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Elinor Ostrom: Understanding Institutional Diversity

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Understanding the Diversity of Structured Human Interactions

TO UNDERSTAND institutions one needs to know what they are, how and why they are crafted and sustained, and what consequences they generate in diverse settings. Understanding anything is a process of learning what it does, how and why it works, how to create or modify it, and eventually how to convey that knowledge to others. Broadly defined, institutions are the prescriptions that humans use to organize all forms of repetitive and structured interactions including those within families, neighborhoods, markets, firms, sports leagues, churches, private associations, and governments at all scales. Individuals interacting within rule-structured situations face choices regarding the actions and strategies they take, leading to consequences for themselves and for others.

The opportunities and constraints individuals face in any particular situation, the information they obtain, the benefits they obtain or are excluded from, and how they reason about the situation are all affected by the rules or absence of rules that structure the situation. Further, the rules affecting one situation are themselves crafted by individuals interacting in deeper-level situations. For example, the rules we use when driving to work every day were themselves crafted by officials acting within the collective-choice rules used to structure their deliberations and decisions. If the individuals who are crafting and modifying rules do not understand how particular combinations of rules affect actions and outcomes in a particular ecological and cultural environment, rule changes may produce unexpected and, at times, disastrous outcomes.

Thus, understanding institutions is a serious endeavor. It is an endeavor that colleagues and I at the Workshop in Political Theory and Policy Analysis have been struggling with for at least three decades.¹ After designing multiple research projects; writing numerous articles; developing ideas in the classroom; learning from eminent scholars in the field, from students, and from colleagues; and making diverse attacks on this problem, it is time to try to put thoughts on this subject together within the covers of a book, even though I am still not fully satisfied with my own understanding. Consider this a progress report on a long-term project that will be continued, I hope, by many others into the future.

Diversity: A Core Problem in Understanding Institutions

A major problem in understanding institutions relates to the diversity of situations of contemporary life. As we go about our everyday life, we interact in a wide diversity of complex situations. Many of us face a morning and evening commute where we expect that others, who are traveling at great speeds, will observe the rules of the road. Our very lives depend on these expectations. Others depend on our own driving behavior conforming in general to locally enforced rules about speeding, changing lanes, and turn-taking behavior at intersections. Those of us who work in large organizations—universities, research centers, business firms, government offices—participate in a variety of team efforts. In order to do our own work well, we are dependent on others to do their work creatively, energetically, and predictably, and vice versa. Many of us play sports at noontime, in the early evening, or on the weekends. Here again, we need to learn the basic rules of each of the games we play as well as find colleagues with whom we can repeatedly engage in this activity. During the average week, we will undertake activities in various types of market settings—ranging from buying our everyday food and necessities to investing funds in various types of financial instruments. And we will spend some hours each week with family and friends in a variety of activities that may involve worship, helping children with homework, taking care of our homes and gardens, and a long list of other activities undertaken with family and friends.

Somehow as individuals we implicitly make sense of most of these diverse and complex situations. We do so even today, with all of the new opportunities and risks that were not even conceivable a few generations ago. We now expect to watch the Olympic games and other international competitions as they happen, no matter where they are located or where we are in the world. We have become accustomed to buying bananas, oranges, and kiwi fruit at any time of the year in almost any market we enter around the globe. Not only do millions of us drive to work regularly, many of us also fly to other parts of the globe on a regular basis, trusting our lives to the knowledge and skills of pilots to know and utilize the many do's and don'ts of flying airplanes.

If we are considered to be adults and sane, we are expected to be able to reason about, learn, and eventually know what to do in many diverse situations that we confront in today's world. We know that when we are shopping in a supermarket that we can take a huge variety of goods off the shelf and put them in a pushcart. Before we put these same goods in our car, however, we need to line up at a counter and arrange to pay for them using cash or a credit card (something else that was not so widely available a few years ago). When we are shopping in an open bazaar in

Asia or Africa, however, the do's and don'ts differ. If we go at the end of the market day, we may bargain over the price of the fruit that is left on the stand—something we could never do in a supermarket where fruit will be refrigerated overnight. If we are in the household goods section of the bazaar, vendors would be astounded if we did not make several counteroffers before we purchased an item. Try that in a furniture store in a commercial district of a Western country, and you would find yourself politely (or not so politely) told to leave the establishment. Thus, there are many subtle (and not so subtle) changes from one situation to another even though many variables are the same.

These institutional and cultural factors affect our expectations of the behavior of others and their expectations of our behavior (Allen 2005). For example, once we learn the technical skills associated with driving a car, driving in Los Angeles—where everyone drives fast but generally follows traffic rules—is quite a different experience from driving in Rome, Rio, and even in Washington, D.C., where drivers appear to be playing a bluffing game with one another at intersections rather than following traffic rules. When playing racquetball with a colleague, it is usually okay to be aggressive and to win by using all of one's skills, but when teaching a young family member how to play a ball game, the challenge is how to let them have fun when they are first starting to learn a new skill. Being too aggressive in this setting—or in many other seemingly competitive situations—may be counterproductive. A “well-adjusted and productive” adult adjusts expectations and ways of interacting with others in situations that occur in diverse times and spaces.

Our implicit knowledge of the expected do's and don'ts in this variety of situations is extensive. Frequently, we are not even conscious of all of the rules, norms, and strategies we follow. Nor have the social sciences developed adequate theoretical tools to help us translate our implicit knowledge into a consistent explicit theory of complex human behavior. When taking most university courses in anthropology, economics, geography, organization theory, political science, psychology, or sociology, we learn separate languages that do not help us identify the common work parts of all this buzzing confusion that surrounds our lives. Students frequently complain—and justifiably so—that they have a sense of being in a Tower of Babel. Scholars also see the same problem (V. Ostrom 1997, 156).

Is There an Underlying Set of Universal Building Blocks?

The core questions asked in this book are: Can we dig below the immense diversity of regularized social interactions in markets, hierarchies, families, sports, legislatures, elections, and other situations to identify universal building blocks used in crafting all such structured situations? If

so, what are the underlying component parts that can be used to build useful theories of human behavior in the diverse range of situations in which humans interact? Can we use the same components to build an explanation for behavior in a commodity market as we would use to explain behavior in a university, a religious order, a transportation system, or an urban public economy? Can we identify the multiple levels of analysis needed to explain the regularities in human behavior that we observe? Is there any way that the analyses of local problem solving, such as the efforts of Maine lobster fishers for the last eighty years to regulate their fisheries (see Acheson 1988, 2003; Wilson 1990), can be analyzed using a similar set of tools as problem solving at a national level (Gellar 2005; McGinnis forthcoming; Sawyer 2005) or at an international level (Gibson, Anderson, et al. 2005; O. Young 1997, 2002)?

My answer to these questions is yes. This answer is, of course, a conjecture and can be challenged. Asserting that there is an underlying unity is easy. Convincing others of this is more difficult. I welcome exchanges with others concerning the fundamental building blocks of organized human interactions.

Many Components in Many Layers

The diversity of regularized social behavior that we observe at multiple scales is constructed, I will argue, from universal components organized in many layers. In other words, whenever interdependent individuals are thought to be acting in an organized fashion, several layers of universal components create the structure that affects their behavior and the outcomes they achieve. I give a positive answer to these questions based on years of work with colleagues developing and applying the Institutional Analysis and Development (IAD) framework.²

Helping others to see the usefulness of developing a multilevel taxonomy of the underlying components of the situations human actors face is the challenge that I undertake in this volume. Scholars familiar with the working parts used by mathematical game theorists to describe a game will not be surprised by the positive answer. To analyze a game, the theorist must answer a series of questions regarding universal components of a game, including the number of players, what moves they can take, what outcomes are available, the order of decisions, and how they value moves and outcomes.

