CHAPTER ONE

Limited Rationality

By far the most common portrayal of decision making is one that interprets action as rational choice. The idea is as old as thought about human behavior, and its durability attests not only to its usefulness but also to its consistency with human aspirations. Theories of rational choice, although often elaborated in formal and mathematical ways, draw on everyday language used in understanding and communicating about choices. In fact, the embedding of formal theories of rationality in ordinary language is one of their distinctive features. Among other things, it makes them deceptively comprehensible and self-evident. This chapter examines the idea of rational choice and some ways in which theories of limited rationality have made that idea more consistent with observations of how decisions actually happen.

1.1 The Idea of Rational Choice

Like many other commonly used words, “rationality” has come to mean many things. In many of its uses, “rational” is approximately equivalent to “intelligent” or “successful.” It is used to
describe actions that have desirable outcomes. In other uses, “rational” means “coldly materialistic,” referring to the spirit or values in terms of which an action is taken. In still other uses, “rational” means “sane,” reflecting a judgment about the mental health displayed by an action or a procedure for taking action. Heterogeneous meanings of rationality are also characteristic of the literature on decision making. The term is used rather loosely or inconsistently.

In this book, “rationality” has a narrow and fairly precise meaning linked to processes of choice. Rationality is defined as a particular and very familiar class of procedures for making choices. In this procedural meaning of “rational,” a rational procedure may or may not lead to good outcomes. The possibility of a link between the rationality of a process (sometimes called “procedural rationality”) and the intelligence of its outcomes (sometimes called “substantive rationality”) is treated as a result to be demonstrated rather than an axiom.

1.1.1 The Logic of Consequence

Rational theories of choice assume decision processes that are consequential and preference-based. They are consequential in the sense that action depends on anticipations of the future effects of current actions. Alternatives are interpreted in terms of their expected consequences. They are preference-based in the sense that consequences are evaluated in terms of personal preferences. Alternatives are compared in terms of the extent to which their expected consequences are thought to serve the preferences of the decision maker.

A rational procedure is one that pursues a logic of consequence. It makes a choice conditional on the answers to four basic questions:

1. The question of alternatives: What actions are possible?
2. The question of expectations: What future consequences might follow from each alternative? How likely is each possible consequence, assuming that alternative is chosen?
3. The question of preferences: How valuable (to the decision maker) are the consequences associated with each of the alternatives?
4. The question of the decision rule: How is a choice to be made among the alternatives in terms of the values of their consequences?

When decision making is studied within this framework, each of these questions is explored: What determines which alternatives are considered? What determines the expectations about consequences? How are decision maker preferences created and evoked? What is the decision rule that is used?

This general framework is the basis for standard explanations of behavior. When asked to explain behavior, most people “rationalize” it. That is, they explain their own actions in terms of their alternatives and the consequences of those alternatives for their preferences. Similarly, they explain the actions of others by imagining a set of expectations and preferences that would make the action rational.

A rational framework is also endemic to theories of human behavior. It is used to understand the actions of firms, marriage partners, and criminals. It underlies many theories of bargaining, exchange, and voting, as well as theories of language and social structure. Rational choice processes are the fundamentals of microeconomic models of resource allocation, political theories of coalition formation, statistical decision theories, and many other theories and models throughout the social sciences.

1.1.2 Rational Theories of Choice

Within rational processes, choice depends on what alternatives are considered and on two guesses about the future: The first guess is a guess about future states of the world, conditional on the choice. The second guess is a guess about how the decision maker will feel about that future world when it is experienced.

PURE THEORIES OF RATIONAL CHOICE

Some versions of rational choice theory assume that all decision makers share a common set of (basic) preferences, that alterna-
jectives would have to be known and specified in advance, and all possible task definitions, all possible sets of employees, and all possible assignments of people to jobs would have to be considered. In the end, the decision maker would be expected to choose the one combination that maximizes expected return.

A considerably less glorious version of rationality—but still heroic—would assume that a structure of tasks and a wage structure are given, and that the decision maker assigns persons to jobs in a way that maximizes the return to the organization. Another version would assume that a decision maker calculates the benefits to be obtained by gathering any of these kinds of data, and their costs.

Virtually no one believes that anything approximating such a procedure is observed in any individual or organization, either for the job assignment task or for any number of other decision tasks that confront them. Although some people have speculated that competition forces the outcomes of actual decision processes to converge to the outcomes predicted from a purely rational process, even that speculation has been found to be severely restricted in its applicability. Pure rationality strains credulity as a description of how decisions actually happen. As a result, there have been numerous efforts to modify theories of rational choice, keeping the basic structure but revising the key assumptions to reflect observed behavior more adequately.

RATIONAL DECISION MAKING AND UNCERTAINTY ABOUT CONSEQUENCES

The most common and best-established elaboration of pure theories of rational choice is one that recognizes the uncertainty surrounding future consequences of present action. Decision makers are assumed to choose among alternatives on the basis of their expected consequences, but those consequences are not known with certainty. Rather, decision makers know the likelihoods of various possible outcomes, conditional on the actions taken.

Uncertainty may be imagined to exist either because some processes are uncertain at their most fundamental levels or be-
cause decision makers’ ignorance about the mechanisms driving the process make outcomes look uncertain to them. The food vendor at a football game, for example, knows that the return from various alternative food-stocking strategies depends on the weather, something that cannot be predicted with certainty at the time a decision must be made.

Since a decision maker does not know with certainty what will happen if a particular action is chosen, it is unlikely that the results of an action will confirm expectations about it. Postdecision surprise, sometimes pleasant sometimes unpleasant, is characteristic of decision making. So also is postdecision regret. It is almost certain that after the consequences are known (no matter how favorable they are) a decision maker will suffer regret—awareness that a better choice could have been made if the outcomes could have been predicted precisely in advance. In such a spirit, investors occasionally rue the gains they could have realized in the stock market with perfect foresight of the market.

The most commonly considered situations involving uncertainty are those of decision making under “risk,” where the precise consequences are uncertain but their probabilities are known. In such situations, the most conventional approach to predicting decision making is to assume a decision maker will choose the alternative that maximizes expected value, that is, the alternative that, on average, produce the best outcome if this particular choice were to be made many times. The analog is gambling and the choice of the best gamble. An expected-value analysis of choice involves imagining a decision tree in which each branch represents either a choice to be made or an “act of nature” that cannot be predicted with certainty. Procedures for constructing and analyzing such trees constitute a large fraction of modern decision science.

In more elaborate rational theories of choice in the face of risk, an alternative is assessed not only by its expected value but also by its uncertainty. The value attached to a potential alternative depends not only on the average expected return but also on the degree of uncertainty, or risk, involved. For risk-averse decision makers, riskiness decreases the value of a particular alternative. For risk-seeking decision makers, riskiness increases the value.

The riskiness of an alternative is defined in different ways in different theories, but most definitions are intended to reflect a measure of the variation in potential outcomes. This variation has a natural intuitive measure in the variance of the probability distribution over outcome values. For various technical reasons, such a measure is not always used in studies of choice, but for our purposes it will suffice. When risk is taken into account, a decision is seen as a joint function of the expected value (or mean) and the riskiness (or variance) of the probability distribution over outcomes conditional on choice of a particular alternative.

MODIFYING THE ASSUMPTIONS

The introduction of risk and the development of ways to deal with it were major contributions to understanding and improving decision making within a rational framework. Such developments were, however, just the first step in modifying the knowledge assumptions of rational choice. Most modern theories of rational choice involve additional modifications of the pure theory. They can be distinguished by their assumptions with respect to four dimensions:

1. Knowledge: What is assumed about the information decision makers have about the state of the world and about other actors?
2. Actors: What is assumed about the number of decision makers?
3. Preferences: What is assumed about the preferences by which consequences (and therefore alternatives) are evaluated?
4. Decision rule: What is assumed to be the decision rule by which decision makers choose an alternative?

Although most theories “relax” the assumptions of the pure theory on at least one of these dimensions, they tend to be con-
servative in their deviations from the assumptions underlying a pure conception of rationality. For example, most theories of limited knowledge are not simultaneously theories of multiple actors; most theories of multiple actors (for example, microeconomic versions of game theory) are not simultaneously theories of limited knowledge; and virtually none of the limited knowledge or multiple-actor theories introduce conceptions of ambiguous or unstable preferences. In that sense at least, the pure model still permeates the field—by providing an overall structure and significant (though different) parts for various different theories.

1.1.3 Enthusiasts and Skeptics

Enthusiasts for rational models of decision making notice the widespread use of assumptions of rationality and the successes of such models in predictions of aggregates of human actors. They easily see these symptoms of acceptance and usefulness as impressive support for the models. Skeptics, on the other hand, are less inclined to give credence to models based on their popularity, noting the historical fact that many currently rejected theories have enjoyed long periods of popularity. They are also less inclined to find the models particularly powerful, often emphasizing their less than perfect success in predicting individual behavior. They easily see these symptoms of conventionality and imperfection as making the models unattractive.

Both enthusiasts and skeptics endorse limited rationality, the former seeing limited rationality as a modest, natural extension of theories of pure rationality, and the latter seeing limited rationality as a fundamental challenge to pure rationality and a harbinger of much more behaviorally based conceptions of decision making.

1.2 Limited (or Bounded) Rationality

Studies of decision making in the real world suggest that not all alternatives are known, that not all consequences are considered, and that not all preferences are evoked at the same time. Decision makers appear to consider only a few and to look at them sequentially rather than simultaneously. Decision makers do not consider all consequences of their alternatives. They focus on some and ignore others. Relevant information about consequences is not sought, and available information is often not used. Instead of having a complete, consistent set of preferences, decision makers seem to have incomplete and inconsistent goals, not all of which are considered at the same time. The decision rules used by real decision makers seem to differ from the ones imagined by decision theory. Instead of considering “expected values” or “risk” as those terms are used in decision theory, they invent other criteria. Instead of calculating the “best possible” action, they search for an action that is “good enough.”

As a result of such observations, doubts about the empirical validity and usefulness of the pure theory of rational choice have been characteristic of students of actual decision processes for many years. Rational choice theories have adapted to such observations gradually by introducing the idea that rationality is limited. The core notion of limited rationality is that individuals are intended rational. Although decision makers try to be rational, they are constrained by limited cognitive capabilities and incomplete information, and thus their actions may be less than completely rational in spite of their best intentions and efforts.

In recent years, ideas of limited (or bounded) rationality have become sufficiently integrated into conventional theories of rational choice to make limited rationality viewpoints generally accepted. They have come to dominate most theories of individual decision making. They have been used to develop behavioral and evolutionary theories of the firm. They have been used as part of the basis for theories of transaction cost economics and game theoretic, information, and organizational economics. They have been applied to decision making in political, educational, and military contexts.

1.2.1 Information Constraints

Decision makers face serious limitations in attention, memory,
ual decision making seem to allude to some more or less obvious biological constraints on human information processing, although the limits are rarely argued from a strict biological basis. In a similar way, students of organizational decision making assume some more or less obvious information constraints imposed by methods of organizing diverse individuals:

1. **Problems of attention.** Time and capabilities for attention are limited. Not everything can be attended to at once. Too many signals are received. Too many things are relevant to a decision. Because of these limitations, theories of decision making are often better described as theories of attention or search than as theories of choice. They are concerned with the way in which scarce attention is allocated.

2. **Problems of memory.** The capabilities of individuals and organizations to store information are limited. Memories are faulty. Records are not kept. Histories are not recorded. Even more limited are individual and organizational abilities to retrieve information that has been stored. Previously learned lessons are not reliably retrieved at appropriate times. Knowledge stored in one part of an organization cannot be used easily by another part.

3. **Problems of comprehension.** Decision makers have limited capacities for comprehension. They have difficulty organizing, summarizing, and using information to form inferences about the causal connections of events and about relevant features of the world. They often have relevant information but fail to see its relevance. They make unwarranted inferences from information, or fail to connect different parts of the information available to them to form a coherent interpretation.

4. **Problems of communication.** There are limited capacities for communicating information, for sharing complex and specialized information. Division of labor facilitates mobilization and utilization of specialized talents, but it also encourages differentiation of knowledge, competence, and language. It is difficult to communicate across cultures, across generations, or across professional specialties. Different groups of people use different frameworks for simplifying the world.

As decision makers struggle with these limitations, they develop procedures that maintain the basic framework of rational choice but modify it to accommodate the difficulties. Those procedures form the core of theories of limited rationality.

1.2.2 **Coping with Information Constraints.**

Decision makers use various information and decision strategies to cope with limitations in information and information-handling capabilities. Much of contemporary research on choice by individuals and organizations focuses on those coping strategies, the ways choices are made on the basis of expectations about the future but without the kind of complete information that is presumed in classical theories of rational choice.

**THE PSYCHOLOGY OF LIMITED RATIONALITY**

Psychological studies of individual decision making have identified numerous ways in which decision makers react to cognitive constraints. They use stereotypes in order to infer unobservable from observables. They form typologies of attitudes (liberal, conservative) and traits (dependent, extroverted, friendly) and categorize people in terms of the typologies. They attribute intent from observing behavior or the consequences of behavior. They abstract “central” parts of a problem and ignore other parts. They adopt understandings of the world in the form of socially developed theories, scripts, and schemas that fill in missing information and suppress discrepancies in their understandings.

The understandings adopted tend to stabilize interpretations of the world. For the most part, the world is interpreted and understood today in the way it was interpreted and understood yesterday. Decision makers look for information, but they see what they expect to see and overlook unexpected things. Their memories are less recollections of history than constructions based on what they thought might happen and reconstructions based on what they now think must have happened, given their present beliefs.
A comprehensive review of psychological studies of individual information processing and problem solving would require more space and more talent than are available here. The present intention is only to characterize briefly a few of the principal speculations developed as a result of that research, in particular speculations about four fundamental simplification processes: editing, decomposition, heuristics, and framing.

**Editing.** Decision makers tend to edit and simplify problems before entering into a choice process, using a relatively small number of cues and combining them in a simple manner. Complex problems or situations are simplified. Search may be simplified by discarding some available information or by reducing the amount of processing done on the information. For example, decision makers may attend to choice dimensions sequentially, eliminating all alternatives that are not up to standards on the first dimension before considering information from other dimensions. In other situations, they may consider all information for all alternatives, but weight the dimensions equally rather than weight them according to their importance.

**Decomposition.** Decision makers attempt to decompose problems, to reduce large problems into their component parts. The presumption is that problem elements can be defined in such a way that solving the various components of a problem individually will result in an acceptable solution to the global problem. For example, a decision maker might approach the problem of allocating resources to advertising projects by first decomposing the global advertising problem of a firm into subproblems associated with each of the products, then decomposing the product subproblems into problems associated with particular geographic regions.

One form of decomposition is working backward. Some problems are easier to solve backward than forward because, like mazes, they have only a few last steps but many first steps. Working backward is particularly attractive to decision makers who accept a “can do” decision making ideology, because it matches an activist role. Working backward encourages a perspective in which decision makers decide what they want to have happen and try to make it happen.

Decomposition is closely connected to such key components of organizing as division of labor, specialization, decentralization, and hierarchy. An important reason for the effectiveness of modern organization is the possibility of decomposing large complex tasks into small independently manageable ones. In order for decomposition to work as a problem solving strategy, the problem world must not be tightly interconnected. For example, if actions taken on one advertising project heavily affect the results of action on others, deciding on the projects independently will produce complications. The generality of decomposition strategies suggests that the world is, in fact, often only loosely interconnected, so subproblems can be solved independently. But that very generality makes it likely that decomposition will also be attempted in situations in which it does not work.

**Heuristics.** Decision makers recognize patterns in the situations they face and apply rules of appropriate behavior to those situations. Studies of expertise, for example, generally reveal that experts substitute recognition of familiar situations and rule following for calculation. Good chess players generally do more subtle calculations than novices, but their great advantage lies less in the depth of their analysis than in their ability to recognize a variety of situations and in their store of appropriate rules associated with situations. Although the problem solving of expert salespersons has been subjected to less research, it appears to be similar.

As another example, people seem not to be proficient at calculating the probability of future events by listing an elaborate decision tree of possible outcomes. However, they are reasonably good at using the output of memory to tell them how frequently similar events have occurred in the past. They use the results of memory as a proxy for the projection of future probability.

Such procedures are known to the literature of problem solving and decision making as “heuristics.” Heuristics are rules-of-
thumb for calculating certain kinds of numbers or solving certain kinds of problems. Although psychological heuristics for problem solving are normally folded into a discussion of limited rationality because they can be interpreted as responses to cognitive limitations, they might as easily be interpreted as versions of rule-following behavior that follows a logic quite different from a logic of consequence (see Chapter 2).

Framing. Decisions are framed by beliefs that define the problem to be addressed, the information that must be collected, and the dimensions that must be evaluated. Decision makers adopt paradigms to tell themselves what perspective to take on a problem, what questions should be asked, and what technologies should be used to ask the questions. Such frames focus attention and simplify analysis. They direct attention to different options and different preferences. A decision will be made in one way if it is framed as a problem of maintaining profits and in a different way if it is framed as a problem of maintaining market share. A situation will lead to different decisions if it is seen as being about “the value of innovation” rather than “the importance of not losing face.”

Decision makers typically frame problems narrowly rather than broadly. They decide about local options and local preferences, without considering all tradeoffs or all alternatives. They are normally content to find a set of sufficient conditions for solving a problem, not the most efficient set of conditions. Assigning proper weights to things in the spatial, temporal, and causal neighborhood of current activity as opposed to things that are more distant spatially, temporally, or causally is a major problem in assuring decision intelligence (see Chapter 6). It is reflected in the tension between the frames of decision makers, who often seem to have relatively short horizons, and the frames of historians, who (at least retrospectively) often have somewhat longer horizons.

