

## Applied Social Science Methodology

An Introductory Guide

This textbook provides a clear, concise, and comprehensive introduction to methodological issues encountered by the various social science disciplines. It emphasizes applications, with detailed examples, so that readers can put these methods to work in their research. Within a unified framework, John Gerring and Dino Christenson integrate a variety of methods – descriptive and causal, observational and experimental, qualitative and quantitative. The text covers a wide range of topics including research design, data-gathering techniques, statistics, theoretical frameworks, and social science writing. It is designed both for those attempting to make sense of social science, as well as those aiming to conduct original research. The text is complemented by practice questions, exercises, examples, key term highlighting, and additional resources, including related readings and websites. An essential resource for undergraduate and postgraduate programs in communications, criminal justice, economics, business, finance, management, education, environmental policy, international development, law, political science, public health, public policy, social work, sociology, and urban planning.

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## An Introductory Guide

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## Abbreviations and Notation

Symbol	Description
$A$	Event or option
$a$	Y-intercept or constant of a regression equation
$\alpha$	Significance level (read as "alpha")
$  $	Absolute value operator
$ATE$	Average treatment effect
$ATT$	Average treatment effect on the treated
$B$	Event or option
$b$	Slope coefficient for independent variable (read as "beta")
$ $	Expression of conditionality
$CI$	Confidence interval
$Cov$	Covariance
$D_{ij}$	Distance from observation $i$ to $j$
$D_{Greedy}$	Distance from a greedy algorithm
$D_{Optimal}$	Distance from an optimal algorithm
$\Delta X$	Change in values of $X$ (read as "delta $X$ ")
$\Delta_i$	Causal treatment effect for individual $i$
$df$	Degrees of freedom
$\dots$	Expression of omission of values in a repeated operation (read as "ellipsis")
$e$	Error term or random component, usually of a regression equation
$E$	Expectation or expected value
$ESS_Y$	Explained sum of squares for $Y$
$exp$	Natural exponential function
$H_X$	Hypothesis about the effect of $X$ on $Y$
$i$	Individual or unit in the sample of observations, not $j$
$\perp$	Expression of independence
$j$	Individual or unit in the sample of observations, not $i$
$k$	Maximum number in a series of variables or coefficients
$M$	Mechanism or pathway connecting $X$ to $Y$
$MOE$	Margin of error
$MS_e$	Mean squared errors
$\mu$	Mean of a population or probability distribution (read as "mu")
$N$	Sample size or number of observations, but occasionally units or cases
$N_{Col}$	Number of cases in a column

## Abbreviations and Notation

(cont.)

Symbol	Description
$N_{Row}$	Number of cases in a row
$NA$	Expression that value is not available, unknown or missing
$1 - \alpha$	Confidence level
$P$	Probability
$p$	P-value
$Pct_{Col}$	Column percents
$Pct_{Row}$	Row percents
$\pi$	Constant value, approximately 3.14 (read as "pi")
$Prop$	Proportion
$Q$	Variable; the antecedent cause (to X) that may be used as an instrumental variable
$r$	Pearson's correlation coefficient
$r^2$	Coefficient of determination
$RSS_e$	Residual sum of squared errors
$S_{\bar{X}_1 - \bar{X}_2}$	Standard error of difference between means
$s_b$	Standard error of b
$s^2$	Variance of a sample
$s$	Standard deviation of a sample
$SE_e$	Standard error of the estimate
$\Sigma$	Summation operator
$\sigma$	Standard deviation of a population or probability distribution
$\sigma_{\bar{X}}$	Standard error of the mean
$\sigma^2$	Variance of a population or probability distribution
$SP$	Sum of products
$SS_X$	Sum of squares for X
$SS_Y$	Sum of squares for Y
$T_i$	Treatment condition for individual $i$
$Time_{1-N}$	Time-periods, usually referring to occasions when key variables are measured
$t$	T-ratio
$X$	Variable; usually an independent variable of causal interest
$\bar{X}$	Mean of X (read as "X-bar")
$X_C$	Control group condition, $X = 0$ when binary
$X_T$	Treatment group condition, $X = 1$ when binary
$X \leftrightarrow Y$	Expression that X causes Y and Y causes X
$X \rightarrow Y$	Expression that X causes Y
$X \text{—} Y$	Expression that X covaries with Y
$Y$	Variable; usually the dependent variable or outcome
$\bar{Y}$	Mean of Y (read as "Y-bar")
$\hat{Y}$	Predicted, fitted or estimated values of Y (read as "Y-hat")
$Y_i$	Outcome or effect for individual $i$

**Abbreviations and Notation***(cont.)*

Symbol	Description
$Y_{iC}$	Potential outcome if $i$ does not receive treatment (i.e., in control group)
$Y_{iT}$	Potential outcome if $i$ receives treatment (i.e., in treatment group)
$Z$	Background factor(s) that affect $Y$ and may also affect $X$ , and thus may serve as confounder(s)
$z$	Z-score

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Chapters 1–4, 6–8, 10, 12, and 17 draw on material published originally in Gerring's *Social Science Methodology: A Unified Framework* (Cambridge University Press, 2012). Chapter 9 is based loosely on Gerring's "Selecting Cases for Intensive Analysis: A Diversity of Goals and Methods" (*Sociological Methods & Research*, 2016, joint with Lee Cojocararu) and *Case Study Research: Principles and Practices*, 2nd edn. (Cambridge University Press, 2017). Readers may refer to these works for a more detailed treatment of these subjects.

