

## CHAPTER ONE

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## Overcoming Methodological Challenges

QUESTIONS ABOUT the relative merits of alternative research strategies pervade the social sciences. What counts as an adequate explanation for social phenomena? How can we evaluate competing explanations? What standards should we apply when weighing evidence? How much and what types of evidence are convincing? Can social phenomena related to policy areas be studied scientifically? Some eminent scholars appear to agree on broad methodological goals or criteria (Brady and Collier 2004; Gerring 2001; Lieberman 2005). Explanations should be general yet precise, accurate, and well-specified. Evidence should be theoretically relevant and should identify mechanisms linking explanations to outcomes. Abundant evidence, if theoretically relevant, is valued because it enhances confidence in findings.

Despite the apparent common ground underlying the work of many scholars, methodological divides within the social sciences also run deep. As lamented by Mahoney and Goertz (2006) and E. Ostrom (2006), rival camps often cast aspersions on each other's work rather than engage in constructive dialogue. The acrimony has several sources. The disagreements have been provoked in part by battles over induction versus deduction, poor methodological practice by some scholars, and a lack of sensitivity to diverse research goals. The stakes of the methodological debate are increased by the intertwining of methodological choice with ontological, normative, and theoretical positions, and with competition for professional status and resources (Moses and Knutsen 2007). These dynamics encourage intense and sometimes grossly unfair critiques.

The substantive focus of this book is on collective action and the commons. It is a field of research that utilizes multiple methods extensively, as well as being the one most familiar to the authors of this book. We believe that the discussion of the use of multiple methods in this research field, and the lessons we draw from our practical experiences, apply more broadly to social science in general. Therefore, we start this first chapter with a broader discussion on the methodological challenges in the social sciences.

Examples of poor methodological practice pervade social science research. Often, scholars follow "the rule of the hammer" and apply a single method indiscriminately, regardless of its suitability for a given

research project. Harmonization of research goals, theory, data, and method does not, however, guarantee sound practice. One can find qualitative studies that overstate either the uniqueness or the generality of particular cases, fail to utilize relevant concepts and theories in the literature, or work with concepts that conflate multiple dimensions (Sartori 1991; compare Goldthorpe 1997). Quantitative studies sometimes use inadequate data and do not always use appropriate diagnostic checks and technical fixes (Jackman 1985; Scruggs 2007; Shalev 2007). Formal models often work with unrealistic assumptions without addressing the gap between assumptions and reality (Bendor 1988; Green and Shapiro 1994). No method is immune to poor applications.

Critics sometimes conflate methodological practice with the method itself, arguing that examples of poor application discredit the method. A method need not be abandoned because it has been poorly utilized; it makes more sense to encourage greater methodological awareness and better practices (Geddes 2003; Jackman 1985; King, Keohane, and Verba 1994; Scruggs 2007). Others fail to appreciate that research goals are varied and require diverse methods. More than three decades ago Robert Clark (1977, 10; emphasis in original) strongly warned against reliance on a single method:

A first rule should be to beware of one researcher, one method, *or* one instrument. The point is not to prove that the hypothesis is *correct*, but to *find out* something. To rely on a single approach is to be shackled.

Indiscriminate application of a method makes little sense, but complete rejection of a method because it is inappropriate in a particular setting or for a particular purpose is not more sensible. It is important for social scientists to recognize that all methods generate results that contain some level of uncertainty. While multiple scientific goals and trade-offs in achieving those goals are widely acknowledged (Coppedge 1999; Gerring 2001), little consensus exists on the relative importance of particular goals. Some scholars prioritize one or a few goals to such an extent that they dismiss as unscientific research that prioritizes other goals. For example, Goldthorpe (1997) includes generality as the most important criterion in his definition of causal explanation, rather than as one of several criteria (compare Gerring 2001). Consequently, he sees unique events and contingency as marking the limits of scientific inquiry. By this definition, analyses of such events are not scientific and cannot support causal inferences. Proponents of path-dependent explanations, analytic narratives, interpretive methods, and other approaches strongly disagree (Bates et al. 1998; Bennett and Elman 2006; Rogowski 2004; R. Smith 2004). As in this example, and as discussed further below,

methodological controversies often reflect competition between research traditions.

Fortunately, social scientists increasingly recognize trade-offs across methods (Bates 2007; Brady and Collier 2004; Gerring 2001).<sup>1</sup> King, Keohane, and Verba (1994), for example, point out that all methodologies have limitations; scholars should be more aware of these limits and more transparent about the limits as well as the solid contributions of their work. To overcome the limits of any one method, one needs to draw on multiple methods (Bates et al. 1998; Coppedge 1999; Granato and Scioli 2004; Jackman 1985; King, Keohane, and Verba 1994; Laitin 2003; Lieberman 2005; Scharpf 2000; Tarrow 2004). If social scientists have shared standards, no single method fully addresses all standards. Methods offer different strengths and weaknesses. Rigorous research that combines complementary methods will be superior to research that relies on any single method (Gray et al. 2007).

The pragmatism and respect for diverse methodological traditions in these reflections are welcome. Too often, however, the challenges involved in using multiple methods are themselves overlooked. Proponents of mixed methods justify their preferred combination in logical terms and illustrate the approach with a few examples. With some exceptions (Lieberman 2005; Scharpf 2000), this literature offers few specific practical suggestions.

Practical challenges can be formidable. Not all methods are equally feasible or even appropriate for all research topics (Bennett and Elman 2006; Poteete and Ostrom 2008). Lieberman's (2005) nested analysis, for example, involves large-N analysis *prior* to any case study work. There are many important topics for which broadly comparative data are scarce, difficult to access, or of dubious quality. Lieberman, however, does not address these challenges. Even if data availability is not a problem, the value of a multimethod approach requires sufficient command of multiple methods. Yet considerable investment is required to gain competency in any methodology, and the benefits of methodological specialization are substantial. While these challenges are sometimes acknowledged, few social scientists make practical suggestions to address them.

This book focuses on the practical challenges that influence methodological choice. We are particularly concerned with research on topics for which data are scarce, difficult to collect, and not readily comparable. These conditions affect research on a wide variety of topics, including those concerned with informal institutions, subnational organizations, and nonelite populations. We focus on collective action for the management of natural resources, an area of research in which all of these

conditions apply. For such topics, data for large-N analysis are neither available nor readily accessible, and field research is unavoidable. Researchers often need considerable contextual knowledge even to recognize the phenomenon of interest. The need to conduct intensive fieldwork limits the potential for collecting enough data to support broadly comparative analysis.