On the other hand, game theorists will be surprised at the extremely large number of components identified in this book that create the context within which a game is played. Further, if one drops the use of a universal, simplified model of the individual, the number of options that a theorist

must self-consciously make is even larger than experienced in the past. While the usefulness of a universal *model* of rational behavior is challenged in chapter 4, the assumption of a universal *framework* composed of nested sets of components within components for explaining human behavior is retained throughout the book.

Building a Framework

Game-theoretical analysis is drawn on and expanded in this book in several ways. First, I do not confine analysis to those situations that are simple enough to be analyzed as formal games. The core concept of an action situation (discussed in chapters 2 and 3) can be formalized as a mathematical game to represent many simple and important situations. Many other significant situations—particularly where rules are the object of choice—are too complex to be modeled as a simple game. (Agent-based models and simulations of diverse types will provide the modeling tools we need to capture patterns of interaction and outcomes in many of these more complex settings [Janssen 2003].)

Second, I dig further to develop a consistent method for overtly analyzing the deeper structures that constitute any particular action situation. For some game theorists, this deeper structure is irrelevant once the structure of a game itself is made explicit. Third, the narrow model of human behavior used in game theory is viewed as one end of a continuum of models of human behavior appropriate for institutional analysis. The three basic assumptions of that model are used as a foundation for specifying the type of assumptions that a theorist needs to make when animating an institutional analysis.

The challenge for institutional theorists—as I discuss in chapter 4—is to know enough about the structure of a situation to select the appropriate assumptions about human behavior that fit the type of situation under analysis. Thus, the approach presented here encompasses contemporary game theory as one of the theories that is consistent with the IAD framework. Also included, as discussed in chapter 4, are broader theories that assume individuals are fallible learners trying to do the best they can in the long term by using norms and heuristics in making their immediate decisions.

As a scholar committed to understanding underlying universal components of all social systems, I do not introduce complexity lightly. I view scientific explanation as requiring just enough variables to enable one to explain, understand, and predict outcomes in relevant settings. Thus, for many questions of interest to social scientists, one does not need to dig down through nested layers of rules that are examined in the last half of this book. One can develop a good analysis of the situation (chapters 2

and 3), decide what assumptions to make about participants (chapter 4), and predict outcomes. If the predictions are supported empirically, that may be all that is needed.³

If the predictions are not supported, however, as is the case with much contemporary work on social dilemmas and settings involving trust and reciprocity, one has to dig under the surface to begin to understand why. And if one wants to improve the outcomes achieved over time, one is faced with the need to understand the deeper structure in the grammar of institutions discussed in chapter 5 and the types of rules used to create structure as discussed in chapters 7 and 8. This volume can be viewed as presenting a series of nested conceptual maps of the explanatory space that social scientists can use in trying to understand and explain the diversity of human patterns of behavior. Learning to use a set of conceptual maps and determining the right amount of detail to use is, however, itself a skill that takes some time to acquire just as it does with geographic maps (see Levi 1997b).

Frameworks and Conceptual Maps

For example, if I want to know the quickest route from Providence Bay to Gore Bay on the Manitoulin Island, where Vincent Ostrom and I spend summers writing at our cabin on the shores of Lake Huron, I need a very detailed map of the interior of the island itself. If I want to explain where the Manitoulin Island is to a colleague—who wants to know where we spend our summers—I need a less detailed and larger map that shows its location on the northern shores of Lake Huron, one of the Great Lakes of the North American continent. If I try to use a map of the entire Western Hemisphere, however, the Great Lakes are all so small that locating the Manitoulin Island itself may be a challenge. I may only be able to point to the Province of Ontario in Canada, where it is located, or to the entire set of the Great Lakes. The advantage of a good set of geographic maps is that after centuries of hard work, multiple levels of detailed maps of most places are available and are nested in a consistent manner within one another. Most of us recognize that there is not one optimal map that can be used for all purposes. Each level of detail is useful for different purposes.

The “map” that I will elucidate in this volume is a conceptual framework called, as mentioned above, the Institutional Analysis and Development (IAD) framework. The publication of “The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches” (Kiser and Ostrom 1982) represented the initial published attempt to describe the IAD framework. Our goal was to help integrate work undertaken by political scientists, economists, anthropologists, lawyers, sociologists, psycholo-

gists, and others interested in how institutions affect the incentives confronting individuals and their resultant behavior.⁴ During the time since this publication, the framework has been developed further⁵ and applied to analyze a diversity of empirical settings. These include:

- the study of land boards in Botswana (Wynne 1989);
- the impact of institutions on creating effective monitoring and evaluations in government development projects (Gordillo and Andersson 2004);
- the incentives of operators and state government regarding coal roads in Kentucky (Oakerson 1981);
- the evolution of coffee cooperatives in Cameroon (Walker 1998);
- the causes and effects of property-right changes among the Maasai of Kenya (Mwangi 2003);
- the performance of housing condominiums in Korea (J. Choe 1992);
- the regulation of the phone industry in the United States (Schaaf 1989);
- the effect of rules on the outcomes of common-pool resource settings throughout the world (Oakerson 1992; Blomquist 1992; E. Ostrom 1990, 1992b; Agrawal 1999; Schlager 1994, 2004; Tang 1992; E. Ostrom, Gardner, and Walker 1994; Lam 1998; de Castro 2000; Dolšak 2000; Futemma 2000; Yandle 2001; Gibson, McKean, and Ostrom 2000);
- a comparison of nonprofit, for profit, and government day-care centers (Bus-house 1999);
- the impact of decentralization on forest governance in Bolivia (Andersson 2002, 2004);
- the evolution of banking reform in the United States (Polski 2003); and
- the effect of incentives on donor and recipient behavior related to international aid (Gibson, Anderson et al. 2005).

Our confidence in the usefulness of the IAD framework has grown steadily in light of the wide diversity of empirical settings where it has helped colleagues identify the key variables to undertake a systematic analysis of the structure of the situations that individuals faced and how rules, the nature of the events involved, and community affected these situations over time. What is certainly true is that the number of specific variables involved in each of these empirical studies is very large. The specific values of variables involved in any one study (or one location in a study) differ from the specific values of variables involved in another study.

The problem of many variables, and potentially few instances of any one combination of these variables, has been recognized by other scholars as one of the perplexing problems haunting systematic empirical testing of social science theories. James Coleman (1964, 516–19) referred to the development and testing of “sometimes true theories,” by which he meant that explanations were likely to hold under specific conditions and not

under others. If a small number of conditions were identified, sometimes true theories would not present a major problem for the social sciences.

