

borenstein introduction to meta analysis

Borenstein Introduction to Meta-Analysis: A Comprehensive Guide

Introduction:

Are you drowning in a sea of research studies, struggling to synthesize the findings and draw meaningful conclusions? Feeling overwhelmed by the sheer volume of data and the conflicting results? Then you need a life raft – and that life raft is *Introduction to Meta-Analysis*, by Borenstein, Hedges, Higgins, and Rothstein. This comprehensive guide is the gold standard for understanding and conducting meta-analyses, a powerful statistical technique for combining results from multiple independent studies. This post will serve as your ultimate guide to navigating this essential text, exploring its key components, and understanding its invaluable contribution to research synthesis. We'll delve into the structure, content, and practical applications, equipping you with the knowledge to confidently undertake your own meta-analyses.

Understanding the Power of Meta-Analysis

Before we dissect Borenstein's book, let's understand the crucial role meta-analysis plays in research. Individual studies, while valuable, often suffer from limitations like small sample sizes, methodological inconsistencies, and publication bias. Meta-analysis overcomes these limitations by combining data from multiple studies, providing a more comprehensive and robust understanding of a research question. This leads to more precise effect size estimates, stronger conclusions, and a more nuanced interpretation of the existing literature. In essence, meta-analysis provides a higher level of evidence synthesis, crucial for informing clinical practice, policy decisions, and future research directions.

A Deep Dive into Borenstein's Introduction to Meta-Analysis

Borenstein's *Introduction to Meta-Analysis* isn't just a textbook; it's a comprehensive toolkit for researchers. Its strength lies in its clarity, practical approach, and step-by-step guidance, making even complex statistical concepts accessible. The book effectively bridges the gap between theoretical understanding and practical application. It doesn't shy away from statistical detail but presents it in a way that's digestible even for those with limited statistical background.

Structure and Content Outline:

The book is structured logically, progressing from fundamental concepts to advanced techniques. Here's a breakdown of its key components:

Introduction: Establishes the context of meta-analysis, its importance, and its applications

across various disciplines.

Fundamentals of Meta-Analysis: Covers key concepts like effect sizes, weighting schemes, and the rationale behind combining study results.

Fixed-Effects and Random-Effects Models: Explains the differences between these two fundamental models, highlighting their assumptions and implications for interpretation.

Dealing with Heterogeneity: Addresses the challenges posed by heterogeneity (variability in study results), exploring methods for investigating and handling heterogeneity.

Publication Bias: Explores the pervasive issue of publication bias – the tendency for studies with positive results to be published more frequently than studies with negative or null results – and techniques for detecting and mitigating its effects.

Meta-Regression: Introduces meta-regression, a powerful technique for exploring the relationship between study characteristics and effect sizes.

Software and Practical Application: Provides hands-on guidance on using statistical software packages to conduct meta-analyses, often focusing on widely accessible tools like Review Manager (RevMan) and Comprehensive Meta-Analysis (CMA).

Advanced Topics: Explores more complex topics such as network meta-analysis, meta-analysis of diagnostic tests, and other specialized applications.

Conclusion: Summarizes the key principles and reinforces the importance of meta-analysis in research synthesis.

Detailed Explanation of Key Chapters:

Introduction: This initial chapter sets the stage, defining meta-analysis, outlining its benefits, and providing a roadmap for the subsequent chapters. It effectively explains the limitations of relying solely on narrative reviews and highlights the superior power of quantitative synthesis.

Fundamentals of Meta-Analysis: This crucial section lays the groundwork for understanding core concepts. It meticulously explains different types of effect sizes (e.g., odds ratios, risk ratios, standardized mean differences), their interpretation, and how to calculate them from raw data. It also introduces the concept of weighting studies based on their sample size and precision.

Fixed-Effects and Random-Effects Models: This chapter is pivotal for grasping the underlying statistical models. It clearly explains the assumptions of both fixed-effects and random-effects models, emphasizing the implications for the interpretation of the overall effect size. Understanding the difference between these models is critical for choosing the appropriate method for a given meta-analysis.

Dealing with Heterogeneity: Heterogeneity – the variation in effect sizes across studies – is a common challenge in meta-analysis. This chapter provides strategies for detecting heterogeneity (e.g., I^2 statistic) and understanding its potential sources. It also explores methods for handling heterogeneity, including subgroup analysis and meta-regression.

Publication Bias: Publication bias is a significant threat to the validity of meta-analyses. This section details the mechanisms of publication bias, its impact on the results, and various methods for assessing and addressing its influence (e.g., funnel plots, Egger's test, trim-and-fill methods).

Meta-Regression: This chapter delves into the advanced technique of meta-regression, allowing researchers to explore the relationship between study characteristics (e.g.,

sample size, study quality, treatment dosage) and the observed effect sizes. It enables researchers to identify potential moderators of the treatment effect.

Software and Practical Application: This highly practical chapter guides readers through the process of conducting meta-analyses using statistical software. It provides step-by-step instructions, making the transition from theoretical understanding to practical application seamless.

Advanced Topics: This section ventures into more sophisticated meta-analytic techniques, such as network meta-analysis (comparing multiple interventions simultaneously) and specialized methods for different types of outcomes (e.g., diagnostic test accuracy).

Conclusion: The concluding chapter reinforces the value of meta-analysis as a powerful research synthesis tool. It summarizes the key concepts and provides practical recommendations for conducting and interpreting meta-analyses effectively.

Frequently Asked Questions (FAQs):

1. What is the difference between a fixed-effects and a random-effects model in meta-analysis? Fixed-effects assumes a single true effect size across all studies, while random-effects accounts for variability in true effect sizes between studies.
1. How do I deal with heterogeneity in my meta-analysis? Explore potential sources through subgroup analysis or meta-regression; consider using a random-effects model.
1. What is publication bias, and how can I detect it? Publication bias is the tendency to publish studies with positive results. Funnel plots and statistical tests (e.g., Egger's test) can help detect it.
1. What software packages are commonly used for meta-analysis? Review Manager (RevMan), Comprehensive Meta-Analysis (CMA), and Stata are popular choices.
1. What are effect sizes, and why are they important? Effect sizes quantify the magnitude of an effect, allowing for comparison across studies and providing a more informative summary than p-values.

1. What is the role of weighting in meta-analysis? Weighting gives more influence to studies with larger sample sizes and greater precision.
1. How can I interpret the results of a meta-analysis? Consider the overall effect size, its confidence interval, the presence of heterogeneity, and the potential for publication bias.
1. What are the limitations of meta-analysis? Meta-analysis is only as good as the studies included; it cannot overcome inherent biases in the original studies.
1. Can meta-analysis be used for qualitative research? While primarily quantitative, techniques exist to synthesize qualitative findings, often through thematic analysis and narrative synthesis.