We have become strongly aware of these challenges through our own work on collective action and natural resource management. We feel that the practical challenges of conducting rigorous social science research on topics for which data are scarce, or difficult to access or to interpret, have not received adequate attention in discussions about social science research. We have seen the benefits of collaboration and the combination of multiple methods in our research. We also have firsthand experience of the challenges involved in such research, and we will discuss these throughout this book.

In this chapter, we introduce four themes that recur through the book: (1) the interlinking of methodological debates with theoretical development, (2) the advantages and limitations of multiple methods and collaborative research, (3) practical constraints on methodological choices, and (4) the often problematic influence of career incentives on methodological practice. In this book, we explicitly acknowledge the practical challenges that affect methodological choices, evaluate several strategies for addressing these challenges, and direct attention to the influence of career incentives on methodological choices in social science research. We discuss a range of options for balancing competing methodological demands under the inevitable conditions of limited resources, including a variety of techniques that we feel have been underutilized in the social sciences. We discuss the merits and limits of each method, as well as the possibilities for and constraints on combining various methods. In our discussion of constraints on methodological choice, we hope to stimulate a debate about professional incentives and other structural aspects of academia that influence how research is conducted.

This book is more about methodological practice than about methodological ideals. We thus begin this chapter with a historical overview of methodological debates, highlighting interactions among methodological practices, changing theoretical orientations, and competition for professional status and resources. We then look more closely at issues surrounding research that uses multiple methods, an approach that has gained in acceptance in recent years. This leads to a discussion of constraints on methodological choice, both practical and professional. We then explain how our substantive focus—the study of collective action in natural resource management—helps us address our four thematic concerns. The chapter concludes with an outline of the rest of the book.

## SOCIAL SCIENCE DEBATES OVER THE SUPERIORITY OF PARTICULAR METHODS

The history of the social sciences can be recounted with reference to major methodological shifts. An initial reliance on qualitative analysis gave way dramatically to quantification in the early to mid-twentieth century. When this transformation began, quantification largely meant statistical analysis of large-N data sets of public opinion surveys. The last third of the twentieth century saw a surge in the use of formal models as well. Debates about the relative merits of qualitative, statistical, and formal methods contributed to several developments in the late twentieth and early twenty-first centuries: refinements of quantitative methods that attempt to better match social conditions; the rise of formal models; greater appreciation for combining multiple methods; and the spread of post-positivist methods such as discourse analysis.

The qualitative orientation of the early social sciences can be seen in the emphasis on case studies and participant observation in sociology, ethnographic field-based research in anthropology, and descriptive and normative analyses of formal legal arrangements. In the early decades of the twentieth century, many scholars embraced quantitative methods as part of a drive to make the social sciences more scientific.<sup>2</sup> Quantitative methods began to gain currency across the social sciences in the 1920s and 1930s. The adoption of these methods accelerated at midcentury, as conveyed by references to the behavioral revolution.

The branches of the social sciences differed in their timing, pace, and preferred forms of quantification. Nonetheless, the methodological shift from qualitative to quantitative methods in the social sciences was dramatic. Psychology rapidly adopted experimental and statistical methods. Quantitative methods in economics encompassed formal models as well as experiments and statistics. For sociology, research activities during World War II marked the ascendance of survey research, experiments, and statistical forms of analysis (Platt 1986). Postwar political science shared the enthusiasm for survey research and statistical analysis, but formal modeling became widespread only in the 1980s and 1990s. In sociocultural anthropology, some interest was expressed in mathematical models in the early postwar period, but multivariate statistical analyses remained relatively rare until the 1970s (Chibnik 1985).

The role of quantitative methods in the social sciences has always been contentious. Current methodological debates echo those of a century ago, even if framed in somewhat different terms.<sup>3</sup> Scholars concerned with methods have disagreed over (1) the goals of social research, (2) philosophical and theoretical issues, and (3) practical considerations, especially related to data quality. Methodological choices should be

driven by theoretical and ontological assumptions (Hall 2003), but they also reflect underlying values and beliefs (Mahoney and Goertz 2006) and practical considerations (Platt 1986). The ontological and normative dimensions of methodological choices are not widely recognized (Mahoney and Goertz 2006). As a result, social science debates about methods involve frequent misunderstandings, with proponents of different approaches talking past each other (E. Ostrom 2006). Furthermore, because methodological discussions rarely acknowledge practical and professional considerations, they offer little guidance on how to address these constraints. In this section, we discuss controversies over the goals of social research, and how philosophical and theoretical issues interact with professional competition. We expand our treatment of practical and professional considerations in subsequent sections.

During the 1920s and 1930s, the social sciences became more institutionalized in North America. The social sciences sought recognition as sciences, and each discipline developed a more or less distinct professional identity (Guy 2003; Platt 1986). This process of institutionalization influenced methodological debates. During the prewar period, disagreements focused on the goals of social research. Should sociological research support social work to improve social conditions, seek subjective understanding of life experiences, or attempt to identify general patterns (Platt 1986)? Should the study of politics provide normative and practical guidance for administrators or objective understanding of political phenomena (Guy 2003; Lasswell 1951)? As universities set up schools of social work, public administration, and business administration alongside departments of sociology, political science, and economics, differences over goals were alleviated—but not really addressed—through the institutionalization of more focused programs of study.

Yet differences over the relative importance of theory and praxis cannot fully account for methodological debates. Scholars with common goals disagree over methods, and scholars draw on the same methods to pursue divergent goals. A lack of consensus on fundamental philosophical issues contributes to disagreements over methods. What counts as science? What model or models of causality and explanation make sense for social phenomena? In particular, do models of science and explanation developed in the natural, and especially the physical, sciences make sense for the social sciences?