Rigorous analysis of many important questions, however, does eventually require examining a large number of variables. Viewing macropolitical orders in developed Western societies, for example, Fritz Scharpf (1997, 22) points out that the national institutional settings “known to affect policy processes can be described as being either unitary or federal, parliamentary or presidential, have two- or multi-party systems in which interactions are competitive or consociational, and with pluralist or neo-corporatist systems of interest intermediation.” Each one of the five variables can exist in one or the other “setting” independently of the other four variables. And, to make it worse, there may be variables related to the particular policy area—such as banking, environmental policy, or education—that may also change. “For comparative policy research, this means that the potential number of different constellations of situational and institutional factors will be extremely large—so large, in fact, that it is rather unlikely that exactly the same factor combination will appear in many empirical cases” (23). A similar level of complexity exists when analyzing factors affecting the performance of city-county consolidation efforts (Carr and Feiock 2004).

Hammond and Butler (2003) have illustrated this problem clearly in their critique of the work of some institutional theorists who have made overly strong claims for the overarching differences between parliamentary and presidential systems. Presidential systems—according to Burns (1963), Sundquist (1968), and Valenzuela (1993)—are thought to slow, if not halt, policy change and lead to obstruction, frustration, and deadlock interspersed with occasional bursts of change when a president faces both houses of Congress dominated by his own party. Hammond and Butler carefully analyze the interaction between rules and the preference profiles that may exist in five variations of institutional rules. They conclude “that considering institutional rules alone provides an inadequate guide to the behavior of any system” (Hammond and Butler 2003, 183).

As Marwell and Oliver (1993, 25) put it, the “predictions that we can validly generate must be complex, interactive and conditional.” And, we can hope that some changes in a component are neutral—or have no impact on outcomes—in at least some settings (as biologists are now learning about in regard to genotypes; see Gavrilets 2003). While verifying the empirical warrantability of precise predictions has been the guiding standard for much of the work in political economy, we may have to be satisfied with an understanding of the complexity of structures and a capacity to expect a broad pattern of outcomes from a structure rather than a precise point prediction. An outcome consistent with a pattern

may be the best verification we can achieve in settings of substantial complexity (Crutchfield and Schuster 2003).

Thus, the many relevant variables, the immense number of combinations of these variables that exist, and their organization into multiple levels of analysis make understanding organized social life a complex endeavor. If every social science discipline or subdiscipline uses a different language for key terms and focuses on different levels of explanation as the “proper” way to understand behavior and outcomes, one can understand why discourse may resemble a Tower of Babel rather than a cumulative body of knowledge. This book is devoted to the task of building on the efforts of many scholars to develop a conceptual approach that hopefully has a higher chance of cumulation than many of the separate paths currently in vogue in contemporary social sciences.

Holons: Nested Part-Whole Units of Analysis

Like good geographic maps, the IAD framework can be presented at scales ranging from exceedingly fine-grained to extremely broad-grained. Human decision making is the result of many layers of internal processing starting with the biophysical structure, but with layers upon layers of cognitive structure on top of the biophysical components (Hofstadter 1979). Further, many of the values pursued by individuals are intrinsic values that may not be represented by external material objects, and their presence and strength are important parts of the individual to be examined. Building on top of the single individual are structures composed of multiple individuals—families, firms, industries, nations, and many other units—themselves composed of many parts and, in turn, parts of still larger structures. What is a *whole* system at one level is a part of a system at another level.

Arthur Koestler (1973) refers to such nested subassemblies of part-whole units in complex adaptive systems as *holons*. “The term holon may be applied to any stable sub-whole in an organismic or social hierarchy, which displays rule-governed behaviour and/or structural Gestalt constancy” (291). Christopher Alexander (1964) earlier conceptualized all components of social arrangements as having a pattern and being a unit. Units have subunits and are themselves parts of larger units that fit together as a pattern. Koestler asserts that a “hierarchically organized whole cannot be ‘reduced’ to its elementary parts; but it can be ‘dissected’ into its constituent branches on which the holons represent the nodes of the tree, and the lines connecting them the channels of communication, control or transportation, as the case may be” (1973, 291). Thus, much of the analysis presented in this book will be a form of “dissecting” complex

systems into composite holons that are then dissected further. Explanations occur at multiple levels and different spatial and temporal scales.

Because explanations occur at multiple levels and different spatial and temporal scales, the relevant theoretical concepts needed to understand phenomena at one level do not necessarily scale up or down. One of the core puzzles facing the field of landscape ecology, for example, is the problem of identifying the scale at which a process or phenomenon occurs. According to Pickett and Cadenasso (1995, 333), “The basic question about scale in ecology consists of determining whether a given phenomenon appears or applies across a broad range of scales, or whether it is limited to a narrow range of scales” (see also S. Levin 1992).

The parts used to construct a holon are frequently not descriptive of the holon they have created. A house is constructed out of floor joists, roof beams, lumber, roofing material, nails, and so forth. When one wants to talk about the house itself, one usually talks about the number of rooms, the style of the house, the number of stories, rather than the number of nails used in construction—even though a contractor and a hardware salesperson may try to estimate exactly this variable at some point during construction. When one wants to talk about the street on which the house is located, one uses terms such as the size of the lots, the width of the road, the complementarity or lack of complementarity of the building style, and the like. Descriptions of a neighborhood will use still different concepts, as will a description of an urban or rural political jurisdiction in which a neighborhood is located. On the other hand, some concepts can be used to dissect holons operating at different scales of analysis.

Consequently, the institutional analyst faces a major challenge in identifying the appropriate level of analysis relevant to addressing a particular puzzle and learning an appropriate language for understanding at least that focal level and one or two levels above and below that focal level. It is not only social scientists who face this problem. At a meeting of the global change scientists held in Bonn in March of 2001, Peter Lemke of the World Climate Research Project indicated that the earlier emphasis in climate research was all on global weather forecasts. This has proved to be a myth and a delusion. Now they recognize that to do good weather forecasting, one has to have detailed local models supplemented by global weather models. Both local and global are needed. They are complementary rather than competitive. Physical scientists are trying now in their global models to integrate some of the more localized conditions, but that turns out to be very difficult.

Ecologists have struggled with understanding ecological systems composed of communities, modular units within communities, subunits within these, and attributes of the species in a community (such as diver-

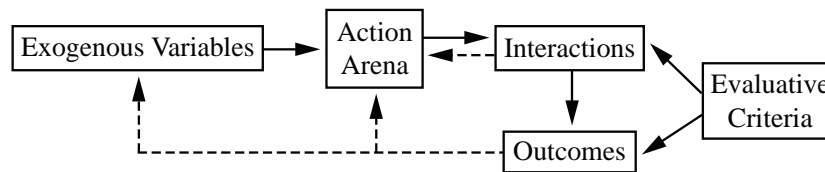


Figure 1.1 The focal level of analysis—an action arena.

sity) or of individual species (such as trophic level) (see Tilman 1999; Tilman, Lehman, and Bristow 1998). Extensive field research, analytical modeling, and simulations now enable ecologists to make relatively strong predictions about some of these interactions. “Increasing species diversity is likely associated with more complex community structure, as species with unique ecological roles are added. The introduction of new ecological roles may be stabilizing or destabilizing, depending on how species function within the community. For example, the addition of a third trophic level to an otherwise stable community with only prey and predators could potentially destabilize the system” (Ives, Klug, and Goss 2000, 409). Social scientists are slowly gaining greater capabilities for understanding multilevel complex systems, but until we develop the appropriate theoretical language for analyzing these systems, we will continue to condemn all complex communities of interacting human organizations as chaotic, as was the dominant view of urban scholars during the last half-century (see, for example, Hawley and Zimmer 1970).