Related Articles:

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borenstein introduction to meta analysis: *Introduction to Meta-Analysis* Michael Borenstein, Larry V. Hedges, Julian P. T. Higgins, Hannah R. Rothstein, 2011-08-24 This book provides a clear and thorough introduction to meta-analysis, the process of synthesizing data from a series of separate studies. Meta-analysis has become a critically important tool in fields as diverse as medicine, pharmacology, epidemiology, education, psychology, business, and ecology. *Introduction to Meta-Analysis*: Outlines the role of meta-analysis in the research process Shows how to compute effects sizes and treatment effects Explains the fixed-effect and random-effects models for synthesizing data Demonstrates how to assess and interpret variation in effect size across studies Clarifies concepts using text and figures, followed by formulas and examples Explains how to avoid common mistakes in meta-analysis Discusses controversies in meta-analysis Features a web site with additional material and exercises A superb combination of lucid prose and informative graphics, written by four of the world's leading experts on all aspects of meta-analysis. Borenstein, Hedges, Higgins, and Rothstein provide a refreshing departure from cookbook approaches with their clear explanations of the what and why of meta-analysis. The book is ideal as a course textbook or for self-study. My students, who used pre-publication versions of some of the chapters, raved about the clarity of the explanations and examples. David Rindskopf, Distinguished Professor of Educational Psychology, City University of New York, Graduate School and University Center, & Editor of the *Journal of Educational and Behavioral Statistics*. The approach taken by *Introduction to Meta-analysis* is intended to be primarily conceptual, and it is amazingly successful at achieving that goal. The reader can comfortably skip the formulas and still understand their application and underlying motivation. For the more statistically sophisticated reader, the relevant formulas and worked examples provide a superb practical guide to performing a meta-analysis. The book provides an eclectic mix of examples from education, social science, biomedical studies, and even ecology. For anyone considering leading a course in meta-analysis, or pursuing self-directed study, *Introduction to Meta-analysis* would be a clear first choice. Jesse A. Berlin, ScD *Introduction to Meta-Analysis* is an excellent resource for novices and experts alike. The book provides a clear and comprehensive presentation of all basic and most advanced approaches to meta-analysis. This book will be referenced for decades. Michael A. McDaniel, Professor of Human Resources and Organizational Behavior, Virginia Commonwealth University

borenstein introduction to meta analysis: *Introduction to Meta-Analysis* Michael Borenstein, Larry V. Hedges, Julian P. T. Higgins, Hannah R. Rothstein, 2021-04-20 A clear and thorough introduction to meta-analysis, the process of synthesizing data from a series of separate studies The first edition of this text was widely acclaimed for the clarity of the presentation, and quickly established itself as the definitive text in this field. The fully updated second edition includes new and expanded content on avoiding common mistakes in meta-analysis, understanding heterogeneity in effects, publication bias, and more. Several brand-new chapters provide a systematic how to approach to performing and reporting a meta-analysis from start to finish. Written by four of the world's foremost authorities on all aspects of meta-analysis, the new edition: Outlines the role of meta-analysis in the research process Shows how to compute effects sizes and treatment effects Explains the fixed-effect and random-effects models for synthesizing data Demonstrates how to assess and interpret variation in effect size across studies Explains how to avoid common mistakes in meta-analysis Discusses controversies in meta-analysis Includes access to a companion website containing videos, spreadsheets, data files, free software for prediction intervals, and step-by-step instructions for performing analyses using Comprehensive Meta-Analysis (CMA) Download videos,

class materials, and worked examples at www.Introduction-to-Meta-Analysis.com This book offers the reader a unified framework for thinking about meta-analysis, and then discusses all elements of the analysis within that framework. The authors address a series of common mistakes and explain how to avoid them. As the editor-in-chief of the *American Psychologist* and former editor of *Psychological Bulletin*, I can say without hesitation that the quality of manuscript submissions reporting meta-analyses would be vastly better if researchers read this book. —Harris Cooper, Hugo L. Blomquist Distinguished Professor Emeritus of Psychology and Neuroscience, Editor-in-chief of the *American Psychologist*, former editor of *Psychological Bulletin* A superb combination of lucid prose and informative graphics, the authors provide a refreshing departure from cookbook approaches with their clear explanations of the what and why of meta-analysis. The book is ideal as a course textbook or for self-study. My students raved about the clarity of the explanations and examples. —David Rindskopf, Distinguished Professor of Educational Psychology, City University of New York, Graduate School and University Center, & Editor of the *Journal of Educational and Behavioral Statistics* The approach taken by *Introduction to Meta-analysis* is intended to be primarily conceptual, and it is amazingly successful at achieving that goal. The reader can comfortably skip the formulas and still understand their application and underlying motivation. For the more statistically sophisticated reader, the relevant formulas and worked examples provide a superb practical guide to performing a meta-analysis. The book provides an eclectic mix of examples from education, social science, biomedical studies, and even ecology. For anyone considering leading a course in meta-analysis, or pursuing self-directed study, *Introduction to Meta-analysis* would be a clear first choice. —Jesse A. Berlin, ScD

borenstein introduction to meta analysis: Introduction to Meta-Analysis , 2009-04-13

This text provides a concise and clearly presented discussion of all the elements in a meta-analysis. It is illustrated with worked examples throughout, with visual explanations, using screenshots from Excel spreadsheets and computer programs such as Comprehensive Meta-Analysis (CMA) or Strata.

borenstein introduction to meta analysis: Introduction to Meta-Analysis Michael

Borenstein, Larry V. Hedges, Julian P. T. Higgins, Hannah R. Rothstein, 2009-03-12 This book provides a clear and thorough introduction to meta-analysis, the process of synthesizing data from a series of separate studies. Meta-analysis has become a critically important tool in fields as diverse as medicine, pharmacology, epidemiology, education, psychology, business, and ecology. *Introduction to Meta-Analysis*: Outlines the role of meta-analysis in the research process Shows how to compute effects sizes and treatment effects Explains the fixed-effect and random-effects models for synthesizing data Demonstrates how to assess and interpret variation in effect size across studies Clarifies concepts using text and figures, followed by formulas and examples Explains how to avoid common mistakes in meta-analysis Discusses controversies in meta-analysis Features a web site with additional material and exercises A superb combination of lucid prose and informative graphics, written by four of the world's leading experts on all aspects of meta-analysis. Borenstein, Hedges, Higgins, and Rothstein provide a refreshing departure from cookbook approaches with their clear explanations of the what and why of meta-analysis. The book is ideal as a course textbook or for self-study. My students, who used pre-publication versions of some of the chapters, raved about the clarity of the explanations and examples. David Rindskopf, Distinguished Professor of Educational Psychology, City University of New York, Graduate School and University Center, & Editor of the *Journal of Educational and Behavioral Statistics*. The approach taken by *Introduction to Meta-analysis* is intended to be primarily conceptual, and it is amazingly successful at achieving that goal. The reader can comfortably skip the formulas and still understand their application and underlying motivation. For the more statistically sophisticated reader, the relevant formulas and worked examples provide a superb practical guide to performing a meta-analysis. The book provides an eclectic mix of examples from education, social science, biomedical studies, and even ecology. For anyone considering leading a course in meta-analysis, or pursuing self-directed study, *Introduction to Meta-analysis* would be a clear first choice. Jesse A. Berlin, ScD *Introduction to Meta-Analysis* is an excellent resource for novices and experts alike. The book provides a clear and

