4149

LAVE + MARCH

an introduction to models in the social sciences

Charles A. Lave
University of California, Irvine

James G. March
Stanford University

HARPER & ROW, Publishers
New York Evanston San Francisco London

2

This book is about the social sciences. It is not, however, a grand tour of what the social sciences are. It is a first excursion into a few domains of social science imagination. It does not claim the scholarly virtues of comprehensiveness and balance. It is a brief introduction to the pleasures of thinking about human behavior.

To speak of pleasures is probably dangerous and certainly pretentious. Few people rely solely on any social science for their pleasures, and attaining a suitable level of ecstasy involves work. We regret the latter problem. It is a nuisance, but God has chosen to give the easy problems to the physicists. We do not regret the former problem. We have no intention of suggesting that poetry and sex be abandoned. Rather, we invite you, in the moments left between Byron and bed, to join us in speculating about ordinary human existence.

Speculation presumes observation. We rely on the difficult and creative drudgery required to retrieve the record of social events. The data are lost in the files of bureaucracies, diaries of servants, accounts of businesses, and memories of participants. They are discovered through the paraphernalia of research and manipulated by the technology of inference. Precise and imaginative empirical observation distinguishes fine work in anthropology, business administration, demography, economics, education, geography, history, journalism, law, linguistics, political science, psychology and sociology.

Many smart and patient people have accumulated knowledge from observations of individuals, groups, and institutions in society. Others have articulated the methodology of the social sciences. We are in debt to both traditions, but our approach is different. Our theme is more a way of thinking about observations than an inventory of them; it is more concerned with the invention of conjectures than with the formal rules for talking about them.

We propose a practical guide to speculation. We explore the arts of developing, elaborating, contemplating, testing, and revising models of human behavior. The point of view is that of a person trying to comprehend the behavior around him. The primary emphasis is on using a few simple concepts and a little imagination to understand and enjoy individual and collective human behavior.

Speculation is the soul of the social sciences. We cherish attempts to discover possible interpretations of behavior. The effort is complicated and subtle; it has a distinguished history. Aristotle, Smith, Toynbee, Marx, Malinowski, Camus, James, Weber, Dos-

toevsky, Freud, Durkheim, Cervantes and a host of other figures have added to our understanding of human behavior.

Despite such an impressive ancestry our ambitions are not heroic. We think that playing with ideas is fun. We think there are some interesting ideas in the social sciences. We think that an increase in the quality of speculation both in the social sciences and in everyday life would be good. We would like to contribute to an understanding of models in the social sciences and to enjoyment of their pleasure.

What is a model? How do you invent one? What are some common models in the social sciences? How do you apply them in new situations? What makes a good model? This book attempts to answer such questions by engaging the reader in the process of invention. By the end of the book we will have presented enough examples of models to make a definition superfluous. At the outset, however, we begin with an inelegant characterization: A model is a simplified picture of a part of the real world. It has some of the characteristics of the real world, but not all of them. It is a set of interrelated guesses about the world. Like all pictures, a model is simpler than the phenomena it is supposed to represent or explain.

Consider a scale model of a train. We call it a "model" train because it has some of the characteristics of a train. It is similar in appearance to a real train, has similar parts, and possibly moves in a similar manner. It does not have all of the characteristics of a real train, however. By examining a scale model of a train, we can learn something about a real train's general size and design, but we can not tell much about its horsepower, speed, capacity, or mechanical dependability.

Since a model has only some of the characteristics of reality, it is natural to have several different models of the same thing, each of which considers a different aspect. A diagram of the energy flow in the train's power plant would also be a model of the train. It would be useful for answering some questions that the scale model does not. Neither of these models, however, could tell us whether the train would be an economic success. To determine this we need a performance table (model) showing the relations among tonnage hauled, speed, and fuel consumption. There are many other possible models of a train, each representing some but not all of the train's attributes. Each could be used to say something, but not everything, about a real train.

Whether we are talking of modeling trains, societies, groups, or individuals, the modeling process is the same. We construct

models in order to explain and appreciate the world. Sometimes we call our simplifications theories, paradigms, hypotheses, or simply ideas. In a more formal treatise we might make distinctions among some of the labels; but we will not do so here. We will talk simply of models as a generic term for any systematic set of conjectures about real world observations.

Speculative models are central to science, history, and literature. They are also a part of normal existence. We are constantly forming partial interpretations of the world in order to live in it. Because we do not always label our daily guesses about the world as "models," we sometimes overlook the extent to which we are all theorists of human behavior. The activity is not mysterious.

We will treat models of human behavior as a form of art, and their development as a kind of studio exercise. Like all art, model building requires a combination of discipline and playfulness. It is an art that is learnable. It has explicit techniques, and practice leads to improvement. We can identify a few of the necessary skills:

1. An ability to *abstract* from reality to a model. Problems in social science are complex and frequently personal. It is necessary, but not easy, to form abstract representations of a delicately intricate reality.
2. A facility at *derivation* within an abstract model. Models become rich through their implications. It is necessary to devise models that yield significant derivations and to develop skill at producing meaningful implications.
3. A competence at *evaluating* a model. Not all models are good ones. Some are unattractive because their derivations are inaccurate; some because their consequences are immoral; some because they are unaesthetic. It is necessary to know how to reject inadequate models.
4. A *familiarity with some common models.* The number of models in the social sciences is large; but a few are common enough to make familiarity with them essential. It is necessary to have command of a few standard models and to know how to apply them to a wide variety of situations.