Action Arenas as Focal Units of Analysis

The focal level for this book is the holon called an action arena in which two holons—participants and an action situation—interact as they are affected by exogenous variables (at least at the time of analysis at this level) and produce outcomes that in turn affect the participants and the action situation. Action arenas exist in the home; in the neighborhood; in local, regional, national, and international councils; in firms and markets; and in the interactions among all of these arenas with others. The simplest and most aggregated way of representing any of these arenas when they are the focal level of analysis is shown in figure 1.1, where exogenous variables affect the structure of an action arena, generating interactions that produce outcomes. Evaluative criteria are used to judge the performance of the system by examining the patterns of interactions and outcomes.

Outcomes feed back onto the participants and the situation and may transform both over time. Over time, outcomes may also slowly affect

some of the exogenous variables. In undertaking an analysis, however, one treats the exogenous variables as fixed—at least for the purpose of the analysis. When the interactions yielding outcomes are productive for those involved, the participants may increase their commitment to maintaining the structure of the situation as it is, so as to continue to receive positive outcomes. When participants view interactions as unfair or otherwise inappropriate, they may change their strategies even when they are receiving positive outcomes from the situation (Fehr and Gächter 2000b). When outcomes are perceived by those involved (or others) as less valued than other outcomes that might be obtained, some will raise questions about trying to change the structure of the situations by moving to a different level and changing the exogenous variables themselves. Or, if the procedures were viewed as unfair, motivation to change the structure may exist (Frey, Benz, and Stutzer 2004).

Similar efforts to identify a core unit of analysis, such as the action arena, that is contained in many diverse environments have a long history. Core units of analyses identified by other scholars include:

- collective structures (Allport 1962);
- events (Appleyard 1987; Heise 1979);
- frames (Goffman 1974);
- social action and interaction settings (Burns and Flam 1987);
- logic of the situation (Farr 1985; Popper 1961, 1976);
- problematic social situations (Raub and Voss 1986);
- scripts (Schank and Abelson 1977);
- transactions (Commons [1924] 1968); and
- units of meaning (Barwise and Perry 1983; Raiffa 1982).

Because the IAD framework is a multitier conceptual map, the simplest schematic representation of an action arena shown in figure 1.1 will be unpacked—and then further unpacked and unpacked throughout the initial chapters of this book. Action arenas include two holons: an *action situation* and the *participant* in that situation (see figure 1.2). An action situation can, in turn, be characterized using seven clusters of variables: (1) participants (who may be either single individuals or corporate actors), (2) positions, (3) potential outcomes, (4) action-outcome linkages, (5) the control that participants exercise, (6) types of information generated, and (7) the costs and benefits assigned to actions and outcomes (see figure 2.1 in the next chapter). Thus, an action situation refers to the social space where participants with diverse preferences interact, exchange goods and services, solve problems, dominate one another, or fight (among the many things that individuals do in action arenas). In chapter 2, we will zoom in and unpack the action situation as a focal unit of analysis. We will illustrate the working parts of an action situation in

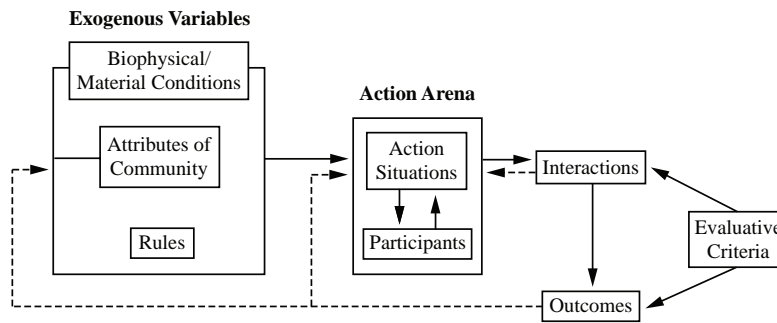


Figure 1.2 A framework for institutional analysis. *Source:* Adapted from E. Ostrom, Gardner, and Walker 1994, 37.

chapter 3, showing how this holon can be operationalized in an experimental laboratory. In chapter 4, we will zoom in to unpack the concept of a participant and discuss the puzzles and possibilities available to animate the actor. But first, let's use zoom out to examine the variables that are treated as exogenous when examining an action arena (but may themselves be an outcome of another action arena). Let's look at a broader overview of the IAD conceptual map.

Zooming Out to an Overview of the IAD Framework

An institutional analyst can take two additional steps after an effort is made to understand the initial structure of an action arena leading to a particular pattern of interactions and outcomes. One step moves outward and inquires into the exogenous factors that affect the structure of an action arena. From this vantage point, any particular action arena is now viewed as a set of dependent variables. The factors affecting the structure of an action arena include three clusters of variables: (1) the *rules* used by participants to order their relationships, (2) the attributes of the *biophysical world* that are acted upon in these arenas, and (3) the structure of the more general *community* within which any particular arena is placed (see Kiser and Ostrom 1982). The next section of this chapter provides a brief introduction to this first step (see the left side of figure 1.2). How rules influence the action arena will then be discussed in much more depth in chapters 5, 6, and 7.

The second step also moves outward—but to the “other side” of a particular action arena—to look at how action arenas are linked together either sequentially or simultaneously. This step will be discussed in the last section of chapter 2 after discussion of the components of action situations.

Viewing Action Arenas as Dependent Variables

Underlying the way analysts conceptualize action situations and the participants that interact in them are implicit assumptions about the *rules* participants use to order their relationships, about attributes of the *biophysical world*, and about the *nature of the community* within which the arena occurs. Some analysts are not interested in the role of these underlying variables and focus only on a particular arena whose structure is given. On the other hand, institutional analysts may be more interested in one factor affecting the structure of arenas than they are interested in others. Anthropologists and sociologists tend to be more interested in how shared or divisive value systems in a community affect the ways humans organize their relationships with one another. Environmentalists tend to focus on various ways that physical and biological systems interact and create opportunities or constraints on the situations human beings face. Political scientists tend to focus on how specific combinations of rules affect incentives. Rules, the biophysical and material world, and the nature of the community all jointly affect the types of actions that individuals can take, the benefits and costs of these actions and potential outcomes, and the likely outcomes achieved.

The Concept of Rules

The concept of rules is central to the analysis of institutions (Hodgson 2004a). The term *rules*, however, is used by scholars to refer to many concepts with quite diverse meanings. In an important philosophical treatment of rules, Max Black (1962) identified four different usages of the term in everyday conversations. According to Black, the word *rule* is used to denote regulations, instructions, precepts, and principles. When used in its *regulation* sense, rules refer to something “laid down by an authority (a legislature, judge, magistrate, board of directors, university president, parent) as required of certain persons (or, alternatively, forbidden or permitted)” (115). The example of a rule in the regulation sense that Black uses is: “The dealer at bridge must bid first.” When using rule in its regulation sense, one can meaningfully refer to activities such as the rule “being announced, put into effect, enforced (energetically, strictly, laxly, invariably, occasionally), disobeyed, broken, rescinded, changed, revoked, reinstated” (109).

When the term *rule* is used to denote an *instruction*, it is closer in meaning to an effective strategy for how to solve a problem. An example of this usage is, “In solving quartic equations, first eliminate the cubic term” (110). When speaking about a rule in this sense, one would not talk about

a rule being enforced, rescinded, reinstated, or any of the other activities relevant to regulation. When rule denotes a *precept*, the term is being used as a maxim for prudential or moral behavior. An example would be: “A good rule is: to put charity ahead of justice” (111). Again, one would not speak of enforcing, rescinding, or reinstating a rule in the precept sense.