The frames used by decision makers are part of their conscious and unconscious repertoires. In part they are encased in early individual experiences that shape individual approaches to problems. In part they are responsive to the particular sequences of decision situations that arise. There is a tendency for frames to persist over a sequence of situations. Recently used frames hold a privileged position, in part because they are more or less automatically evoked in a subsequent situation. In addition, past attention strengthens both a decision maker’s skills in using a frame and the ease of justifying action to others within the frame.

These internal processes of developing frames and using them is supplemented by an active market in frames. Decision makers adopt frames that are proposed by consultants, writers, or friends. They copy frames used by others, particularly others in the same profession, association, or organization. Consequential decision making itself is, of course, one such frame. Prescriptive theories of decision making seek to legitimize a consequential frame for considering decisions, one that asks what the alternatives are, what their expected consequences are, and what the decision maker’s preferences are.

THE STATISTICS OF LIMITED RATIONALITY

Faced with a world more complicated than they can hope to understand, decision makers develop ways of monitoring and comprehending that complexity. One standard approach is to deal with summary numerical representations of reality, for example income statements and cost-of-living indexes. The numbers are intended to represent phenomena in an organization or its environment: accounting profits, aptitude scores, occupancy rates, costs of production. The phenomena themselves are elusive—real but difficult to characterize and measure. For example, income statements confront a number of uncertainties. How quickly do resources lose their value (depreciate or spoil)? How should joint costs be allocated to various users? How should inventory be counted and valued? How can the quality of debts be assessed? What is the value of a contract? Of a good name? There is ambiguity about the facts and much potential for conflict over them. As a result, the numbers are easily described as inventions, subject to both debate and ridicule. They have elements of magic about them, pulled mysteriously
from a statistician’s or a manager’s hat. For example, estimates of U.S. government subsidies to nuclear power went from $40 billion under one administration to $12.8 billion under another with no change in actual programs.

The numbers are magical, but they also become quite real. Numbers such as those involved in a cost-of-living index or an income (profit and loss) statement come to be treated as though they were the things they represent. If the cost-of-living index goes down, decision makers act as though the cost of living has gone down—even though they are well aware of the many ways in which, for many people, the cost of living may actually have gone up. Indeed, the whole concept of “cost of living” moves from being an abstract hypothetical figure to being a tangible reality.

Three main types of such numbers can be distinguished:

1. Representations of external reality are numbers purporting to describe the environment in which decision makers exist. Measures of external reality include such numbers as the balance of payments with another country, the number of five-year olds in a school district, the number of poor in a country, the cost of living, the unemployment rate, and the number of people watching a particular television program on a given night.

2. Representations of processes are numbers purporting to measure “work” performed. They include the fraction of the time of a machinist or lawyer that is allocated to a particular product or client, the total number of hours worked, and the length of time taken to produce a product. They also include records of how resources were allocated—for example, how much was spent on administration, on pure versus applied research, and on graduate versus undergraduate education.

3. Representations of outcomes are numbers purporting to report the outcomes of decisions or activities. In a business firm, this includes outcomes such as sales or profits. In a school, student achievement is represented by a number. Numbers are also constructed to measure such outcomes as number of enemy killed, changes in crime rates, and budget deficits.

The construction of these magic numbers is partly problem solving. Decision makers and professionals try to find the right answer, often in the face of substantial conceptual and technical difficulties. Numbers presuppose a concept of what should be measured and a way of translating that concept into things that can be measured. Unemployment numbers require a specification of when a person is “seeking employment” and “not employed”. The concepts and their measurement are sufficiently ambiguous to make the creation of unemployment statistics a difficult technical exercise. Similarly, the definition and measurement of corporate profits, gross national product (GNP), or individual intelligence are by no means simple matters. They involve professional skills of a high order.

The construction of magic numbers is also partly political. Decision makers and others try to find an answer that serves their own interests. Unemployment levels, profits, GNP, individual intelligence, and other numbers are negotiated among contending interests. If the cost-of-living index affects prices or wages, affected groups are likely to organize to seek a favorable number. If managers are evaluated in terms of their profits, they will seek to influence transfer prices, depreciation rates, and the application of accounting rules and conventions that affect the “bottom line.” If political leaders care about GNP, they will involve themselves in the negotiation of those numbers. Management involves account and number management as much as it involves management of the things that the numbers represent.

These simultaneous searches for truth and personal advantage often confound both participants and observers. Realist cynics portray the pursuit of truth as a sham, noticing the many ways in which individuals, experts, and decision makers find it possible to “discover” a truth that happens to be consistent with their own interests. Idealist professionals portray the pursuit of personal advantage as a perversion, noticing the many ways in which serious statisticians struggle to improve the technical quality of the numbers without regard for policy consequences. Both groups have difficulty recognizing the ways in which the process subtly interweaves truth seeking and advantage seeking, leaving each somewhat compromised by the other, even as each somewhat serves the other.

The tenaciousness and political basis of many key numbers is
well-known to decision makers. They regularly seek to improve and influence the numbers. At the same time, however, decision makers and others have an interest in stabilizing the numbers, securing agreement about them, and developing shared confidence in them as a basis for joint decision making and communication. The validity of a number may be less important than its acceptance, and decision makers may be willing to forgo insisting on either technical correctness or immediate political advantage in order to sustain social agreement.

1.2.3 Satisficing and Maximizing

Most standard treatments of rational decision making assume that decision makers choose among alternatives by considering their consequences and selecting the alternative with the largest expected return. Behavioral students of decision rules, on the other hand, have observed that decision makers often seem to satisfice rather than maximize. Maximizing involves choosing the best alternative. Satisficing involves choosing an alternative that exceeds some criterion or target.

The shopkeeper in a small retail store could determine price by assessing information about the complete demand of the relevant population at a set of various prices and selecting the price that best serves her or his preferences. Alternatively he or she could use a simple mark-up over cost in order to ensure an acceptable profit margin on each item. A maximizing procedure for choosing equipment at a new manufacturing facility would involve finding the best combination of prices and features available. A satisficing strategy would find equipment that fits specifications and falls within budget. A marketing manager could seek to find the best possible combination of products, pricing, advertising expenses, and distribution channels; or he or she could create a portfolio of products that meets some sales, market share, or profit target.

DO DECISION MAKERS SATISFICE OR MAXIMIZE?

Neither satisficing nor maximizing is likely to be observed in pure form. Maximizing requires that all possible alternatives be compared and the best one chosen. Satisficing requires only a comparison of alternatives with a target until one that is good enough is found. Maximizing requires that preferences among alternatives meet strong consistency requirements, essentially requiring that all dimensions of preferences be reducible to a single scale—although that scale need not exist in conscious form. Satisficing specifies a target for each dimension and treats the targets as independent constraints. Under satisficing, a bundle that is better on each criterion will not be chosen over another bundle that is good enough on each criterion if the latter bundle is considered first. Satisficing also makes it possible that no bundle will satisfy all criteria, in which case a decision will not be made.

In personnel decisions, a maximizing procedure would involve finding the best possible combination of persons and tasks. A satisficing procedure, on the other hand, would involve finding a person good enough to do the job. A decision maker would define a set of tasks adequate to accomplish the job, and would set targets (performance standards, job requirements) for performance on the job. A decision maker would consider candidates sequentially, perhaps by looking at the current job holder or an immediate subordinate, and would ask whether that person is good enough. When universities consider granting tenure to professors, or when individuals consider mates, for example, they can choose among a host of decision rules varying from relatively pure satisficing rules (“Does this person meet the standards set for satisfactory performance as a tenured professor or spouse?”) to relatively pure maximizing rules (“Is this person the best possible person likely to be found—and available—for tenure or marriage in the indefinite future?”).

There are problems with using empirical data to tell whether (or when) decision makers maximize or satisfice. The usual difficulties of linking empirical observations to theoretical statements are compounded by the case with which either vision can be made tautologically “true.” True believers in maximization can easily use circular definitions of preferences to account for many apparent deviations from maximizing. True believers in satisficing can easily use circular definitions of targets to account for many apparent deviations from satisficing.
Assessing whether organizations satisfice or maximize involves inferring decision rules from one or more of three kinds of data: (1) data drawn from listening to participants as they talk about the process, (2) data drawn from observing decision processes, and (3) data drawn from observing decision outcomes. The different kinds of data lead to different impressions.

When participants talk about the process, they seem generally to accept the ideology of maximization, but their descriptions sound a lot like satisficing. There is a strong tendency for participants to talk about targets as critical to the process of decision. Although there are frequent efforts to reduce a few separate goals to a common measure (e.g., profit), separate targets are treated as substantially independent constraints unless a solution satisfying them all cannot be found. In addition, alternatives are considered semisequentially. It may not be true that only one alternative is considered at a time (as in the pure form of satisficing), but only a few seem to be considered at a time.

In observations of the process of decision making, targets frequently appear as components of both official and unofficial practices. It is common to specify goals as constraints, at least at first. There is a tendency for only a few alternatives to be considered at a time, but consideration often continues for some more or less predetermined time, rather than strictly until the first satisfactory alternative is found. Decision makers sometimes seem to maximize on some dimensions of the problem and satisfice on others. Sometimes they seem to try to maximize the chance of achieving a target. Targets seem to be especially important when they are defined in terms of surviving until the next period, meeting a deadline, or fulfilling a contract. The pure maximization model seems not to fit the data, although in some situations people might be described as maximizing within a much-edited choice set.

When decision outcomes are observed, it is difficult to differentiate maximizing from satisficing. Most decisions are interpretable in either way, so it is necessary to find situations in which the two yield distinctively different outcomes. Maximization emphasizes the relative position of alternatives. A maximizing procedure is sensitive to nonhomogeneous shifts in alternatives, when one alternative improves relative to another. A maximizing search is sensitive to changes in expected return and costs. Satisficing, on the other hand, emphasizes the position of alternatives relative to a target. A satisficing procedure is sensitive to a change in the absolute value of the current choice, and thus to homogeneous downward shifts in alternatives if they include the chosen one. A satisficing search is sensitive to current position relative to the target.

It is necessary to find situations in which the position of the chosen alternative is changing relative to either other alternatives or the target, but not both. As an example, take the willingness of people to pursue energy conservation. Maximizers will be sensitive to shifts in relative prices but not to whether they reach a target or not (except secondarily). Satisficers will be sensitive to whether they are reaching a target but not to shifts in relative prices (except secondarily). Observations of actual decision making in such domains as new investments, energy conservation, and curricular decisions indicate that satisficing is an aspect of most decision making but that it is rarely found in pure form.

Beyond the evidence that such a portrayal seems to match many observations of decision making behavior, there are two broader theoretical reasons—one cognitive and one motivational—why behavioral students of decision making find satisficing a compelling notion. From a cognitive perspective, targets simplify a complex world. Instead of having to worry about an infinite number of gradations in the environment, individuals simplify the world into two parts—good enough and not good enough. From a motivational perspective, it appears to be true that the world of psychological sensation gives a privileged position to deviations from some status quo.

Satisficing, Adaptive Aspirations, and the Status Quo

In classical theories of rational choice, the importance of a potential consequence does not depend on whether it is portrayed as a “loss” or as a forgone “gain.” The implicit aspiration level represented by the status quo is irrelevant. This posture of the
theory has long been resisted by students, and generations of economists have struggled to persuade students (and managers) to treat cash outlays and forgone gains as equivalent. The resistance of students has a natural satisficing explanation. Satisficing assumes that people are more concerned with success or failure relative to a target than they are with gradations of either success or failure. If out-of-pocket expenditures are treated as decrements from a current aspiration level (and thus as unacceptable) and forgone gains are not, the former are more likely to be avoided than the latter. A satisficing decision maker is likely to make a distinction between risking the “loss” of something that is not yet “possessed” and risking the loss of something that is already considered a possession.

The tendency to code alternatives as above or below an aspiration level or a status quo has important implications for decision making. Whether a glass is seen as half-empty or half-full depends on how the result is framed by aspiration levels and a decision maker’s history. The history is important because aspiration levels—the dividing line between good enough and not good enough—are not stable. In particular, individuals adapt their aspirations (targets) to reflect their experience. Studies of aspiration level adjustment in situations in which information on the performance of others is lacking indicate that decision makers revise aspirations in the direction of past performance but retain a bit more optimism than is justified by that experience. Thus, current aspirations can be approximated by a positive constant plus an exponentially weighted moving average of past experience.

If aspirations adapt to experience, then success contains the seeds of failure, and failure contains the seeds of success. In a very general way, empirical data seem to support such a conception. Although there are some signs that chronically impoverished individuals are less happy than chronically rich individuals, studies of lottery winners reveal that they are no more happy than other people, and studies of paraplegics reveal that they are no less happy than others. This pattern of results has led some people to describe life as a “hedonic treadmill.” As individuals adapt their aspirations to their experience, both their satisfactions and their dissatisfactions are short-lived.

The world is more complicated than such a simple model would suggest, of course. Aspirations adapt not only to one’s own experience but also to the experience of others. They can become attached not just to the level of reward but to the rate of change of reward. They do not adapt instantaneously, and they appear to adapt upward more rapidly than downward. As a result, deviations in a negative direction seem to be more persistently noticed than positive deviations. This “predisposition to dissatisfaction” is, of course, a strong stimulus for search and change in situations where it exists.

1.3 Theories of Attention and Search

In theories of limited rationality, attention is a scarce resource. The evoked set, of alternatives, consequences, and preferences, and the process that produces the evoked set, take on an importance not found in models of infinitely rational decision makers. Not all alternatives are known, they must be sought; not all consequences are known, they must be investigated; not all preferences are known, they must be explored and evoked. The allocation of attention affects the information available and thus the decision.

Ideas that emphasize the importance of attention are found throughout the social and behavioral sciences. In psychology, the rationing of attention is central to notions of editing, framing, and problem solving “set”; in political science, it is central to the notion of agendas; in sociology, it is central to the notion that many things in life are “taken as given” and serve as constraints rather than as decision alternatives. In economics, theories of search are a central concern of the study of decisions. The study of decision making is, in many ways, the study of search and attention.

1.3.1 The Rationing of Attention

In contrast to traditional societies, which are ordinarily described as short of physical and human resources rather than short of time, the modern world is usually described as stimu-
lus-rich and opportunity-filled. There are more things to do than there is time to do them, more claims on attention than can be met. The importance of scheduling and time, and concerns about “information overload,” are distinctive complaints. Industries have arisen to compete for the attention of individuals, as well as to advise people on proper time management. The problems are conspicuously not ameliorated by information technology. Time pressures are further dramatized and probably accentuated by telefaxes, car phones, and systems of electronic mail. Computers seem to have done more to increase information load than to reduce it.

The problems of time, attention, and information management are critical to research on decision making. Limitations on attention and information raise dilemmas for actors in the system and cause difficulties for those who would try to understand decisions. If attention is rationed, decisions can no longer be predicted simply by knowing the features of alternative and desires. Decisions will be affected by the way decision makers attend (or fail to attend) to particular preferences, alternatives, and consequences. They will depend on the ecology of attention: who attends to what, and when. Interested participants may not be present at a given decision because they are somewhere else. Something may be overlooked because something else is being attended to. Decisions happen the way they do, in large part, because of the way attention is allocated, and “timing” and “mobilization” are important issues.

Decision makers appear to simplify the attention problem considerably. For example, they respond to deadlines and the initiatives of others. They organize their attention around well-defined options. Insofar as decisions about investments in attention are made consciously, they are delayed as long as possible. The simplifications do not always seem appropriate to students of decision making. Decision makers are often criticized for poor attention management. They are criticized for dealing with the “wrong” things, or for dealing with the right things at the “wrong” time. Short-run problems often seem to be favored over long-run. Crises seem to preempt planning.

1.3.2 Rational Theories of Information and Attention

Investments in information and attention can be examined using the same rational calculations used to make other investments. No rational decision maker will obtain all possible information (unless it has some direct consumption value—as in the case of rabid sports fans). Rational decision makers can be expected to invest in information up to the point at which the marginal expected cost equals the marginal expected return. The cost of information is the expected return that could be realized by investing elsewhere the resources expended to find and comprehend the current information. There are times when information has no decision value. In particular, from the point of view of decision making, if a piece of information will not affect choice, then it is not worth acquiring or attending to.

Since information is costly, rational decision makers can be expected to look for ways to reduce the average costs of attention, computation, calculation, and search. By assuming that actual decision makers and organizations do in fact make such efforts and are effective in optimizing with respect to information costs, information and transaction cost economists generate a series of predictions about the organization of communication, incentives, contracts, and authority. For example, they consider the possibilities for using other resources to “buy” time. Owners hire managers to act in their interests. Managers delegate responsibility to employees. Since agents may not know the interests of those who delegate to them or may not take those interests fully to heart, the use of agents incurs costs of delegation that are experienced in terms of time as well as money.

As a classic example of rationalizing information and its use, consider the design of optimal information codes. A rational code would be designed to minimize the expected cost of sending messages. People typically tell others to “yell if you’re in trouble” rather than to “yell as long as you’re okay.” Yelling takes energy and so should be conserved. Since “being in trouble” is a less likely state than “being okay,” energy expenditure is minimized by associating it with the former state rather than the latter. Similarly, if we assume the early American patriot
Paul Revere was an optimal code designer, then we know that he must have calculated the expected cost of alternative codes in signaling an attack by the British as they moved out of Boston. Under such assumptions, his code of “one if by land, two if by sea” tells us that he thought an attack by land was more likely than an attack by sea (assuming, of course, that he assumed the British would not know about his code).

Organizations use many specially designed codes for recording, retrieving, and communicating information. Accounting systems, human resource management systems, and inventory systems are examples. But the most familiar form of information code is a natural language. Languages and other codes partition continuous worlds into discrete states. Language divides all possible gradations of hues into a relatively small number of colors. Language recognizes a small set of kin relationships (a different set in different cultures) among the many relations that could be labeled. Insofar as a natural language can be imagined to have developed in response to considerations of the costs and benefits of alternative codes, it should make decision relevant distinctions easier to communicate than distinctions that are not relevant to decisions. Where fine gradations in colors are important for decisions, the language will be elaborated to reflect fine gradations. Where color distinctions are unimportant for decisions, they will tend to disappear.

