Modern Meta-Analysis

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Review and Update of Methodologies

Springer

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Preface

Modern meta-analyses do more than combine the effect sizes of a series of similar studies. The term "meta" in meta-analysis can be interpreted as "beyond", and meta-analyses are currently increasingly applied for any analysis beyond the primary analysis of studies. Terminologies like meta-learning, metacognition, meta-knowledge, higher order of thinking, and awareness of learning processes and thinking skills are used. We should add that nowadays, we have a big body of research data, thanks to the publication of one scholarly article every 20 seconds. Handling those big research data with powerful methods like meta-analytic forest plots, Bayesian networks, automatic data mining programs, etc. can now provide a more rapid learning process of essential issues and scientific progress. Very important and, even more so, with big data, the exchangeability assumption emphasized in the early 80th meta-analyses remains vital today: patient and study characteristics must be exchangeable and similar enough for studies to be compared.

This book was written for nonmathematical professionals of medical and health care, in the first place, but, in addition, for anyone involved in any field involving scientific research. Every methodology in this update will be explained with data examples, both hypothesized and real data. The authors have published many pretty innovative meta-analyses from the turn of the century till now. A list of international publications is given underneath. This edition will review the current state of the art and will use for that purpose the methodological aspects of these publications, in addition to other relevant methodological issues from literature.To readers requesting more background, theoretical, and mathematical information of computations given, several textbooks complementary to the current production and written by the same authors are available: *Statistics Applied to Clinical Studies* 5th edition, 2012; *Machine Learning in Medicine: A Complete Overview*, 2015; *SPSS for Starters and 2nd Levelers* 2nd edition, 2015; *Clinical Data Analysis on a Pocket Calculator* 2nd edition, 2016; and *Understanding Clinical Data Analysis* from published research, 2016, all of which are edited by Springer Heidelberg, Germany.

Are there alternative works in the field? Yes, there are, particularly in the field of psychology. Psychologists have invented meta-analyses in 1970, and they have continuously written and updated methodologies ever since. Although very interesting, their work, just like the whole discipline of psychology, is rather explorative in nature, and so is the focus of their approach to meta-analysis. As such, they are not particularly involved in confirmatory placebo-controlled double-blind therapeutic clinical trials, and, despite their overwhelming productions and sometimes expensive software, they never address clinically important subjects like the meta-analysis with diagnostic tests, contrast coefficients, tetrachoric correlations, Bayesian networks, quasi-likelihood modeling, correlation coefficients to z transformations, confounding and interaction assessments, and other clinically relevant subjects. Then, there is the field of epidemiologists. Many of them are from the school of angry young men, who publish shocking news all the time, and JAMA and other publishers are happy to publish it. The reality is, of course, that things are usually not as bad as they seem. The recently published book entitled *Meta-analysis with R*, Springer Heidelberg, Germany, 2015, is lovely and, in addition, written by professional statisticians. A problem is that all analyses are with R software. R has a miserable menu program and requires lots of syntax to be learned. This is prohibitive to many clinical and other health professionals.

The current edition is a must-read textbook written by a very experienced mathematical statistician and an internist/clinical pharmacologist. It addresses new meta-analytical methodologies relevant to clinical research including diagnostic and therapeutic clinical trials and drug research. The book will consist, like our previous books, of many examples and step-by-step analyses using software like the free MetaXL from Excel, the SPSS work bench for automatic data mining entitled SPSS Modeler, the free Konstanz information miner (KNIME), and pocket calculator methods, if more convenient. In order for readers to perform their own analyses, SPSS data files are given in extras.springer.com.

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