The fourth sense in which the term *rule* is used in everyday language is to describe a law or principle. An example of this usage is: “Cyclones rotate clockwise, anticyclones anticlockwise” (113). Principles or physical laws are subject to empirical test, and as such truth values can be ascribed to them. But physical laws are not put into effect, broken, or rescinded.

Social scientists employ all four of the uses of the term *rule* that Black identifies—and others as well (see discussion in chapter 5). Scholars engaged in institutional analysis frequently use the term to denote a regulation. The definition of rules used in this book is close to what Black identified as the regulation sense. Rules can be thought of as the set of instructions for creating an action situation in a particular environment. In some ways, rules have an analogous role to that of genes. Genes combine to build a phenotype. Rules combine to build the structure of an action situation. The property rights that participants hold in diverse settings are a result of the underlying set of rules-in-use (Libecap 1989).

Rules, in the instruction sense, can be thought of as the strategies adopted by participants within ongoing situations. I will consistently use the term *strategy* rather than *rule* for individual plans of action. Rules in the precept sense are part of the generally accepted moral fabric of a community (Allen 2005). We refer to these cultural prescriptions as norms. Rules in the principle sense are physical laws.

Until recently, rules have not been a central focus of most of the social sciences. Even in game theory where “the rules of the game” seem to play an important role, there has not been much interest in examining where rules come from or how they change. Game-theoretical rules include all physical laws that constrain a situation as well as rules devised by humans to structure a situation. The rules of the game—including both physical and institutional factors—structure the game itself, but have been irrelevant to many game theorists once a game can be unambiguously represented. An influential contributor to the development of game theory, Anatol Rapoport (1966, 18) stated this distinction very clearly: “Rules are important only to the extent that they allow the outcomes resulting from the choices of participants to be unambiguously specified. . . . Any other game with possibly quite different rules but leading to the same relations among the choices and the outcomes is considered equivalent to the game in question. In short, game theory is concerned with rules only to the extent that the rules help define the choice situation and the outcomes

associated with the choices. Otherwise the rules of games play no part in game theory.” So long as the game theorist has adequately represented this focal level of analysis, the theorist interested primarily in finding the solution to a game has no need to dig into the rules, attributes of a community, and physical laws that create the structure of the situation. As institutional analysts asked to diagnose why perverse outcomes occur and to propose ways to improve the outcomes of many action situations, on the other hand, we have to dig below and learn how rules create the set being analyzed. One cannot improve outcomes without knowing how the structure is itself produced (Eggertsson 2005).

As will be discussed in more depth in chapter 5, rules as used in this book are defined to be shared understandings by participants about *enforced* prescriptions concerning what actions (or outcomes) are *required*, *prohibited*, or *permitted* (Ganz 1971; V. Ostrom 1980; Commons 1968). All rules are the result of implicit or explicit efforts to achieve order and predictability among humans by creating classes of persons (positions) who are then required, permitted, or forbidden to take classes of actions in relation to required, permitted, or forbidden outcomes or face the likelihood of being monitored and sanctioned in a predictable fashion (V. Ostrom 1991).

Well-understood and enforced rules operate so as to *rule out* some actions and to *rule in* others. In a well-ordered human enterprise, some behaviors are rarely observed because individuals following rules do not normally engage in that activity in the given setting. It is rare to observe, for example, that one driver on a public freeway within the United States will race another driver on that freeway at a speed exceeding one hundred miles per hour. State highway patrols invest substantial sums in an attempt to enforce highway speeding laws and to rule out excessive speeds on freeways.

At a racing track, however, one can observe speeds of well over one hundred miles per hour and drivers directly racing one another in a determined manner. The rules of a racing track *rule in* some activities that are *ruled out* on a freeway. Anyone driving on a freeway will observe a range of speeds rather than the single maximum speed mentioned in the speed limit law. Speed limits illustrate rules that authorize a range of activities rather than requiring one particular action. Further, enforcement patterns differ regarding the range of speed in excess of the official upper limit that will be tolerated, once observed, before a sanction is issued.

It is also important to recognize that rules need not be written. Nor do they need to result from formal legal procedures. Institutional rules are often self-consciously crafted by individuals to change the structure of repetitive situations that they themselves face in an attempt to improve the outcomes that they achieve.

ON THE ORIGIN OF RULES

When one is interested in understanding the processes of governance, one needs to ask where the rules that individuals use in action situations originate. In an open and democratic governance system, many sources exist of the rules used by individuals in everyday life. It is not considered illegal or improper for individuals to self-organize and craft their own rules if the activities they engage in are legal. In addition to the legislation and regulations of a formal central government, there are apt to be laws passed by regional and local governments. Within private firms and voluntary associations, individuals are authorized to adopt many different rules determining who is a member of the firm or association, how profits (benefits) are to be shared, and how decisions will be made. Each family constitutes its own rule-making body.

When individuals genuinely participate in the crafting of multiple layers of rules, some of that crafting will occur using pen and paper. Much of it, however, will occur as problem-solving individuals interact trying to figure out how to do a better job in the future than they have done in the past. Colleagues in a work team are crafting their own rules when they might say to one another, "How about if you do *A* in the future, and I will do *B*, and before we ever make a decision about *C* again, we both discuss it and make a joint decision?" In a democratic society, problem-solving individuals do this all the time. They also participate in more structured decision-making arrangements, including elections to select legislators.

WORKING RULES

Thus, when we do a deeper institutional analysis, we attempt first to understand the working rules that individuals use in making decisions. Working rules are the set of rules to which participants would make reference if asked to explain and justify their actions to fellow participants. While following a rule may become a "social habit," it is possible to make participants consciously aware of the rules they use to order their relationships. Individuals can consciously decide to adopt a different rule and change their behavior to conform to such a decision. Over time, behavior in conformance with a new rule may itself become habitual (see Shimanoff 1980; Toulmin 1974; Harré 1974). The capacity of humans to use complex cognitive systems to order their own behavior at a relatively subconscious level makes it difficult at times for empirical researchers to ascertain what the working rules for an ongoing action arena may actually be in practice. It is the task of an institutional analyst, however, to dig under surface behavior to obtain a good understanding of what rules participants in a situation are following.⁶

Once we understand the working rules, then, we attempt to understand where those rules come from. In an open society governed by a “rule of law,” the general legal framework in use will have its source in actions taken in constitutional, legislative, and administrative settings augmented by rule-making decisions taken by individuals in many different particular settings. In other words, the rules-in-form are consistent with the rules-in-use (Sproule-Jones 1993). In a system that is not governed by a “rule of law,” there may be central laws and considerable effort made to enforce them, but individuals generally attempt to evade rather than obey the law.

THE PREDICTABILITY OF RULES

Rule following or conforming actions are not as predictable as biological or physical behavior explained by scientific laws. All rules are formulated in human language. As such, rules share problems of lack of clarity, misunderstanding, and change that typify any language-based phenomenon (V. Ostrom 1980, 1997). Words are always simpler than the phenomenon to which they refer. In many office jobs, for example, the rules require an employee to work a specified number of hours per week. If a staff member is physically at their desk for the required number of hours, is day-dreaming about a future vacation or preparing a grocery list for a shopping trip on the way home within the rules? Interpreting rules is more challenging than writing them down.

