Contents

Preface xv

1. EXPERIMENTS AND GENERALIZED CAUSAL INFERENCE 1

Experiments and Causation 3

Defining Cause, Effect, and Causal Relationships 3
Causation, Correlation, and Confounds 7
Manipulable and Nonmanipulable Causes 7
Causal Description and Causal Explanation 9

Modern Descriptions of Experiments 12

Randomized Experiment 13
Quasi-Experiment 13
Natural Experiment 17
Nonexperimental Designs 18

Experiments and the Generalization of Causal Connections 18

Most Experiments Are Highly Local But Have General Aspirations 18
Construct Validity: Causal Generalization as Representation 20
External Validity: Causal Generalization as Extrapolation 21
Approaches to Making Causal Generalizations 22

Experiments and Metascience 26

The Kuhnian Critique 27
Modern Social Psychological Critiques 28
Science and Trust 28
Implications for Experiments 29

A World Without Experiments or Causes? 31

2. STATISTICAL CONCLUSION VALIDITY AND INTERNAL VALIDITY 33

Validity 34

A Validity Typology 37
Threats to Validity 39

Statistical Conclusion Validity 42

Reporting Results of Statistical Tests of Covariation 42
Threats to Statistical Conclusion Validity 45
The Problem of Accepting the Null Hypothesis 52

Internal Validity 53

Threats to Internal Validity 54
Estimating Internal Validity in Randomized Experiments and Quasi-Experiments 61

The Relationship Between Internal Validity and Statistical Conclusion Validity 63

3. CONSTRUCT VALIDITY AND EXTERNAL VALIDITY 64

Construct Validity 64

Why Construct Inferences Are a Problem 66
Assessment of Sampling Particulars 69
Threats to Construct Validity 72
Construct Validity, Preexperimental Tailoring, and Postexperimental Specification 81

External Validity 83

Threats to External Validity 86
Constancy of Effect Size Versus Constancy of Causal Direction 90
Random Sampling and External Validity 91
Purposive Sampling and External Validity 92

More on Relationships, Tradeoffs, and Priorities 93

The Relationship Between Construct Validity and External Validity 93
The Relationship Between Internal Validity and Construct Validity 95
Tradeoffs and Priorities 96

Summary 102

4. QUASI-EXPERIMENTAL DESIGNS THAT EITHER LACK A CONTROL GROUP OR LACK PRETEST OBSERVATIONS ON THE OUTCOME 103

The Logic of Quasi-Experimentation in Brief 104

Designs Without Control Groups 106

The One-Group Posttest-Only Design 106
The One-Group Pretest–Posttest Design 108
The Removed-Treatment Design 111
The Repeated-Treatment Design 113

Designs That Use a Control Group But No Pretest 115

Posttest-Only Design With Nonequivalent Groups 115
Improving Designs Without Control Groups by Constructing Contrasts Other Than With Independent Control Groups 125
The Case-Control Design 128

Conclusion 134

5. QUASI-EXPERIMENTAL DESIGNS THAT USE BOTH CONTROL GROUPS AND PRETESTS 135

Designs That Use Both Control Groups and Pretests 136

The Untreated Control Group Design With Dependent Pretest and Posttest Samples 136
Matching Through Cohort Controls 148

Designs That Combine Many Design Elements 153

Untreated Matched Controls With Multiple Pretests and Posttests, Nonequivalent Dependent Variables, and Removed and Repeated Treatments 153
Combining Switching Replications With a Nonequivalent Control Group Design 154
An Untreated Control Group With a Double Pretest and Both Independent and Dependent Samples 154

The Elements of Design 156

Assignment 156
Measurement 158
Comparison Groups 159
Treatment 160
Design Elements and Ideal Quasi-Experimentation 160

Conclusion 161

Appendix 5.1: Important Developments in Analyzing Data From Designs With Nonequivalent Groups 161

Propensity Scores and Hidden Bias 162
Selection Bias Modeling 166
Latent Variable Structural Equation Modeling 169