## Preface

Once upon a time, the practice of social science could be understood as the application of commonsense and intuition – something you might develop in the course of growing up. This is no longer true, or only partly true. Although commonsense and intuition are still useful, the social science disciplines have moved well beyond what can be understood without specialized training.

If you want to become an artist, musician, engineer – or pretty much anything, these days – developing your technique in these highly specialized areas is essential. It takes great dedication, countless hours of concentrated work, and professional guidance. The same may be said for social science in the contemporary era. One may mourn the death of the amateur social scientist. But one might as well reconcile oneself to the fact.

In response, methods courses have proliferated at both the undergraduate and graduate level. Likewise, methodological skills are in high demand in the social sciences and their cognate professions. Successful careers in government, communications, education, social work, business, law, and all of the policy fields require a solid grounding in methodology. Whether one is applying for graduate programs or for a job, the material covered in this book should stand one in good stead.

Indeed, a working knowledge of social science tools of analysis may prove more crucial for one's career than whatever substantive knowledge one acquires in the course of a college education. What one knows is less important than what one can *do*, and what one can do depends on a working knowledge of methodology.

These developments may be viewed as part of a broader sea-change, driven by the rise of computers and the Internet. With sophisticated IT tools at our disposal, factual knowledge about a subject is no longer at a premium and can usually be obtained from a Google search or from a specially designed database in milliseconds. Likewise, any repetitive procedure can be programmed as a set of algorithms on a computer. This means that the value of an education is no longer in the facts or established protocols you might learn. This sort of knowledge can be produced by machines in a more timely and accurate fashion than by the human brain. Our value-added, as humans, stems from our capacity to identify important questions and think through practical solutions to those questions in a creative fashion. This is the function of a broadly pitched course on methodology and it is what this text is designed to convey.

The present text is appropriate for use in introductory or intermediate methods courses at the undergraduate, master's, or doctoral level. It is designed to assist those who are attempting to make sense of social science as well as those who are

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conducting original research. We assume no prior methodological knowledge, though we do presume that the reader has some background in at least one field of social science, e.g., anthropology, communications, criminal justice, economics (including business, finance, and management), education, environmental policy, international development, law, political science, psychology, public health, public policy, social work, sociology, or urban planning.<sup>1</sup>

We try to address key points of social science methodology in an applied fashion – so that readers can put these methods to work. Note that insofar as we can impact the societies we live in (in a conscious fashion) social science is indispensable. We can't enhance economic growth, health, and education – or reduce poverty, crime, conflict, inequality, and global warming – without consulting the work of social scientists. To understand that work, and to conduct original research on these topics, an understanding of the methodological principles underlying this set of practices is indispensable. We hope that you will approach social science methodology not simply as a means for self-advancement (though there is surely nothing wrong with that!) but also as a set of tools for changing – and preserving – the world.

## A Wide-Ranging Approach

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In many textbook markets the offerings are fairly similar. A standard format has been developed over the years that everyone adheres to (more or less), and the courses that utilize these texts bear a strong resemblance to each other. There is scholarly consensus in the field about how to teach a subject.

This does not describe the topic at hand. Gazing out across the social science disciplines one finds a wide range of methodological approaches, reflected in a wide range of textbooks. As a service to the prospective reader (and instructor) it may be helpful to indicate how this volume differs from other textbooks in this crowded field – and why.

Some methods texts limit their purview to a specific discipline, e.g., political science, sociology, or economics. This may seem reasonable, and it allows one to focus on a set of substantive problems that orient a field. However, few substantive problems are confined to a single discipline. In order to learn about crime, for example, you will probably need to read across the fields of sociology, psychology, law, political science, economics, and criminology. The same is true for most other problems, which do not observe neat disciplinary boundaries.

Of course, important differences in theory and method characterize the disciplines. But it does not follow that one is well-served by a text that offers only one view of how to conduct social science. A narrow methodological training does not prepare one to integrate knowledge from other disciplines. To understand the range of literature on a topic and to think creatively about methods that might be applied to that topic it makes sense to adopt an ecumenical approach. Hence, this book focuses broadly on the methodological principles of *social science* rather than on methods practiced within a single discipline.



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Some texts are focused primarily on quantitative methods, i.e., statistics or econometrics. While these are important skills, this approach has a tendency to reduce methodology to mathematics. And this, in turn, presents a narrow and technical vision of social science that is not faithful to the way in which social science is practiced (or, at any rate, to the way it should be practiced). Statistics are the handmaiden of methodology, not the other way around.