Over the past century, some have embraced deductive models of science inspired by the natural sciences as a way to gain more reliable insights about social processes (King, Keohane, and Verba 1994; Przeworski and Teune 1970). Deduction involves the logical derivation of universalistic, lawlike statements of the sets of conditions associated with the outcome of interest from theoretical assumptions. Lawlike statements may

be derived from formal or mathematical models, as in rational-choice approaches, or logical analysis, as in some qualitative studies. Empirical evaluations rely on the analysis of correlation, as in behavioral research or paired comparisons.<sup>4</sup> The journal *Public Choice* devoted a special issue in December 2008 to the topic “Homo Economicus and Homo Politicus” (edited by Geoffrey Brennan and Michael Gillespie) with nine articles addressing the question of how to reconcile the basic differences between theories of human behavior in economics and political science. In the introduction, Brennan (2008, 431) reflects that

the ambition to find common ground on which public choice scholars and “political theorists” of a more traditional kind might have profitable exchange is not a trivial one: we start from very different conceptions of what counts as theory—even of what counts as worthwhile scholarship—and from rather different disciplinary presuppositions as to how differences in approach can most profitably be engaged and resolved.

Critics, however, argue that deductive methods do not allow for human agency and reflexivity, the influence of meaning and interpretation, or contingent relationships (Almond and Genco 1977; Hall 2003; Ragin 1987; see review in Platt 1986). If agency is taken seriously, we must allow for both creativity and differences in perspectives. But creativity and differences in interpretation mean that lawlike social patterns are unlikely to arise. Contingent relationships are possible even if questions of agency are put aside. These differences over the nature of causality have fueled heated methodological debates. In political science, both the behavioral revolution of the early postwar period and the rise of rational-choice theory in the 1980s and 1990s assumed the value of deductive-nomological reasoning. Scholars who used methods that reflected alternative ontological assumptions had difficulty gaining recognition for their work. Their frustration gave rise to the recent perestroika movement, in which constructivists and others challenged both the universality of social patterns assumed by rational choice and behavioral theories, and the dominance of statistical and formal methods associated with these approaches in the profession (Monroe 2005). Within economics, the concern that narrow rational-choice models have come to dominate much of economic scholarship is regularly expressed in the online journal *Real-World Economics Review*.<sup>5</sup>

Deductive-nomological reasoning suggests a mechanical view of the world, in which the same stimulus produces the same effect, *ceteris paribus*. Theories that view social phenomena as products of either evolutionary processes or intentional action challenge this mechanical view. Both evolutionary and intentional theories assume that individuals and

organizations adjust their responses to social conditions (Alchian 1950; Brady 2004; E. Ostrom 2000; Thelen 2003). Intentional theories of human behavior assume that adaptation occurs as people struggle to solve puzzles related to the pursuit of their goals (Almond and Genco 1977; Elster 1983; Knight 1992). While some intentional theories emphasize routines and heuristics, there is always a possibility for creativity and innovation (March and Olsen 1984; Simon 1955). Evolutionary theories do not require intentionality but do require some sort of selection mechanism, such as market or electoral competition, to drive adaptation. Both forms of adaptation imply that the same circumstances will generate diverse responses across actors and changes in individual behavior over time, but that adaptations will reflect historical trajectories. Thus the same stimulus will *not* produce the same effect on average, and constant effects cannot be assumed. Both perspectives raise questions about the suitability of research methods that assume constant effects (Elster 1998; Hall 2003; Ragin 1987, 2000).

The choice of method tends to signal one's theoretical perspective, as does the nature of methodological critique. Those who discount qualitative methods as incapable of evaluating general relationships signal a belief in both lawlike social relations and the relative unimportance of factors such as agency, history, and informal context. Not surprisingly, critiques of quantitative methods often charge that they do not capture the most important aspects of social conditions. Likewise, those wary of formal models worry about the level of abstraction. How can formal models adequately represent the dense networks of formal and informal institutions and cultural understandings in which human action occurs? None of these critiques really concerns the method as method; rather, they target the theoretical assumptions as reflected in methodological choices. What variables are important? What is the relative importance of formal institutions, culture, social structure, or informal institutions? How important are mass beliefs and behavior, or individual interests, beliefs, and strategic action? How are those variables related? While the behavioral revolution during the mid-twentieth century certainly fostered the rapid spread of quantitative analysis, it also redirected theoretical emphasis from formal institutions to the behavior and attitudes of individuals interacting within both formal and informal institutions. Likewise, rational-choice analysis often relies on game theory and other varieties of formal modeling, but is defined by assumptions of methodological individualism and intentional action.

Yet the influence of theory—and the implied influence of ontology—on methodological practice cannot be assumed and should not be overstated.<sup>6</sup> Theoretical changes can and do occur independently of changes in methodological practice (Hall 2003; Platt 1986). Sometimes, method-



ological challenges seem to drive theoretical arguments rather than the other way around (Liebersohn 1991, 318). Indeed, sophisticated methods sometimes crowd out theory altogether (Achen 2002, 2005). We argue that methodological choices are often driven as much by data availability or career incentives. When career survival is at stake, practical considerations can squeeze out concerns about matching theory and method. The link between methods and career prospects can, however, be expected to influence the tenor of methodological—and theoretical—debates.

Sometimes, methodological and theoretical debates take on existential overtones. When a particular theory and associated methods become extremely widespread, for example, proponents of alternative approaches may worry about their own academic survival. Proponents of new theories—and associated methods—also face an existential fight for recognition and survival. The degree of (perceived) existential threat depends on the extent to which fellowships, job opportunities, publishing outlets, and research grants are open (or closed) to diverse theories and methods. The recent perestroika movement in political science, for example, presented itself as defending against methodological hegemony, conjuring images of political scientists conspiring to control journal outlets and professional associations.<sup>7</sup> This was not simply a methodological critique but a call to action against presumed tyranny. While the inflammatory public language associated with the perestroika movement may be unusual, the layering of methodological debates with value judgments and competition for professional recognition and resources is commonplace.

Despite references to “revolutions” and paradigm shifts, new social science theories and methods have not fully displaced their predecessors. Rather, each new theory and method has added another strand. Constructivists, institutionalists, and postmodernists coexist with behavioralists and structuralists. Despite the history of theoretical and methodological competition and critique, scholars also engage in creative synthesis. The current appreciation for methodological pluralism may be interpreted as a product of the survival and adaptation of approaches that were once perceived to be under existential threat. Promotion of methodological pluralism favors a theoretical eclecticism that should decrease concerns about existential threats to particular approaches, and should thus decrease the intensity of methodological debates.