It is not trivial to imagine a process of code development that will optimize a code or language, and it would not be overly surprising to observe suboptimal codes. Decision alternatives are often ambiguous, overlapping, and changing, as are costs and benefits. Decisions require tradeoffs across time and space that are not easy to make. And languages are likely to endure for some time after decision options have changed. Moreover, there are strategic issues involved. If codes distinguish possible actions efficiently from the point of view of a decision maker, they simultaneously provide a guide for the strategic manipulation of that decision maker’s choices. Since natural languages have evolved in the face of these complications, one speculation is that some puzzling elements of languages—particular their ambiguities, inconsistencies, and redundancies—are actually efficient solutions to the many ways in which the world does not match the simplifications of rational models of information.

Rational theories of attention, information, and information structures have become some of the more interesting and important domains of modern economics and decision theory. They have been used to fashion substantial contributions to the practices of accounting, communication, and information management. They have also been used to predict important features of organizational forms and practices. However, there is a kind of peculiarity to all such theories. Determining the optimal information strategy, code, investment, or structure requires complete information about information options, quality, processing, and comprehension requirements. It requires a precise specification of preferences that resolve complicated tradeoffs over time and space. In effect, the problem of limits is “solved” by a solution that presumes the absence of limits. Behavioral students of attention, search, and information have generally pursued a different set of ideas.

1.3.3 Satisficing as a Theory of Attention and Search

Rather than focus on rationalizing attention and information decisions, behavioral students of attention are more likely to build on ideas of satisficing. In its early formulations, satisficing was commonly presented as an alternative decision rule to maximizing. Emphasis was placed on the step function characteristics of the satisficing utility function. Actually, satisficing is less a decision rule than a search rule. It specifies the conditions under which search is triggered or stopped, and it directs search to areas of failure. Search is controlled by a comparison between performance and targets. If performance falls below target, search is increased. If performance achieves its target, search is decreased. As performance rises and falls, search falls and rises, with a resulting feedback to performance.

Thus, satisficing has close relatives in the psychology of decision making. The idea that decision makers focus on targets to organize their search and decision activities is standard. The “elimination by aspects” model of choice assumes that decision
makers do not engage in tradeoffs, they simply consider each criterion sequentially—usually in order of importance—and eliminate alternatives that do not exceed a threshold. The “prospect theory” of choice assumes that decision makers are more risk-averse when returns are expected to be above a target than when they are expected to be below a target.

FAILURE-INDUCED SEARCH

The most important step in a satisficing model of search is the comparison of achievements to targets. Decision makers set aspiration levels for important dimensions—firms for sales and profits, museums for contributions and attendance, colleges for enrollments and placements. Achievements are evaluated with respect to those aspirations. Failure increases search, and success decreases search. In a pure satisficing model, search continues as long as achievement is below the target and ends when the target is exceeded. A natural modification of the pure model would allow search to vary with the discrepancy between achievement and the target, with a decreasing effect as the discrepancy increases.

There are three principal features of satisficing as a theory of search:

1. Search is thermostatic. Targets (or goals) are essentially search branch points rather than ways of choosing among alternatives directly. They are equivalent to discrimination nets or thermostats; they begin and end search behavior. As a result, researchers frequently learn more about the real operational goals of decision makers by asking for their search triggers than by asking about their “goals.”

2. Targets are considered sequentially. A satisficing search process is serial rather than parallel; things are considered one at a time—one target, one alternative, one problem. Since decision makers generally act as though they assume a solution will be found in the neighborhood of a symptom of a problem, the first alternatives they consider tend to be local. If sales fall in Texas, then they look for the problem and the solution in Texas. In this way, order effects become important, and better alternatives are likely to be overlooked if inferior, but acceptable, alternatives are evoked earlier.

3. Search is active in the face of adversity. In many ways, standard decision theory is a passive theory. It emphasizes making the best of a world as it exists. Decision theory instructs decision makers to calculate the odds, lay the best bet they can, and await the outcome. Satisficing stimulates a more active effort to change adverse worlds. A satisficing decision maker faced with a host of poor alternatives is likely to try to find better ones by changing problem constraints. A maximizing decision maker is more likely to select the best of the poor lot.

SLACK

Satisficing theories of limited rationality assume two adaptive processes that bring aspirations and performance close to each other. First, aspirations adapt to performance. That is, decision makers learn what they should expect. Second, performance adapts to aspirations by increasing search and decreasing slack in the face of failure, decreasing search and increasing slack when faced with success.

Such theories predict that as long as performance exceeds aspirations, search for new alternatives is modest, slack accumulates, and aspirations increase. When performance falls below aspirations, search is stimulated, slack decreases, and aspirations decrease. Search stops when targets are achieved, and if targets are low enough, not all resources will be effectively used. The resulting cushion of unexploited opportunities and undiscovered opportunities—the difference between a decision maker’s realized achievement and potential achievement—is slack.

Slack includes undiscovered and unexploited technological, marketing, and cost reduction opportunities. It includes undiscovered and unexploited strategies. Variations in search intensity or efficiency result in variations in slack. Since knowledge about opportunities may not be shared generally within an organization, organizational slack resources may be preemptively expropriated by subunits. Some units may not work as hard as
However, the simple thermostat model of satisficing search captures some important truths. Failure-induced search, the basic idea of the model, is clearly a general phenomenon. Necessity is often the mother of invention, and decision makers threatened with failure often discover ways to cut costs, produce better products, and market them more effectively. Slack serves as a buffer, accumulating in good times and decreasing in bad times. The simple model of search, which involves comparing changing performance with a fixed aspiration, does not capture all that is known about satisficing search, however.

First, aspirations change over time, and they change endogenously. They are affected by the past performances of the particular individual or organization and by the past performances of those individuals and organizations perceived as comparable. In general, as performances improve, so do aspirations; as performances decline, so do aspirations.

Adaptive aspirations and have very general effects on organizations. The way they, along with failure-induced search, tend to bring performance and aspirations together has already been noted. When performance exceeds the target, search is reduced, slack is increased, and the target is raised. On average, this tends to reduce performance. When performance is below the target, search is increased, slack is decreased, and the target is lowered. On average, this tends to increase performance.

Thus the process of target adjustment can be seen as a substitute for slack adjustment. If targets adapt rapidly, then slack and search will not adapt rapidly, and vice versa. By virtue of the adaptation of aspirations, subjective definitions of success and failure (which control search behavior and—as will be developed later—both risk taking and learning from experience) depend not only on current performance but also on current aspirations for performance (and thus on a performance history).

Second, search is success-induced as well as failure-induced. When the presence of slack relaxes coordination and control pressures, decision makers are free to pursue idiosyncratic, local preferences. They may act opportunistically or imperialism. If they are members of an organization, they may assert
independence from the organization or may pursue linkages with outside constituents (professional organizations or community interests). These activities are forms of slack search, stimulated by success rather than failure.

Slack search differs in character, as well as timing, from search under adversity. It is less tightly tied to key objectives and less likely to be careful. It involves experiments that are, on average, probably inefficient, particularly in the short run, relative to the primary goals of a decision maker or organization. Most such experiments are probably disadvantageous, but they allow for serendipity, foolishness, and variation. The outcomes of slack search are likely to have a lower mean and higher variance than the outcomes of failure-induced search or institutionalized search. The possibility that such activities find a protective cover in the “waste” of slack plays an important role in an expanded theory of long-run adaptation.

Third, search is supply-driven as well as demand-driven. Search is a possible way of describing information acquisition in decision making, but the metaphor has its limits if search is seen as prospecting, seeking alternatives and information that lie passively in the environment. A significant feature of contemporary life is that information is not passive. In some circumstances, a better analogy for information acquisition might be to mating, where information is seeking users even as users are seeking information (for example, in the purchase of equipment). Or the proper analogy might be to hunting, where information is actively eluding information seekers (for example, military secrets) or where information “seekers” are actively eluding information sources (for example, investors and stock salespeople). In general, the market in information is a joint consequence of behavior by the recipient and behavior by the transmitter of the information. It cannot be understood without considering both sides of the transaction.

The general structure of an expanded model of satisficing search is sketched in Figure 1. It displays the close relations among changes in aspirations, changes in slack, and changes in search, the direct and indirect effects of slack on performance, and the exogenous effects of institutionalized search, supply-

side search, and the performance of others on the dynamics of the system.

UNDERSTANDING INNOVATION

It is possible to use the general ideas of satisficing search to speculate about the long-run dynamics of individual and institutional change: Do those who have been successful in the past
continue to be successful, or does success sow the seeds of failure? Do the rich get richer or poorer?

There are no simple answers to such questions. Both success and failure stimulate mechanisms that encourage subsequent success, and both success and failure stimulate other mechanisms that encourage subsequent failure. However, an important part of the answer to the stability of success depends on the richness of the search environment. Failure-induced search increases efficiency and reduces foolishness. Success-induced search introduces more risky alternatives. It tends to produce more distant search and introduces bigger changes with lower odds of success. The rich get richer if success-induced search (slack search) gives better returns than failure-induced search or if prior success was produced by either institutionalized search or supply-side search that continues.

In technologically mature worlds, success will tend to breed failure. Slack will produce inefficiencies and unproductive success-induced search. In technologically young worlds, on the other hand, success will tend to breed success. The specific innovation that will provide a breakthrough is hard to identify in advance, so there is a good deal of chance in the outcome from any particular innovation. But slack search provides the resources for relatively frequent experiments, thus increases the chance of an important discovery.

Will there then be persistent innovators? Assuming that all actors are competent, within the satisficing search theory major successful innovations are produced by foolishness, which in turn is produced by a combination of slack (thus success) and luck. Individuals or organizations must be foolish enough to look and lucky enough to find something. A few innovative ideas will be successful, thus marking the individuals and organizations involved as “innovative.” Success will lead to slack and thus to more foolish innovative ideas.

As a result, persistently successful organizations will tend to be more innovative than others. However, since most innovative ideas will not be successful, most innovators will not repeat their successes, and their resources will fall, leading them to produce fewer and fewer potentially innovative ideas. Thus, success in innovation increases the amount of innovative activity. By increasing the amount of innovative activity, it increases the likelihood of new success. But unless the pool of opportunities is rich, it may not increase the likelihood enough to pay the increased costs incurred by the search. Under those circumstances, it leads to long-term decline.

1.4 Risk and Risk Taking

As has been suggested above, understanding risk and risk taking is a serious concern of rational theories of choice. In fact, “risk” is sometimes used as a label for the residual variance in a theory of rational choice. The strategy is to assume that risk preference accounts for any deviation in observed behavior from the behavior that would be observed if decision makers had utilities for money that were linear with money and made decisions by maximizing expected monetary value. This strategy has some appeal for many formal theorists of choice and for many students of aggregate decision behavior.

Behavioral students of decision making are inclined to take a different route. They try to understand the behavioral processes that lead to taking risks. The emphasis is on understanding individual and organizational risk taking rather than fitting the concept into aggregate predictions. As a result, behavioral students of risk are more interested in characterizing the way variability in possible outcomes affects a choice.\(^*\)

The factors that affect risk taking in individuals and organizations can conveniently be divided into three sets:

1. **Risk estimation.** Decision makers form estimates of the risk involved in a decision. Those estimates affect the risk actually taken. If the risk is underestimated, decisions will reflect greater risk taking than is intended. If the risk is overestimated, decisions will reflect less risk taking than is intended.

2. **Risk-taking propensity.** Different decision makers seem to

\(^*\)This section draws from work done jointly with Zur Shapira.
have different propensities to take risk. In some choice theories, decision makers are described as having “preferences” for risk. Observations of risk taking suggest that the term “preferences” may incorrectly imply that individual risk propensities are primarily conscious preferences, whereas they appear to arise only partly through conscious choice.

3. **Structural factors** within which risk taking occurs. Both risk estimation and risk-taking propensity are affected by the context in which they occur. Features of organizing for decisions introduce systematic effects into risk taking.

### 1.4.1 Estimating Risk

Decision makers seek to form estimates of risk that are both technically and socially valid. Technically valid estimates are those that reflect the true situation faced by the decision maker. Socially valid estimates are those that are shared by others, are stable, and are believed with confidence. Neither technical nor social validity can be assured, nor can either be described as distinct.

**IMPROVING TECHNICAL VALIDITY**

Decision makers typically attribute uncertainty about outcomes to one or more of three different sources: an inherently unpredictable world, incomplete knowledge about the world, and incomplete complete contracting with strategic actors. Each produces efforts to reduce uncertainty.

**Inherently Unpredictable Worlds.** Some uncertainties are seen as irreducible, inherent in the mechanisms of the universe. For uncertainties that are thought to arise from inherently uncertain environmental processes, decision makers try to judge the likelihood of events. There are numerous studies of individual estimates of the likelihood of uncertain future events. In general, the studies indicate that experienced decision makers are by no means helpless when it comes to estimating future probabilities. They do rather well in situations in which they have experience.

On the other hand, the mental machinery they use to anticipate the future contains some flaws. For example, future events are rated as more likely to the extent that similar events can be remembered in the decision maker’s own past. This is one of the reasons why experienced decision makers do reasonably well in the domain of their experience. The sample from which they draw is related to the universe about which they make predictions. Biases are produced by differences between the universe of relevant events and the sample stored in memory.

Decision makers also assess the likelihood of an event by considering how closely it conforms to a prototypical image of what such an event would look like. Events are judged to be more likely to the extent they are “representative.” The most prototypical events are, however, not always the most frequent. In particular, decision makers tend to overlook important information about the base rates of events. Even though the greatest hitters in history were successful only about 40 percent of the time in their best seasons, there is a tendency to expect great baseball hitters to hit whenever they bat, because hitting is what is prototypical of great hitters. Similarly, although great designers produce exceptional designs only a few times in a lifetime, every failure of a great designer to produce a great design is experienced as a surprise.

There are indications that decision makers, in effect, seek to deny uncertainty by focusing on events that are certain to occur or certain not to occur and by ignoring those that are highly uncertain. This is accentuated by the tendency to round extreme probabilities either to certainty or to impossibility. Very few decision makers have the experience necessary to distinguish an event with a probability of 0.001 from one with a probability of 0.00001, although the difference is extremely large and, in some cases, critical.

**Incomplete Knowledge.** Decision makers tend to exaggerate their control over their environment, overweighting the impacts of their actions and underweighting the impact of other factors,
including chance. They believe things happen because of their intentions and their skills (or lack of them) more than because of contributions from the environment. This tendency is accentuated by success. As a result, although decision makers certainly recognize that some uncertainties are unresolvable, there is a strong tendency to treat uncertainty as something to be removed rather than estimated.

Some of these “avoidable” uncertainties are seen as a result of ignorance or lack of information, incomplete knowledge of the world. For uncertainties that arise from gaps or ambiguities in their knowledge of the environment, decision makers assume that uncertainty can be removed by diligence and imagination. They try to judge and, if possible, improve the quality of information. They have a strong tendency to want their knowledge about what will happen to be couched in terms that deny doubt. They are more likely to seek to confirm their existing information than to acquire or notice disconfirming information. For example, purchasing agents spend a few minutes forming an impression of a potential product, then devote the rest of their time to seeking information consistent with their initial hypothesis.

Since their strategies for understanding uncertain worlds involve forming firm estimates, decision makers appear to prefer stories to more academic information. They prefer information about specific cases to information about general trends. They prefer vivid information to pallid information. They prefer concrete information to abstract statistics. When confronted with inconsistent information, they tend to rely on one cue and exclude others from consideration.

Incomplete Contracting. Some uncertainties are seen as a result of incomplete contracting, the failure to establish understandings with critical people in the environment. Many of the other actors in the environment have interests at variance with those of any particular decision maker. Each decision maker acts on the basis of the probable actions of the others, knowing that they are doing the same. The resulting indeterminacy leads to intelligence systems designed to spy on the intentions of others. It leads to the pursuit of resources to remove dependence on them. And it leads to negotiations to bind others to desired future actions, rather than to efforts to predict them probabilistically.

The tendency to negotiate and control the environment rather than predict it is consistent with what has already been observed. Uncertainty is treated the same way any other problem is treated—as something to be removed. Decision makers seek control over the uncontrolled part of their environments. Deadlines and guarantees are more common than time-dependent or performance-dependent variable prices, and the latter are more common than time and performance gambles.

IMPROVING SOCIAL VALIDITY

Individuals, social systems, and systems of knowledge all require reasonable stability and agreement in understandings of the world. Without such social validity, decision makers may have difficulty acting, and social systems may have difficulty enduring. The social robustness of beliefs is threatened by the ambiguities of experience and meaning and by the numerous alternative interpretations of reality that can be sustained. Processes toward differentiation persistently break down tendencies toward agreement. Successes lead to decentralization and experimentation in beliefs; failures lead to rejection of beliefs and disagreement.

Countering these pressures toward heterogeneity and instability are an assortment of mechanisms fostering shared and stable estimates of risk. Experience is edited to remove contradictions. Individuals recall prior beliefs as more consistent with present ones than they are. Incongruous data or predictions are likely to be forgotten. Information is gathered to sustain decisions rather than change them. Beliefs are adjusted to be consistent with actions. They are shaped by the beliefs of others.

Preferences for vivid and detailed information and for redundant, overly idiosyncratic information fit this picture of augmenting robustness and building confidence. Detailed stories tend to be filled with redundant and arguably irrelevant information, thus probably inefficient and misleading from the standpoint of making more valid estimates of risk. Nevertheless, decision makers show a preference for detail. The mind's way of organizing reality is the way of organizing a story.
so far as the goal of the decision process is to see the world with confidence rather than accuracy, the double counting of evidence becomes an asset rather than a liability. In social contexts, this justification could possibly be explained as the confounding of social influence with personal preference, but the same kind of effect seems to occur even within individuals who are merely trying to justify their choices to themselves. Confidence increases with the amount of information processed, even though accuracy typically does not.