The stability of rule-ordered actions is dependent upon the shared meaning assigned to words used to formulate a set of rules. If no shared meaning exists when a rule is formulated, confusion will exist about what actions are required, permitted, or forbidden. Regularities in actions cannot result if those who must repeatedly interpret the meaning of a rule within action situations arrive at multiple interpretations. Because “rules are not self-formulating, self-determining, or self-enforcing” (V. Ostrom 1980, 342), it is human agents who formulate them, apply them in particular situations, and attempt to enforce performance consistent with them. Even if shared meaning exists at the time of the acceptance of a rule, transformations in technology, in shared norms, and in circumstances more generally change the events to which rules apply. “Applying language to changing configurations of development increases the ambiguities and threatens the shared criteria of choice with an erosion of their appropriate meaning” (342).

The stability of rule-ordered relationships is also dependent upon enforcement. According to Commons ([1924] 1968, 138), rules “simply say what individuals must, must not, may, can, and cannot do, if the authoritative agency that decides disputes brings the collective power of the community to bear upon the said individuals.” Breaking rules is an option that

is always available to participants in an action situation (as contrasted to players in a formal game-theoretic model), but associated with breaking rules is a risk of being monitored and sanctioned. If the risk is low, the predictability and stability of a situation are reduced. And instability can grow over time. If one person can cheat without fear of being caught, others can also cheat with impunity. If the risk of exposure and sanctioning is high, participants can expect that others will make choices from within the set of permitted and required actions. The acceptance of rules represents a type of Faustian bargain (V. Ostrom 1996). Someone is given authority to use coercion to increase benefits for others—hopefully, for most others.

The simplifying assumption is frequently made in analytical theories that individuals in an action situation will take only those actions that are lawful given the rules that apply. For many purposes, this simplifying assumption helps the analyst proceed to examine important theoretical questions not related to how well the rules are enforced. Highly complicated games, such as football, can indeed be explained with more ease because of the presence of active and aggressive on-site referees who constantly monitor the behavior of the players and assign penalties for infraction of rules.⁷ And these monitors face real incentives for monitoring consistently and for applying fair and accepted penalties. Both the fans and the managers of the relevant sports teams pay a lot of attention to what the monitors are doing and the fairness of their judgments. In settings where a heavy investment is *not* made in monitoring the ongoing actions of participants, however, considerable difference between predicted and actual behavior can occur as a result of the lack of congruence between a model of lawful behavior and the illegal actions that individuals frequently take in such situations.

This is not to imply that the only reason individuals follow rules is because they are enforced. If individuals voluntarily participate in a situation, they must share some general sense that most of the rules governing the situation are appropriate. Otherwise, the cost of enforcement within voluntary activities becomes high enough that it is difficult, if not impossible, to maintain predictability in an ongoing voluntary activity. (One can expect that it is always difficult to maintain predictability in an ongoing activity where participants do not have the freedom to enter and leave the situation.)

WHAT ARE THE IMPORTANT RULES?

What rules are important for institutional analysis? For some institutional scholars, the important difference among rules has to do with the system of property rights in use. At a very general level, it is sometimes useful to

know whether the rules related to a situation can be broadly classed as government property, private property, community property, or no property which is an open-access setting (Bromley et al. 1992). Scholars in the legal pluralist tradition have strongly criticized these categories as not being precise enough to understand the incentives facing participants and thus are inadequate as a foundation for public policy (Benda-Beckmann 2001). They argue that an analyst needs to learn more about particular property rights that specify particular bundles of rights (such as the right to enter a state park versus the right to hunt deer in the same park) in much more detail than those broad categories of rights (Benda-Beckmann 1995, 1997).

A myriad of specific rules are used in structuring complex action arenas. Scholars have been trapped into endless cataloging of rules not related to a method of classification most useful for theoretical explanations. But classification is a necessary step in developing a science. Anyone attempting to define a useful typology of rules must be concerned that the classification is more than a method for imposing superficial order onto an extremely large set of seemingly disparate rules. The way we have tackled this problem using the IAD framework is to classify rules according to their direct impact on the working parts of an action situation (as will be discussed in chapters 6 and 7).

Biophysical and Material Conditions

While a rule configuration affects all of the elements of an action situation, some of the variables of an action situation (and thus the overall set of incentives facing individuals in a situation) are also affected by attributes of the biophysical and material world being acted upon or transformed. What actions are physically possible, what outcomes can be produced, how actions are linked to outcomes, and what is contained in the actors' information sets are affected by the world being acted upon in a situation. The same set of rules may yield entirely different types of action situations depending upon the types of events in the world being acted upon by participants. These "events" are frequently referred to by political economists as the "goods and services" being produced, consumed, and allocated in a situation as well as the technology available for these processes.

The attributes of the biophysical and material conditions and their transformation are explicitly examined when the analyst self-consciously asks a series of questions about how the world being acted upon in a situation affects the outcome, action sets, action-outcome linkages, and information sets in that situation. The relative importance of the rule configuration and biophysical conditions structuring an action situation var-

ies dramatically across different types of settings. The rule configuration almost totally constitutes some games, like chess, where physical attributes are relatively unimportant. The relative importance of working rules to biophysical attributes also varies dramatically within action situations considered to be part of the public sector. Rules define and constrain voting behavior inside a legislature more than attributes of the biophysical world. Voting can be accomplished by raising hands, by paper ballots, by calling for the ayes and nays, by marching before an official counter, or by installing computer terminals for each legislator on which votes are registered. In regard to communication within a legislature, however, attributes of the biophysical world strongly affect the available options. The principle that only one person can be heard and understood at a time in any one forum strongly affects the capacity of legislators to communicate effectively with one another (see V. Ostrom 1987).

Considerable academic literature has focused on the effect of attributes of goods on the results obtained within action situations. A key assumption made in the analysis of a competitive market is that the outcomes of an exchange are highly excludable, easily divisible and transferable, and internalized by those who participate in the exchange. Markets are predicted to fail as effective decision mechanisms when they are the only arena available for producing, consuming, or allocating a wide variety of goods that do not meet the criteria of excludability, divisibility, and transferability. Market failure means that the incentives facing individuals in a situation, where the rules are those of a competitive market but the goods do not have the characteristics of “private goods,” are insufficient to motivate individuals to produce, allocate, and consume these goods at an optimal level.

Let us briefly consider two attributes that are frequently used to distinguish among four basic goods and services: exclusion and subtractability of use. Exclusion relates to the difficulty of restricting those who benefit from the provision of a good or a service. Subtractability refers to the extent to which one individual’s use subtracts from the availability of a good or service for consumption by others. Both of these two attributes can range from low to high. When these attributes are dichotomized and arrayed as shown in figure 1.3, they can be used as the defining attributes of four basic types of goods: toll goods (sometimes referred to as club goods), private goods, public goods, and common-pool resources. Goods that are generally considered to be “public goods” yield nonsubtractive benefits that can be enjoyed jointly by many people who are hard to exclude from obtaining these benefits. Peace is a public good, as my enjoyment of peace does not subtract from the enjoyment of others. Common-pool resources yield benefits where beneficiaries are hard to exclude but each person’s use of a resource system subtracts units of that resource

	Subtractability of use		
		<i>Low</i>	<i>High</i>
Difficulty of excluding potential beneficiaries	<i>Low</i>	Toll goods	Private goods
	<i>High</i>	Public goods	Common-pool resources

Figure 1.3 Four basic types of goods. *Source:* Adapted from V. Ostrom and E. Ostrom 1977, 12.

from a finite total amount available for harvesting (E. Ostrom, Gardner, and Walker 1994; Aggarwal and Dupont 1999). When a fisher harvests a ton of fish, those fish are not available to any other fisher.