#### MULTIPLE METHODS: PROMISES AND CHALLENGES

There are many reasons for social scientists to welcome methodological pluralism and greater use of mixed methods. No single method overcomes all challenges. Case studies and small-N comparative research

designs offer advantages for concept and theory development as well as evaluation of hypothesized causal sequences and mechanisms (Bates 2008; Bates et al. 1998; Collier, Brady, and Seawright 2004; Coppedge 1999; Lieberman 2005). Rich explanations of particular cases are often valuable substantively and theoretically (Mahoney and Goertz 2006; Rogowski 2004). Yet, as is widely recognized, small-N studies offer an uncertain foundation for positing or evaluating general relationships.

Formal methods seek to build logically coherent models and discern their logical implications. Their emphasis on logical consistency facilitates the distillation of parsimonious yet general hypotheses and guides the choice of statistical techniques (Achen 2002, 2005; Bates et al. 1998; Granato and Scioli 2004).<sup>8</sup> The high level of abstraction in formal models, however, raises questions about their empirical applicability (Green and Shapiro 1994). The controlled conditions in experimental research provide greater confidence in the internal validity of observed relationships. The external validity of general relationships can best be evaluated, however, through analysis of a large number of nonexperimental observations (Goldthorpe 1997; King, Keohane, and Verba 1994) as well as through field experiments (see Cardenas 2003; Cardenas, Stranlund, and Willis 2000; Henrich et al. 2004; List 2004).

Small-N qualitative studies can suggest the plausibility of formal models but provide little leverage in assessing the generality of relationships. The broad comparisons required to evaluate the generality of hypothesized relationships demand some form of quantitative analysis. Where quantitative analysis once meant regression-based analysis, options for quantitative analysis of empirical social science data now include Qualitative Comparative Analysis (QCA) and fuzzy-set Qualitative Comparative Analysis (fs/QCA) (Ragin 1987, 2000) as well as probabilistic, likelihood-based, and Bayesian statistics (Gill 2004).<sup>9</sup> This methodological menu includes options for scholars who hold varied ontological assumptions about the social world.

Mixed methods take a variety of forms. A researcher might use different methods to address different research questions or contexts. Or different methods might guide different stages of a research program (Lieberman 2005). Increasingly, scholars strive to use two or more methods at each stage of research. Those concerned with general causal patterns draw on quantitative and qualitative methods (Coppedge 1999; Lieberman 2005; Tarrow 2004). Combinations of formal and qualitative methods address concerns about logical coherence and causal processes in contingent relationships where there is no expectation of generality (Bates et al. 1998). Others contend that scholars should seek logical coherence and evidence for causal processes, and should test for the generality of relations by drawing on formal, qualitative, and quantitative methods (Granato and

Scioli 2004; Laitin 2003). Scholars who develop agent-based models use role games and experiments to collect data as well as involving stakeholders in the validation of their models (Barreteau, Le Page, and Aquino 2003; Bousquet et al. 2002; Gurung, Bousquet, and Trébuil 2006). Other scholars combine their formal models with ethnographic observations (Bharwani et al. 2005; Huigen, Overmars, and de Groot 2006).

The use of multiple methods, however, does not guarantee methodologically superior social science research. Some question the extent to which formal, qualitative, and quantitative research methods are actually complementary. Several recent publications have argued that different methods reflect different assumptions about the nature of causality, and have called for greater care in matching methods to ontological assumptions (Bennett and Elman 2006; Clark, Gilligan, and Golder 2006; Hall 2003; Mahoney 2003; Ragin 1987, 2000).

There are also limits to the feasibility of multimethod research. Hypotheses about complex causal relationships imply complex statistical models that stretch the limits of available data. Statistical analyses often add interaction terms or dummy variables to model contingent effects and multiple causal paths (Clark, Gilligan, and Golder 2006; Pontusson 2007), but these additional variables consume degrees of freedom in a context of limited data availability (Shalev 2007). Other techniques developed to address causal complexity, such as the analysis of time-series-cross-sectional data and hierarchical models, may strain the technical skills of both the researcher and the audience (Shalev 2007).

Mahoney and Goertz (2006) contend that interaction effects, dummy variables, hierarchical models, and other similar statistical fixes do not accurately reflect the relationships posited in the underlying theories. The assumption that observations are independent, for example, is called into question by globalization, diffusion effects, and actor-centered theories that emphasize strategic interactions. Even some quantitatively oriented scholars question the appropriateness of standard statistical techniques. In recent years, new techniques have been proposed to incorporate interdependence (Signorino 1999), Bayesian statistics (Dion 1998; Gill 2004), and Boolean logic (Braumoeller 2003; Ragin 1987, 2000). The verdict is still out on whether these new techniques match underlying assumptions better than does regression-based statistics.

Too often, the development of ever-more sophisticated techniques seems to be an end in itself. The latest techniques are sometimes adopted with little reference to theoretical considerations or understanding of the underlying assumptions. But methodological sophistication cannot substitute for theory. Achen (2002, 2005) warns that quantitative analyses that are not supported by theoretical microfoundations or careful exploration of the data yield unreliable results and should not be trusted.

Scholars must do more to develop explicit theoretical arguments and ensure that their methods match their underlying assumptions about causality, ontology, and epistemology (Achen 2002, 2005; Brady and Collier 2004; Hall 2003).

Neither theory nor methodological techniques substitute for a thorough familiarity with the data, gained from diagnostic tests and data exploration. Visualization techniques such as graphical analysis and simple statistical techniques such as cross-tabulations bring empirical regularities and patterned variation into focus (Achen 2002, 2005; Shalev 2007). Data exploration draws attention to potential causal heterogeneity, nonlinear relationships, interaction effects, and other aspects of the data that are obscured by more sophisticated multivariate techniques. Thus thorough data exploration contributes to theory testing and development by complementing more sophisticated forms of data analysis and drawing attention to empirical patterns that call out for theoretical explanation (Achen 2002, 2005).

Even if causal, epistemological, and ontological assumptions pose no barrier, practical considerations complicate methodological choice. These practical challenges, largely overlooked in the exchanges regarding the relative merits of alternative and multiple methods, stand at the center of our analysis. The groundswell of interest in multiple methods demands more intensive and diversified forms of technical skill-development. Yet individual researchers rarely master more than a couple of methodologies. Even within a single research tradition, technical language and efforts to solve technical problems threaten to obscure or overshadow substantive issues (Beck and Katz 1996; Green and Shapiro 1994; Shalev 2007). If there are limits to the methods any individual researcher can master, what are the implications for multimethod research? The next two sections elaborate on some of the practical and career-related constraints on methodological practice.