The view of decision makers as seekers of stable, shared estimates in which they can have confidence is consistent with research on reactions to alternative gambles. At one point, it was speculated that decision makers might be averse not just to uncertainty about outcomes but also to uncertainty about the probabilities of those outcomes. In fact, people seem to seek not certainty of knowledge but social validity. They actually reject clear bets in favor of those with ill-defined probabilities in domains where they feel their estimates and actions are based on valid beliefs. They avoid bets with ill-defined probabilities in domains where they lack such a sense of socially valid knowledge or competence.

1.4.2 Risk-Taking Propensity

The level of risk taking observed in organizations is affected not only by the estimation of the risk but also by the propensity of a risk taker to seek or avoid a particular level of expected risk. Consider four different understandings of risk-taking propensity: (1) risk-taking propensity as a personality trait, (2) risk-taking propensity as a reaction to targets, (3) risk-taking propensity as a reasoned choice, and (4) risk-taking propensity as an artifact of reliability.

RISK-TAKING PROPENSITY AS TRAIT

In one interpretation of risk-taking propensity, propensities for risk are described as individual traits. For example, in many theories of rational choice, particularly those in which risk is measured by nonlinearities in the utility for money, individuals are assumed to be risk-averse. They are assumed to prefer an alternative that will yield a given return with certainty to any alternative having the same expected value but some chance of higher and lower returns. The assumption of risk aversion is sometimes taken as an unexplained attribute of human beings, sometimes linked to an assumption of decreasing marginal utility of money, sometimes given a somewhat casual competitive advantage survival interpretation.

If people are risk-averse, it is argued, risk taking must be rewarded. Thus, it is expected that risky gambles will be accepted only if they have higher expected returns than those without risk, or, more generally, there should be a positive relation between the amount of risk in an investment and the return provided. The argument is impeccable if one accepts the risk-aversion trait assumption and an assumption that markets in risk are efficient. Such assumptions are not universally accepted, and direct observation often produces a negative correlation between risk and return. The assumptions seem to have somewhat greater merit in narrow finance markets than elsewhere—or at least somewhat greater acceptance.

Skepticism about a generic trait of risk aversion, however, does not preclude the possibility that any one individual has a risk-taking propensity that is stable over time but that propensities vary among individuals. In this interpretation, different individuals have different characteristic tastes for risk, some being inherently more risk-averse and some more risk-seeking. Those tastes for risk are seen as established relatively early in life and to be maintained as stable personality traits in adulthood.

The distribution of risk takers in a population (e.g. in a given organization), therefore, is assumed to be affected primarily by selection. Risk-averse people are assumed to select (and to be selected by) different professions and different organizations from those chosen by people more comfortable with risk. The people who become underwater welders or racing drivers will be different kinds of people from those who become postal workers or professors. Thus the solution to creating an organization with a certain “risk propensity” is to attract the right kind of people.
The evidence for variation among decision makers in individually stable risk-taking propensities is mixed, but it seems plausible to suspect that some such variations exist, that there may be consistent differences among people, even consistent differences among cultures or subcultures. However, the evidence also seems to indicate that, at least within a given culture, the risk-taking effects attributable to trait differences in risk propensity are relatively small when compared with other effects.

RISK-TAKING PROPENSITY AS TARGET-ORIENTED

In most behavioral studies of risk taking, individual risk-taking propensity is not seen as a stable trait of an individual but as varying with the situation. Probably the best established situational effect stems from the way decision makers distinguish between situations of success (or expected success) and situations of failure (or expected failure). Risk-taking propensity varies with the relationship between an individual's position and a target or aspiration level, and thus between contexts of success and failure.

When they are in the neighborhood of a target and confront a choice between two items of equal expected value, decision makers tend to choose the less risky alternative if outcomes involve gains, and the more risky alternative if outcomes involve losses. This is a relatively robust empirical result, true for college students, business executives, racetrack bettors, and small granivorous birds.

When individuals find themselves well above the target, they tend to take greater risks—partly because, presumably, in that position they have little chance of failing, and partly because they may be inattentive to their actions as a result of the large cushion. The risk-taking propensities of decision makers who are well below a target are more complicated, especially when their position puts them in danger of not surviving. On the one hand, as they fall farther and farther below their targets, they tend to take bigger and bigger risks, presumably to increase the chance of achieving their targets. On the other hand, as they come closer and closer to extinction, they tend to become rigid and immobile, repeating previous actions and avoiding risk.

Since falling farther from a target and falling closer to extinction are normally correlated, the effect of failure on risk taking appears to depend on whether decision makers focus attention on their hopes (organized around their aspiration level target) or their fears (organized around their extinction level).

These links between success (outcomes minus aspirations) and risk taking are complicated by two important feedbacks:

First, outcomes are affected by risk taking. At the least, decision makers who take greater risks realize a higher variance in their returns than those who take lower risks. In situations where risk and return are positively correlated, risk takers will, on average, do better than risk avoiders. In situations where risk and return are negatively correlated, risk avoiders will, on average, do better.

Second, aspiration levels (targets) adapt to outcomes. Success leads to higher aspirations; failure leads to lower aspirations. In general, adaptive aspirations tend to moderate the effects of success and failure by making very successful people less risk taking, and by making unsuccessful people less risk taking. Thus, adaptive aspirations smooth system performance and risk taking. Explorations of the dynamic properties and long-run competitive consequences of this system suggest that there are some survival advantages in variable risk preferences when combined with adaptive aspiration levels.

RISK-TAKING PROPENSITY AS CHOICE

In a third view of risk-taking propensity, risky behavior is treated not as a function of personality or of aspirations, but as a reasoned choice. In the spirit of the present chapter, individuals can be imagined as rationally calculating what level of risk they think would serve them best. Consider, for example, risk-taking strategy in a competitive situation where relative position makes a difference. Suppose that someone wishes to finish first, and anything else is irrelevant. Such an individual might want to choose a level of risk that maximizes the chance of finishing first. In general, strategies for maximizing the chance of finishing first are quite different from strategies for maximizing ex-
For example, suppose one were challenged to a tennis match and given the option of specifying the number of points in the match. Given a choice, how long a game would a rational tennis player choose to play, assuming that the length of the game itself had no intrinsic value? The key to answering this question lies in recognizing how the probability of outscoring an opponent depends both on the probability of winning any particular point and on the length of the game. As the length of the game increases, the better player is more and more likely to win, because the variability in outcomes declines with “sample” size (relatively rapidly, in fact). The game’s outcome becomes more and more certain, less and less risky.

Any disadvantaged player (i.e., any player who on average loses, for example, a weaker tennis player or a customer at a casino) increases the chance of reaching a positive outcome by decreasing the number of trials (that is, by increasing the sampling error or risk). That is one reason why better students might prefer majors, courses, and examinations with relatively little random error in their evaluations, and poorer students might prefer majors, courses, and examinations with relatively large random error.

Anticipating somewhat the spirit of Chapter 2, it is also possible to observe that individuals might make a reasoned choice of risk that depends not only on calculations of expected consequences but on fulfilling the demands of an identity. A culture might define appropriate risk behavior for different roles. For example, it is sometimes reported that teachers seem to expect (and observe) greater playground risk taking by boys than by girls. Rites of passage into different groups require different risk preferences. Similarly, managerial ideology contains a large number of recommendations about the appropriate levels of risk that should be assumed. Management is often defined in terms of taking risks, acting boldly, making tough choices, and making a difference.

RISK-TAKING PROPENSITY AS AN ARTIFACT OF RELIABILITY

Risks may also be taken without consciousness, as a consequence of decisional processes.
BIASES IN ESTIMATION OF RISK

The estimation of risk by decision makers is systematically biased by the experiences they have in organizations. Decision maker experience is not random but is strongly biased in at least two ways: Decision makers are characteristically successful in their past performance in the organization, and they rarely experience rare events. These two mundane facts produce systematic effects in the estimation of risk.

Success-induced Bias. Organizations provide a context of success and failure, both for individuals and for the organizations as a whole. Success and failure, in turn, affect the estimation of risk. Suppose that all outcomes are a mix of ability and luck (risk). Then biases in the perception of the relative contributions of ability and luck to outcomes will translate into biases in the estimation of risk. Any inclination to overattribute outcomes to luck will be associated with overestimating risk, thus with decreasing risk taking. Similarly, any inclination to overattribute outcomes to ability will be associated with underestimating risk, thus with increasing risk taking.

Research on individual attributions of causality to events indicates that success and failure produce systematic biases in attribution. Individuals are more likely to attribute their successes to ability and their failures to luck than they are to attribute their successes to luck and their failures to ability. They are likely to experience lucky successes as deserved and to experience unlucky failures as manifestations of risk. Persistent failure leads to a tendency to overestimate the amount of risk involved in a situation because of oversampling cases in which luck was bad. Persistent success leads to a tendency to underestimate the amount of risk involved because of oversampling cases in which luck was good.

Since organizations promote successful people to positions of power and authority, rather than unsuccessful ones, it is the biases of success that are particularly relevant to decision making. Success makes executives confident in their ability to handle future events; it leads them to believe strongly in their wisdom and insight. They have difficulty recognizing the role of luck in their achievements. They have confidence in their ability to beat the apparent odds. The same conceits may be found in organizational cultures. Successful organizations build a "can do" attitude that leads people in them to underestimate risk. This "can do" attitude is likely to be especially prevalent in young, successful high-growth organizations where the environment conspires to induce decision makers to believe they know the secrets of success. As a result, successful managers (and others who record their stories) tend to underestimate the risk they have experienced and the risk they currently face, and decision makers who are by intention risk-averse may actually be risk-seeking in behavior.

This organizational inducement of risk underestimation may, of course, be useful for the organization. On the one hand, it is a way of compensating for the negative effects of success and upward aspiration adjustments on risk taking. On the other hand, it is a way of inducing the individually self-sacrificing risk taking that serves the organization and the larger society. In situations where risks must be taken in order to be successful, most of those overconfident decision makers will undoubtedly fall prey to the risks they unwittingly face. But only the overconfident will be heroes. Actors in high-performance, quick-decision, high-risk professions (neurosurgery, air force pilots, investment bankers) all share a professional stereotype of being unusually confident. Overconfidence is still overconfidence and often leads to disaster, but in some situations organizations profit from the individual foolishness that unwarranted self-confidence provides.

Biases in Estimating Extreme Probabilities. As has already been observed, there appears to be a tendency for human subjects to assume that extremely unlikely events will never occur and that extremely likely events will occur. This tendency is accentuated by ordinary experiential learning in an organizational setting. Consider an event of great importance to an organization and very low probability. Individuals in the organization can be expected to estimate the probability of the event and to update their estimates on the basis of their experience.
Suppose, for example, that an event of great importance is so unlikely that it is expected to occur only once every hundred years. Examples might be a disaster in a nuclear power facility, an unprecedented flood, or a dramatic scientific discovery. The rare individual or organization that actually experiences a rare event will come to overestimate the likelihood of the event as a result of that experience. However, most individuals in most organizations will never experience such an unlikely event. As a result, experience will lead most individuals in most organizations to underestimate the likelihood of a very unlikely event.

The effects of this underestimation are twofold. First, in cases where the event being estimated is outside the control of the organization (e.g. natural disasters, revolutions), the underestimation leads to a perversity in planning. The tendency is for plans to ignore extremely unlikely events, to treat them as having no chance of occurring. When planning scenarios exclude extremely unlikely events, they tend to overlook (1) that many of these very unlikely events would have very substantial consequences if they were to occur, and (2) that although each one of these events is extremely unlikely to occur, the chance of none of them occurring is effectively zero. Predicting precisely which extremely unlikely event with important consequences will occur is impossible, but some such event will almost certainly occur. Yet plans tend to ignore all such events. As a result, plans are developed for a future that is known (with near certainty) to be inaccurate.

Second, in cases where the event being estimated is within the control of an organization, underestimating the likelihood of an extremely unlikely event may have perverse motivational and control consequences. Consider the case of “high-reliability” organizations (e.g. nuclear power plants, air traffic control systems, the space program), where organizations go to great lengths to avoid accidents—to manage the system so that an accident becomes an extremely rare event. In such high-reliability systems, most individual decision makers never experience a failure. They come to think the system is more reliable than it is. This exaggerated confidence in the reliability of the system is likely to lead to relaxation of attention to reliability and to a

Consider, similarly, research and development organizations looking for a rare discovery. Innovative breakthrough discoveries are extremely unlikely events. Most individuals in research never experience them. They come to think breakthroughs are actually rarer than they are. This reduces the motivation to seek such breakthroughs, and thus further reduces the probability.

Most individuals in these two situations learn over time to modify their estimates of risk in directions that are organizationally perverse. Individuals in high-reliability situations underestimate the danger of breakdown and, as a result, increase the danger. Individuals in breakthrough creativity situations underestimate the possibility of discovery and, as a result, reduce the likelihood. The two situations are not entirely parallel, however. The perversities involved in high-reliability are—at some substantial cost—self-correcting. Degradation of reliability leads to increasing the likelihood that individuals will experience a breakdown and recognize that they have underestimated the danger. On the other hand, the perversities in research are not self-correcting in the same way. Reduced motivation to seek discoveries leads to reduced likelihood of such discoveries, thus confirming the earlier underestimate.

**SELECTION ON INDIVIDUAL TRAITS**

Insofar as risk-taking propensity is an individual trait, the main way in which organizational risk taking can be affected is by affecting the entrance, exit, and promotion of individuals with particular risk-taking propensities.

**Who Enters? Who Leaves?** Entry into and exit from an organization are commonly seen as voluntary matchmaking and match-breaking, acts of deliberate consequential choice. In such a vision, a match is established or continued if (and only if) it is acceptable to both the individual and the organization. Thus, in effect, the match between an individual and an organization continues as long as neither has a better alternative. This hyper-simple rational model of entries and exits is, of course, subject to a variety of qualifications of the sort considered in this book. But as long as it is taken as roughly correct,
highlight a few features of the process by which individuals and organizations select each other.

In particular, it is possible to ask whether entry or exit processes are likely to be affected by risk-taking propensity. One possibility is that an organization systematically monitors risk-taking propensity and explicitly includes that consideration in its decisions to hire or retain an individual. If risk-taking propensity is observable, the only question is whether one would expect an organization to prefer risk seekers or risk avoiders. The most common speculation is that organizations, particularly those using formal hiring and firing procedures, tend to prefer risk avoiders to risk seekers. The argument is straightforward: Since big employment mistakes are more visible, more attributable, and more connected to the reward system than big employment triumphs, rational employment agents prefer reliable employees to high-risk ones. The argument is plausible, but very little evidence exists for gauging the extent to which it is true.

A second possibility is that organizations do not (or cannot) monitor risk-taking propensity but monitor other things that are, perhaps unknowingly, correlated with risk-taking propensity. For example, suppose employers seek competence. As they assess competence and secure it, they favor individuals who are able to gain and exhibit competence. Since an important element of competence is reliability—being able to accomplish something within relatively small tolerances for error—competence itself selects individuals by traits of risk-avoidance. Thus, unwittingly, an organization in pursuit of ordinary competence disproportionately selects risk avoiders.

Who Moves Up? If risk taking is considered to be a trait that varies from individual to individual, we need to ask not only which individuals enter or exit an organization but also which individuals move toward the top in a hierarchy. As before, it can be imagined that an organization has some preference for risk-seeking or risk-avoiding managers, monitors the behavior of candidates for promotion, and favors those who have the right traits. Also as before, the most common prediction is that (for reasons similar to those given above) an organization will tend to favor risk-avoiding managers for promotion. As a result, it is predicted that the average risk-taking propensity of higher-level managers will be less than that of lower-level managers.

Surprisingly enough, the small amount of information available to test the prediction indicates that the prediction is wrong. The average risk-taking propensity of higher-level managers appears to be somewhat higher than that of lower-level managers. One possibility is, of course, that organizations monitor risk-taking propensity and differentially promote managers who are prone to take risks. Alternatively, however, it is possible that risk-prone managers are promoted not because the organization consciously seeks risk-seeking executives but because it promotes those who do particularly well.

To explore how this might come to pass, consider the following simple model: Assume that there is a hierarchy within the organization, that there is competition for promotion, and that promotion is based on comparative reputation. Reputation is accumulated over a series of performances on the job. Each single performance on a job is a draw from a distribution having a mean equal to the individual’s ability level and a variance equal to the individual’s risk-taking propensity. Individuals accumulate reputations over a series of performances. Their reputations are averages of their realized performances. Whenever a vacancy occurs in the organization, the person with the highest reputation on the next lower level is promoted.

Let us assume that individual risk-taking propensity is a trait (individuals do not consciously choose to take risks, they are simply either risky people or cautious people), and that abilities and risk-taking propensities are independent. Then, as the size of the performance samples becomes very large, the reputations of individuals approach their true abilities. The assignment of individuals to levels is determined entirely by the relative abilities of employees. Average ability increases as you move up the hierarchy, and average risk preference is approximately equal at every level in the organization.

However, in real organizations performance samples are typically rather small. For very small performance samples (with
limited variability in both ability and risk-taking propensity), reputation no
longer depends exclusively on ability but is a joint
consequence of ability and risk-taking propensity. If the hierar-
chy is steep (that is, only a few people are promoted from one
level to another), the assignment of individuals to levels is heav-
ily dependent on risk preference. Average ability increases very
little as you move up the hierarchy, while average risk prefer-
ence increases substantially. Thus, a procedure that appears to
promote people on the basis of their abilities actually moves
them ahead on the basis of the amount of risk they take.

EXPERIENCE, LEARNING, AND RELIABILITY

If experience on a job leads to an accumulation of skills and
knowledge, then this cumulative knowledge should both in-
crease average performance and increase reliability, decreasing
the variance in the performance. As long as competition, pro-
motion, and order effects are relatively small, people with expe-
rience will be more likely to stay in a job and in an organization
because of their higher average performance, and the increased
reliability associated with longer tenure in a job should be man-
ifested in less risk taking.