Some texts are focused exclusively on qualitative methods. This is a hard topic to define, and these books are varied in their content and approach. A few are strongly anti-positivist, meaning that they reject the scientific ideal as it has been understood in the natural sciences. While we agree with the standard critique of a narrowly positivist approach to social science we also think the natural sciences and social sciences share a good deal in common. In any case, a book that treats only qualitative components of social science is missing a good deal of the action. Both qualitative and quantitative approaches are required as part of everyone's social science education. Certainly, they are both required in order to make sense of the social science literature on a subject.

One way to handle this problem is to include both qualitative and quantitative methods within a single text but to keep them separate, with the idea that the tools are distinct and each draws on a different epistemology (theory of knowledge). In our opinion, this claim is difficult to sustain: "qualitative" and "quantitative" tools tend to blend together and their epistemological traditions are not as far apart as they might seem. More important, a segregated approach to knowledge is not helpful to the advancement of social science. If knowledge on a topic is to grow it must be based on a unified epistemology that encompasses both qualitative and quantitative methods. This is the approach taken in the present text.

The most distinctive feature of this book is its wide-ranging approach to the subject. The text is intended to encompass all of the social science disciplines, qualitative and quantitative methods, descriptive and causal knowledge, and experimental and observational research designs. We also address the nuts and bolts of how to conduct research, as laid out below.

Naturally, there are some topics that we do not have time or space to engage.<sup>2</sup> However, relative to most methods texts this one qualifies as highly inclusive, offering an entrée to myriad aspects of social science methodology. To our way of thinking, these topics are all essential. And they are also closely linked. While there are many ways to do good social science these diverse approaches also share certain common elements. Only by grasping the full extent of social science's diversity can we glimpse its underlying unity.

## Outline and Features

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With a text of this size the reader may want to read strategically, focusing on chapters that are most relevant to your current work and interests, skipping or skimming chapters that cover topics about which you are already well-informed. A good textbook need not be read cover-to-cover.

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However, readers should also be aware that the book is organized in a cumulative fashion, with later sections building on previous sections. Something may be lost if you peruse the text in a scattershot fashion.

Part I sets forth the basic *building blocks* of social science methodology. Chapter 1 introduces our topic, social science methodology, expanding on themes in the Preface and introducing several specific examples that will be referred to throughout the book. Subsequent chapters within this section focus on (2) arguments (including theories and hypotheses), (3) concepts and measures, and (4) analyses.

Part II focuses on *causal* arguments and analysis. This topic is broken down into chapters dealing with (5) causal frameworks, (6) causal hypotheses and analyses, (7) experimental research designs, (8) non-experimental research designs, (9) case study research designs, and (10) diverse tools of causal inference.

Part III deals with the process of research and the presentation of results. This includes (11) reading and reviewing the literature on a subject, (12) brainstorming (finding a research topic and a specific hypothesis), (13) data gathering, (14) writing, (15) public speaking, and (16) ethics.

Part IV deals with statistics. This is divided into several topics: (17) data management, (18) univariate statistics, (19) probability distributions, (20) statistical inference, (21) bivariate statistics, (22) regression, and (23) causal inference.

Every effort has been made to divide up these subjects in a way that makes logical sense and to avoid unnecessary redundancies. Of course, topics do not always neatly divide into separate chapters and sections. There is a holistic quality to social science methodology; diverse topics invariably bleed into one another. To assist the reader, we indicate where the reader might look for further elaboration of an issue. You may also consult the Detailed Table of Contents or the Index.

An objective of the book is to introduce readers to *key terms* of social science methodology. When a term is first introduced, or when it is formally defined, it is printed in bold. At the end of each chapter the reader will find a list of these bolded terms, which may be useful for purposes of review. In the Index, we indicate the page on which a term is defined by printing that number in bold.

The online materials for this book include series of questions and exercises for each chapter under the heading Inquiries. These inquiries serve a review function, summarizing the main points of the chapter. Some questions are speculative, building on the material presented but also moving beyond it. Instructors may draw on these inquiries to structure class discussion, to construct quizzes or exams, or for assignments.

In posing questions and constructing exercises we are sensitive to the fact that readers of the book have diverse disciplinary backgrounds. Consequently, many of the inquiries are presented in a manner that allows for tailoring the questions to the reader's particular field of expertise. Rather than imposing a particular concept or theory on a methodological issue we might ask readers to choose a concept or theory with which they are familiar and employ it to address a question in their course of study.

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An introductory textbook of modest length must deal with topics in an expeditious fashion. Accordingly, we have omitted many qualifications, caveats, and citations to the literature in favor of a streamlined approach. Although the treatment in this text is somewhat more detailed than that found in many textbooks it is still highly selective when placed within the context of scholarly work on these subjects. This is the cost of writing a short book on a long subject. Readers who choose to continue in some branch of social science should view this book as a point of departure on their methodological journey. The online materials include lists of suggested readings and web sites related to topics broached in each chapter, under the heading Resources. Consider these references as an invitation to further study.