## PRACTICAL CHALLENGES AND METHODOLOGICAL TRADE-OFFS

Methodological debates in the social sciences have had at least three positive effects. First, sterile debates over the superiority of alternative methods have given way to an appreciation of trade-offs and complementarities between approaches. Second, the goals of qualitative research and associated methods are receiving more explicit elaboration in response to a feeling that they were widely misunderstood (Brady and Collier 2004; Coppedge 1999; Gerring 2001, 2004; Goodwin and Horowitz 2002; Mahoney and Rueschemeyer 2003).<sup>10</sup> Third, more constructive critiques have stimulated considerable innovation in techniques within specific

methodological traditions and in strategies for combining multiple methods in research (Bates et al. 1998; Braumoeller 2003, 2004; Gill 2004; Lieberman 2005; Ragin 1987, 2000).

Nonetheless, scholars often struggle to make full and appropriate use of available research methods. As each methodological tradition becomes more sophisticated, the task of mastering multiple methods also becomes more challenging. When research demands intensive fieldwork and substantial local knowledge, unavoidably large investments in data collection present additional obstacles. All too often, methodological discussions overlook these practical constraints on methodological choice.

We promote collaborative research as a way to expand the potential for using multiple methods well in the analysis of broadly comparative research. Collaboration can bring scholars from multiple disciplines together on the same research team with strengths in complementary methods, increasing confidence that each method is applied rigorously. Likewise, collaboration that brings together expertise about different countries can expand the scope of comparison. In this book, we will discuss a variety of strategies for collaborative research and analyze obstacles to collaborative and broadly comparative research. But first, we outline some practical constraints on multimethod and collaborative research.

### *Technological Development and the Costs of Border Crossing*

Contemporary social science features tremendous innovation within each methodological tradition. Innovation indicates vitality but also increases the costs of competency in a particular method. Higher entry costs raise the barriers to methodological border crossing. And yet the benefits of multimethod research depend on competent application of each method. Otherwise, the use of multiple methods weakens rather than strengthens confidence in the research. To better illustrate the challenges, let us consider what is required for a researcher to gain competency in several methods: formal, quantitative, experimental, and qualitative.

The technical demands of formal modeling were evident even as this approach spread across the social sciences. Formal modeling requires a command of set theory and mathematical logic, optimization, and other techniques from economics, game theory, and complexity theory. Computational modelers require skills in programming and algorithmic design. Formal theorists devote considerable energy to the development of new modeling techniques and solution concepts.

Increasingly, similar conditions prevail in quantitative methodology. As recently as the 1980s, many social scientists equated quantitative research with ordinary least squares regression. The assumptions for multivariate regression rarely hold for social phenomena, however, and more suitable

statistical techniques exist. “Standard” quantitative techniques now encompass maximum likelihood techniques, analysis of cross-national-time-series data, and analyses of event histories. A variety of other techniques, including Bayesian statistics and Boolean-based methods, are also becoming more common. Computational power and statistical software make it very easy to apply advanced statistical techniques, but do not guarantee appropriate application. Each technique involves a particular set of assumptions, diagnostic checks, and ongoing debates about technological fixes. As with formal methods, a large investment is required of the researcher seeking to gain and maintain competency in even a subset of quantitative methods.

If researchers are to perform experiments, it is crucial that they learn the practice of experimental design in order to measure the relevant attributes of different experimental treatments. This requires the development of hypotheses related to outcomes expected from different treatments based on formal models, and statistical analysis on the data collected from the experiments to test the significance of differences found across treatments. Someone on an experimental team will also need programming skills to enter and analyze the data, and to enter the experimental instructions and response categories for experiments run in computer laboratories.

The menu of qualitative methods of data collection techniques includes ethnography, participant observation, interviews, oral histories, and archival research. Each technique involves a set of issues that researchers must understand and address to apply the method well (e.g., Burawoy 1998; Lustick 1996; Rocheleau 1995). Many of these techniques require a substantial period of fieldwork, keen observational skills, thorough record keeping, and a high degree of self-awareness and ethical management of social relations.<sup>11</sup> For fieldwork, researchers must have appropriate language skills and sufficient understanding of the local context to gain access, recognize informal institutions, and accurately interpret culturally coded observations.

Fieldwork yields voluminous data, but the data generally take forms that are not easily processed (H. Becker 1996). Thus the value of a qualitative study hinges on disciplined data analysis related to theoretical questions (Campbell 1975; Lijphart 1971). Qualitative researchers have developed a variety of techniques to structure data analysis, such as counterfactual analysis, process tracing, structured comparisons, and analysis of deviant cases (Bennett and Elman 2006; Fearon 1991; Goldstone 1997; Tarrow 2004). The development of software for Computer-Assisted Qualitative Data Analysis (CAQDAS) expands options for data management. There is considerable confusion, however, about what these programs do, the differences among them, how to match programs

and theoretical approaches, and even whether CAQDAS makes sense for a particular study or approach (MacMillan and Koenig 2004). As in quantitative research, the increase in computational tools can facilitate rigorous data analysis, but it can also produce misleading results if applied inappropriately.

Thus each method encompasses several sophisticated techniques. Whether a method yields analytical insights or misleading findings depends on competency in recognizing appropriate techniques, implementing them well, and making sense of the data. A large and ongoing investment is necessary for the researcher to gain and maintain competency in a given method. The investment required to master any single method is not excessive, but it limits the number of methods in which any individual can be expected to gain and maintain competency. While scholars should utilize diverse methods as possible and appropriate, methodological specialization and multimethod research designs present a dilemma. Collaboration offers a potential solution. Scholars with strengths in complementary methods can work together with increased confidence that each method is applied rigorously.

### *Availability and Accessibility of Data*

Depending on the period, country, and scale of analysis, data might be abundant and readily available or virtually nonexistent. Different methods require different kinds and quantities of data. Data compiled by national and international agencies do not address many issues at the subnational level and are often blind to both informal institutions and nonelite actors. Even in industrialized democracies, data availability and quality vary considerably across states, provinces, cities, and other subnational jurisdictions. Reliable and comprehensive data sources often do not exist for nongovernmental organizations, informal institutions, or collective action. In part, the lack of readily available data on informal institutions, subnational phenomena, nonelite actors, and other similar topics reflects the difficulty of data collection. Informality and nonelite status imply a need for local knowledge and trust. In the absence of trust, local actors may hesitate to provide accurate information about themselves, their practices, or other informal institutions.

