Experimental Psychology

seventh edition

A Case Approach

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SEVENTH EDITION

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TO THE INSTRUCTOR

We are pleased to present this seventh edition of *Experimental Psychology: A Case Approach*. Experimental psychologists have covered a lot of territory during the past century when psychology became a formal discipline, and the many changes have necessitated changes in books and professional articles. This edition of *Experimental Psychology* reflects the diversity of research areas in psychology and clearly demonstrates how experiments are conducted.

Originally, we wrote this book to identify the basic principles of experimental design as practiced by experimental psychologists. Too often, the teaching of experimental psychology involves lengthy discussions of theoretical statistics, or concentration on a highly specialized area of research. Therefore, after several years of experimenting with how to best present the material for a first course in experimental psychology, we have developed a method by which students study actual case examples in psychology and then generalize the ideas from those examples to the principles of experimental design. The approach is "bottom-up," in the vernacular of cognitive psychology, in that we emphasize actual experiments from which principles are derived. Although this approach builds from the basic to the more abstract, it is our intention to give both aspects of experimental psychology due attention. Both examples *and* principles are important in the study of experimental psychology. It is our purpose to teach both.

The pedagogical method in this book uses actual experiments to help the student learn how design principles are applied in research. In this edition of *Experimental Psychology* the student will read, critique, or analyze approximately 75 cases or experiments that exemplify various design principles and problems. In addition to understanding design, the student will become comfortable with the research literature and learn much of the content material of psychology.

Teaching by example has been a traditional means of instruction and is still widely practiced, whether the subject is high-energy physics, carpentry, accounting, computer programming, psychotherapy, creative writing, or cellular biology. But in courses involving experimental design in the psychological sciences, the common practice is to plod through a series of philosophical and theoretical issues that, while important to any scholar's education, are often difficult to relate to the real world of research. We believe that teaching by example is essential to the development of critical thought and the practice of research, particularly for students new to psychology, or those on the brink of conducting their own research.

We wrote the book from a tutorial standpoint, as if we were a private tutor instructing a student as he or she was reading the material. First, we present a principle or a problem in experimental design. Then we show how the principle or problem has been dealt with in the psychological literature. We provide annotated reviews of actual articles, much as a master teacher might do if he or

she sat down with a student and critically read an article with him or her. Based on the comments we have received from students and instructors, this technique is remarkably successful.

Part One of this edition, which deals with the basic principles of experimental design, has been expanded and reorganized. Although experimental psychology is largely considered a laboratory science, we have expanded discussion on research methods that fall outside the bounds of traditional experimental psychology. The purpose of this is to highlight the need for making decisions and justifications in research. And sometimes the best way to answer a particular research question will require knowledge about a variety of research methods. We have emphasized the importance of research ethics earlier in the text than in previous editions. The logic behind this change is that many students of experimental psychology are planning and conducting their own research in their courses, and covering ethics earlier in the text (and thus earlier in the course) is important. A new section has been added on securing human subjects' approval for research projects. Comprehensive chapters on the research process have been expanded and updated to include new information on using electronic databases and the Internet for literature reviews, planning and doing research, funding research, writing abstracts, preparing posters and attending conferences, writing a professional paper, and publishing manuscripts.

Part Two of the book contains 16 reprinted articles, two of which are new to this edition. With student and instructor feedback in mind, two of the previous editions' articles have been deleted. The scope of the articles in Part Two was carefully selected to sample the major areas of psychology, including industrial psychology, cognitive psychology, social psychology, animal and ethological studies, practical problems, cross-cultural studies, psychotherapy, single-subject designs, educational psychology, behavioral modification, and child psychology, among others. We selected these articles to illustrate the design issues presented in Part One. We have also identified some *special issues* of experimental design that are embodied in some of the articles. These issues include control problems, field-based experiments, subject selection, small *n* experiments, research with animals, clinical research, and social behavior in the laboratory, among others. We have found that by using this format students learn a great deal about the different fields of psychology in addition to learning about the vast diversity of experimental design. Some professors have told us that Part Two of the book is the reason why they select the book for class use, either as the primary text or as a supplementary one. (Curiously, about the same number have told us that they select the book for the contents of the first section!)

Finally, Appendixes A and B cover basic statistics, and allow the book to be used in a much wider range of courses in which basic statistics is necessary. The appendixes also allow instructors to demonstrate the computational procedures for a large number of the statistical tests demonstrated in this book.

Our goal in this book is to make psychological research more understandable, more interesting, and perhaps even exciting to the student. We invite ideas from instructors on how to best achieve these goals.

An Instructor's Manual Test Bank is available that contains test questions, class demonstrations, discussion questions, and lecture strategies.