comprehensive presentation of all basic and most advanced approaches to meta-analysis. This book will be referenced for decades. Michael A. McDaniel, Professor of Human Resources and Organizational Behavior, Virginia Commonwealth University

borenstein introduction to meta analysis: *Common Mistakes in Meta-Analysis* Michael Borenstein, 2019-08-15

borenstein introduction to meta analysis: *Doing Meta-Analysis with R* Mathias Harrer, Pim Cuijpers, Toshi A. Furukawa, David D. Ebert, 2021-09-15 *Doing Meta-Analysis with R: A Hands-On Guide* serves as an accessible introduction on how meta-analyses can be conducted in R. Essential steps for meta-analysis are covered, including calculation and pooling of outcome measures, forest plots, heterogeneity diagnostics, subgroup analyses, meta-regression, methods to control for publication bias, risk of bias assessments and plotting tools. Advanced but highly relevant topics such as network meta-analysis, multi-three-level meta-analyses, Bayesian meta-analysis approaches and SEM meta-analysis are also covered. A companion R package, dmetar, is introduced at the beginning of the guide. It contains data sets and several helper functions for the meta and metafor package used in the guide. The programming and statistical background covered in the book are kept at a non-expert level, making the book widely accessible. Features • Contains two introductory chapters on how to set up an R environment and do basic imports/manipulations of meta-analysis data, including exercises • Describes statistical concepts clearly and concisely before applying them in R • Includes step-by-step guidance through the coding required to perform meta-analyses, and a companion R package for the book

borenstein introduction to meta analysis: Handbook of Meta-analysis in Ecology and Evolution Julia Koricheva, Jessica Gurevitch, Kerrie Mengersen, 2013-04-21 Meta-analysis is a powerful statistical methodology for synthesizing research evidence across independent studies. This is the first comprehensive handbook of meta-analysis written specifically for ecologists and evolutionary biologists, and it provides an invaluable introduction for beginners as well as an up-to-date guide for experienced meta-analysts. The chapters, written by renowned experts, walk readers through every step of meta-analysis, from problem formulation to the presentation of the results. The handbook identifies both the advantages of using meta-analysis for research synthesis and the potential pitfalls and limitations of meta-analysis (including when it should not be used). Different approaches to carrying out a meta-analysis are described, and include moment and least-square, maximum likelihood, and Bayesian approaches, all illustrated using worked examples based on real biological datasets. This one-of-a-kind resource is uniquely tailored to the biological sciences, and will provide an invaluable text for practitioners from graduate students and senior scientists to policymakers in conservation and environmental management. Walks you through every step of carrying out a meta-analysis in ecology and evolutionary biology, from problem formulation to result presentation Brings together experts from a broad range of fields Shows how to avoid, minimize, or resolve pitfalls such as missing data, publication bias, varying data quality, nonindependence of observations, and phylogenetic dependencies among species Helps you choose the right software Draws on numerous examples based on real biological datasets

borenstein introduction to meta analysis: *Publication Bias in Meta-Analysis* Hannah R. Rothstein, Alexander J. Sutton, Michael Borenstein, 2005-11-18 Publication bias is the tendency to decide to publish a study based on the results of the study, rather than on the basis of its theoretical or methodological quality. It can arise from selective publication of favorable results, or of statistically significant results. This threatens the validity of conclusions drawn from reviews of published scientific research. Meta-analysis is now used in numerous scientific disciplines, summarizing quantitative evidence from multiple studies. If the literature being synthesised has been affected by publication bias, this in turn biases the meta-analytic results, potentially producing overstated conclusions. *Publication Bias in Meta-Analysis* examines the different types of publication bias, and presents the methods for estimating and reducing publication bias, or eliminating it altogether. Written by leading experts, adopting a practical and multidisciplinary approach. Provides comprehensive coverage of the topic including: Different types of publication bias, Mechanisms that

may induce them, Empirical evidence for their existence, Statistical methods to address them, Ways in which they can be avoided. Features worked examples and common data sets throughout. Explains and compares all available software used for analysing and reducing publication bias. Accompanied by a website featuring software, data sets and further material. Publication Bias in Meta-Analysis adopts an inter-disciplinary approach and will make an excellent reference volume for any researchers and graduate students who conduct systematic reviews or meta-analyses. University and medical libraries, as well as pharmaceutical companies and government regulatory agencies, will also find this invaluable.

borenstein introduction to meta analysis: Cochrane Handbook for Systematic Reviews of Interventions Julian P. T. Higgins, Sally Green, 2008-11-24 Healthcare providers, consumers, researchers and policy makers are inundated with unmanageable amounts of information, including evidence from healthcare research. It has become impossible for all to have the time and resources to find, appraise and interpret this evidence and incorporate it into healthcare decisions. Cochrane Reviews respond to this challenge by identifying, appraising and synthesizing research-based evidence and presenting it in a standardized format, published in The Cochrane Library (www.thecochranelibrary.com). The Cochrane Handbook for Systematic Reviews of Interventions contains methodological guidance for the preparation and maintenance of Cochrane intervention reviews. Written in a clear and accessible format, it is the essential manual for all those preparing, maintaining and reading Cochrane reviews. Many of the principles and methods described here are appropriate for systematic reviews applied to other types of research and to systematic reviews of interventions undertaken by others. It is hoped therefore that this book will be invaluable to all those who want to understand the role of systematic reviews, critically appraise published reviews or perform reviews themselves.