It is possible to identify a set of common models in the social sciences that are relatively simple, easily modified to extend their scope, and suggestive of the varieties of formal reasoning that might be used. And though they do not immediately require more

than high school mathematics, they do involve abstraction, derivation, and evaluation.

Beginning in Chapter 4, we consider four such models:

1. *Individual Choice.* The processes by which individuals choose among alternatives, make decisions, and solve problems. For example, investment behavior, gambling, voting, occupational choice, consumer behavior, the selection of mates. The basic model is a model of rational choice under risk. We examine the fundamentals of decision trees, expected value calculations, and alternative criteria for rational choice. The rational model is applied to a variety of choice situations found throughout the study of human behavior.
2. *Exchange.* Exchange as a special case of individual and collective choice. We introduce the basic ideas of indifference curves and the ways in which mutually acceptable trades are made in the market, the cold war, small groups, marriage, and politics. Some effort is made to apply the basic model (drawn largely from economics) to a variety of "noneconomic" situations.
3. *Adaptation.* Modification of behavior by individuals and collectivities in response to experience. The basic model is a probability learning model taken from psychology. The ideas are applied to learning, personality development, socialization, organizational change, attitude change, and cultural change. Special attention is given to superstitious learning and mutual adaptation.
4. *Diffusion.* The spread of behaviors, attitudes, knowledge, and information through a society. The basic models are borrowed from epidemiology and sociology and include both simple versions of contact, transmission, and contagion and more complicated models of the spread of a "disease" in a social structure. The models are applied to the spread of fads, innovations, rumors, political allegiances, emotions, and ideas.

These four varieties of models comprise the basic substantive content of the book. By the end of the book a reader who has worked through the problems and examples should be able to apply the models to any reasonably well-defined situation for which they are relevant. He should be able to make a first approach to asking theoretically interesting questions about almost any situation involving human behavior.

Models of choice, exchange, adaptation, and diffusion are not the only kinds of models we might have considered. Indeed, the variations are considerable and limited mostly by our ability to invent interesting metaphors. The social sciences include ideas about *transition*: how people change from one job to another, from one social class to another over time. The social sciences include ideas about *demography*: how entry (birth) rates, exit (death) rates, and the movement of people (migration) change the age distribution and other features of a population of a society or a part of society. The social sciences include ideas about *structure*: how attitudes, memory, social positions, classes, associations, and language are organized.

Each of these, as well as the four models with which we will deal, is an exhibit in modern social science art. Each has its admirers and its critics; each has its geniuses and its hacks. We hope that the identification of model building as a form of art is not empty, although it may be optimistic. It is intended to communicate the frustrations, aesthetic charm, and unanticipated discovery to be found in the analysis of human behavior.

The major pleasures of the social sciences stem from an elementary property of human beings: Man is capable of producing more complex behavior than he is capable of understanding. The behavior of an infant baffles a psychologist, and vice versa. As a result, models of human behavior are knowledge, ideology, and art. They are metaphors by which we seek to ensure that our understanding of behavior, the complexity of behavior, and the number of questions about behavior all increase over time. Our excitements are those of participating in this spiral.

We invite you to join the game. Participation requires effort, but it does not (in the beginning) require extensive knowledge about the literature of the social sciences. We have used these materials in formal courses and in casual reading, in graduate seminars and in freshman required courses, in professional schools and in high schools, in the United States and abroad. Prior exposure to the social sciences sometimes helps, but a willingness to play with ideas, to construct images, and to solve puzzles seems much more important.

Of greatest importance, however, is the commitment to working through a set of problems. These problems are found at the end of each subsequent chapter of the book. Each problem asks the reader to develop some model, its implications, use it as a basis for recommending social policy, or evaluate it. The problems range

from simple exercises to complicated social questions requiring considerable ingenuity to answer. They require involvement, time, and thought on the part of the reader. The text provides a guide to possible ideas and some examples; but it is the problems at the end of the chapters that are intended to serve as the locus of major effort.

As you go through the rest of the book, we hope that you will experience some of the enjoyment that we do in the activity. We hope you will discover a general style of approaching the social sciences that encourages a playful exercise of disciplined thought, allows the invention of new ways for thinking about familiar things, and treats human behavior as mystery and social scientists as detectives or artists.

References

Robert Henri, *The Art Spirit* (Philadelphia: Lippincott, 1960; first published in 1923).

Leo Rosten, *The Joys of Yiddish* (New York: McGraw-Hill, 1968).

