

Contents

| | |
|--|-----------|
| Preface | v |
| Part I Introduction | 1 |
| 1 The Growth of Meta-Analysis and Implications for Methodological Controversies | 3 |
| 2 Basic Steps of Meta-Analysis and the Emergence of Approaches | 9 |
| 2.1 Basic Steps of Meta-Analysis | 9 |
| 2.2 On the Emergence of Approaches | 14 |
| Part II Statistical Methods of Meta-Analysis | 17 |
| 3 Effect Sizes | 19 |
| 3.1 Correlation Coefficients as Effect Sizes | 20 |
| 3.2 Standardized Mean Differences as Effect Sizes | 28 |
| 3.3 Conversion of Effect Sizes | 30 |
| 4 General Frameworks of Meta-Analysis | 33 |
| 4.1 Fixed Effects Model | 35 |
| 4.2 Random Effects Model | 39 |
| 4.3 Mixture Models | 42 |
| 4.4 Hierarchical Linear Models | 45 |
| 4.5 Classes of Situations for the Application of Meta-Analysis | 48 |
| 5 Statistical Approaches to Meta-Analysis | 55 |
| 5.1 Hedges and Olkin | 56 |
| 5.1.1 Procedures for r as Effect Size | 57 |
| 5.1.2 Procedures for d as Effect Size | 59 |
| 5.2 Rosenthal and Rubin | 61 |
| 5.3 Hunter and Schmidt | 62 |
| 5.4 Refined Approaches | 70 |
| 5.4.1 DerSimonian-Laird | 71 |

| | | |
|-----------------|---|------------|
| 5.4.2 | Olkin and Pratt | 72 |
| 5.5 | Consequences of Choosing an Approach: Different Estimated Parameters | 75 |
| 5.6 | Comparisons of Approaches: Statistical Procedures | 82 |
| 6 | Summary of Statistical Part | 87 |
| Part III | Evaluation of Statistical Approaches: A Monte-Carlo Study | 91 |
| 7 | Aims, Design, and Implementation | 93 |
| 7.1 | General Aims and Procedure | 94 |
| 7.2 | General Expectations and Predictions for the Results | 95 |
| 7.3 | Distributions in the Universe of Studies | 100 |
| 7.4 | Parameters | 102 |
| 7.5 | Drawing Random Correlation Coefficients | 105 |
| 7.5.1 | Approximations to the Sampling Distribution of r | 106 |
| 7.5.2 | Evaluation of the Approximations | 109 |
| 7.6 | Details of Programming | 114 |
| 7.7 | Summary | 114 |
| 8 | Results | 115 |
| 8.1 | Preliminaries | 115 |
| 8.2 | Estimation of the Mean Effect Size in the Universe of Studies | 117 |
| 8.2.1 | Bias | 118 |
| 8.2.1.1 | Homogeneous Situation $\odot!$ | 118 |
| 8.2.1.2 | Heterogeneous Situation $<S_2$ | 123 |
| 8.2.1.3 | Heterogeneous Situation e_3 | 130 |
| 8.2.2 | Relative Efficiency | 134 |
| 8.3 | Significance Tests for the Mean Effect Size: Type I Errors and Power | 137 |
| 8.4 | Confidence Intervals | 148 |
| 8.5 | Homogeneity Tests | 158 |
| 8.5.1 | Homogeneity Tests Based on the Q-Statistic | 159 |
| 8.5.1.1 | Homogeneous Situation $6j$: Type I Errors | 159 |
| 8.5.1.2 | Heterogeneous Situations \odot_2 and $<5_3$: Power | 161 |
| 8.5.2 | The Hunter-Schmidt Approach to the Test of Homogeneity: The 75%- and 90%-rule | 164 |
| 8.6 | Estimation of Heterogeneity Variance | 170 |
| 8.6.1 | Homogeneous Situation $\&\backslash$ | 171 |
| 8.6.2 | Heterogeneous Situations \odot_2 and 6_3 | 175 |

| | |
|---|-----|
| Part IV Putting It All Together | 181 |
| 9 Synopsis of Statistical Methods and Monte Carlo Study Results | 183 |
| 10 Discussion and Conclusions | 191 |
| Nomenclature | 197 |
| References | 201 |
| Appendices | 215 |
| Appendix A Beta Distributions in the Universe of Effect Sizes | 217 |
| Appendix B Annotated Mathematica Notebook | 223 |
| Appendix C Tables of Results | 229 |
| Author Index | 235 |
| Subject Index | 239 |