borenstein introduction to meta analysis: Introduction to Meta-analysis Michael Borenstein, Larry V. Hedges, Julian P. T. Higgins, Hannah Rothstein, 2011

borenstein introduction to meta analysis: Applied Meta-Analysis for Social Science Research Noel A. Card, 2015-10-06 Offering pragmatic guidance for planning and conducting a meta-analytic review, this book is written in an engaging, nontechnical style that makes it ideal for graduate course use or self-study. The author shows how to identify questions that can be answered using meta-analysis, retrieve both published and unpublished studies, create a coding manual, use traditional and unique effect size indices, and write a meta-analytic review. An ongoing example illustrates meta-analytic techniques. In addition to the fundamentals, the book discusses more advanced topics, such as artifact correction, random- and mixed-effects models, structural equation representations, and multivariate procedures. User-friendly features include annotated equations; discussions of alternative approaches; and Practical Matters sections that give advice on topics not often discussed in other books, such as linking meta-analytic results with theory and the utility of meta-analysis software programs. ÿ

borenstein introduction to meta analysis: Systematic Reviews in Health Research Matthias Egger, Julian P. T. Higgins, George Davey Smith, 2022-06-21 Systematic Reviews in Health Research Explore the cutting-edge of systematic reviews in healthcare In this Third Edition of the classic Systematic Reviews textbook, now titled Systematic Reviews in Health Research, a team of distinguished researchers deliver a comprehensive and authoritative guide to the rapidly evolving area of systematic reviews and meta-analysis. The book demonstrates why systematic reviews—when conducted properly—provide the highest quality evidence on clinical and public health interventions and shows how they contribute to inference in many other contexts. The new edition reflects the broad role of systematic reviews, including: Twelve new chapters, covering additional study designs, methods and software, for example, on genetic association studies, prediction models, prevalence studies, network and dose-response meta-analysis Thorough update of 15 chapters focusing on systematic reviews of interventions Access to a companion website offering supplementary materials and practical exercises (www.systematic-reviews3.org) A key text for health researchers, Systematic Reviews in Health Research is also an indispensable resource for

practitioners, students, and instructors in the health sciences needing to understand research synthesis.

borenstein introduction to meta analysis: Research Synthesis and Meta-Analysis Harris Cooper, 2015-12-24 The Fifth Edition of Harris Cooper's bestselling text offers practical advice on how to conduct a synthesis of research in the social, behavioral, and health sciences. The book is written in plain language with four running examples drawn from psychology, education, and health science. With ample coverage of literature searching and the technical aspects of meta-analysis, this one-of-a-kind book applies the basic principles of sound data gathering to the task of producing a comprehensive assessment of existing research.

borenstein introduction to meta analysis: Statistical Methods for Meta-Analysis Larry V. Hedges, Ingram Olkin, 2014-06-28 The main purpose of this book is to address the statistical issues for integrating independent studies. There exist a number of papers and books that discuss the mechanics of collecting, coding, and preparing data for a meta-analysis, and we do not deal with these. Because this book concerns methodology, the content necessarily is statistical, and at times mathematical. In order to make the material accessible to a wider audience, we have not provided proofs in the text. Where proofs are given, they are placed as commentary at the end of a chapter. These can be omitted at the discretion of the reader. Throughout the book we describe computational procedures whenever required. Many computations can be completed on a hand calculator, whereas some require the use of a standard statistical package such as SAS, SPSS, or BMD. Readers with experience using a statistical package or who conduct analyses such as multiple regression or analysis of variance should be able to carry out the analyses described with the aid of a statistical package.

borenstein introduction to meta analysis: Methods of Meta-Analysis John E Hunter, Frank L. Schmidt, 2004-04-07 Covering the most important developments in meta-analysis from 1990 to 2004, this text presents new patterns in research findings as well as updated information on existing topics.

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borenstein introduction to meta analysis: Meta-Analysis with R Guido Schwarzer, James R. Carpenter, Gerta Rücker, 2015-10-08 This book provides a comprehensive introduction to

performing meta-analysis using the statistical software R. It is intended for quantitative researchers and students in the medical and social sciences who wish to learn how to perform meta-analysis with R. As such, the book introduces the key concepts and models used in meta-analysis. It also includes chapters on the following advanced topics: publication bias and small study effects; missing data; multivariate meta-analysis, network meta-analysis; and meta-analysis of diagnostic studies.

borenstein introduction to meta analysis: How Science Takes Stock Morton Hunt, 1997-04-24 Policymakers, medical practitioners, and the public alike face an increasingly bewildering flood of new and often contradictory scientific studies on almost every topic. Whether the issue is the the best treatment for breast cancer, the need for prenatal food programs to improve the health of poor infants and mothers, or the ability of women to succeed in scientific professions, the healthy growth of modern science has at times done more to stir up controversy than to establish reliable knowledge. But now scientists in several fields have developed a sophisticated new methodology called meta-analysis to address this problem. By numerically combining diverse research findings on a single question, meta-analysis can be used to identify their central tendency and reach conclusions far more reliable than those of any single investigation. How Science Takes Stock vividly tells the story of meta-analysis through the eyes of its architects and champions, and chronicles its history, techniques, achievements, and controversies. Noted science author Morton Hunt visits key practitioners and recounts their use of meta-analysis to resolve important scientific puzzles and longstanding debates. Does psychotherapy work, and if so what form works best? Does spending federal money on education really improve student performance? Can a single enzyme significantly decrease the risk of heart attack? Do boot camps reduce juvenile delinquency? With each account, Hunt illustrates the major components of the meta-analytic method, reveals strategies for resolving practical and theoretical problems, and discusses the impact of meta-analysis on the science and policy communities. In many cases, he demonstrates how meta-analysts have gone a step further to determine the causes of earlier discrepancies. In this way they not only identify successful approaches to the question at hand, but also clarify the conditions under which they will work best. Hunt also portrays the important but frequently controversial business of doing meta-analysis for legislators and government agencies, particularly in sensitive areas of social policy. How Science Takes Stock demonstrates how the statistical techniques of meta-analysis produce more accurate data than the standard literature review or the old-fashioned process of tallying up the results of each scientific study as if they were votes in an election to decide the truth. Hunt also addresses issues of quality control in each phase of the meta-analytic process, and answers skeptics who claim that the dissimilarities between studies are often too significant for meta-analysis to be any more than an apples and oranges approach. This volume conveys the power of meta-analysis to help social policymakers and health professionals resolve their most pressing problems. How Science Takes Stock concludes with a discussion of the future of meta-analysis that examines its potential for further refinements, its growth in the scientific literature, and exciting new possibilities for its future use. An appendix by meta-analysis expert Harris Cooper offers some finer points on the mechanics of conducting a meta-analytic investigation.

