RESEARCH DESIGN EXPLAINED

FOURTH EDITION

MARK MITCHELL JANINA JOLLEY

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Fourth Edition

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PREFACE

This textbook began as a search for a textbook. When we first began teaching research design, we looked around for a textbook that conveyed the excitement that accompanies scientific discovery. We also wanted a user-friendly book that could engage our students while offering practical advice about how to read, conduct, and write up research.

Unfortunately, we couldn't find such a book. Existing books conveyed one of two messages: "Research design is easy—just memorize these terms and research studies" or "Research design is hard—it's something so complicated to understand that it should be left to the professionals."

We wanted to replace the sense of mystery and confusion that students bring to scientific psychology with an appreciation of science's excitement and relevance to psychology. To enable students to explore uncharted psychological frontiers, we envisioned a book that explained fundamental concepts so clearly and with so many real-life analogies and examples that students would understand these ideas rather than simply memorize terms.

In short, we discovered we were going to have to write the textbook ourselves. And, once we got started, we discovered that all those frustrations that we—and our students—had experienced in the past were actually helpful. We were able to translate these difficulties into a textbook that explained research concepts in a way that was easy to grasp. Here are some of our methods (methods that you probably use in your teaching):

- We make a concerted effort to stimulate students' interest in the course. For example, we show students how understanding scientific psychology can make them more sophisticated consumers and more marketable job/graduate school applicants.
- We use numerous, clear examples—especially for concepts with which students have trouble, such as statistical significance and interactions.
- We focus on important, fundamental concepts, show students why those concepts are important, relate those concepts to what students already know, and directly attack common misconceptions about those concepts.
- We show the logic behind the process of research design so that students know more than just terminology—they learn how to think like research psychologists.
- We explain statistical concepts (not computations) because statistics need to be considered before doing research, not afterward.

In addition, unlike most texts on the market, each chapter has

- tables that help students see the relationships between concepts
- a glossary that not only defines key terms, but shows the inter-relationships between the terms

DISTINCTIVE CHAPTERS AND APPENDICES

The goal of this book is to encourage students to value, read, and conduct ethical research. Therefore:

- We introduce ethical issues in Chapter 1 and discuss them throughout the book. In addition, we include a separate appendix on ethical issues. Appendix A contains the entire ethical code of APA relating to human and animal research, a sample informed consent form, a sample ethical review form, and practical tips for conducting ethical research.
- We focus on how to read research in Chapter 10, and Appendix B covers ways of searching the literature.
- We discuss how to generate research ideas in Chapter 2.
- We devote Chapter 13 to survey research—the research method that students will most likely use after they leave school.
- We include practical tips about how to conduct a research study in Appendix C.
- We demonstrate in Chapter 14 how to write research proposals and articles in APA style.

FLEXIBLE ORGANIZATION

We know that most professors share our goals of teaching students to be able to read, evaluate, defend, and produce scientific research. We also know that professors differ in how they go about achieving these goals and in the emphasis professors place on each of these goals. For example, about half of all research methods professors think that the best way to help students understand design is to cover nonexperimental methods first, whereas the other half think that students must understand experimental methods first.

To accommodate these differences, we have made the chapters relatively self-contained modules. Because each chapter focuses on ethics, construct validity, external validity, and internal validity, it's easy to skip chapters or cover them in different orders. To give you even more flexibility, we have moved the computationally oriented statistical sections from the chapters to Appendix F. Thus, whether you want to focus exclusively on the basic conceptual issues in analysis or you want students to have a thorough knowledge of basic statistical terms and computations, this text will meet your needs.

ANCILLARIES

To help meet your needs, this book comes with many more ancillaries than you would expect from a research methods text:

- a class-tested test bank
- sample lectures in PowerPoint®, HTML, and even printed form

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- handouts
- lab exercises

.....

- · detailed answers to the end-of-chapter exercises
- a Web site (http://www.researchmethods.com) with an area for professors and a separate area for students

WHAT'S NEW IN THE FOURTH EDITION

By being even clearer and even more focused on helping students critically evaluate research, this edition promises to be more helpful to students and teachers alike. Although we would like to take credit for the improvement in this edition, we can't. Most of the credit belongs to our reviewers. We are especially indebted to an English professor, Dr. Darlynn Fink, and a professional editor, Karen Weyant. Neither individual had any background in psychology and neither was afraid to comment when they had difficulty understanding a section. As a result of their work, this book has more advance organizers, more summary statements, more tightly organized chapters, and fewer hard-to-read paragraphs.

Some of the credit for the improved clarity also belongs to our students. As in previous editions, we had students review the text. However, this time, we each received feedback as a result of teaching the research methods course using our text and the mastery system. Specifically, (1) the wrong answers students gave on quizzes and exercises, and (2) the problems students had in reading articles, writing up lab reports, and writing proposals led us to:

- state some concepts more clearly
- state other concepts more emphatically
- make some examples more closely match what students might see in journal articles
- revise some of the exercises and test items

The product of these revisions is a book that does a slightly better job of reaching "A" students and a much better job of reaching the average student.

Finally, much of the credit for the numerous improvements in this edition belongs to the psychology professors who reviewed the text. Every chapter is better because of their efforts. Below, we list just a few of the changes that have been made in the text.