As the costs of data collection increase, so do the restrictions on methodological choice. Recommendations that qualitative researchers should gather more data (Goldthorpe 1997; King, Keohane, and Verba 1994; Lijphart 1971) ignore the difficulty of recognizing some types of phenomena in field settings, the costs of collecting qualitative data, and the voluminous yet difficult-to-process data yielded by qualitative research (H. Becker 1996; Poteete and Ostrom 2004b). These conditions make it

more difficult to build large databases for quantitative analysis, even if quantitative analysis makes sense for a given theoretical approach.

Data problems also vary in severity. If data availability and access were unproblematic, then scholars could choose methodologies that matched their causal and epistemological assumptions. Scholars have to choose from a subset of less appropriate methods, however, when data are not readily available. As a result, the capacity to engage in quantitative analysis and broad comparison is higher for research on formal institutions, some types of international and national phenomena, and elites. Because data on informal institutions, subnational issues, and historically disadvantaged populations are less readily available, it is quite a challenge to engage in broadly comparative and quantitative social research on these topics.

At least in principle, collaborative research enhances a more general comparative analysis without sacrificing data quality. Collaborative research offers the potential to collect larger quantities of data, engage in more broadly comparative research, and utilize a broader array of methods competently. Unlike an individual researcher who is expected to do it all, collaborators can pool their data and draw on complementary methodological skills. Using formal models, Scott Page (2007) found that groups with a higher diversity of problem-solving approaches are more effective in overcoming difficult problems. This gives us even more confidence in strongly recommending collaboration across methods as an important foundation for the future development of the social sciences.

In practice, collaborative research is itself challenging. Collaboration is generally limited by divergent research interests and theoretical orientations. Inconsistency in conceptualization and measurement can be a problem as well (Poteete and Ostrom 2004b), especially for qualitative researchers who work hard to develop contextually suitable measures. Yet these challenges are not insurmountable. Colleagues with shared interests and theoretical perspectives can collaborate on the full research process, from conceptualization through analysis. As discussed below, however, the social sciences still reward individual research more than they do collaborative research. Scholars concerned about their careers recognize these incentives and limit their participation in collaborative efforts.

## CAREER INCENTIVES AS METHODOLOGICAL CONSTRAINTS

Ideally, training in the social sciences should encourage scholars to develop competency in a variety of methods and engage in collaborations that fur-



ther extend their methodological range. Universities should foster multi-method and collaborative research by encouraging cross-appointments, and by creating and sustaining thematic research centers and initiatives. Funding agencies should offer longer-term grants to support the longer time frame required for multimethod and collaborative research. In reality, academia rewards specialization and individual projects, especially in early career stages. Although collaborative and multimethod research can yield better knowledge, individual accomplishments do more to advance careers. The tenure clock also generates more stimulus for rapid research output than for the development of longer-term research programs. And funding agencies rarely provide long-term support.

### *Training*

Graduate program curricula and programs for intensive methodological training provide an indication of disciplinary support for multimethod and collaborative research. Training in quantitative methods has been a standard component of graduate programs in economics, political science, and sociology throughout the postwar period. Likewise, opportunities to supplement in-house courses with intensive training in more specialized quantitative methods have been available for decades. Probably the best-known source of specialized quantitative training for social scientists, the Interuniversity Consortium for Political and Social Research (ICPSR) at the University of Michigan, has offered an annual summer institute in research methods since the 1960s.

By comparison, options for training in qualitative methods were rare until recently. Before the turn of the (current) century, most social science departments offered no graduate training in qualitative methods beyond a course in research design. Opportunities for intensive training in other qualitative methods and in multimethod research have expanded over the past decade. The Consortium on Qualitative Research Methods holds an annual intensive Institute in Qualitative and Multi-Method Research.<sup>12</sup> The (U.S.) National Science Foundation has supported methodological training programs for the social sciences, including month-long summer institutes on multimethod research beginning with the Empirical Implications of Theoretical Models (EITM) program, the Summer Institute on Research Design in Cultural Anthropology, Short Courses on Research Methods in Cultural Anthropology, and Field Training in Methods of Data Collection in Cultural Anthropology.<sup>13</sup> Even with these new opportunities, social science graduate students interested in multimethod research find it difficult to gain adequate training in nonquantitative methods (Siegel et al. 2007).

### *Career Incentives and Specialization*

Susanne Lohmann (2007) argues forcefully that the procedures for reviewing manuscripts, grant applications, and applications for academic positions and promotions strongly favor specialization. All of these forms of evaluation rely on peer review. As Lohmann notes, peer review generally means review by specialists. The work of a specialist will be reviewed by other specialists in the same method, with the same area expertise, and/or with the same or similar substantive concerns. Scholars with the same specialization share a common understanding of their area, assume its value, and are familiar with practical challenges faced by their favored approach.

Scholars who engage multiple methods or disciplines, on the other hand, will most likely be evaluated by disciplinary specialists rather than other practitioners of multimethod or interdisciplinary research. The reviewers are not likely to fully understand all of the methods, the rationale for mixing methods, or the challenges involved in multimethod research. Specialists tend to discount the results of unfamiliar methods, references to works in other fields, publications in journals outside their own discipline, and interdisciplinary publications. Thus scholars who use multiple methods and draw on multiple disciplines tend to get less enthusiastic and more contradictory evaluations. Only the best scholars survive this process. As a result, Lohmann argues, a small proportion of social scientists are top-notch scholars who use diverse methods and cross subfield and disciplinary boundaries, but specialists dominate the field numerically. Despite increased interest in multimethod research, hiring committees still prefer candidates who have a strong command of a single method over candidates with more superficial competency in multiple methods (Siegel et al. 2007).

Similar dynamics associated with career incentives constrain collaborative research. Historically, as a profession, the social sciences have rewarded individual innovation and individual accomplishments more than they have collaborative research. Committees charged with hiring and promotion typically give more weight to single-authored publications than to multiauthored publications (Rothgeb and Burger 2009). Multiauthored publications are viewed with skepticism in part because it is impossible to discern the individual contribution of each author. Scholars are well aware of these issues and respond to them when making decisions about how to pursue their research agendas. Collaborative social science research has become more common, but publications rarely have more than three authors.<sup>14</sup> This contrasts sharply with the natural sciences, where publications often include the names of all of the researchers working in a laboratory.