borenstein introduction to meta analysis: Presenting Medical Statistics from Proposal to Publication Janet L. Peacock, Sally M. Kerry, Raymond R. Balise, 2017-07-21 As many medical and healthcare researchers have a love-hate relationship with statistics, the second edition of this practical reference book may make all the difference. Using practical examples, mainly from the authors' own research, the book explains how to make sense of statistics, turn statistical computer output into coherent information, and help decide which pieces of information to report and how to present them. The book takes you through all the stages of the research process, from the initial research proposal, through ethical approval and data analysis, to reporting on and publishing the findings. Helpful tips and information boxes, offer clear guidance throughout, including easily followed instructions on how to: -develop a quantitative research proposal for ethical/institutional approval or research funding -write up the statistical aspects of a paper for publication -choose and perform simple and more advanced statistical analyses -describe the statistical methods and present

the results of an analysis. This new edition covers a wider range of statistical programs - SAS, STATA, R, and SPSS, and shows the commands needed to obtain the analyses and how to present it, whichever program you are using. Each specific example is annotated to indicate other scenarios that can be analysed using the same methods, allowing you to easily transpose the knowledge gained from the book to your own research. The principles of good presentation are also covered in detail, from translating relevant results into suitable extracts, through to randomised controlled trials, and how to present a meta-analysis. An added ingredient is the inclusion of code and datasets for all analyses shown in the book on our website (<http://medical-statistics.info>). Written by three experienced biostatisticians based in the UK and US, this is a step-by-step guide that will be invaluable to researchers and postgraduate students in medicine, those working in the professions allied to medicine, and statisticians in consultancy roles.

borenstein introduction to meta analysis: *The Handbook of Research Synthesis and Meta-Analysis* Harris Cooper, Larry V. Hedges, Jeffrey C. Valentine, 2019-06-14 Research synthesis is the practice of systematically distilling and integrating data from many studies in order to draw more reliable conclusions about a given research issue. When the first edition of *The Handbook of Research Synthesis and Meta-Analysis* was published in 1994, it quickly became the definitive reference for conducting meta-analyses in both the social and behavioral sciences. In the third edition, editors Harris Cooper, Larry Hedges, and Jeff Valentine present updated versions of classic chapters and add new sections that evaluate cutting-edge developments in the field. *The Handbook of Research Synthesis and Meta-Analysis* draws upon groundbreaking advances that have transformed research synthesis from a narrative craft into an important scientific process in its own right. The editors and leading scholars guide the reader through every stage of the research synthesis process—problem formulation, literature search and evaluation, statistical integration, and report preparation. The Handbook incorporates state-of-the-art techniques from all quantitative synthesis traditions and distills a vast literature to explain the most effective solutions to the problems of quantitative data integration. Among the statistical issues addressed are the synthesis of non-independent data sets, fixed and random effects methods, the performance of sensitivity analyses and model assessments, the development of machine-based abstract screening, the increased use of meta-regression and the problems of missing data. The Handbook also addresses the non-statistical aspects of research synthesis, including searching the literature and developing schemes for gathering information from study reports. Those engaged in research synthesis will find useful advice on how tables, graphs, and narration can foster communication of the results of research syntheses. The third edition of the Handbook provides comprehensive instruction in the skills necessary to conduct research syntheses and represents the premier text on research synthesis. Praise for the first edition: *The Handbook* is a comprehensive treatment of literature synthesis and provides practical advice for anyone deep in the throes of, just teetering on the brink of, or attempting to decipher a meta-analysis. Given the expanding application and importance of literature synthesis, understanding both its strengths and weaknesses is essential for its practitioners and consumers. This volume is a good beginning for those who wish to gain that understanding. —*Chance* Meta-analysis, as the statistical analysis of a large collection of results from individual studies is called, has now achieved a status of respectability in medicine. This respectability, when combined with the slight hint of mystique that sometimes surrounds meta-analysis, ensures that results of studies that use it are treated with the respect they deserve....*The Handbook of Research Synthesis* is one of the most important publications in this subject both as a definitive reference book and a practical manual.—*British Medical Journal* When the first edition of *The Handbook of Research Synthesis* was published in 1994, it quickly became the definitive reference for researchers conducting meta-analyses of existing research in both the social and biological sciences. In this fully revised second edition, editors Harris Cooper, Larry Hedges, and Jeff Valentine present updated versions of the Handbook's classic chapters, as well as entirely new sections reporting on the most recent, cutting-edge developments in the field. Research synthesis is the practice of systematically distilling and integrating data from a variety of sources in

order to draw more reliable conclusions about a given question or topic. The Handbook of Research Synthesis and Meta-Analysis draws upon years of groundbreaking advances that have transformed research synthesis from a narrative craft into an important scientific process in its own right. Cooper, Hedges, and Valentine have assembled leading authorities in the field to guide the reader through every stage of the research synthesis process—problem formulation, literature search and evaluation, statistical integration, and report preparation. The Handbook of Research Synthesis and Meta-Analysis incorporates state-of-the-art techniques from all quantitative synthesis traditions. Distilling a vast technical literature and many informal sources, the Handbook provides a portfolio of the most effective solutions to the problems of quantitative data integration. Among the statistical issues addressed by the authors are the synthesis of non-independent data sets, fixed and random effects methods, the performance of sensitivity analyses and model assessments, and the problem of missing data. The Handbook of Research Synthesis and Meta-Analysis also provides a rich treatment of the non-statistical aspects of research synthesis. Topics include searching the literature, and developing schemes for gathering information from study reports. Those engaged in research synthesis will also find useful advice on how tables, graphs, and narration can be used to provide the most meaningful communication of the results of research synthesis. In addition, the editors address the potentials and limitations of research synthesis, and its future directions. The past decade has been a period of enormous growth in the field of research synthesis. The second edition Handbook thoroughly revises original chapters to assure that the volume remains the most authoritative source of information for researchers undertaking meta-analysis today. In response to the increasing use of research synthesis in the formation of public policy, the second edition includes a new chapter on both the strengths and limitations of research synthesis in policy debates

borenstein introduction to meta analysis: Systematic Reviews and Meta-Analysis

Jacqueline Corcoran, Vijayan Pillai, 2008-02-13 When used in tandem, systematic reviews and meta-analysis-- two distinct but highly compatible approaches to research synthesis-- form a powerful, scientific approach to analyzing previous studies. But to see their full potential, a social work researcher must be versed in the foundational processes underlying them. This pocket guide to Systematic Reviews and Meta-Analysis illuminates precisely that practical groundwork. In clear, step-by-step terms, the authors explain how to format topics, locate and screen studies, extract and assess data, pool effect sizes, determine bias, and interpret the results, showing readers how to combine reviewing and meta-analysis correctly and effectively. Each chapter contains vivid social work examples and concludes with a concise summary and notes on further reading, while the book's glossary and handy checklists and sample search and data extraction forms maximize the book's usefulness. Highlighting the concepts necessary to understand, critique, and conduct research synthesis, this brief and highly readable introduction is a terrific resource for students and researchers alike.