EXCLUDABILITY AND THE FREE-RIDER PROBLEM

When the benefits of a good are available to a group, whether or not members of the group contribute to the provision of the good, that good is characterized by problems of excludability. Where exclusion is costly, those wishing to provide a good or service face a potential free-rider or collective-action problem (Olson 1965). Individuals who gain from the maintenance of an irrigation system, for example, may not wish to contribute labor or taxes to maintenance activities, hoping that others will bear the burden. This is not to say that all individuals will free-ride whenever they can. A strong incentive exists to be a free-rider in all situations where potential beneficiaries cannot easily be excluded for failing to contribute to the provision of a good or service.

When it is costly to exclude individuals from enjoying benefits from an investment, private, profit-seeking entrepreneurs, who must recoup their investments through quid pro quo exchanges, have few incentives to provide such services on their own initiative. Excludability problems can thus lead to the problem of free-riding, which in turn leads to underinvestment in capital and its maintenance.

Public sector provision of common-pool resources or infrastructure facilities raises additional problems in determining preferences and organizing finances. When exclusion is low cost to the supplier, preferences are revealed as a result of many quid pro quo transactions. Producers learn about preferences through the consumers' willingness to pay for various goods offered for sale. Where exclusion is difficult, designing mechanisms that honestly reflect beneficiaries' preferences and their will-

ingness to pay is challenging, regardless of whether the providing unit is organized in the public or the private sphere. In very small groups, those affected are usually able to discuss their preferences and constraints on a face-to-face basis and to reach a rough consensus. In larger groups, decisions about infrastructure are apt to be made through mechanisms such as voting or the delegation of authority to public officials. The extensive literature on voting systems demonstrates how difficult it is to translate individual preferences into collective choices that adequately reflect individual views (Arrow 1951; Monroe forthcoming).

Another attribute of some goods with excludability problems is that once they are provided, consumers may have no choice whatsoever as to whether they will consume. An example is the public spraying of insects. If an individual does not want this public service to be provided, there are even stronger incentives not to comply with a general tax levy. Thus, compliance with a broad financing instrument may, in turn, depend upon the legitimacy of the public-choice mechanism used to make provision decisions.

SUBTRACTABILITY

Goods and facilities can generate a flow of services that range from being fully subtractable upon consumption by one user to another extreme where consumption by one does not subtract from the flow of services available to others. The withdrawal of a quantity of water from an irrigation canal by one farmer means that there is that much less water for anyone else to use. Most agricultural uses of water are fully subtractive, whereas many other uses of water—such as for power generation or navigation—are not. Most of the water that passes through a turbine to generate power, for instance, can be used again downstream. When the use of a flow of services by one individual subtracts from what is available to others and when the flow is scarce relative to demand, users will be tempted to try to obtain as much as they can of the flow for fear that it will not be available later.

Effective rules are required if scarce, fully subtractive service flows are to be allocated in a productive way (E. Ostrom, Gardner, and Walker 1994). Charging prices for subtractive services obviously constitutes one such allocation mechanism. Sometimes, however, it is not feasible to price services. In these instances, some individuals will be able to grab considerably more of the subtractive services than others, thereby leading to non-economic uses of the flow and high levels of conflict among users.

Allocation rules also affect the incentives of users to maintain a system. Farmers located at the tail end of an irrigation system that lacks effective allocation rules have little motivation to contribute to the maintenance

of that system because they only occasionally receive their share of water. Similarly, farmers located at the head end of such a system are not motivated to provide maintenance services voluntarily because they will receive disproportionate shares of the water whether or not the system is well-maintained (E. Ostrom 1996).

ADDITIONAL ATTRIBUTES

In addition to exclusion and subtractability, the structure of action situations is also affected by a diversity of other attributes that affect how rules combine with physical and material conditions to generate positive or negative incentives. The number of attributes that may affect the structure of a situation is extraordinarily large, and I do not want even to start a list in this volume. The crucial point for the institutional analyst is that rules that help produce incentives leading to productive outcomes in one setting may fail drastically when the biophysical world differs. As our extensive studies of common-pool resources have shown, for example, effective rules depend on the size of the resource; the mobility of its resource units (e.g., water, wildlife, or trees); the presence of storage in the system; the amount and distribution of rainfall, soils, slope, and elevation; and many other factors (see E. Ostrom, Gardner, and Walker 1994).

These additional attributes are slowly being integrated into a body of coherent theory about the impact of physical and material conditions on the structure of the situations that individuals face and their resulting incentives and behavior. Analysts diagnosing policy problems need to be sensitive to the very large difference among settings and the need to tailor rules to diverse combinations of attributes rather than some assumed uniformity across all situations in a particular sector within a country.

Attributes of the Community

A third set of variables that affect the structure of an action arena relate to the concept of the community within which any focal action arena is located. The concept of community is again one that has many definitions and meanings across and within the social sciences. Given the breadth of what I already plan to tackle, I do not plan to focus in detail on how various attributes of community affect the structure of situations within a community (see Agrawal and Gibson 2001 for an excellent overall review of the concept of community). The attributes of a community that are important in affecting action arenas include: the values of behavior generally accepted in the community; the level of common understanding that potential participants share (or do not share) about the structure of

particular types of action arenas; the extent of homogeneity in the preferences of those living in a community; the size and composition of the relevant community; and the extent of inequality of basic assets among those affected.

The term *culture* is frequently applied to the values shared within a community. Culture affects the mental models that participants in a situation may share. Cultures evolve over time faster than our underlying genetic endowment can evolve. Cultures have in turn affected how the human brain itself has evolved (Boyd and Richerson 1985; Richerson and Boyd 2002). The history of experience with governance institutions at multiple levels affects the way local participants understand, implement, modify, or ignore rules written by external officials (Medard and Geheb 2001).

For example, when all participants share a common set of values and interact with one another in a multiplex set of arrangements within a small community, the probabilities of their developing adequate rules and norms to govern repetitive relationships are much greater (Taylor 1987). The importance of building a reputation for keeping one's word is important in such a community, and the cost of developing monitoring and sanctioning mechanisms is relatively low. If the participants in a situation come from many different cultures, speak different languages, and are distrustful of one another, the costs of devising and sustaining effective rules are substantially increased.

Whether individuals use a written vernacular language to express their ideas, develop common understanding, share learning, and explain the foundation of their social order is also a crucial variable of relevance to institutional analysis (V. Ostrom 1997). Without a written vernacular language, individuals face considerably more difficulties in accumulating their own learning in a usable form to transmit from one generation to the next.

Institutional Frameworks, Theories, and Models

So far in this chapter, I have provided a brief overview of the IAD framework without telling the reader what I mean by a framework. The terms—*framework*, *theory*, and *model*—are all used almost interchangeably by diverse social scientists. This leads to considerable confusion as to what they mean.⁸ Frequently, what one scholar calls a framework others call a model or a theory.⁹ In this book, I will use these concepts to mean a nested set of theoretical concepts—which range from the most general to the most detailed types of assumptions made by the analyst. Analyses con-

ducted at each level provide different degrees of specificity related to a particular problem (Schlager 1999).