6. QUASI-EXPERIMENTS: INTERRUPTED TIME-SERIES DESIGNS 171

What Is a Time Series? 172

Describing Types of Effects 172
Brief Comments on Analysis 174

Simple Interrupted Time Series 175

A Change in Intercept 175
A Change in Slope 176
Weak and Delayed Effects 178
The Usual Threats to Validity 179

Adding Other Design Features to the Basic Interrupted Time Series 181

Adding a Nonequivalent No-Treatment Control Group Time Series 182
Adding Nonequivalent Dependent Variables 184
Removing the Treatment at a Known Time 188
Adding Multiple Replications 190
Adding Switching Replications 192

Some Frequent Problems with Interrupted Time-Series Designs 195

Gradual Rather Than Abrupt Interventions 196
Delayed Causation 197
Short Time Series 198
Limitations of Much Archival Data 203

A Comment on Concomitant Time Series 205

Conclusion 206

7. REGRESSION DISCONTINUITY DESIGNS 207

The Basics of Regression Discontinuity 208

The Basic Structure 208

Examples of Regression Discontinuity Designs 212
Structural Requirements of the Design 216
Variations on the Basic Design 219

Theory of the Regression Discontinuity Design 220
Regression Discontinuities as Treatment Effects in the Randomized Experiment 221
Regression Discontinuity as a Complete Model of the Selection Process 224

Adherence to the Cutoff 227
Overrides of the Cutoff 227
Crossovers and Attrition 228
Fuzzy Regression Discontinuity 229

Threats to Validity 229
Regression Discontinuity and the Interrupted Time Series 229
Statistical Conclusion Validity and Misspecification of Functional Form 230
Internal Validity 237

Combining Regression Discontinuity and Randomized Experiments 238

Combining Regression Discontinuity and Quasi-Experiments 241

Regression Discontinuity—Experiment or Quasi-Experiment? 242

Appendix 7.1: The Logic of Statistical Proofs about Regression Discontinuity 243

8. RANDOMIZED EXPERIMENTS: RATIONALE, DESIGNS, AND CONDITIONS CONDUCIVE TO DOING THEM 246

The Theory of Random Assignment 247
What Is Random Assignment? 248
Why Randomization Works 248
Random Assignment and Units of Randomization 253
The Limited Reach of Random Assignment 256

Some Designs Used with Random Assignment 257
The Basic Design 257
The Pretest-Posttest Control Group Design 261
Alternative-Treatments Design with Pretest 261

Multiple Treatments and Controls with Pretest 262
Factorial Designs 263
Longitudinal Designs 266
Crossover Designs 268

Conditions Most Conducive to Random Assignment 269

When Demand Outstrips Supply 269
When an Innovation Cannot Be Delivered to All Units at Once 270
When Experimental Units Can Be Temporally Isolated: The Equivalent-Time-Samples Design 270
When Experimental Units Are Spatially Separated or Interunit Communication Is Low 271
When Change Is Mandated and Solutions Are Acknowledged to Be Unknown 272
When a Tie Can Be Broken or Ambiguity About Need Can Be Resolved 273
When Some Persons Express No Preference Among Alternatives 273
When You Can Create Your Own Organization 274
When You Have Control over Experimental Units 274
When Lotteries Are Expected 275

When Random Assignment Is Not Feasible or Desirable 276

Discussion 277

9. PRACTICAL PROBLEMS 1: ETHICS, PARTICIPANT RECRUITMENT, AND RANDOM ASSIGNMENT 279

Ethical and Legal Issues with Experiments 280

The Ethics of Experimentation 281
Withholding a Potentially Effective Treatment 283
The Ethics of Random Assignment 286
Discontinuing Experiments for Ethical Reasons 289
Legal Problems in Experiments 290

Recruiting Participants to Be in the Experiment 292

Improving the Random Assignment Process 294

Methods of Randomization 294
What to Do If Pretest Means Differ 303
Matching and Stratifying 304
Matching and Analysis of Covariance 306
The Human Side of Random Assignment 307

Conclusion 311

Appendix 9.1: Random Assignment by Computer 311
SPSS and SAS 311
World Wide Web 313
Excel 313