borenstein introduction to meta analysis: *The Essential Guide to Effect Sizes* Paul D. Ellis, 2010-07 A jargon-free introduction for students and researchers looking to interpret the practical significance of their results.

borenstein introduction to meta analysis: Practical Meta-Analysis Mark W. Lipsey, David B. Wilson, 2001 This book offers readers the best of both worlds: technical sophistication coupled with user-friendly, practical information for doing meta-analysis. -- Page 4 of cover.

borenstein introduction to meta analysis: The Oxford Handbook of Personnel

Assessment and Selection Neal Schmitt, 2013-12-15 Employee selection has long stood at the practical forefront of industrial/organizational psychology. Today's social, business, and economic climates require ongoing adaptations by those who select organizations' personnel, and research on the topic helps gauge the impact of these adaptations and their implications for human performance and potential. The Oxford Handbook of Personnel Assessment and Selection codifies the wealth of new research surrounding employee selection (web-based assessments, social networking, globalization of organizations), situating them alongside more traditional practices to establish the best and most relevant research for both professionals and academics. Comprising chapters from

authors in both the private sector and academia, this volume is organized into seven parts: (1) historical and social context of the field of assessment and selection; (2) research strategies; (3) individual difference constructs that underlie effective performance; (4) measures of predictor constructs; (5) employee performance and outcome assessment; (6) societal and organizational constraints on selection practice; and (7) implementation and sustainability of selection systems. While providing a comprehensive review of current research and practice, the purpose of this handbook is to provide an up-to-date profile of each of the areas addressed and highlight current questions that deserve additional attention from researchers and practitioners. This compendium is essential reading for industrial/organizational psychologists and human resource managers.

borenstein introduction to meta analysis: *Meta-Analysis* Mike W.-L. Cheung, 2015-05-06
Presents a novel approach to conducting meta-analysis using structural equation modeling. Structural equation modeling (SEM) and meta-analysis are two powerful statistical methods in the educational, social, behavioral, and medical sciences. They are often treated as two unrelated topics in the literature. This book presents a unified framework on analyzing meta-analytic data within the SEM framework, and illustrates how to conduct meta-analysis using the metaSEM package in the R statistical environment. *Meta-Analysis: A Structural Equation Modeling Approach* begins by introducing the importance of SEM and meta-analysis in answering research questions. Key ideas in meta-analysis and SEM are briefly reviewed, and various meta-analytic models are then introduced and linked to the SEM framework. Fixed-, random-, and mixed-effects models in univariate and multivariate meta-analyses, three-level meta-analysis, and meta-analytic structural equation modeling, are introduced. Advanced topics, such as using restricted maximum likelihood estimation method and handling missing covariates, are also covered. Readers will learn a single framework to apply both meta-analysis and SEM. Examples in R and in Mplus are included. This book will be a valuable resource for statistical and academic researchers and graduate students carrying out meta-analyses, and will also be useful to researchers and statisticians using SEM in biostatistics. Basic knowledge of either SEM or meta-analysis will be helpful in understanding the materials in this book.

borenstein introduction to meta analysis: *Network Meta-Analysis for Decision-Making* Sofia Dias, A. E. Ades, Nicky J. Welton, Jeroen P. Jansen, Alexander J. Sutton, 2018-03-19 A practical guide to network meta-analysis with examples and code In the evaluation of healthcare, rigorous methods of quantitative assessment are necessary to establish which interventions are effective and cost-effective. Often a single study will not provide the answers and it is desirable to synthesise evidence from multiple sources, usually randomised controlled trials. This book takes an approach to evidence synthesis that is specifically intended for decision making when there are two or more treatment alternatives being evaluated, and assumes that the purpose of every synthesis is to answer the question for this pre-identified population of patients, which treatment is 'best'? A comprehensive, coherent framework for network meta-analysis (mixed treatment comparisons) is adopted and estimated using Bayesian Markov Chain Monte Carlo methods implemented in the freely available software WinBUGS. Each chapter contains worked examples, exercises, solutions and code that may be adapted by readers to apply to their own analyses. This book can be used as an introduction to evidence synthesis and network meta-analysis, its key properties and policy implications. Examples and advanced methods are also presented for the more experienced reader. Methods used throughout this book can be applied consistently: model critique and checking for evidence consistency are emphasised. Methods are based on technical support documents produced for NICE Decision Support Unit, which support the NICE Methods of Technology Appraisal. Code presented is also the basis for the code used by the ISPOR Task Force on Indirect Comparisons. Includes extensive carefully worked examples, with thorough explanations of how to set out data for use in WinBUGS and how to interpret the output. *Network Meta-Analysis for Decision Making* will be of interest to decision makers, medical statisticians, health economists, and anyone involved in Health Technology Assessment including the pharmaceutical industry.

borenstein introduction to meta analysis: *Applied Meta-Analysis with R and Stata*

Ding-Geng (Din) Chen, Karl E. Peace, 2021-03-31 Review of the First Edition: The authors strive to reduce theory to a minimum, which makes it a self-learning text that is comprehensible for biologists, physicians, etc. who lack an advanced mathematics background. Unlike in many other textbooks, R is not introduced with meaningless toy examples; instead the reader is taken by the hand and shown around some analyses, graphics, and simulations directly relating to meta-analysis... A useful hands-on guide for practitioners who want to familiarize themselves with the fundamentals of meta-analysis and get started without having to plough through theorems and proofs. —Journal of Applied Statistics Statistical Meta-Analysis with R and Stata, Second Edition provides a thorough presentation of statistical meta-analyses (MA) with step-by-step implementations using R/Stata. The authors develop analysis step by step using appropriate R/Stata functions, which enables readers to gain an understanding of meta-analysis methods and R/Stata implementation so that they can use these two popular software packages to analyze their own meta-data. Each chapter gives examples of real studies compiled from the literature. After presenting the data and necessary background for understanding the applications, various methods for analyzing meta-data are introduced. The authors then develop analysis code using the appropriate R/Stata packages and functions. What's New in the Second Edition: Adds Stata programs along with the R programs for meta-analysis Updates all the statistical meta-analyses with R/Stata programs Covers fixed-effects and random-effects MA, meta-regression, MA with rare-event, and MA-IPD vs MA-SS Adds five new chapters on multivariate MA, publication bias, missing data in MA, MA in evaluating diagnostic accuracy, and network MA Suitable as a graduate-level text for a meta-data analysis course, the book is also a valuable reference for practitioners and biostatisticians (even those with little or no experience in using R or Stata) in public health, medical research, governmental agencies, and the pharmaceutical industry.