Moreover, organizations are adept at cumulating experience
across individuals to increase both average performance and re-
liability. They use rules, procedures, and standard practices to
ensure that the experiences of earlier individuals are trans-
ferred to newer members of the organization. This process of
routinization is a powerful factor in converting collective expe-
rience into improved average performance. It is also a powerful
influence on reliability and should tend to make the average
level of risk taken by individuals within an organization decline
as the organization ages.

RISK STRATEGIES

In a competitive world, of course, the positive effects of increas-
es in the mean performance must be weighed against the (po-
tentially negative) performance effects of increased reliability.
Increasing both competence and reliability is a good strategy
for getting ahead on average. But finishing first in a large field
requires not just doing things others do well but doing some-
thing different and being lucky enough to have your particular
deviation pay off.

In particular, experience gains that increase reliability sub-
stantially and mean performance only a little (e.g. standardiza-
tion, simplification) are not good for competitive advantage
when the number of competitors is large. It may be no accident
that while experience (as reflected in years of prior work) and
knowledge of standard beliefs (as reflected by success in school)
are fair predictors of individual success in organizations
on average, very conspicuous success in highly competitive situ-
ations is not closely related to either experience or knowledge
as conventionally defined.

The competitive situation inside and outside an organization
affects optimal risk-taking strategies. Suppose that risk can be
chosen deliberately and strategically by individual decision
makers competing for hierarchical promotion (as above). Any
particular individual's reputation will depend on a sample of
performances, and the sample mean will depend on two things:
ability (which is fixed) and risk taken (which can be chosen). If a
hierarchy is relatively steep and reputations are based on rela-
tively small samples of performances, a low-ability person can
win only by taking high risks. But if low-ability persons take
high risks, the only way a higher-ability person can win in a
highly competitive situation is also by taking substantial risks. If
the level of risk can be taken arbitrarily to any level, anyone
who wants to get ahead will choose to take maximum risks. In
this situation there is no screening on ability at all. The "noise"
of risk makes it impossible to detect the "signal" of ability. The
average ability level will be approximately the same at all levels
in the organization, and the average risk preference at all levels
will be identical and high.

It should be observed that fluctuations in the importance of
risk taking for hierarchical promotion also have implications
for the selection of organizations by individuals. If individuals
who are ambitious for promotion can choose organizations
based on organizational characteristics, then high-ability indi-

1.4.4 “Risk Taking” and “Risk Preference”

The concept of “risk-preference,” like other concepts of preferences in theories of rational choice, divides students of decision making into two groups. The first group, comprising many formal theorists of choice, treats risk preference as revealed by choices and associates it with deviations from linearity in a revealed utility for money. For this group, “risk” has no necessary connection to any observable behavioral rules followed by decision makers. It is simply a feature of a revealed preference function. The second group, consisting of many behavioral students of choice, emphasize the behavioral processes by which risky choices are made or avoided. This group finds many of the factors in risk taking to be rather remote from any observable “preference” for taking or avoiding risk.

To be sure, decision makers often attend to the relationship between opportunities and dangers, and they are often concerned about the latter; but they seem to be relatively insensitive to probability estimates when thinking about taking risks. Although theories of choice tend to treat gambling as a prototypic situation of decision making under risk, decision makers distinguish between “risk taking” and gambling, saying that while they should take risks, they should never gamble. They react to variability more by trying actively to avoid it or to control it than by treating it as a tradeoff with expected value in making a choice.

Sometimes decision makers take greater risks than they do at other times, but ideas of risk, risk taking, and risk preference are all, to some extent, inventions of students of decision mak-
CHAPTER TWO

Rule Following

Chapter 1 portrayed decision making as resulting from intendedly rational calculation. Pure rationality and limited rationality share a common perspective, seeing decisions as based on an evaluation of alternatives in terms of their consequences for preferences. This logic of consequences can be contrasted with a logic of appropriateness by which actions are matched to situations by means of rules organized into identities. This chapter considers a perspective in which decision making is seen as resulting from rule following and the fulfillment of an identity.

2.1 Decision Making as Rule Following

When individuals and organizations fulfill identities, they follow rules or procedures that they see as appropriate to the situation in which they find themselves. Neither preferences as they are normally conceived nor expectations of future consequences enter directly into the calculus.
2.1.1 The Logic of Appropriateness

Rule following is grounded in a logic of appropriateness. Decision makers are imagined to ask (explicitly or implicitly) three questions:

1. The question of recognition: What kind of situation is this?
2. The question of identity: What kind of person am I? Or what kind of organization is this?
3. The question of rules: What does a person such as I, or an organization such as this, do in a situation such as this?

The process is not random, arbitrary, or trivial. It is systematic, reasoning, and often quite complicated. In those respects, the logic of appropriateness is quite comparable to the logic of consequences. But rule-based decision making proceeds in a way different from rational decision making. The reasoning process is one of establishing identities and matching rules to recognized situations.

2.1.2 The Familiarity and Centrality of Identities and Rules

Rule- and identity-based decision making is familiar to modern experience. Social systems socialize and educate individuals into rules associated with age, gender, and social position identities. Decisions are shaped by the roles played by decision makers—family roles, school roles, organizational roles. Individuals learn what it means to be a mother, a manager, a college student, or a man. Universities teach appropriate rules for members of professions. Individuals learn how a doctor or an engineer acts.

Rule following as a way of decision making is also familiar to theories of behavior. Economists and political scientists talk about the importance of institutions, anthropologists about culture and norms, sociologists about roles, and psychologists about identities, production systems, and schema. Each discipline, in its own way, sees decision making as organized by a logic of appropriateness.

Rules and identities are so obvious that they are more likely to be regarded as a context for behavior than as an interesting phenomenon in their own right. Not only do decision makers take them for granted, so also do observers. Within an ideology of choice, any detectable willfulness is exalted, no matter how circumscribed by rules. The stories told in history and journalism tend to glorify strategies of rational maneuver within the rules. They tend to ignore the rich processes by which identities and rules are created, maintained, interpreted, changed, and ignored. In that spirit, some rational theorists of choice treat rules as the outcome of a higher-order rational process. They endogenize rules by rationalizing them.

Students of rule following, on the other hand, tend to regard the rational model of choice described in Chapter 1 as simply one version of rule following associated with the identity of the decision maker. Rationality is a rule that requires decisions to be made consequentially. It is a common rule, so actions following its structure are also common, as are procedures that reassure actors and observers that rationality is being practiced. Within such conceptions, it is rule following that is fundamental. Rationality is derivative.

2.2 Rules, Identities, and Action

Rules and identities provide a basis for decision making in every aspect of life: in families, informal groups, markets, political campaigns, and revolutions. Individuals and social systems depend on rules and on the standardization, routinization, and organization of actions that they provide. From this perspective, any decision in any context can be seen as being shaped by identities and a logic of appropriateness.

Studying decision making within a rule-following frame involves a set of questions different from those that guide research on the logic of consequence: How are situations interpreted and recognized? How are organizational identities defined? How are those definitions and identities created and changed? How are they preserved and transmitted? How is the match between situations and identities made? Why are the rules what they are?
2.2.1 Rules and Identities in Organizations

The ubiquity of rules and identities can be illustrated by considering their role in formal organizations. Most people in an organization execute their tasks most of the time by following a set of well-specified rules that they accept as a part of their identity. This is true of doctors in hospitals, workers on assembly lines, sales representatives in the field, teachers in a classroom, and police officers on a beat. It is also true for those people in organizations whose tasks primarily involve making decisions. Organizational rules define what it means to be an appropriate decision maker.

There are rules about what factors are to be considered in decisions (e.g., return on investment); who has access to a decision process; and how decisions should be timed, reported, and justified. Examples include hiring the applicant with the highest test scores or setting price by totaling costs and adding 40 percent. There are rules controlling information flows and use, specifying how it should be gathered and who should gather it, how it should be summarized and filtered, how it should be communicated and to whom, and how it is to be stored and for how long. Examples are admonitions to go “through channels” with a particular request, or rules about the appropriate forums for announcing meetings or job positions. There are rules specifying the criteria to be used to assess and monitor performance. Examples are performance standards such as production plans and personnel performance contracts.

Organizations select individuals with preexisting identities and rules. When an engineer, machinist, clerk, or truck driver is hired, the organization hires those identities, mixed as they are with an assortment of other identities that any one individual accepts—parent, friend, member of an ethnic or religious group. Organizations also define identities specific to themselves, train individuals in them, and socialize individuals to adopt the identities as their own. Formal and informal organizational rules are woven into, utilize, and help define organizational identities and roles. Tasks are organized around sets of skills, responsibilities, and rules that define a role. Roles and their associated rules coordinate and control organizational activities.

Organizations also have identities. For an organization to be a proper business firm, or a proper military unit, it must organize and act in a particular way. Organizations are described in terms of their legal structures, their national or regional characters, their technological configurations, and sets of individual identities. As organizations seek to confirm such descriptions, they frame organizational forms and procedures in ways consistent with them. They achieve standing as legitimately representing what they are.

To say that individuals and organizations follow rules and identities, however, is not to say that their behavior is always easily predicted. Rule-based behavior is fraught with uncertainty. Situations, identities, and rules can all be ambiguous. Decision makers use processes of recognition to classify situations; they use processes of self-awareness to clarify identities; they use processes of search and recall to match appropriate rules to situations and identities. The processes are easily recognized as standard instruments of intelligent human behavior. They require thought, judgment, imagination, and care. They are processes of reasoned action, but they are quite different from the processes of rational analysis.

2.2.2 The Concept of Identity and Individual Action

The logic of appropriateness is tied to the concept of identity. An identity is a conception of self organized into rules for matching action to situations. When Don Quixote says “I know who I am,” he claims a self organized around the identity of “knight-errant.” When an executive is enjoined to “act like a decision maker,” he or she is encouraged to apply a logic of appropriateness to a conception of an identity.

Individuals describe themselves in terms of their occupational, group, familial, ethnic, national, and religious identities.
Identities are both constructed by individuals and imposed upon them. Creating or accepting an identity is a motivational and cognitive process by which order is brought to the concept of self and to individual behavior. It involves learning to act in a particular way. Identity development is a part of individual development, closely linked to the development of language and to an understanding of the physical and social environment.

**INDIVIDUALIZATION AND SOCIALIZATION**

Conceptions of identity are embedded in a broader cultural context. In many of the cultures found in the United States, for example, defining an identity is pictured as ultimately a task of *individualization*. Individuals are assumed to be independent and unique, defined by the complex assortment of behaviors and roles that they endorse. Identity is seen as a matter of “self,” and the metaphors of self are metaphors of discovery and creation. Such expressions as “finding oneself” or “being in touch with oneself” are common. In this process of creation, individuals are encouraged to take an active role in deriving their identities from observations of their own behavior or their internal thoughts, emotions, or motivations. They are seen as struggling to differentiate their identities from others (particularly parents and other figures of authority and convention) by exhibiting distinctive dress, behavior, and thoughts.

Alternatively, identities can be seen as arising from a process of socialization into socially defined relationships and roles. Individuals are taught how to behave as proper accountants or proper soldiers. They learn the rules of accountancy or warfare. They are taught appropriate codings of situations and appropriate responses to them. Educational systems, religions, and legal systems spend a great deal of time educating people on the meaning of identities and on applications of principles of proper behavior to specific life situations.

In a socialization perspective, identity is adopted or imposed rather than discovered or created. The imagery of self is less inclined to emphasize being true to idiosyncratic individual goals and desires, and more inclined to emphasize being true to important relationships and cultural expectations. Individuals see identities as establishing and celebrating their ties with others and their place in a social order of relationships that they honor. Attention is directed outward toward real or imagined groups rather than inward toward individual opinions, abilities, and judgments. Identities shift from situation to situation as each situation highlights a different set of relationships.

The differences between the metaphorical images conjured by these two visions of identity formation are important. In the image of individualization, actions are imagined to arise from self-imposed standards or self-selected roles and rules. In the image of socialization, actions are imagined to arise from learned obligations, responsibilities, or commitments to others. Thus the first perspective, even though it emphasizes the ways identities constrain behavior, portrays identities as in some sense chosen voluntarily. The second perspective sees identities as followed, but not chosen.

The differences are important, but they are as much statements of alternative ideologies as they are alternative descriptions of the world. Most studies of identity formation report an interaction between processes of individualization and processes of belonging. Particular cultures may glorify one or the other side of this interaction, both in their behavior and in their theories of that behavior. But more “individualistic” cultures exhibit strong effects of socialization, and more “social” cultures exhibit strong elements of individual deviance. Moreover, the two are intertwined. As many parents and children in many cultures can testify, the process of adolescent identity formation and revolt is a complicated mixture of individualistic differentiation and socialization into group conformity.

**THE SOCIAL BASIS OF IDENTITY**

Someone who says, “I am a good accountant. I do what good accountants do,” is making a statement that is both a confirmation of an individual identity and a recognition of the social basis of individual action. Individuals adopt rules of behavior from families, schools, religious groups, age cohorts, and com-
panies. They build their own understandings of themselves using socially based distinctions. As collections of individuals define and solve problems posed by their environments, they develop shared rules for behavior and shared attitudes toward experience. Those rules and attitudes are organized in terms of social roles or identities from which individual identities are formed. Being a “good accountant” means knowing, accepting, and following a variety of socially constructed and maintained rules that control individual behavior in considerable detail. The individual self is drawn using social templates.

Socially defined identities are templates for individual identities in three senses. First, they define the essential nature of being an accountant, or manager, or plumber, permitting individuals to deal with identities as meaningful things. In this sense, identities are like other labels through which cognition is organized. Individuals in a society distinguish a police officer from a postal carrier in much the same way they distinguish a dog from a cat—by looking for properties and actions that are associated with the label. Recognizing a dentist involves knowing how dentists behave and associating observed behavior with that role. Being a dentist involves knowing how dentists behave and acting appropriately.

The second sense in which social identities are templates is that they are prepackaged contracts. Individuals accept them in return for receiving things they value. Groups facilitate the construction of an identity by rewarding behavior consistent with the definition of the identity and penalizing inconsistent behavior. The social specification of what it means to act as an accountant details the terms of the contract by which an individual agrees to assume the accountant role. An individual agrees to behave in a way consistent with the socially defined identity in order to gain certain compensation. The “compensation” will often be monetary in an organizational setting, but it need not be. Individuals also accept identities as long as they receive group approval or love in return. In particular, social acceptance of an individual as a legitimate accountant (father, teacher, etc.) may be precious not only to individual self-esteem but also to the ability to function effectively. Decision makers who fail in their contractual obligations are likely to lose legitimacy and authority.

In principle, contractual identities could be idiosyncratic—everybody’s job could be unique. More commonly, however, identities are, at least to some extent, standardized. The social standardization of identities makes them well-defined clusters of reliable rules, building blocks of a social system. Standardized identities simplify thinking about the structure of an organized system, and they simplify implementing it. They simplify labor markets and management. They simplify education and training. Consider, for example, the dependence of a traffic system on the socially standardized identity of a “proper driver.”

The third sense in which social identities are templates for individual action is that they frequently come to be assertions of morality, accepted by individuals and society as what is good, moral, and true. An individual “internalizes” an identity, accepting and pursuing it even without the presence of external incentives or sanctions. The identity is protected by a conscience and by such emotions as pride, shame, and embarrassment. Social reactions to inappropriate behavior include accusations of immorality and lack of propriety. Shame and guilt are important components of social control based on a logic of appropriateness. Decision makers can violate a logic of consequence and be considered stupid or naive, but if they violate the moral obligations of identity, they will be condemned as lacking in elementary virtue. Among other things, the fact that logics of appropriateness are imbued with such moral content increases the emotionality of decision making.

INCENTIVES AND THE INTERNALIZATION OF IDENTITIES

There is a complicated relationship between the provision of incentives for following rules associated with identities and their internalization. On the one hand, there is a strong tendency for individuals (and organizations) to accept identities that are easy or rewarding to perform—that confirm their competences. As learning and experience increase competence at an identity, they simultaneously increase the likelihood of internalization of
the identity. People are likely to internalize roles and rules that they fulfill effectively more than those that they do not. Professionals who feel competent in their profession are more likely to internalize the norms of the profession. Individuals are likely to regard those identities in which they or their friends excel as more important than others.

In hierarchical organizations, for example, top-level executives have experienced their own competence in decision making and tend to internalize the role of decision maker. They are likely to think of themselves as decision makers. They act appropriately as decision makers because they have come to believe that the proper way is not only a way to gain social approval but also a way to conform to their own standards. On the other hand, individuals who have experienced failures in decision making, or who lack experience at it, are less likely to have internalized the role. As a result, experienced, successful decision makers become socially more reliable in their decision making, and inexperienced, unsuccessful decision makers become less reliable.

Since competence leads to internalization of an identity and its rules, one might be tempted to speculate that any rewarded identity will tend to be internalized, that contractual identities inexorably become internalized identities. Such a speculation is not, in general, true. If anything, the data seem to support a “conservation of motivation” hypothesis: The extent to which an identity is internalized (at least in the short run) is inversely related to the strengths of external incentives provided for adopting it. As individuals observe and interpret their own behaviors, they construct internal motives (internalized identities) where coercive external motives (contractual identities) are inadequate to account for their behavior. Strong external threats or dramatic rewards can be used to explain behavior without the need of internal commitment, so fail to stimulate internalization. Internalized identities are likely to be imagined (and thus formed) where external incentives are weak.

Studies of commitment seem to show that internalization of identities is associated with the development of internal interpretations of one's own behavior rather than directly with incentives. One standard strategy for increasing the internalization of an identity is to highlight the identity implications of a certain (typically small) behavior. People are asked, for example, to sign a petition to show they are ecology- or community-minded. The act is minor, but the interpretation of being a certain kind of citizen is made explicit by outsiders. This is, of course, usually in the context of being rewarded for being that kind of citizen, but the key strategy is not rewarding behavior but rewarding an interpretation of identity. Later, a much larger favor requiring a larger sacrifice is solicited. People are willing to engage in a much more onerous task in order to avoid violating their new identity.

