squares and F -tests | 51 |
| 2.4 | Estimating Contrasts | 53 |
| 2.5 | Deeper into Factorials | 54 |
| 2.5.1 | Investigating Interactions | 54 |
| 2.5.2 | Higher-Order Factorials | 59 |
| 2.6 | Adjusting for Covariates | 62 |
| 2.7 | Exercises | 70 |
| 2.8 | Technical Notes | 79 |
| 2.9 | Miscellanea | 85 |
| 3 | Complete Block Designs | 91 |
| 3.1 | Introduction | 91 |
| 3.1.1 | An RCB Model | 92 |
| 3.1.2 | RCB and the Paired t -test | 94 |
| 3.1.3 | The RCB Anova | 96 |

| | | |
|----------|---|------------|
| 3.2 | Model and Distribution Assumptions | 98 |
| 3.3 | Expected Squares and F -tests | 101 |
| 3.4 | Estimating Contrasts | 104 |
| 3.5 | Modeling the Interaction | 108 |
| 3.6 | Variations on a Theme | 112 |
| 3.6.1 | Replicating the Experiment | 112 |
| 3.6.2 | Crossed Blocks | 115 |
| 3.6.3 | Latin Squares | 117 |
| 3.7 | Exercises | 123 |
| 3.8 | Technical Notes | 135 |
| 3.9 | Miscellanea | 140 |
| 4 | Interlude: Assessing the Effects of Blocking | 145 |
| 4.1 | Introduction | 145 |
| 4.2 | Model and Distribution Assumptions | 146 |
| 4.3 | Expected Squares and F -tests | 147 |
| 4.4 | Estimating Contrasts | 149 |
| 4.5 | Modeling the Interaction | 153 |
| 4.6 | Reconciliation | 157 |
| 4.7 | Exercises | 159 |
| 4.8 | Technical Notes | 164 |
| 4.9 | Miscellanea | 166 |
| 5 | Split Plot Designs | 171 |
| 5.1 | Introduction | 171 |
| 5.1.1 | A Split Plot Model | 171 |
| 5.1.2 | Dissecting the Split Plot | 173 |
| 5.2 | CRD on the Whole Plots | 175 |
| 5.2.1 | Model and Distribution Assumptions | 175 |
| 5.2.2 | Expected Squares and F -tests | 177 |
| 5.2.3 | Estimating Contrasts | 179 |
| 5.3 | RCB on the Whole Plots | 185 |
| 5.3.1 | Model and Distribution Assumptions | 185 |
| 5.3.2 | Expected Squares and F -tests | 188 |
| 5.3.3 | Estimating Contrasts | 191 |
| 5.4 | Estimating Effects | 194 |
| 5.5 | Splitting Twice | 196 |
| 5.6 | Variations on a Theme | 207 |
| 5.6.1 | Strip Plots | 207 |
| 5.6.2 | Crossover Designs | 211 |
| 5.6.3 | Repeated Measures | 216 |
| 5.7 | Exercises | 218 |
| 5.8 | Technical Notes | 234 |
| 5.9 | Miscellanea | 238 |

| | | |
|----------|--|-----|
| 6 | Confounding in Blocks | 243 |
| 6.1 | Introduction | 243 |
| 6.2 | Balanced Incomplete Block Designs | 248 |
| 6.2.1 | Model and Distribution Assumptions | 250 |
| 6.2.2 | Estimating Contrasts | 252 |
| 6.3 | Fractional Factorial Designs | 254 |
| 6.4 | Variations on a Theme | 262 |
| 6.5 | Exercises | 272 |
| 6.6 | Miscellanea | 286 |
| A | Designs Illustrated | 289 |
| | References | 293 |
| | Author Index | 299 |
| | Subject Index | 301 |



<http://www.springer.com/978-0-387-75964-7>

Statistical Design

Casella, G.

2008, XXIII, 307 p., Hardcover

ISBN: 978-0-387-75964-7