The development and use of a general *framework* helps to identify the elements (and the relationships among these elements) that one needs to consider for institutional analysis. Frameworks organize diagnostic and prescriptive inquiry. They provide the most general set of variables that should be used to analyze all types of settings relevant for the framework. Frameworks provide a metatheoretic language that is necessary to talk about theories and that can be used to compare theories. They attempt to identify the *universal* elements that any relevant theory would need to include. Many differences in surface reality can result from the way these variables combine with or interact with one another. Thus, the elements contained in a framework help the analyst generate the questions that need to be addressed when first conducting an analysis.

The development and use of *theories* enable the analyst to specify which components of a framework are relevant for certain kinds of questions and to make broad working assumptions about these elements. Thus, theories focus on parts of a framework and make specific assumptions that are necessary for an analyst to diagnose a phenomenon, explain its processes, and predict outcomes. To conduct empirical research, a scholar needs to select one or more theories to use in generating predictions about expected patterns of relationships. Several theories are usually compatible with any framework. Empirical research should narrow the range of applicable theories over time by showing the superiority of the remaining theories to explain data. Microeconomic theory, game theory, transaction cost theory, social choice theory, public choice, constitutional and covenantal theory, and theories of public goods and common-pool resources are all compatible with the IAD framework discussed in this book.

The development and use of *models* make precise assumptions about a limited set of parameters and variables. Logic, mathematics, game theory models, experimentation and simulation, and other means are used to explore the consequences of these assumptions systematically on a limited set of outcomes. Multiple models are compatible with most theories. In an effort to understand the strategic structure of the games that irrigators play in differently organized irrigation systems, for example, Weissing and Ostrom (1991a, 1991b) developed four families of models to explore the likely consequences of different institutional and physical combinations relevant to understanding how successful farmer organizations arranged for monitoring and sanctioning activities. These models enabled us to analyze in a precise manner a subpart of the theory of common-pool resources and thus also one combination of the components of the IAD framework. Models are extensively used in contemporary policy

analysis by officials working with the World Bank, national governments, as well as state and local governments.

For policy makers and scholars interested in issues related to how different governance systems enable individuals to solve problems democratically by modifying rules at various levels, the IAD framework helps to organize diagnostic, analytical, and prescriptive capabilities. It is similar in structure and intent to the “Actor-Centered Institutionalism” framework developed by Renate Mayntz and Fritz Scharpf (1995) and applied to several national policy settings by Fritz Scharpf (1997). It also aids in the accumulation of knowledge from empirical studies and in the assessment of past efforts at reforms.

Without the capacity to undertake systematic, comparative institutional assessments, recommendations of reform may be based on naive ideas about which kinds of institutions are “good” or “bad” and not on an analysis of performance. Some policy analysts tend to recommend private property as a way of solving any and all problems involving overuse of a resource. While private property works effectively in some environments, it is naive to presume it will work well in all (see Tietenberg 2002; Rose 2002). One needs a common framework and family of theories in order to address questions of reforms and transitions. Particular models then help the analyst to deduce specific predictions about likely outcomes of highly simplified structures. Models are useful in policy analysis when they are well-tailored to the particular problem at hand. Models are used inappropriately when applied to the study of problematic situations that do not closely fit the assumptions of the model (see E. Ostrom 1990 for a critique of the overreliance on open access models of common-pool resources regardless of whether users had created their own rules to cope with overharvesting or not).

The Limited Frame of This Book

Several times in the past, I have participated with colleagues in efforts to outline a book that examined how rule configurations, attributes of goods, and attributes of the community all affected the structure of action situations, individual choices, outcomes, and the evaluation of outcomes.¹⁰ Each time, the projected volume mushroomed in size and overcame our capacity to organize it. Thus in this book, I have tried to focus primarily on how rules affect the structure of action situations instead of trying to work out the details of the entire framework. The focus on the components of institutions in this volume should not be interpreted to mean that I feel that institutions are the *only* factor affecting outcomes in all action situations.

Institutions are only one of a large number of elements that affect behavior in any particular situation at a particular time and place. No single cause exists for human behavior. To live, one needs oxygen, water, and nutrition. All are key parts of the explanation of life. Life itself operates at multiple levels. Genes underlie phenotypic structures in a manner that is broadly analogous to the way that rules underlie action situations. But neither genes nor rules fully determine behavior of the phenotypes that they help to create. Selection processes on genes operate largely at the individual level, but rules—as well as other cultural “memes”—are likely to be selected at multiple levels (see Hammerstein 2003). When one steps back, however, for all of the complexity and multiple levels, there is a large amount of similarity of underlying factors. In the biological world, it is somewhat amazing that there is only a small proportion of the genes that differ between an elephant and a mouse. As we develop the logic of institutions further, we will see that many situations that have the surface appearance of being vastly different have similar underlying parts. Thus, our task is to identify the working parts, the grammar, the alphabet of the phenotype of human social behavior as well as the underlying factors of rules, biophysical laws, and community.

Thus, the focus of this book reflects my sense that the concept of institutions, the diversity of institutions and their resilience, and the question of how institutions structure action situations require major attention. This volume is, thus, an effort to take an in-depth look at one major part of what is needed to develop fuller theories of social organization. In this volume, I will try to articulate in more detail than has been possible before what I think the components of institutions are and how they can be used to generate explanations of human behavior in diverse situations. The focus on institutions should not be interpreted, however, as a position that rules are always the most important factor affecting interactions and outcomes. In the midst of a hurricane, rules may diminish greatly in their importance in affecting individual behavior.

This volume should be thought of as part of a general effort to understand institutions so as to provide a better formulation for improving their performance. Our book *Rules, Games, and Common-Pool Resources* (E. Ostrom, Gardner, and Walker 1994) provides one focused application of the IAD framework. Michael McGinnis has recently edited three volumes (1999a, 1999b, 2000) that present earlier elucidations of the IAD framework and empirical studies that are closely related. Kenneth Bickers and John Williams (2001) and Michael McGinnis and John Williams (2001) clearly elucidate important aspects of the general approach.

I am writing this book from the perspective of a policy analyst. Without the careful development of a rigorous and empirically verifiable set of theories of social organization, we cannot do a very good job of fixing

problems through institutional change. And, if we cannot link the theoretical results into a coherent overall approach, we cannot cumulate knowledge. All too often, major policy initiatives lead to counterintentional results. We need to understand institutions in order to improve their performance over time (North 2005).

As I demonstrate in chapter 8, however, the option of optimal design is not available to mere mortals. The number of combinations of specific rules that are used to create action situations is far larger than any set that analysts could ever analyze even with space-age computer assistance. This impossibility does not, however, leave me discouraged or hopeless. It does, however, lead me to have great respect for robust institutions that have generated substantial benefits over long periods of time (see Shepsle 1989; E. Ostrom 1990). None have been designed in one single step. Rather, accrued learning and knowledge have led those with good information about participants, strategies, ecological conditions, and changes in technology and economic relationships over time to craft sustainable institutions, even though no one will ever know if they are optimal. Thus, in chapter 9, I dig into the process of learning, adaptation, and evolution as processes that enable polycentric institutional arrangements to utilize very general design principles in the dynamic processes of trying to improve human welfare over time. It is also necessary to discuss the threats that can destroy the resilience of complex social systems.