Such strategies are often effective. Children are more likely to clean up their classrooms after having been induced to think of themselves as the kind of people who maintain clean places than after being threatened for being unclean. This is a kind of character change by grace: bestowing on an individual an identity that he or she values but has not earned, in hopes that external confirmation of an identity will lead to its acceptance and fulfillment. Treat the statue of a young woman as the woman herself and it will come to life.* There are limits to Pygmalionic magic, of course. Like most strategies, strategies of interpretation are well known and often detected as manipulative. Even when an interpretation is accepted, its ultimate stability depends on experiential confirmation, so interpretations that are totally unrealistic will be eroded by subsequent disconfirmation. Since experiential disconfirmation itself is subject to interpretation, Pygmalionic identities can be protected by defining them ambiguously (at the cost of making their mandates less precise also).

For now, however, the strategic elements of identity formation are less important than an awareness of the interplay of social processes that shape individual and collective identities. Identities are created by external incentives and sanctions, by senses of competence or autonomy, and by learning the accepted meanings of roles. Identities are socially constructed con-

*With a little help from Aphrodite, of course.
tracts, motives, and cognitions that connect to organizational rule structures. And this fine tapestry of obligations controls much of what is called decision making.

2.2.3 Which Identity? Which Situation? Which Rule?

To make decisions within a logic of appropriateness, decision makers need to be able to determine what their identities are, what the situation is, and what action is appropriate for persons such as they in the situation in which they find themselves. Most decisions could call up a number of relevant identities and rules, and attention is as important in rule following as it is in consequential action. When reminded of the role of citizen, a decision maker may well act in a way that is different from the way that results from being reminded of the role of family member. Motivational, cognitive, and organizational factors all play a role in evoking one identity or rule rather than another. Likewise, since identities and rules rarely specify everything unambiguously, motivational, cognitive, and organizational factors play a role in determining behavior within the identities and rules evoked.

MULTIPLE IDENTITIES, MULTIPLE RULES

The singularity of the term “identity,” along with various popular enthusiasms for personal integration and consistency, leads to a tendency to imagine an internally coherent self—“a well-rounded and integrated personality” in which actions reflect stable and consistent qualities of the actor’s identity. In fact, of course, any particular actor has multiple identities, not just one. The self is a collection of incompletely integrated identities.

The problem of multiple identities is well known to the literature on human behavior. A decision maker is a parent as well as a police officer, a friend as well as a physician, a lover as well as a woman. The apparent inconsistency between the variety of roles accepted by any one individual and the concept of a coherent self is mitigated by having the multiple identities of any one individual fit together in a mutually supportive way. Such integration is accomplished partly by clustering consistent identities and partly by interpreting any one identity with a consciousness of the others. Openness in the meaning of being a “decision maker” allows that identity to be made consistent with different other roles at different times.

Although the collection of images that constitute a personal identity achieves a limited amount of structure, the self is not a seamless whole. An individual is likely to have sets of diverse self-images, which shift and alter as the context shifts. More peripheral aspects of the self are less elaborated, less frequently evoked, and less burdened with requirements of consistency than are more central aspects. They may be developing and tentative rather than fully accepted. The pursuit of appropriateness involves experimentation with new identities, inconsistency, and “self-discovery.”

In a similar fashion, the rules of an identity are rarely unique or precise. The same identity may evoke inconsistent rules. A parent is expected to be firm and loving. A decision maker is expected to be thoughtful and decisive. The same set of standard operating procedures may mandate and forbid the same behavior. Good practice may be vague, particularly in new domains.

EVOKING IDENTITIES AND RULES

Not all parts of an individual’s identity are available at the same time. Different behavior, different attitudes about the self and others, and different motivations may be invoked in different environments or different relationships. Accountants do not act like accountants in all situations, nor do men see “manliness” as equally relevant to all situations. Seemingly subtle environmental changes have a strong impact on behavior. Seemingly clear constraints on behavior can be overcome. For example, in experimental settings, ordinary people have proved themselves willing to deliver electric shocks to other people when instructed in such a way as to evoke a role consistent with such an action.

In the same way, not all potentially relevant rules are evoked. Some rules are overlooked. Noticing the relevance of identities
or rules in a situation comes from an interaction among at least four common psychological mechanisms. The first mechanism is experiential learning. Individuals learn to evoke (or not to evoke) an identity in a situation by experiencing the rewards and punishments of having done so in the past. Identities with which they have had extensive positive experience are more likely to be evoked than will those with less extended or less positive experience.

The second mechanism involved in evoking identities and rules is categorization. Responses to situations tend to be organized around a few central conceptions of identity. Central aspects of the self are likely to be evoked more frequently and maintained more consistently than others. Thus, people who always see the world in terms of competition are likely to see the central categorizing feature of a situation to be its competitive character, while others may focus on other categorizing features. Individuals judge others on identities that are central to their concept of themselves. They process information about central identities more quickly and in larger chunks. In dealing with a central aspect of their conception of self, they are likely to elaborate more information and to draw more extreme conclusions about their behavior and the behavior of others. Individuals with single-category taxonomies for classifying the world exhibit behavior that is less dependent on the process of evoking (and presumably less carefully calibrated to the world) than do people with richer taxonomies.

The third mechanism is recency. Identities and rules that have recently been evoked are likely to be evoked again. This leads to intertemporal and intersituational stability, which may create problems. An individual who has been working in the role of executive all day carries that identity over into the role of spouse when she comes home. An individual who has been negotiating a tough contract as an antagonistic lawyer carries that identity over to the role of diner in a restaurant or driver on a highway.

The fourth mechanism is the social context of others. The real or imagined presence of others highlights social definitions of identities and situations rather than personal ones and leads to closer conformity to social expectations. For example, evoking an identity that emphasizes the presence of others leads people to use a norm of equality in distributing rewards, while a focus on self leads them toward norms of “equity” or “fairness.” Distinctiveness is a social setting also evokes identities. A single redhead in a crowd of others is likely to focus on hair color as a salient characteristic. One or two younger people are likely to notice their youth in a group of older people. The first-order effect is for distinctive people to become more aware of their own identities. The second-order effect is for this identity confirmation and differentiation among the small group to evoke the dimension of difference in the predominant group.

ORGANIZATIONAL FACTORS IN THE USE OF IDENTITIES AND RULES

Social institutions, such as formal organizations, play important parts in organizing the application of identities and rules to situations. Organizations shape individual action both by providing the content of identities and rules and by providing appropriate cues for invoking them. They not only define appropriate behavioral rules to attach to appropriate identities (teaching recruits how a proper manager or a proper professor behaves in a wide variety of contexts) but also structure the occasions for evoking one identity or rule or another. The boundaries between organizations and the outside world and among subunits in an organization regulate the awareness of inconsistencies in individual identities and rules.

The organized structure of identities and rules is not static but changes in response to external and internal pressures. For example, in recent years many organizations in the Western world have struggled with the complexity of moving from a segregation of work, gender, and familial identities to various forms of greater integration. In the process, familial, gender, and organizational identities have been reconstructed, the procedures for evoking them have been changed, and ideologies about proper solutions to problems of multiple simultaneous identities have been redefined.

Providing Models. Much of the formal and informal training that occurs in an organization is training in defining identities.
categorizing situations, and applying appropriate rules. This training involves providing models, exemplars of proper behavior. New workers and managers model themselves after more experienced ones. They imitate. They emulate. They learn. Every organization, as every society, provides leaders, teachers, and priests who serve in positions that are socially highlighted to model prototypical behavior and to save others the trouble of deriving it. The modern term is “mentoring,” a concept that combines the cognitive and motivational aspects of modeling identities.

As individuals seek models for their own identities and behavior, they draw from the organization’s repertoire of examples. They also rely on organizational interpretation of the models. Rules of appropriate behavior are supplied with concrete meaning in concrete situations through elaboration and clarification within an organization. Decision makers coach decision makers and seek coaching. Social workers seek to understand the implications of their identities by talking with their clients and with other social workers.

Providing Cues. Organizations can be pictured not as writers of contracts and providers of incentives, but as writers of scripts and providers of cues and prompts. Organizations are stage managers. They provide prompts that evoke particular identities in particular situations, and they organize the temporal and spatial cues to minimize identity inconsistencies. They manage conflict not by arranging negotiation and bargaining but by managing attention. They reduce the chance that conflicting identities will be evoked at the same time and place by highlighting shared identities at appropriate times.

Organizations highlight identities through language, providing appropriate labels for people (“Mr. President,” “Doctor,” “Boss”) and situations (“This is an engineering ... finance ... human resources ... managerial problem”). Group members use acronyms and jargon to define their community, and formal and informal language to define situations (e.g. using different terminology in a meeting as opposed to a chat at the lunch table). They also use dress to invoke appropriate roles for both organizational participants and outsiders who interact with organizational members. Common uniforms signal a common fate and may smooth even unpredictable and unscriptable encounters. A doctor’s uniform is a marker and a reminder of one’s identity as a physician. It also reminds patients of their roles as patients. The act of putting on or taking off “work clothes” thus brings different identities to the surface.

Organizations remind people of their situation by landscaping: Formal locations (e.g. boardrooms) are constructed as a reminder of the appropriateness of formal behavior. Changes in geography invoke different rules. The behavior of a laboratory scientist changes as the scientist moves from the workbench to corporate headquarters. Features of location and physical space are used to segregate personal lives and their associated identities from organizational lives and identities.

Providing Experience. An organization is an arena in which identities and rules are exercised. Identities are evoked, rules are followed, results are monitored. Experience with pursuing an identity produces learning, by which the rules of identity are changed. The experiences are managed to stabilize a consistent set of identities within any given organization. The management is, however, never complete. Experience also develops norms, rules, and identities that thwart managerial control, sharpening their effectiveness through trial and error and differential survival. The experiential elements of rule development are elaborated briefly later in subsections 2.3.3 and 2.3.4.

2.2.4 Violations of Rules

Most of the time behavior follows the rules. At the same time, it is hard to imagine a social system without violations of rules. Rules are overlooked or ignored. Decision makers do things they are not supposed to do, and they fail to do things that they are supposed to do. Sometimes violations of rules involve large numbers of individuals. Sometimes they involve single, isolated cases.
IGNORANCE, INCONSISTENCY, AND INCOMPATIBILITY

Many deviations from rules are unintentional. Decision makers may lack the ability to follow the rules because of lack of resources or competence. An action may be mandated without the resources required to make it possible, particularly when an action is mandated by one set of authorities and resources are provided by another. Decision makers may be unaware of rules, particularly where the number and complexity of rules is great. The rules may be ambiguous, particularly when they are new or are the result of political compromises.

Many deviations from rules are necessitated by inconsistencies among them. If every situation evoked one and only one identity and every identity evoked one and only one rule, rule-based decision making would be more routine than it is. Situations often evoke several identities or several rules. Sometimes there is clear conflict between the demands of alternative identities. When national interests conflict with class interests, a worker may have a problem. When the demands of work roles conflict with the demands of family roles, a family member may have a problem.

Rules may be imposed by legitimate but independent authorities, as in the conflict between institutional rules and professional standards or the conflict between auditing rules and performance rules. Decision makers may be faced with deadlines that are inconsistent with required procedures. They may be required both to engage in widespread consultation and to maintain secrecy. Violations of rules due to inconsistent demands will increase as rules multiply and become more complex, where devices for coordination are weak, and where independent authorities have the right to impose rules (e.g. company rules versus professional rules in the accounting industry).

Not all deviations from rules are unintentional or the result of inconsistency in rules, however. Many are deliberate, conscious violations of known rules. Rule making and rule enforcing sometimes involve different coalitions. They address different interests and require different mobilization patterns. The forces that have adopted a rule may be different from the forces that are asked to implement it. Political winners characteristically have a greater stake in the observance of rules that result from a political process than do political losers. The losers are likely to believe that the rules are inappropriate. They may want to continue the political debate through the implementation process. They may be upset by their defeat and want to create trouble.

The conflict of interest of politics is not, of course, the only conflict of interest involving rules. One of the most common reasons for rules is the expectation that individuals might not act “correctly” because it is not in their personal self-interest to do so. In the modern literature, this problem is often labeled “incentive incompatibility” between principals (in this case the ownership, management, or governing body of the organization) and agents (in this case the individual members or workers). Incompatible rules produce similar conflicts. Agents pursuing their own identities and rules may act in ways that are inconsistent with their principals’ identities and rules. For example, professional ethics may conflict with organizational profits.

TOLERANCE, COLLUSION, AND CORRUPTION

Sometimes rule violations are justified or sanctioned (even demanded) by an organization or the larger society. Sometimes tolerance for deviation stems from a belief that flexibility is advantageous. Rules cannot fit every situation, and there is need to “fine-tune” them to meet the demands of a variable environment. Knowing when to bend the rules is one of the hallmarks of an experienced decision maker. Tolerance for rule violation is a form of delegation to individuals who have a more refined capability for accomplishing the intent of the rule in a special case. Organizations also allow variation in interpreting rules in order to experiment with what they might come to mean.

Violations in the name of effectiveness are more likely when the rules are relatively rigid than when they are easily changed. They are more likely when it is possible to point to performance measures that demonstrate the good sense of ignoring rules
than where accepted performance measures are lacking. Thus, the bending of rules should be more prevalent in young organizations than in older ones, more prevalent in business organizations than in public organizations.

Social systems also may ignore cheating because rules are less designed to control behavior than to proclaim virtue. “Winking” at violations of virtuous but bothersome rules serves the social function of maintaining the shared values of the system while avoiding the costs of living up to them. In such cases, a social system is likely to be particularly tolerant of cheating if the violations are private. In many such cases implicit, informal agreements are made to accept rule breaking. Participants, in effect, agree that even though not everything is what it appears to be, and even though the parties know it, no party wishes to acknowledge the discrepancy. This kind of hypocrisy preserves the rules, sustains the sense of community within the social system, and allows accommodation to pressures for rule flexibility.

Sometimes this tolerance of variability is less benign. It reflects a way of placing individual actors “at risk.” When individuals must violate one rule to serve another, or are allowed to violate rules in order to accomplish personal or group objectives, they are made vulnerable to a subsequent accusation of rule violation. Disparities between the rules that are espoused and the rules that are observed make any significant decision maker liable to exposure and disgrace. In this way, organizations gain a modicum of control over members who are constantly vulnerable by virtue of being in violation of some rule. The possibility of delicate (and often not so delicate) blackmail of this sort is a common feature of modern life.

2.3 Rule Development and Change

Much of the research on rule-based decision making treats rules, forms, procedures, and practices as given. The research identifies decision heuristics, standard organizational practice, or institutionalized norms and explores the implications of those rules for decision behavior. It elaborates how behavior is molded by rules, how decision makers operate within rules, and how they deal with uncertainties about rules. That strategy was reflected in section 2.2.

Examining how rules are evoked, interpreted, and used is, however, only part of the story. The logic of appropriateness is a logic attached to an evolving conception of propriety. Decision makers follow rules, but the rules change. Identities endure, with individuals learning and pursuing the rules of behavior consistent with the roles, but the rules themselves change through a mixture of analysis, negotiation, learning, selection, and diffusion. As the rules change, decision making behavior changes. As a result, the study of rule-based decision making is not only a study of how identities and situations are defined and how rules are applied but also a study of rule development. Since identities and roles are social constructions, developed within a context of other decision makers and historical experience, understanding the actions of any particular decision maker involves understanding how those social and historical contexts have molded them and how the continued unfolding of history will mold them in the future.

How is the process by which rules come to exist to be understood? How are rules modified as a result of experience; as a consequence of observing the rules used by others; as a result of deliberate strategic action; as a result of political conflict? How are rules maintained in memory and transmitted to new cohorts of decision makers? How does the distribution of rules change over time as a result of differential survival and growth of institutions? In short, how do the rules come to be the way they are?

2.3.1 Alternative Visions of How Rules Change

Identities and rules change as part of the process by which institutions adapt to their environments. The idea that individuals, institutions, and their environments adapt to each other is central to many modern theories of behavior. Such theories presume that individuals and institutions survive and prosper as their standard practices come to match environmental requirements. In the case of an institution, those requirements include both the demands of an institution’s internal structures and
coalitions and the demands and opportunities of the external world.

Rules and their environments adapt to each other by means of several intertwined processes:

1. **Analysis**, through the anticipation and evaluation of future consequences by intentional decision makers
2. **Bargaining**, through negotiation, conflict, and compromise among decision makers with inconsistent preferences and identities
3. **Imitation**, through the copying of rules, practices, and forms used by others
4. **Selection**, through differential birth and survival rates of unchanging rules and the decision making units that use them
5. **Learning**, through experience-based changes of routines and of the ways routines are used

Those are the processes by which identities and rules come to anticipate the future or reflect the past. Analysis is forward looking. Theories based on analysis as the primary mechanism of adaptation presume that rules reflect expectations of the future. Selection and learning are backward looking. Theories based on selection or learning presume that rules reflect history. Bargaining is either forward looking or backward looking (or both), depending on the bases of the behavior of the bargainers. Imitation is either forward looking or backward looking (or both), depending on the bases of the behavior of those who are imitated.

2.3.2 Capturing the Future: Plans and Contracts

Much modern thinking about decision making presumes that the expectations and willful actions of human beings enact the future in the present. The presumption is reflected in theories of rational action and power, including theories of strategic action. Rational actor models explain adaptation in organizational rules and form as a result of the preferences of actors and their calculations of future consequences. In this view, actors compete for resources and adjust rationally to each other’s strategies over time. Identities, rules, and forms change as a result of a consequential action in the context of competition. From this perspective, individuals and groups create rules consciously as instruments of control. They construct identities and conceptions of proper behavior in order to control the actions of others as well as their own. They accept their own obligations as part of the process of creating a coherent system of social relationships that can enact an attractive future.