10. PRACTICAL PROBLEMS 2: TREATMENT IMPLEMENTATION AND ATTRITION 314

Problems Related to Treatment Implementation 315
Inducing and Measuring Implementation 315
Analyses Taking Implementation into Account 320

Post-Assignment Attrition 323
Defining the Attrition Problem 323
Preventing Attrition 324
Analyses of Attrition 334

Discussion 340

11. GENERALIZED CAUSAL INFERENCE: A GROUNDED THEORY 341

The Received View of Generalized Causal Inference: Formal Sampling 342
Formal Sampling of Causes and Effects 344
Formal Sampling of Persons and Settings 346
Summary 348

A Grounded Theory of Generalized Causal Inference 348
Exemplars of How Scientists Make Generalizations 349
Five Principles of Generalized Causal Inferences 353
The Use of Purposive Sampling Strategies 354
Applying the Five Principles to Construct and External Validity 356
Should Experimenters Apply These Principles to All Studies? 371
Prospective and Retrospective Uses of These Principles 372

Discussion 373

12. GENERALIZED CAUSAL INFERENCE: METHODS FOR SINGLE STUDIES 374

Purposive Sampling and Generalized Causal Inference 374
Purposive Sampling of Typical Instances 375
Purposive Sampling of Heterogeneous Instances 376

Purposive Sampling and the First Four Principles 378
Statistical Methods for Generalizing from Purposive Samples 386

Methods for Studying Causal Explanation 389

Qualitative Methods 389
Statistical Models of Causal Explanation 392
Experiments That Manipulate Explanations 414

Conclusion 415

13. GENERALIZED CAUSAL INFERENCE: METHODS FOR MULTIPLE STUDIES 417

Generalizing from Single Versus Multiple Studies 418

Multistudy Programs of Research 418

Phased Models of Increasingly Generalizable Studies 419
Directed Programs of Experiments 420

Narrative Reviews of Existing Research 421

Narrative Reviews of Experiments 422
Narrative Reviews Combining Experimental and Nonexperimental Research 423
Problems with Narrative Reviews 423

Quantitative Reviews of Existing Research 425

The Basics of Meta-Analysis 426
Meta-Analysis and the Five Principles of Generalized Causal Inference 435
Discussion of Meta-Analysis 445

Appendix 13.1: Threats to the Validity of Meta-Analyses 446

Threats to Inferences About the Existence of a Relationship Between Treatment and Outcome 447
Threats to Inferences About the Causal Relationship Between Treatment and Outcome 450
Threats to Inferences About the Constructs Represented in Meta-Analyses 453
Threats to Inferences About External Validity in Meta-Analyses 454

14. A CRITICAL ASSESSMENT OF OUR ASSUMPTIONS 456

Causation and Experimentation 453

Causal Arrows and Pretzels 453
Epistemological Criticisms of Experiments 459
Neglected Ancillary Questions 461

Validity 462
Objections to Internal Validity 462
Objections Concerning the Discrimination Between Construct Validity and External Validity 466
Objections About the Completeness of the Typology 473
Objections Concerning the Nature of Validity 475

Quasi-Experimentation 484
Criteria for Ruling Out Threats: The Centrality of Fuzzy Plausibility 484
Pattern Matching as a Problematic Criterion 485
The Excuse Not to Do a Randomized Experiment 486

Randomized Experiments 488
Experiments Cannot Be Successfully Implemented 488
Experimentation Needs Strong Theory and Standardized Treatment Implementation 489
Experiments Entail Tradeoffs Not Worth Making 490
Experiments Assume an Invalid Model of Research Utilization 493
The Conditions of Experimentation Differ from the Conditions of Policy Implementation 495
Imposing Treatments Is Fundamentally Flawed Compared with Encouraging the Growth of Local Solutions to Problems 497

Causal Generalization: An Overly Complicated Theory? 498

Nonexperimental Alternatives 499
Intensive Qualitative Case Studies 500
Theory-Based Evaluations 501
Weaker Quasi-Experiments 502
Statistical Controls 503

Conclusion 504

Glossary 505

References 514

Name Index 593

Subject Index 609