Funding opportunities and career incentives that privilege particular methods also privilege research on topics for which those methods are possible (Lohmann 2007). One might imagine that relative scarcity of data and greater practical difficulties in collecting comparable data would merit higher levels of funding and institutional support for socially important topics. Often, however, this is not the case. Scholars who study data-scarce topics contend with practical challenges in data collection and analysis that limit their methodological options; but then, their methodological choices often limit their ability to compete for funding and gain critical appreciation for their work, as discussed above.

Funding agencies encourage fieldwork, collaboration, and multi-method social science research to some extent.<sup>15</sup> The prevalence of intensive fieldwork has waxed and waned, reflecting variable financial and institutional support for language training and extended periods of field-based research, as well as fluctuating professional appreciation for such research. In the United States, field-based research was encouraged during the period immediately following the world wars. As financial support for area studies declined, however, extended field-based research became less common. Theoretical and methodological trends favored broadly comparative analysis, which dampened interest in extended field-based research. Even when donors do support the sort of research required for the study of data-scarce topics, they rarely provide long-term support. Yet, for research on topics where data are relatively scarce and difficult to collect, long-term support may be required to fully overcome practical obstacles to broadly comparative research. Long-term support could also help overcome collective-action problems among scholars.

Career incentives *discourage* broad collaboration and multimethod research in the social sciences, especially for junior faculty, and exacerbate collective-action problems. The influence of career incentives on methodological choices appears as a leitmotif in this book.<sup>16</sup> Given the unavoidable influence of professional incentives and the other features of the academic world, this book considers how funding agencies, professional associations, universities, and academic departments and programs could better encourage innovative efforts to tackle practical challenges that influence methodological choices, and thus influence substantive emphases in social science research.

## OUR SUBSTANTIVE FOCUS

We illustrate the challenges, advantages, and disadvantages associated with particular methods with reference to research on collective action

for the regulation of natural resources. In its contemporary form, research on collective action for the management of natural resources responds to H. Scott Gordon (1954) and Garrett Hardin (1968), both of whom emphasized the difficulty of managing shared natural resources. Over the subsequent half century, scholars from across the social and natural sciences have used a wide variety of research techniques to establish the possibility of collective action for natural resource management, identify conditions associated with the emergence and durability of collective action, and assess whether and when collective action contributes to *sustainable* management of the resource base.

Although we could have drawn on examples related to diverse research agendas, focusing on a single well-defined research stream allows us to trace the interactions between theory, methods, and results, both in terms of how theory guides methodological choices and how various methods contribute to theoretical development. Collective-action problems are pervasive and important. They occur in families, the workplace, legislatures, and international relations. They affect the provision of public goods like infrastructure and social mobilization of groups with shared political agendas. Problems of collective action have contributed to the collapse of fisheries, deforestation, and climate change. Further, the co-authors of this volume have themselves undertaken extensive research, using multiple methods, on collective action for the management of natural resources. Thus we can speak from experience as well as drawing on the work of others.

In approaching natural resource management as a question of collective action, we are making a number of ontological assumptions. In our view, theoretical explanation must identify causal mechanisms. The theory of collective action assumes that individual behavior has a critical influence on collective outcomes. We are well aware of the limits of rationality, however, and favor a behavioral theory of individual action that allows for limited information, attention, and cognitive processing. We also assume that individual behavior is structured by context. For natural resources, relevant contextual conditions include the ecological structure of the resource system, the sociopolitical and economic structure, and an array of institutional arrangements. Perhaps most importantly for this volume, we assume that comparison is valuable, but that there is rarely a single or linear pattern. We expect causal heterogeneity; there is more than one route to the same outcome.

These assumptions and concerns have influenced the theoretical puzzles that we chose to highlight, the literature reviewed, and the methods examined. Our ontological assumptions are shared by many social scientists, but not all. Structuralists, interpretivists, and those who believe in lawlike social patterns may reject one or more of our assumptions. We

hope that these scholars will nonetheless benefit from thinking about the potential theoretical contributions of a variety of methods and the practical challenges that affect methodological practices.

The research tradition on collective action for natural resource management offers a good point of reference for discussing (1) the interactions between methodology and theory development, (2) multiple methods and collaborative research, (3) practical constraints on methodological choices, and (4) the influence of career incentives on methodological practice.

### *Interactions between Theory and Methods*

Scholarship on collective management of natural resources draws on a wide variety of research methods, including innovative strategies for addressing practical methodological constraints. We will show how different methods—abstract formal models, case studies, meta-analyses, cross-national comparisons, and laboratory and field experiments—have contributed at different points and in different ways to the development of this research agenda.

### *Multiple Methods and Collaborative Research*

Puzzles related to collective management of natural resources span the social and natural sciences, and interdisciplinary research is prominent. This research tradition features several innovative efforts to overcome practical challenges and enable more broadly comparative, quantitative, and multimethod research. Yet, as we will document in chapter 5, collaborative research remains relatively uncommon. We draw upon our own experiences as well as the literature to highlight both the possibilities and the challenges of collaborative and multimethod research.<sup>17</sup>

### *Practical Constraints on Methodological Choices*

Problems with scarce and difficult-to-access data are rampant in this research tradition. Collective management of many natural resources occurs on a subnational scale, and often entails the development of informal rules for resource use with little to no government involvement. Participants in the development and enforcement of these arrangements may include local, but not necessarily national, elites. Many examples of collective action for natural resource management—or its absence—involve ordinary or historically disadvantaged people. Because informal institutions can be difficult for outsiders to recognize, data on these efforts are scarce and not readily accessible. Qualitative field-based research

is necessary to simply identify relevant cases for analysis. The practical challenges of such research are typical of work on topics for which data are scarce and difficult to acquire.

### *Career Incentives and Methodological Practice*

Analysis of collective management of natural resources requires a firm understanding of the natural system, institutional arrangements, and human behavior. Arguably, research on this topic is inherently interdisciplinary and requires multiple methods. A patchwork of projects and research centers provides institutional and financial support that, to some extent, lowers the risks of interdisciplinary and multimethod research, but these do not fully compensate for systemwide career incentives. In general, career incentives encourage either specialization or relatively narrow forms of multimethod research. We draw upon our own experiences working with interdisciplinary and multimethod research centers that enjoyed strong institutional support, as well as in “ordinary” discipline-based settings.