In these perspectives, change stems from imagining the future and imposing it on the present. Visions of the future, or destinies, are confirmed by following courses of action necessary for their fulfillment. The visions may be seen as extrahuman, in which case the theory links adaptation to destiny within some ultimate purpose or design. Alternatively, the visions are sometimes portrayed as inventions of human decision makers, in which case the theory is one of anticipatory individual or institutional choice. Adaptation is seen as reflecting wills and desires and the conscious intention to achieve them.

In traditions of studies of organized action, the future is captured particularly in plans and contracts. Contracts are made in order to avoid the uncertainty implicit in the future. Plans are developed on the basis of expectations of the future, then are implemented in such a way as to enact the future they anticipate. Budgets are a conspicuous example. Budgets are based on forecasts of income and expenditures. Sometimes the world changes so much that a budget cannot be achieved, but the usual situation is that budgets become self-confirming. If income or expenditures start to deviate from the plan, actions are taken to bring them back. If sales lag, new marketing efforts are initiated. If expenditures lag, new uses of funds are discovered. The prototype is the flurry of expenditures to exhaust a budget at the end of a budget period.

2.3.3 Capturing the Past: Experiential Learning

Although ideas of future-dependent adaptation of rules are common in social science, they are usually subsumed under the
general rubric of rational action. In contrast, theories of identities, rules, and institutions tend to emphasize history-dependent adaptation. Ideas of history-based development have been used to understand the birth, death, and change of organizational forms and routines, cultures, institutions, or systems of knowledge. The past is seen as imposing itself on the present through retention of experience in routines. Rules are seen as a residue of the past.

Historical processes by which the present encapsulates the past are the mechanisms of theories of change, including theories of learning, culture, and natural selection. The theories differ in the way they imagine the informational consequences of history to be sustained and diffused within an evolving population, but they belong to a common family. In each case, the past is experienced through a combination of exploration and exploitation. Exploration produces variety in experience (experimentation, variation, diversity). Exploitation produces reliability in experience (selection, consistency, unity). The engines of development include mechanisms for interpreting, retaining, transmitting, and retrieving these lessons of the experienced past.

In this section learning processes, ideas about how rules change as a result of experience, are considered. In subsection 2.3.4 processes of environmental selection are considered. In a learning process, the rules change. In a selection process, the rules themselves do not change, but the mix of rules does. Despite this difference, the two perspectives share a number of common problems and ideas, and most modern students of decision making see the development of rules as an intertwining of these two history-dependent processes with processes of choice, bargaining, and imitation.

BASIC IDEAS OF EXPERIENTIAL LEARNING

The basic idea of experiential learning is that rules are modified on the basis of direct experience. Social systems create, suspend, and refine their rules in response to their own experiences. In that way, rules capture the past. Theories of direct experience learning describe how inferences derived from historical experience are folded back into the actions that create subsequent history. Such theories normally postulate a cycle of four stages: (1) Action is taken using existing rules. (2) That action results in various kinds of outcomes. (3) Inferences are made from those outcomes. (4) Those inferences are used to modify the rules. The cycle is displayed in Figure 2.

The first step in this cycle has been discussed above in subsection 2.2.3. It depends on mechanisms that recognize situations, define identities, and retrieve and apply rules. Some aspects of the second step will be discussed below in subsection 2.3.5, particularly those associated with learning that occurs in the context of other learners. This subsection considers some features of the last two steps, the processes that convert feedback from outcomes into rules. Understanding how rules are modified by learning involves perceiving how small samples of ambiguous experience are converted into inferences about the world and how those inferences are used to change routines.

MAKING EXPERIENCE USEFUL FOR LEARNING

In order to shape learning, interpretations of experience must provide information about what happened, why it happened, and whether what happened was satisfactory or unsatisfactory. Ordinary experience, however, provides only a small sample of events on which to base an interpretation of a possibly complex

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**Figure 2**

The Experiential Learning Cycle

![Diagram of the Experiential Learning Cycle](image)

world. Experience consists in a set of observed events (and interpretations of them). Observed events are a sample of actual realized events. Some of the events of history never enter experience because they are not observed. Realized events, in turn, are a sample of potential events. The realizations of history are draws from the set of all possible events that might be produced by historical processes.

This double sampling makes observed history a noisy representation of historical possibilities. Events are often difficult to observe precisely or to understand fully. Many interconnected things happen simultaneously, and information about them is incomplete and biased. Organizations are complex mixtures of individuals with different interests, competences, identities, and sentiments. Different individuals learn different things from the same ambiguous history. Those various learnings are combined to produce changes in rules. This subsection provides a brief introduction to the ways rules learn from experience, an introduction that focuses on a few basic features of how experience is recorded and recalled, interpreted, augmented, and evaluated.

Recalling Experience. In recalling experience, decision makers are likely to be affected by the availability of the event in memory. Among the many factors that make an event available, three are particularly relevant here:

First, personally experienced events are more available than events not personally experienced. Even though subsequent historians have considerably extended our collective knowledge about the Nazi era in Germany, events of German history from 1937 to 1945 are more available to people who were living in Germany during that period than they are to non-Germans or Germans born after 1945. The pains of failure and the joys of success are remembered more vividly and recalled more readily when they have been experienced in person than when they have been experienced vicariously. Individuals tend to recall their own experiences more readily than the experiences of others. Thus, the availability heuristic tends to lead successful decision makers (who have had generally good experiences with risk taking) to underestimate the risks they face, and to lead un-

Availability biases are also observed in studies of how individuals assess individual contributions to joint projects. Asking partners in a marriage to assess independently the percentage of the housework they perform or asking participants in joint projects at work to estimate their percentage contribution to the success of a project almost always leads to responses totaling more than 100 percent. Since each individual recalls his or her contributions more easily than the contributions of others, the availability heuristic leads each individual to see his or her own contribution as greater than it is seen by others.

Second, the experiences of others with whom individuals share an identity are more readily available than are the experiences of more distant others. Women record and recall the reported experiences of other women more easily than do men. Physicians record and recall the reported experiences of other physicians more easily than do people who are not physicians. Reporters following a particular political candidate systematically overestimate the prospects of "their" candidate. When husbands are asked to estimate the contribution to housework of husbands in general (rather than just themselves), and wives are asked to estimate the contribution to housework of wives in general, the numbers still total more than 100 percent.

Third, people seem to record and recall vivid, concrete information more readily than pallid, abstract, statistical information. Television advertisements reflect awareness of this principle on the part of advertisers. They are more likely to tell a vivid story about one satisfied customer than to present tables of data about customer satisfaction. They are more likely to provide examples of the effects of a product's properties than data on those properties. Teachers report a distinctive feature of student examination answers: Relative to the frequency with which teachers present them, students recall stories and vivid slogans much more frequently than they recall abstract models or data.

Interpreting Experience. Learning processes do not reliably lead to valid interpretations of experience. Some fairly general biases exist in the interpretation of experience. For example, hu-
even when such an attribution appears difficult to sustain. They are inclined to see historical events as necessary events, rather than as draws from a probability distribution of possibilities. They fail to take effective advantage of the information available in the world. They are insensitive to the quality and amount of data on which their inferences are based.

Three general features of the interpretation of experience are particularly relevant to learning: First, interpretations conserve belief. That is, experience is interpreted in ways that sustain prior understandings. Events that disconfirm prior theories or schemata are less likely to be recalled than those that support prior beliefs. Arguments that contradict prior conclusions are less likely to be considered relevant than those that reinforce them.

For example, individuals interpret relationships among variables according to their favorite theory instead of looking for other mediating factors that could also explain a relationship. Lower rates of heart attacks in Mediterranean countries are interpreted by the manufacturers of olive oil as a statement about the effectiveness of certain kinds of fats in the diet, by winemakers as testimony to the therapeutic values of wine, and by hedonists as a statement about the effectiveness of living in a culture with more family connections, a slower-paced lifestyle, and better weather.

Advocates of a particular decision can often use almost any outcome to confirm their belief in the decision's efficacy. If the outcomes are positive, the decision is seen as demonstrably effective. If the outcomes are negative, the results are seen as showing that the decision did not go far enough or was not implemented with enough vigor. This resilience of belief in the face of experience is an obvious feature of social movements, political and religious faiths, and equipment purchases.

Second, individuals use simple causal theories to interpret experience. They assume that most of the time causes will be found in the neighborhood of their effects. Thus, they associate actions and outcomes by their temporal and spatial proximity. If prices are raised today and sales fall tomorrow, decision makers are likely to think the two events are connected. If prices are raised today and ten years later the competition hires a new accounting firm, the two events are less likely to be connected.

The assumption that causes are to be found in the neighborhood of effects is not a foolish assumption. It is often true. Even when it is not true, the connection between nearby effects and distant causes is often mediated by a chain of proximate cause and effect links. Moreover, in an organizational context the assumption of proximity is a basis for organizational control. When a manager is held responsible for outcomes realized within his or her division, the organization acts as though it believes that causes lie in the organizational neighborhood of effects. By so acting, it perhaps increases the likelihood that the assumption will be made true.

Third, the interpretation of experience is a social interpretation. Ideas about the causes of events are developed and shared within a network of social connections. Individuals elaborate an understanding of history by following standard socially approved procedures for telling stories about events and by "sounding out" other individuals about ideas. They confirm their interpretations by establishing the credibility of those interpretations in the minds of others. Reality is certified by a shared confidence in it. For example, the spatial proximity that individuals often use to establish cause and effect relations is defined socially. Organization charts create a presumption that cause–effect distances are related to distances measured in organization charts, and organizational relations and resources are arranged through a negotiation in which managers seek to gain control over the outcomes that are to be viewed as "near" to them.

The classic socially validated outcome in a business setting is the income (or profit and loss) statement. Most decision makers construct such statements and use them to modify actions and rules. Ideas about outcomes found in income statements are developed and validated through interaction with others. The key actors in the construction of an income (profit and loss) statement are typically business firms and their associations, accounting firms and their associations, public agencies, and the courts. In the United States, some agencies are strictly
governmental (e.g. the Securities Exchange Commission, the Congress). Others are public–private hybrids (e.g. the Financial Accounting Standards Board).

All the participants act within a mix of rules and incentives. Their roles demand certain actions. Their professional identities demand others. Their personal incentives include concerns about the consequences of having one kind of income statement or another for individual and organizational prosperity. For example, although accountants are presumed to be independent of management and are assumed to be accountable to the profession, to government officials, and to shareholders for painting an accurate picture of a client’s performance, they are hired by management. They cannot help but be conscious that a continued relationship requires a certain delicacy in constructing an account.

Income statements are social combinations of problem solving, coalition formation, and imagination in the development of accounting conventions, and parallel combinations of problem solving, coalition formation, and imagination as decision makers try to live within the conventions and apply them to concrete situations to produce an income statement. The social understandings that are formed are continually being renegotiated, and both the rules of accounting and the specifics of a particular accounting statement gradually change.

**Augmenting Experience.** Since history ordinarily provides only small samples of experience, direct learning from experience involves assessing the validity of small samples, increasing them when possible, and augmenting the information in them. Small samples are often increased, but individuals tend to be insensitive to sample size, accepting small samples of information as being no less useful in their estimates than large samples. They place greater emphasis on assessing the quality of data drawn from experience than on the size of the sample.

In particular, individuals “overinterpret” experience, treating the events they have experienced as providing more information than standard theories of statistics would assume. The emphasis is on experiencing a limited history richly rather than on extending experience. For example, decision makers learn from the process of making a decision and taking an action as well as from its outcomes. Since learning from the process ordinarily occurs substantially before any possible learning from outcomes, it is frequently the former that makes a greater difference. Thus, if the process of making a particular kind of decision, or taking the resulting action, is painful, decision makers learn not to do such things. If the process is rewarding, they learn to make such decisions. These decision process effects are often independent of final decision outcomes. Because they are gained sooner, the lessons from the process of making a decision serve to frame later learning derived from its outcomes.

Similarly, decision makers learn from their expectations of outcomes before they learn from the outcomes themselves. Anticipations reinforce actions from which good things are expected and extinguish actions from which bad things are expected. Since decisions are ordinarily made with positive expectations, the immediate lessons of a decision tend to be positive. Because those prior anticipations have a positive bias, they will, on average, be more positive than actual realizations. As a result, in the absence of reinterpretation of aspirations or of experience, there is a tendency for the early lessons from a particular set of decisions to be more positive than the later ones.

**Evaluating Experience.** Learning from experience requires not only understanding how experience stems from actions but also evaluating the outcomes of action. Is the outcome positive or negative? Is the policy a success or a failure? Did the action improve performance or degrade it? Often there is ambiguity associated with determining “success” or “failure.”

In general, people seem to learn to like what they get. This behavioral tendency to interpret outcomes in a positive light provides an important counterbalance to a statistical tendency toward postdecision disappointment stemming from exaggerated expectations (see subsection 4.3.2). More generally, the adaptation of desires to realizations is an important feature of learning. If the definition of what is desired is affected by what is received, the basic learning distinction between success and failure becomes endogenous to the process of decision.
facing decision maker distinguishes outcomes that are above an aspiration level from those that are below. It was noted in Chapter 1 that decision makers seem to have targets or aspiration levels for performance, and that they distinguish more sharply between being above and below an aspiration level than they do among various degrees of success or failure. The same basic idea can be carried over to ideas about the evaluation of outcomes in experiential learning.

Suppose decision makers have (possibly changing) aspirations for their performance. Results that exceed their aspirations are treated as “successes,” reinforcing their inclination to maintain the rules on which the actions were based. Results that fall short of their aspirations are treated as “failures,” encouraging them to change the rules on which the actions were based. The learning process, then, depends critically not only on the association of outcomes to actions (and thereby to rules) but also on the aspirations for such outcomes.

If aspirations do not adjust to changes in performance produced by a changed environment, decision makers will experience long runs of success or failure, depending on whether the environmental change was positive or negative in its effects. On the other hand, if aspirations adjust instantaneously to changes in performance, decision makers will experience success and failure as essentially random events. In either case, the learning process will produce relatively little improvement.

“Success” and “failure” are also partly social constructions. Late in the history of the involvement of the United States in the Vietnam War, one U.S. Senator proposed that the army “declare a victory and come home.” The response to the proposal demonstrated that there are limits to arbitrary unilateral evaluations of outcomes, but “success” and “failure” are not uniquely defined by the outcomes. Not only do decision makers adjust their aspiration levels, they also adjust their definitions of what is valuable. Typically, the adjustment is self-congratulatory in the sense that decision makers come to value what they achieve. If sales are up and market share is down, then sales are treated as the appropriate target. If overseas markets are unRewarding, they are devalued in subjective importance.

The social construction of success and failure may mirror the social structure of an organization or society, with different groups defining the same outcomes differently and learning different things from the same history. Internal conflict and competition provide a basis for persistent differences in the interpretation of events. The same outcomes will be seen as successes or failures, depending on whether they are attributed to one’s own group or to a competitive group. When one product is successful and another is not, the advertising campaign that preceded the events is defined as a success by one product group and a failure by another. One faction’s victories are another faction’s defeats.

INCOMPLETE LEARNING CYCLES

The simple learning cycle displayed in Figure 2 is not necessarily achieved. One or more of the links portrayed in the figure may be broken, producing incomplete learning cycles with distinctive features. First, rules are often rigid. Individual inferences from experience are not immediately translated into changes in rules. This incomplete cycle is, of course, a very standard situation. Rules do not change to match every change in individual cognitions or beliefs. In many ways, that is the point of rules. The inhibition of rule adjustment to individual knowledge makes rule-based action predictable to others. It facilitates coordination. It makes rules capable of accumulating history across individuals.

Second, learning is often superstitious. That is, the link between past action and environmental response (outcomes) does not exist or is ambiguous. For example, imagine decision makers choosing among rules in a world in which almost any reasonable rule will lead to successful outcomes (an approximation to the situation in an expanding market or economy). Although decision makers will be successful regardless of what rules they use, learning is likely to lead them to believe in the efficacy of whatever rules they happen to follow. They are unlikely to notice that many other rules would also bring success. In such a superstitious world, successful decision makers are likely to
publish books revealing their “secrets” of success; but other
decision makers will have quite different perceptions of the right
rules to follow. And few of them will notice that almost any-
thing would work.

On the other hand, consider the case in which none of the
available rules for action are followed by good results. A possi-
ble example would be a decision maker facing a contracting
market or economy. In this case, decision makers are likely to
find themselves oscillating among rules, looking for one that
works, perhaps not noticing that nothing has. They would prob-
aply not publish books.

These two cases are examples of pure superstitious learning.
The association between actions and outcomes is misunder-
stood, but learning takes place nevertheless. Rules are adopted
and beliefs and actions are shaped by interpretations of experi-
ence. There is little chance of self-correction, because the
learning and interpretations are internally consistent. They are
wrong, but wrong in ways that do not easily reveal themselves
and often may not make much difference. If a talented tennis
player or a talented politician believes that the reason for her
success is the bracelet she wears, the ritual of wearing the
bracelet (or any number of other rules that decision makers
may come to follow) will probably not affect the outcomes ad-
versely, and its irrelevance may well be discovered slowly.

Although pure cases of superstitious learning are probably
relatively rare, almost all learning from experience has ele-
ments of superstition. Beliefs in the effectiveness of various
strategies, products, technologies, or rules are often learned in
conditions that make it hard to determine causal relations.
When individuals use simple models to learn about complex in-
teracting worlds—which they ordinarily must do because of the
limitations of information and experience—much of what is
learned is likely to be based on associations between actions
and outcomes that are more fortuitous than causal.

Third, memory is often imperfect. Rules do not reliably deter-
mine action. They must be conserved and retrieved. Memory is
difficult to maintain. Transmission and socialization processes
are not always perfect. Those responsible for socialization may
have limits on their time. They may be more accepted by some
groups than by others. Some rules may be overlooked or igno-
red because they conflict with rules imposed by subcultures
or organizational subunits. Geographic or cultural distances
may prohibit effective transmission of information and effective
modeling of correct behavior.