borenstein introduction to meta analysis: *Meta-regression Analysis in Economics and Business* T. D. Stanley, Hristos Doucouliagos, 2012 Meta-Regression Analysis in Economics and Business is the first text devoted to the meta-regression analysis (MRA) of economics and business research.

borenstein introduction to meta analysis: Meta-Analysis John Edward Hunter, Frank L. Schmidt, Gregg B. Jackson, 1982-10 There are few areas of modern life that are burdened by as much information and advice, often contradictory, as our diet and health: eat a lot of meat, eat no meat; whole-grains are healthy, whole-grains are a disaster; eat everything in moderation; eat only certain foods--and on and on. In *One Hundred Million Years of Food* biological anthropologist Stephen Le explains how cuisines of different cultures are a result of centuries of evolution, finely tuned to our biology and surroundings. Today many cultures have strayed from their ancestral diets, relying instead on mass-produced food often made with chemicals that may be contributing to a rise in so-called Western diseases, such as cancer, heart disease, and obesity. Travelling around the world to places as far-flung as Vietnam, Kenya, India, and the US, Stephen Le introduces us to people who are growing, cooking, and eating food using both traditional and modern methods, striving for a sustainable, healthy diet. In clear, compelling arguments based on scientific research, Le contends that our ancestral diets provide the best first line of defense in protecting our health and providing a balanced diet. Fast-food diets, as well as strict regimens like paleo or vegan, in effect hijack our biology and ignore the complex nature of our bodies. In *One Hundred Million Years of Food* Le takes us on a guided tour of evolution, demonstrating how our diets are the result of millions of years of history, and how we can return to a sustainable, healthier way of eating.--Publisher's description.

borenstein introduction to meta analysis: Research Synthesis and Meta-Analysis Harris Cooper, 2010 Providing researchers with a practical and accessible advice, the Fourth Edition of the lauded *Research Synthesis and Meta-Analysis* offers thoroughly updated information. Author Harris M. Cooper draws on more than 30 years of experience to show readers how to conduct a comprehensive synthesis of past research.

borenstein introduction to meta analysis: Mixed Models Eugene Demidenko, 2013-08-05

Praise for the First Edition “This book will serve to greatly complement the growing number of texts dealing with mixed models, and I highly recommend including it in one’s personal library.” —Journal of the American Statistical Association Mixed modeling is a crucial area of statistics, enabling the analysis of clustered and longitudinal data. *Mixed Models: Theory and Applications with R*, Second Edition fills a gap in existing literature between mathematical and applied statistical books by presenting a powerful examination of mixed model theory and application with special attention given to the implementation in R. The new edition provides in-depth mathematical coverage of mixed models’ statistical properties and numerical algorithms, as well as nontraditional applications, such as regrowth curves, shapes, and images. The book features the latest topics in statistics including modeling of complex clustered or longitudinal data, modeling data with multiple sources of variation, modeling biological variety and heterogeneity, Healthy Akaike Information Criterion (HAIC), parameter multidimensionality, and statistics of image processing. *Mixed Models: Theory and Applications with R*, Second Edition features unique applications of mixed model methodology, as well as: Comprehensive theoretical discussions illustrated by examples and figures Over 300 exercises, end-of-section problems, updated data sets, and R subroutines Problems and extended projects requiring simulations in R intended to reinforce material Summaries of major results and general points of discussion at the end of each chapter Open problems in mixed modeling methodology, which can be used as the basis for research or PhD dissertations Ideal for graduate-level courses in mixed statistical modeling, the book is also an excellent reference for professionals in a range of fields, including cancer research, computer science, and engineering.

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Engin Karadağ, 2017-05-14 This book focuses on the effect of psychological, social and demographic variables on student achievement and summarizes the current research findings in the field. It addresses the need for inclusive and interpretive studies in the field in order to interpret student achievement literature and suggests new pathways for further studies. Appropriately, a meta-analysis approach is used by the contributors to show the big picture to the researchers by analyzing and combining the findings from different independent studies. In particular, the authors compile various studies examining the relationship between student achievement and 21 psychological, social and demographic variables separately. The philosophy behind this book is to direct future research and practices rather than addressing the limits of current studies.

borenstein introduction to meta analysis: Improving Learning Steve Higgins, 2019

Evidence-informed teaching is essential for effective teaching, but it is important to understand its limitations as well as its benefits.

borenstein introduction to meta analysis: Systematic Reviews in Health Care Matthias

Egger, George Davey-Smith, Douglas Altman, 2008-04-15 The second edition of this best-selling book has been thoroughly revised and expanded to reflect the significant changes and advances made in systematic reviewing. New features include discussion on the rationale, meta-analyses of prognostic and diagnostic studies and software, and the use of systematic reviews in practice.

borenstein introduction to meta analysis: *Design and Analysis of Ecological Experiments*

Samuel M. Scheiner, Jessica Gurevitch, 2001-04-26 Ecological research and the way that ecologists use statistics continues to change rapidly. This second edition of the best-selling *Design and Analysis of Ecological Experiments* leads these trends with an update of this now-standard reference book, with a discussion of the latest developments in experimental ecology and statistical practice. The goal of this volume is to encourage the correct use of some of the more well known statistical techniques and to make some of the less well known but potentially very useful techniques available. Chapters from the first edition have been substantially revised and new chapters have been added. Readers are introduced to statistical techniques that may be unfamiliar to many ecologists, including power analysis, logistic regression, randomization tests and empirical Bayesian analysis. In addition, a strong foundation is laid in more established statistical techniques in ecology including exploratory data analysis, spatial statistics, path analysis and meta-analysis. Each technique is presented in the context of resolving an ecological issue. Anyone from graduate students to established research

ecologists will find a great deal of new practical and useful information in this current edition.