Finally, we would like to acknowledge the assistance of those colleagues and students who have offered critical feedback on the structure and content of this book. This edition is based on the comments and suggestions of numerous instructors and students who used previous editions in a wide variety of courses, ranging from introductory psychology through graduate psychology, as well as courses in other disciplines. We thank the following reviewers of the Seventh Edition: Jeremy Bailenson, University of California, Santa Barbara; Ron Fagan, Pepperdine University; Barton Poulson, Brigham Young University. Their detailed feedback was very useful in updating this book. Their recommended improvements, as well as our class testing, have strengthened the text considerably. We would also like to thank Otto MacLin for writing the original Appendix A, and for updating it for this edition. Finally, we would like to thank Josh Cruz, of the University of Texas at El Paso for his assistance in gathering materials and making suggestions for this edition. To all, we offer our sincere thanks.

Robert L. Solso

M. Kimberly MacLin

TO THE STUDENT

You have chosen an excellent time to study experimental psychology. Exciting new developments are emerging in nearly every domain of the psychological sciences. A strong background in the methodology of experimental psychology will form a basis for understanding these new developments and provide you with the skills necessary for conducting your own research.

This book examines the methods of experimental psychology. A great deal of the book is devoted to controlled psychological experiments and the collection of reliable data based on observations. We use a "case approach," meaning that we illustrate each of the principles of experimental design with an example, or case, drawn from the professional literature in psychology. Study these cases carefully as they represent excellent examples of skillfully conducted experiments from every major area in psychology—including animal studies, child psychology, social psychology, cognitive psychology, applied psychology, among others. We also emphasize ethics in experimental research and give some guidelines on how to best develop research ideas, write research papers, and present your research at professional conferences.

We believe that a powerful lesson can be learned by studying the techniques of experts. In addition to helping you learn proper experimental design, we hope the book will teach you a little about the various topics of psychology and inspire some of you to continue your studies and the work that some of us have started. We would be interested to hear your reaction to the material in this book and how it affects your study and work in the field. You can email your comments and suggestions to kim.maclin@uni.edu. Good reading!

RLS

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CONTENTS

PART ONE

Basic Principles in Experimental Psychology

It is experimentation that expresses the basic empiricism of science.

—Abraham Kaplan

This book is divided into two distinct sections. Part One focuses on the basic principles of experimental psychology while Part Two analyzes actual experiments drawn from the psychological literature.

We begin with an introduction to scientific inquiry and methodology in psychology. Each major point is illustrated with an example from the experimental literature. In Part One we also discuss the fundamentals of research design as they apply to experimental psychology as well as the ethics of conducting research. A large portion of this material is devoted to the issue of experimental control, which is the means by which experimenters ensure the integrity of a psychological experiment.

Chapters 6 and 8 are called "Design Critiques" and offer brief descriptions of experiments that contain at least one conceptual or technical flaw. As you read these critiques, try to discover the error. Practice with these problems can strengthen your own ability to design experiments devoid of error.

Part One concludes with two important and practical chapters: "The Psychological Literature: Reading for Understanding and as a Source for Research Ideas" and "The Research Process." These chapters should guide you through the experimental process from the conceptualization of an experiment, to running an experiment, and finally to submitting a manuscript for publication.

Part One is intended to present, succinctly yet comprehensively, the rudiments of good experimental design and to show how to present research in a valid experimental paper. In Part Two we have selected for presentation actual experiments from the psychological literature. Each experimental case illustrates one or more specific design/experimental issues and, in some cases, is accompanied by our detailed analysis. (Several cases are without comment and await your remarks.) We suggest that you read these cases as you study the material in Part One to help exemplify the textual material. Upon completion of Part One and Part Two you should be equipped to understand, analyze, and plan research in experimental psychology.

CHAPTER

1 An Introduction to Scientific Inquiry

A [person] may be attracted to science for all sorts of reasons. Among them are the desire to be useful, the excitement of exploring new territory, the hope of finding order, and the drive to test established knowledge.

—Thomas S. Kuhn

Every month the journal *Psychological Science* is sent to my office. Once, a chemist friend saw the journal in my office and asked, "Isn't that title an oxymoron? Do you believe that psychology is really a science?" My friend's questions raise the issue: Are *psychology* and *science* incongruent terms?

It seems that psychology has lived in the shadow of "real" science for so long that many still believe it is in a prescientific period—a kind of alchemic stage in which everything from the volatile nature of human behavior to weird social practices is investigated using mysterious techniques. When I pointed out to my chemist friend that "science" is characterized by its method (i.e., the "scientific method"—science is something you *do*), not by its subject matter (e.g., chemistry, the brain, or demographic trends), the chemist argued that psychology was not a "true" science because it lacked a laboratory tradition in which technical instruments played a role in the search for scientific principles. "But that is a false impression," I retorted. "From the very beginning [by which I meant the late nineteenth century], we have had laboratories, equipment, subjects, experimental techniques, statistical analysis of data, and so on, upon which reliable conclusions are based. And presently, experimental laboratories in psychology are equipped with a dazzling array of computers, physiological instruments, and all sorts of scientific gadgets sure to impress the hardest of the hard among scientists." "But still," he responded, "you study weird, inconsistent, even berserk behavior." "Your impression of experimental psychology is distorted: You see, much of the time we study such things as memory, learning,