CHAPTER-BY-CHAPTER CHANGES

We added examples, diagrams, and cartoons to Chapter 1 to emphasize:

- the distinction between the scientific method and other ways of knowing
- the differences between the types of validity
- the fact that most studies will not be perfect in terms of all forms of validity

- the value of testability and replication
- the reasons why people enjoy research

In this edition, Chapter 2 is significantly shorter, there is more emphasis on refining hypotheses, more focus on techniques that students actually use in generating hypotheses, more groundwork laid for writing the introduction, and less discussion of the esoteric aspects of theory.

In this edition, we tried to engage students by relating the information in Chapter 3 to psychological testing. We made the information clearer by adding examples of hypothetical data to help students visualize test-retest reliability and other forms of validity. Our pilot testing suggests that these data sets are much easier for students to understand than verbal descriptions or graphs. We also added examples that were closer to what students were most likely to see in journal articles or in descriptions of psychological tests. In addition, we focused on making the following relationships clearer: reliability and validity, bias and random error, and interobserver agreement and interobserver reliability. Finally, we removed the discussion of factor analysis because many faculty thought that went beyond the abilities of their students.

In Chapter 4, we give a clearer explanation of the assumptions involved in viewing rating scale data as interval, discuss magnitude estimation, and more closely relate the material to helping students critically examine the validity problems with "tests" that appear in popular magazines.

In Chapter 5, we have revised our examples of regression to focus more on real-life implications of regression, and we added some figures to help students understand how the threats to internal validity hinder our ability to determine whether a treatment causes an effect. In addition, we have sharpened the distinctions between maturation and history as well as between testing and instrumentation. Finally, we allude to random assignment as a simple solution for dealing with the threats to internal validity.

In this edition, we shortened Chapter 6 by putting the material on hand-calculating the test into Appendix F. Thus, professors who want to teach the test in depth can assign that section of the appendix and use the test questions relating to that material. If the professor does not assign Appendix F, the student will still get a solid grounding in statistics. By the end of the chapter, even the student with no previous background in statistics should have a good understanding of such key concepts such as statistical significance, power, Type 1 errors, and Type 2 errors. The student will even understand the essence of the findings of APA's committee on significance testing. In short, rather than focus on the mathematics of the test, the chapter has been reorganized to focus on showing: (1) how statistics affects the design of the experiment, and (2) how to interpret statistics.

In Chapter 7, we complied with reviewers and moved the instructions for hand-calculating ANOVA to Appendix F. In addition, we made the connections between analysis and design clearer and incorporated more examples of the value of having multiple control groups.

In Chapter 8, we added a section that teaches students how to make sense of graphs. In addition to making just about every section even clearer, we placed greater emphasis on the fact that if you do include a nonexperimental variable in a factorial design, you cannot make causal statements about that factor.

In this edition, we moved the hand calculations of the dependent groups' t from Chapter 9 to Appendix F, and we added a box on using the Latin Square design with three or more levels of a variable. We also reorganized some material to help students better understand how to interpret the results of a counterbalanced, within-subjects design.

We expanded the discussions of single-*n* designs and quasi-experiments in Chapter 11 to now include both the controversy about the internal validity of single-*n* designs and the applied concerns that cause a researcher to use a quasi-experimental design. In addition, we slightly expanded our coverage of psychophysical designs.

To keep in touch with what many see as a change in the field, we have placed more emphasis on content analysis and observational research in Chapter 12.

The improvements in Chapter 13 are due, in large part, to Dave VanAmburg, a professional market researcher who shared his insights into the process and problems of modern, applied survey research with us.

For this edition, it was wonderful to have an English professor, Darlynn Fink, help revise Chapter 14 on how to write papers and proposals. We are also grateful to several reviewers for valuable tips on how to deal with writing a "results" section for a research proposal.

Appendix F is a statistical appendix new to this edition. This appendix can do what many research methods professors end up doing: teach a short course in statistics. It contains five sections, any one of which can be understood without reading the others. The first is a short module about how to select the right statistical test.

The second gives an in-depth explanation of logic of computing the independent groups t-test. By in-depth, we mean that we discuss the logic and computations of the standard deviation, the standard error of the mean, confidence intervals, the standard error of the difference. The second module is, in essence, a short course on parametric statistics. Much of the material in the second module was originally contained in Chapter 6.

The third section takes students step by step through computing a one-way ANOVA; this information previously appeared in Chapter 7. The major change is that we have used a more orthodox formula for calculating the Between Groups Sum of Squares.

The fourth section steps students through the dependent groups t-test. This material was originally in Chapter 9.

The fifth module is a free-standing unit on correlational analyses. It contains four independent, but connected, sections. The first is an in-depth explanation of the logic behind the formula for the Pearson r. The second explains why and how to determine whether a Pearson r is significantly different from zero. The third shows, step by step, how to compute a Chi-Square and a phi coefficient. The fourth describes the basic logic behind factor analysis.

Finally, we should note that two appendices were removed. These two appendices, "Marketing your research skills in the real world" and "The field experiment," are available on our Web site http://www.researchmethods.com.

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Writing Research Design Explained was a monumental task that required commitment, love, effort, and a high tolerance for frustration. If it had not been for the support of our friends, family, publisher, and students, we could not have met this challenge.

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To Anna, Glen, and Neal

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