Rules are also sometimes difficult to retrieve. The individual
and organizational availability of a rule depends on the fre-
quency and recency of use. Recently evoked rules are more
likely to be retrieved than rules that have not been used for a
while. This leads to flurries of rule use, like the flurries in appli-
cation of particular criteria to the selection of political ap-
pointees. Rules “reside” in some part of a social or organiza-
tional structure and are more easily retrieved by parts of the
structure that are near their location than parts that are far
from them. Retrieval of home office rules is often difficult in a
distant outpost.

Fourth, history is often obscure. It may be obscure at the time
it occurs because of the small samples and causal complexity of
experience. Even if it is clear at the time it occurs, history may
become obscure with the passage of time. The primary form in
which decision making memory is recorded is in the rules, pro-
cedures, and forms that encode experience. A characteristic
feature of those memories is the way in which they record the
lessons of history but not the history itself. As a result, uncer-
tainty is absorbed by inferences, and the experiential basis for
rules tends to disappear. To some extent the details of the his-
try may be preserved by shared stories or individual memories,
but both are subject to substantial distortion, social differentia-
tion, and doubt.

2.3.4 Capturing the Past: Environmental Selection

Experiential learning is one procedure by which the past is en-
coded into rules, procedures, and forms. A second procedure is
environmental selection. The two procedures represent parallel
forms of adaptation, and they share many common features.
However, they differ fundamentally in the mechanisms they
postulate for creating a match between environmental requirements and organizational rules.

The basic idea of environmental selection is that populations adapt to their environment not by changing the attributes of individual members of the population but by a changing mix of fixed attributes. The distribution of rules and forms in a population of decision makers or decision making organizations changes through differential births, deaths, and growth of rules and of the institutions and individuals using them. In short, the composition of the rule pool changes, not the individual rules.

THE EVOLUTIONARY ANALOGY

The vision of adaptation through selection is taken from evolutionary biology, and many contemporary discussions and issues in population biology have direct analogs in the study of decision making forms and rules. In standard evolutionary theory, evolution requires three things: (1) **variation**: some method for producing variety in forms, (2) **selection**: some method for selecting the most appropriate forms, and (3) **retention**: some method for retaining selected forms over time (generations).

In the classical Darwinian model of natural selection, variation occurs through mutations—rare, random changes in the genetic endowment of the organism—and through the statistical combinations produced by sexual reproduction. Change in the population comes through selection. Organisms increase in numbers relative to their fellows because of higher fertility or lower mortality (differential survival rates through reproduction age) produced by superior “fit” with their particular environment. Attributes that result in a survival advantage are retained by being passed on to subsequent generations through inheritance of genes (subject to mutations and statistical sampling).

The basic model can be complicated by factors that affect the variation process, the selection process, or the retention process. Mixes of types in an ecology are affected by migration patterns that control who is geographically available to mate with whom and by social hierarchies that control who is socially available to mate with whom. Mixes of types may also be affected by complementarities among types—symbiosis, predation, and competition—and by altruism, interactions in which the sacrifice of one organism’s ability to contribute to the gene pool from which descendants are drawn preserves the genetic contributions of others.

Mutation and the statistical sampling of genes through reproduction give chance a powerful role in such a conception of adaptation. Because the models predict probability distributions of attributes, they have very little to say about the success of individuals. There is always some chance that a favorable mutant will be eliminated and an unfavorable mutant will be stabilized. The possibilities for combinations through reproduction are numerous. In addition, as chance accumulates over generations, persistent and irreversible genetic drift is likely, and accurate long-run predictions are extremely unlikely.

Subject to chance, the model is one of environmental control through competition for resources. As organisms compete for resources in the environment, the distribution of types in the gene pool comes to “match” the environment. Until fairly recently, the relevant environment has been treated as exogenous, its effects changing in response to changing competitive conditions but its basic resource structure and character given by some natural processes unaffected by evolution at the gene pool level.

VARIATION, SELECTION, AND RETENTION IN RULES

Students of the adaptation of rules through environmental selection focus not on the gene pool but on pools of rules, forms, and procedures within a population of decision makers or organizations. The biological metaphor is clearly useful, but the processes of variation, selection, and retention in rules differ in important ways from their analogs in the evolution of gene pools.

Consider first the process for varying forms and rules, since without variation, the adaptive power of selection is small. Fun-
damental innovations in rules, like mutations in genes, are comparatively rare and unlikely to be successful, but variation in rules is probably not as chance-like as the process in biological organisms. Variation is often goal-directed, it results from a process of problem solving by decision makers confronted with poor performance, and it tends to consist of refinements of current rules and technology more commonly than recombinations. Variation may come from imperfect imitation or from individual deviations from rules.

Variation in rules also comes from various kinds of “foolishness”—doing things for no good reason. Practices that stimulate variation include those that create arenas in which normal controls are relaxed, protecting playfulness from the usual pressures toward reliability and conformity. These “skunk works” generate ideas, most of which—like most mutations—are bad ones. But they are also a source of the occasional effective change. Thus variation is closely related to risk taking, a topic considered in Chapter 1, since risk taking is defined in terms of introducing or accepting variability. Ideas about how to stimulate (or retard) variation are implicit in the discussion there of how to stimulate or retard risk taking.

Most (but not all) theories of variation and selection in social institutions assume that inheritable changes in attributes can arise through experiential learning. In that sense, such theories are more Lamarckian than Darwinian. By consciously disseminating information and rules, social systems, including organizations, transmit learned attributes to generations of changing personnel. Organizations grow and spread their rules (e.g. a growth in the number of locations within a restaurant chain). Organizations merge and thereby allow one to transplant its rules to another. New firms and units copy old ones. Organizations imitate organizations that occupy more prestigious positions in the social hierarchies (e.g. state legislatures imitating the national legislature). Consultants and professional associations carry rules from well-established clients to newly founded ones.

Finally, consider differences in the selection mechanisms. In this case, there is somewhat more overlap between models of selection among genes and selection among rules. Most variation / selection models in the study of rules and organizations cite the importance of competition and differential survival as a selection mechanism. Organizations and rules die. Indeed, most new organizations seem to die relatively early, and the pattern of survival rates seems generally consistent with the idea that there is considerable heterogeneity among new starts. The birth, death, and transformation of rules has been less studied, but selection seems also likely to be a factor there.

Thus, special features of the process by which rules evolve through variation and selection include a reduced role of chance, an increased role of social diffusion, and a different role for the environment. Characteristics are not passed along through the Mendelian sampling of sexual reproduction (although something like that could be invented for a theory of imitation). In addition, mutations are less random. They are influenced by directed search and problem solving and by the conscious manipulation of slack. Forms spread through growth and social diffusion. The effects of migration and social hierarchy are more obvious, and traits can be acquired by learning. While the environment still determines survival, social systems appear to have power to enact their environments in some circumstances, to create a social reality. In addition, coevolution takes on a much greater role.

2.3.5 The Ecological Basis of Rule Development

A distinctive feature of rule development is its ecological, coevolutionary character. Ecologies of rules are tied together by links in almost every important aspect of learning and selection. Experiential learning depends on the link between actions and outcomes and on an evaluation of those outcomes. Each of those is affected by the interactions within an ecology of learning. Environmental selection depends on survival outcomes and on processes for reproducing or varying rules. Each of those is affected by interaction within an ecology of selection.

For example, as a decision maker learns a new set of lessons from experience, the learning of one lesson interacts with the
learning of other sets of lessons by the same decision maker. Learning in one part of an organization interacts with learning in other parts. Learning in one organization interacts with learning in other organizations. These interactions make understanding and evaluating learning in a system of social institutions considerably more difficult than it would be in a simpler world.

As will be elaborated somewhat in Chapter 6, the coevolutionary features of rules complicate simple intuitions about the "survival of the fittest." They make the population of rules that are observed (and therefore the population of decisions observed) history-dependent. The rules followed today are not simply a solution to some kind of optimization problem involving the current environment but are an interactive, path-dependent representation of a history of coevolution among rules.

COMPETENCY TRAPS

One of the more common effects of the ecology of adaptation in rules is a phenomenon called the competency trap or lock-in. It arises in various forms in many adaptive systems and reflects the ways in which improving capabilities with one rule, technology, strategy, or practice interferes with changing that rule, technology, strategy, or practice to another that is potentially superior (but with which the decision maker has little current competence).

Decision makers learn from experience what rule to use and simultaneously learn how to improve any rule that they use. The two forms of learning interact. The more a particular rule is used, the better becomes the performance using that rule, so the more likely it is that that rule will be reinforced by experience. The more a rule is reinforced, the more likely it is to be used. This positive feedback loop produces considerable competence in using a current rule and makes substitution of another (potentially superior) rule difficult through a learning process. In this way, the natural processes of learning can easily lead to a competency trap, a stable suboptimal solution.

Competency traps are manifested in technological lock-ins at an individual, organizational, and societal level. Individuals find it difficult to shift from one computer or word processor to another (superior) one. In the short run, their performance would decline with such a shift. Organizations pursue and refine product and marketing strategies that work, gaining competence at them, and thereby exclude potentially superior strategies that involve new competencies. Societies sustain technologies (the QWERTY keyboard, the internal combustion engine) that are arguably inferior but on which competence has been developed to such a level that a shift to a new technology cannot easily be achieved.

INTERACTIVE EFFECTS ON OUTCOMES

The interactions among the lessons of learning are further complicated by interactions among learning decision makers. Each decision maker adapts to an environment comprising other learning decision makers, each embedded in organizations of interacting learning individuals and subgroups. Thus the dynamics of rule change cannot be understood simply by focusing on the development of rules by a single decision maker or decision making institution. The outcomes for any particular action depend on what other decision makers do.

This insight about the effects of an environment that is not only changing but changing endogenously is a recurrent theme in the study of decision making. When decision systems made up of multiple actors are considered, as in Chapters 3 and 4, the decisions by any individual actor become much more complex, because they have to take into account the preferences, identities, and likely actions of others. This ecological context of decision making is also significant to understanding the development of rules. As rules evolve, their interactions make their outcomes jointly determined. The rewards for the use of one rule are affected by the use of a second rule, and the rewards of the second are similarly affected by use of the first. Consider, for example, rules of the road, specifically rules about driving on one side of the road or another on a two-lane, two-way road.

The interactive character of rule development is seen con-
spicuously in competition. The effectiveness of particular strategies, rules, or technologies depends on attributes of the competitors, the competition, and the environment. Consider a set of competitors each learning how to allocate resources to a set of alternative activities. The outcomes for any particular competitor will be a joint consequence of the potentials of the alternative activities, the changing capabilities of the various competitors within the various activities, and the allocations of effort by the various competitors to the various activities. Such a situation results in patterns of behavior that are strongly influenced by the ecological structure. The learning outcomes depend on the number of competitors, their learning rates, their rates of adjustment of their aspirations, the extent to which each competitor learns from the experience of others, and the differences among the potentials of the activities.

The relations among decision makers and their rules are not necessarily symmetrical. Some decision makers may interfere with or facilitate other decision makers while themselves remaining unaffected. Decision makers may also act as predators and prey (e.g., brokerage firms and investment innocents). Nor are they necessarily competitive. The interactive nature of rule development is seen conspicuously in cooperative activities. The evolution of communication rules, languages, and technologies is affected substantially by the cooperative, interactive character of communication. There are many different ways to communicate “yes,” but (among people who want to talk to one another) language tends to coevolve so that all say “yes” in the same way. There are many different forms of communication technology, but the frequency with which one individual uses any particular technology will depend heavily on the frequency with which others do, and vice versa. These network externalities dictate important features of the learning process and make any theory of autonomous learning misleading.

ASPIRATIONS, DIFFUSION, LEGITIMACY

These interactive factors in outcomes are paralleled by interactive effects that affect other aspects of the adaptation of rules.

Consider three of those:

First, aspirations (and therefore definitions of subjective success and failure) are social. They are affected not only by a decision maker’s own performance but also by the performance of others. When aspirations are tied to the performances of others, the evaluation of a given performance depends on the performances of others. This reduces the effects of self-referential indexing of performance, thus (on average) increases the chance that outcomes will deviate significantly from aspirations and decreases the likelihood of changing from success to failure or from failure to success. Both effects have consequences for learning. If aspirations in a population converge to the mean of the performances of the members of the population and there are structural reasons why some members of the population persistently do better than others, the population will tend to be partitioned into two groups, one that persistently achieves its aspirations and another that persistently fails to do so. In either case, learning tends to become superstitious.

Second, in both learning and environmental selection, rules “reproduce” by diffusion. Lessons gained from experience by one decision maker diffuse among other decision makers through the transfer of routines and the exchange of knowledge. As a result, theories of rule development need to attend to the structure of social networks and the ways in which knowledge is transferred through those networks. The structure includes associations (e.g., trade associations), networks of consultants and employees who move from one organization to another, and educational institutions and publications. Imitative diffusion can account for substantial elements of the spread of decision making rules, conventions, and technologies.

Third, in both learning and environmental selection, the legitimacy of rules is affected by the use of rules by others. Within a population of decision makers, the definition of appropriate behavior tends to be socially constructed by interpretations of observed behavior. What constitutes a proper
decision maker? A decision maker who does what decision makers do. What constitutes a proper decision making rule? A rule that is used by proper decision makers. How does a decision maker know what a proper decision maker does or what decision making rule is proper? By observing what other decision makers do.

Practices, forms, and rules become more legitimate as more decision makers use them. Commonly used practices become institutionalized as myths defining legitimate decision making routines. Legitimacy is not, of course, determined entirely by use on the part of others. There are frequently official and semiofficial bodies responsible for legitimating particular practices. When a professional group defines standard operating procedures for engineers or professional standards for physicians, it makes those rules legitimate. This sometimes happens even before the practices are widely used, although professional certification of legitimacy is as likely to follow general acceptance as it is to precede it. Similarly, legal requirements may anticipate, or even seek explicitly to force, subsequent practice. The general point is that one of the main ways a rule becomes legitimate in one place is by being used in another.

2.4 Appropriate Rules or Consequential Choice?

As should be clear from comparing this chapter with Chapter 1, there is a substantial chasm between those students who see decisions as choices made in the name of consequences and preferences and those students who see decisions as rule following in the name of appropriateness. Some interpretations of the chasm have already been suggested and will not be repeated extensively here. However, it may be useful to note two versions of the interpretations and to reiterate the position reflected in this book.

2.4.1 Reason and Reasoning

Standard contemporary discourse, particularly in the traditions of decision theory, tends to equate reason with a logic of consequence. The idea is that a reasoning decision maker will consider alternatives in terms of their consequences for preferences. Thoughtful discussion about action is expected to illuminate a decision maker’s expectations and preferences. Deviations from a logic of consequence are treated as deviations from reason. Within that tradition, the claims of duty, obligation, identity, and rules are inferior claims. Rule following is portrayed as unthinking and automatic, identities as arbitrary and imposed. The glory of choice is seen in its links to independence and thought. The shame of rules is seen in their links to dependence and thoughtlessness.

It should be clear that such judgments are not reflected here. A logic of appropriateness is different from a logic of consequence, but both logics are logics of reason. Just as a logic of consequence encourages thought, discussion, and personal judgment about preferences and expectations, a logic of appropriateness encourages thought, discussion, and personal judgment about situations, identities, and rules. Both processes organize an interaction between personal commitment and social justification.

The two logics are not distinguished by differences in their status as thoughtful action. They are distinguished by the demands they make on the abilities of individuals and institutions. One makes great demands on the abilities of individuals and institutions to anticipate the future and to form useful preferences. The other makes great demands on the abilities of individuals and institutions to learn from the past and to form useful identities. Both processes picture human beings and human institutions as having a relatively high order of reasoning skill. Each logic is consistent with the glorification of the human estate and with high hopes for human action. Both are plausible processes for reasoning, reasonable decision makers.

2.4.2 Mutual Subsumesmanship

In arguments between theorists of consequential choice and theorists of rule following, each group sees the other’s perspective as a special case of its own. For theorists of consequential
choice, rules are constraints derived from rational action at a higher level. For theorists of rule following, consequential choice is simply one of many possible rules that may be evoked and followed when deemed appropriate.

The approach here is conscious of, but largely indifferent to, these displays of subsumesmanship. Empirical observations of decisions provide ample examples of behaviors that are hard to understand without attention to both perspectives, and neither (at least in its present incarnation) explains enough of the phenomena to claim exclusive rights to truth. In the cultures and contexts (e.g. much of contemporary economics, psychology, and political science) where enthusiasts for consequential analysis and the pursuit of preferences are dominant, ordinary good sense probably calls for reminders of logics of appropriateness, identities, and rules. In cultures and contexts (e.g. much of contemporary sociology and anthropology) where enthusiasts for roles, rules, and institutions are dominant, ordinary good sense probably calls for reminders of logics of consequences, preferences, and calculation.

Since students of decision making straddle the standard disciplinary boundaries to some extent, it may be appropriate for them to try to fit these contentious cultures of disciplinary interpretation into a single world view. They also have incentives to do so. In this effort, they have allies among decision makers. Since most decision makers are more bemused by disciplinary disputes than inclined to join them, they are likely to find multiple visions complementary rather than contending.

CHAPTER THREE

Multiple Actors: Teams and Partners

In Chapter 1 decision makers were portrayed as rational actors, searching for alternatives in a world of limited knowledge and evaluating those alternatives in terms of their preferences. The focus was on the ways incomplete knowledge of alternatives and consequences imposed limits on rationality, on how decision makers cope with those limitations through satisficing and problem solving heuristics, and on some of the consequences of those coping mechanisms for the accumulation of slack and the occasions of innovation in organizations.

In Chapter 2 decision makers appeared as rule followers, matching appropriate behavior to situations and trying to fulfill their identities. The focus was on the processes involved in creating, maintaining, and acting within conceptions of self that are multiple and sometimes unclear, on the ways in which rules encode history, and on some of the complications in capturing the past through experiential learning and environmental selection.

In both Chapter 1 and Chapter 2, the portrayal was implicitly of a single decision maker. In this chapter and the next, the focus shifts to processes involving multiple actors.