borenstein introduction to meta analysis: *The Handbook of Research Synthesis* Harris Cooper, Larry V. Hedges, 1993-11-23 "The Handbook is a comprehensive treatment of literature synthesis and provides practical advice for anyone deep in the throes of, just teetering on the brink of, or attempting to decipher a meta-analysis. Given the expanding application and importance of literature synthesis, understanding both its strengths and weaknesses is essential for its practitioners and consumers. This volume is a good beginning for those who wish to gain that understanding." —Chance "Meta-analysis, as the statistical analysis of a large collection of results from individual studies is called, has now achieved a status of respectability in medicine. This respectability, when combined with the slight hint of mystique that sometimes surrounds meta-analysis, ensures that results of studies that use it are treated with the respect they deserve....The Handbook of Research Synthesis is one of the most important publications in this subject both as a definitive reference book and a practical manual."—British Medical Journal The Handbook of Research Synthesis is the definitive reference and how-to manual for behavioral and medical scientists applying the craft of research synthesis. It draws upon twenty years of ground-breaking advances that have transformed the practice of synthesizing research literature from an art into a scientific process in its own right. Editors Harris Cooper and Larry V. Hedges have brought together leading authorities to guide the reader through every stage of the research synthesis process—problem formulation, literature search and evaluation, statistical integration, and report preparation. The Handbook of Research Synthesis incorporates in a single volume state-of-the-art techniques from all quantitative synthesis traditions, including Bayesian inference and the meta-analytic approaches. Distilling a vast technical literature and many informal sources, the Handbook provides a portfolio of the most effective solutions to problems of quantitative data integration. The Handbook of Research Synthesis also provides a rich treatment of the non-statistical aspects of research synthesis. Topics include searching the literature, managing reference databases and registries, and developing coding schemes. Those engaged in research synthesis will also find useful advice on how tables, graphs, and narration can be deployed to provide the most meaningful communication of the results of research synthesis. The Handbook of Research Synthesis is an illuminating compilation of practical instruction, theory, and problem solving. It provides an accumulation of knowledge about the craft of reviewing a scientific literature that can be found in no other single source. The Handbook offers the reader thorough instruction in the skills necessary to conduct powerful research syntheses meeting the highest standards of objectivity, systematicity, and rigor demanded of scientific enquiry. This definitive work will represent the state of the art in research synthesis for years to come.

borenstein introduction to meta analysis: *Finding What Works in Health Care* Institute of Medicine, Board on Health Care Services, Committee on Standards for Systematic Reviews of Comparative Effectiveness Research, 2011-07-20 Healthcare decision makers in search of reliable information that compares health interventions increasingly turn to systematic reviews for the best summary of the evidence. Systematic reviews identify, select, assess, and synthesize the findings of similar but separate studies, and can help clarify what is known and not known about the potential benefits and harms of drugs, devices, and other healthcare services. Systematic reviews can be helpful for clinicians who want to integrate research findings into their daily practices, for patients to make well-informed choices about their own care, for professional medical societies and other organizations that develop clinical practice guidelines. Too often systematic reviews are of uncertain or poor quality. There are no universally accepted standards for developing systematic reviews leading to variability in how conflicts of interest and biases are handled, how evidence is appraised, and the overall scientific rigor of the process. In *Finding What Works in Health Care* the Institute of Medicine (IOM) recommends 21 standards for developing high-quality systematic reviews of comparative effectiveness research. The standards address the entire systematic review process from the initial steps of formulating the topic and building the review team to producing a detailed final report that synthesizes what the evidence shows and where knowledge gaps remain. Finding

What Works in Health Care also proposes a framework for improving the quality of the science underpinning systematic reviews. This book will serve as a vital resource for both sponsors and producers of systematic reviews of comparative effectiveness research.

borenstein introduction to meta analysis: Handbook of Meta-Analysis Christopher H. Schmid, Theo Stijnen, Ian White, 2020-09-07 1. Provides a comprehensive overview of meta-analysis methods and applications. 2. Divided into four major sub-topics, covering univariate meta-analysis, multivariate, applications and policy. 3. Designed to be suitable for graduate students and researchers new to the field. 4. Includes lots of real examples, with data and software code made available. 5. Chapters written by the leading researchers in the field.

borenstein introduction to meta analysis: Ecological Statistics Gordon A. Fox, Simoneta Negrete-Yankelevich, Vinicio J. Sosa, 2015 The application and interpretation of statistics are central to ecological study and practice. Ecologists are now asking more sophisticated questions than in the past. These new questions, together with the continued growth of computing power and the availability of new software, have created a new generation of statistical techniques. These have resulted in major recent developments in both our understanding and practice of ecological statistics. This novel book synthesizes a number of these changes, addressing key approaches and issues that tend to be overlooked in other books such as missing/censored data, correlation structure of data, heterogeneous data, and complex causal relationships. These issues characterize a large proportion of ecological data, but most ecologists' training in traditional statistics simply does not provide them with adequate preparation to handle the associated challenges. Uniquely, Ecological Statistics highlights the underlying links among many statistical approaches that attempt to tackle these issues. In particular, it gives readers an introduction to approaches to inference, likelihoods, generalized linear (mixed) models, spatially or phylogenetically-structured data, and data synthesis, with a strong emphasis on conceptual understanding and subsequent application to data analysis. Written by a team of practicing ecologists, mathematical explanations have been kept to the minimum necessary. This user-friendly textbook will be suitable for graduate students, researchers, and practitioners in the fields of ecology, evolution, environmental studies, and computational biology who are interested in updating their statistical tool kits. A companion web site provides example data sets and commented code in the R language.

borenstein introduction to meta analysis: Advances in Meta-Analysis Terri Pigott, 2012-01-31 The subject of the book is advanced statistical analyses for quantitative research synthesis (meta-analysis), and selected practical issues relating to research synthesis that are not covered in detail in the many existing introductory books on research synthesis (or meta-analysis). Complex statistical issues are arising more frequently as the primary research that is summarized in quantitative syntheses itself becomes more complex, and as researchers who are conducting meta-analyses become more ambitious in the questions they wish to address. Also as researchers have gained more experience in conducting research syntheses, several key issues have persisted and now appear fundamental to the enterprise of summarizing research. Specifically the book describes multivariate analyses for several indices commonly used in meta-analysis (e.g., correlations, effect sizes, proportions and/or odds ratios), will outline how to do power analysis for meta-analysis (again for each of the different kinds of study outcome indices), and examines issues around research quality and research design and their roles in synthesis. For each of the statistical topics we will examine the different possible statistical models (i.e., fixed, random, and mixed models) that could be adopted by a researcher. In dealing with the issues of study quality and research design it covers a number of specific topics that are of broad concern to research synthesists. In many fields a current issue is how to make sense of results when studies using several different designs appear in a research literature (e.g., Morris & Deshon, 1997, 2002). In education and other social sciences a critical aspect of this issue is how one might incorporate qualitative (e.g., case study) research within a synthesis. In medicine, related issues concern whether and how to summarize observational studies, and whether they should be combined with randomized controlled trials (or even if they should be combined at all). For each topic, included is a

worked example (e.g., for the statistical analyses) and/or a detailed description of a published research synthesis that deals with the practical (non-statistical) issues covered.

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