### OUTLINE OF THE BOOK

We welcome the recent turn away from recurring debates over the superiority of particular methods in the social sciences. We connect methodological debates to differences over theory and ontology, emphasize variation in the capacity to engage in ascendant methods, and draw out the implications for competition for career-related resources for several periods of intense methodological conflict across the social sciences. We agree that the use of multiple methods can improve research in many situations, but also stress that it is not always appropriate or feasible. That practical considerations constrain methodological choices is a central point. Even when scholars are aware of and open to diverse methods, methodological choices are constrained by specialized training, data scarcity, and problems of data accessibility. Career incentives within academia, unfortunately, by encouraging specialization and doing little to facilitate collaboration, make it more difficult for scholars to overcome practical obstacles.

In this introductory chapter, we have laid out our methodological and practical concerns, and have indicated that we will illustrate our points with reference to research on collective action and the commons. Parts II and III examine several strategies utilized in research on collective action related to natural resources. For each research strategy,

1. we provide a broad overview of the method;
2. we review the contributions of the method to the study of collective action on the commons; and
3. we discuss the method's strengths and weaknesses, when a method is particularly valuable; and refer to complementary methods.

We also discuss (in chapter 8) some relatively new research approaches that combine formal theoretical methods with data derived from case studies, participatory research, and experimental research so as to directly assess the capability of the formal model to generate similar patterns of outcomes.

Thus we will address some of the basic concerns related to the use of a particular method, including the following: the assumptions used; the analytical strategy; whether the method has internal or external validity and can be replicated; the potential contributions of this method to theory development; and some practical considerations (see table 1.1 for an overview of these concerns). We provide references to texts on particular methods and methodological issues, and we discuss pragmatic considerations that influence methodological practices, but we do not outline how to apply any specific method. In other words, this book is not a “methods textbook.” Instead, we focus on what has been learned in a broad research program through the use of a diversity of methods. The underlying issues are discussed in general terms; examples are drawn primarily from work on collective action for natural resource management.

Part II looks more closely at methods used in empirical research related to natural resources, including case studies, meta-analyses of case studies, and large-N and collaborative field-based empirical research. In chapter 2, we first provide a brief overview of the conventional theory of the commons and then evaluate the contributions of case studies to theories of collective action and discuss their limitations. Chapter 3 reveals that, despite important broadly comparative and synthetic publications on collective action for natural resource management, case studies and small-N studies dominated articles published on this topic between 1990 and 2004. Most large-N studies published during this period analyzed survey data drawn from a single country or even a single subnational region. Consequently, these large-N studies offer scant improvement in external validity and are not well suited for research related to the prospects for collective action. As discussed in chapter 4, meta-analysis allows for more broadly comparative analysis by making structured comparisons based on a large number of existing studies. Meta-analysis is constrained by the body of existing empirical research, however, and cannot substitute for broadly comparative field-based research. Chapter 5 considers

TABLE 1.1  
Methodological concerns and strategies

Methodological concerns	Research strategies
Assumptions	Single or multiple causal paths to outcome Deterministic or probabilistic relationships Universal or contingent relationships Comparability of cases (unit homogeneity) Independent or interdependent observations Random assignment or representative sample
Analytical strategy (evidence of causality)	Controlled design or statistical control Process tracing Correlations and analysis of variation
Form of validity and replicability	Internal or external validity Ease of replicability of findings
Potential contributions to theory development	Concept development Deductive or inductive theory development
Practical considerations	Data issues: access; availability of large data sets; gaps in source material (missing data); data quality—consistency, accuracy Costs: travel—costs, ease/difficulty of movement, field expenses; lab—availability, cost to run; payoffs; high-end computer Recognition and/or interpretation of data (e.g., potential unit of collective action) Skills: language skills; local (case-specific) knowledge; analytical skills (including QCA or Computer-Assisted Qualitative Data Analysis [CAQDAS]); programming skills; statistical skills Attributes of researchers: size of research team, composition, multiple disciplines

collaboration as a strategy for broadly comparative field-based research. There was relatively limited evidence of collaborative research in articles published from 1990 to 2004, and collaborative research was not more broadly comparative than single-authored research was. We examine several examples of collaboration, highlighting strategies developed to overcome practical constraints, and theoretical contributions to the study of collective action for natural resource management.

Part III discusses experimental research, field laboratories, and formal modeling approaches. Game theory has been the formal approach for



the study of collective action in the past, and will remain an important method for the years to come. Chapter 6 focuses on experiments to study how small groups make decisions in collective-action settings. Early experiments showed that predictions from game theory were not confirmed in many social dilemma experiments. Later experiments have stimulated the development of an updated theory of collective action. Chapters 7 and 8 discuss the emerging use of agent-based modeling (ABM) as an alternative formal modeling approach for collective action (Miller and Page 2007; Tesfatsion and Judd 2006). The basic premise of agent-based modeling is that the macrolevel consequences of many microlevel interactions can be investigated. It puts more emphasis on heterogeneity among the actors, cognitive constraints, and the topology of interaction. The first generation of agent-based models focused on big questions in a theoretical perspective, such as “How does segregation emerge?” and “When do egoists cooperate?” (Axelrod 1984; Schelling 1978). Although most models of the first generation have been inspired by observation of real biological and social systems, the majority of these models are not rigorously tested on empirical data. In fact, the founding agent-based modeling efforts do not go beyond a “proof of concept.” However, this is changing since an increasing number of scholars are starting to confront their models with empirical observation in more rigorous ways. We discuss these developments, especially how they are combined with human subject experiments and participatory processes.

Part IV offers a synthesis. Chapter 9 distills lessons about collective action related to natural resources. We provide a theoretical framework of collective action and the commons based on the findings over recent decades of empirical and theoretical research. In chapter 10, we elaborate on the practical implications for social science research using multiple methods.

This book confirms that each method can make valuable contributions if applied appropriately, but also underlines the limits of relying on any single method. Many advantages exist to multimethod research, particularly as research moves through successive stages. Yet practical challenges are significant. Thus the final chapter returns to the structural features of academia that influence methodological choices. We identify areas where incentives could be changed to foster more multimethod and collaborative research, as well as the sort of interdisciplinary research that is so valuable for studying the management of natural resources and many other policy-relevant topics. Ultimately, then, we hope this book will draw attention to practical constraints on research methods, identify strategies for overcoming these constraints, and stimulate discussions about how to encourage their adoption.