Richard S. Rudner, *Philosophy of Social Science.* (Englewood Cliffs, N.J.: Prentice-Hall, 1966).

chapter two

an introduction to speculation

2.1 INTRODUCTION

The best way to learn about model building is to do it. In this chapter we invite you to speculate about human behavior. The procedure we have adopted is a familiar one. It is used by novelists in developing characters or events, by historians in interpreting history, by children in training their parents, and by astronomers in creating theories of the universe.

Despite such testimonials, our procedure is not the only procedure for examining human behavior. Intelligent people differ on how to give meaning to observable phenomena. They differ even more on a variety of special issues that we will happily ignore. If we had some unique vision of the only way to approach social science, we would be delighted to present it. If we knew of some major new solutions to the ancient complications of the search for interesting meanings, we would hurry to announce them. Our intentions are incomparably more modest. We have found one common approach to interpreting human behavior both fruitful and enjoyable. We hope you may find it similarly rewarding.

In this chapter we ask you to practice your skill at imagining speculations. In each section we start with an observation and then speculate about processes that might have produced the observed fact. The examples are all taken from the world of ordinary experience: government, college life, friendship, and population control. They even include one example drawn from the physical world simply to demonstrate that the process of speculation is fun there too.

2.2 CONTACT AND FRIENDSHIP

Suppose we were interested in the patterns of friendship among college students. Why are some people friends and not others? We might begin by asking all of the residents of single rooms along a particular dormitory corridor to give us a list of their friends. These lists of friends are our initial data, the result we wish to understand.

If we stare at the lists for a while to see what they mean, we eventually notice a pattern in them: Friends tend to live close to each other; they tend to have adjacent dormitory rooms. What does this mean? What process could have produced this pattern of friendship?

One feature of this book is that we will often ask you to stop and do some thinking. We are serious.

> ***STOP AND THINK.*** **Devote a moment's time to thinking of a possible process that might produce this observed result.**

One *possible* process that might have led to this result is the following:

> Each spring the director of campus housing allows students to indicate their dormitory room preference for the following year; groups of friends take advantage of this and ask to have each other as roommates or to be put in adjacent rooms.

This process is a speculation about a prior world. *If* the real world had once been like our model world, then the observed facts would have been a logical consequence. That is, this speculative prior world would have produced our observed result, namely, that friends tend to have adjacent rooms. Thus we have found a model, a process, that accounts for the facts. We do not stop here, however. We next ask: What other consequences does this model have? What else does it imply? It also implies that the students in each dormitory friendship group must have known each other previously; hence they must have attended the university during the previous year; hence there will be fewer friendship clusters among freshmen.

Is this further implication of our speculative prior world correct? To test it we first examine the friendship patterns in a dormitory of juniors and seniors, and, as expected, we discover groups of friends living next to each other.

We also examine a dormitory that has only freshmen and discover that there are as many groups of friends clustered there too, which is not an expected result (according to the model). This result would not have been predicted by our model unless the freshmen knew each other prior to college. Perhaps the freshman friendship clusters consist of students who knew each other in high school and who asked for adjacent rooms. We look at information on the backgrounds of freshmen to see whether this is true; but we

discover that almost all of the students come from different high schools.

So our speculative model world does not do a very good job of explaining what we have observed. Some process other than mutual selection by prior friends must be involved. We think about it some more and try to imagine another process that could have led to these results. Our new speculation (which is probably the one you yourself thought of when the question was first posed) is as follows:

> College students come from similar backgrounds. As a result, they have enough experiences, problems, and values in common that they are capable of becoming friends with each other. Pairs of college students who live near each other will have frequent opportunities for interaction and hence are likely to discover these common characteristics.

Thus students who live close to one another will become friends. This new speculation explains the presence of friendship clusters in freshmen dorms as well as in junior-senior dorms. Does it have any other implication?

> ***STOP AGAIN.*** **Think about it. *Hint:* what about changes in these friendship clusters over time?**

Since the chance of contact increases over time, the friendship clusters should grow in size as the school year progresses. You would expect the average friendship cluster to be relatively small in October, bigger in December, and still bigger by May. To test this prediction, you would have to run questionnaires at two or three separate dates. If you did so and discovered that the prediction was correct, the model would seem somewhat more impressive.

In summary: We made an observation (friendship clusters around adjacent rooms); we speculated about a model world (mutual selection by preexisting friends) to explain this result; we looked at other implications of the model world (no friendship clusters in freshmen dorms) to see if they were true. Since they were not true, we created a new model, with a new process inherent in it (similarity of values and opportunity to meet cause friendship), we then examined the implications of the new model world (cluster size increases over time) and found that they were true.

So far we have formulated a model of college students discovering similarities. We would now like to make our model more general, to find some new model that includes this model as an implication. Can you think of such a more general model?

> ***STOP AND THINK.*** **Remember you still want to include the predictions we made earlier and yet find a more general model that predicts new behaviors as well, perhaps beyond the campus scene.** ***Hint:*** **Look at the parts of the existing model that restrict its area of applicability.**

One possible approach to reformulation proceeds as follows: College students are people. Perhaps our speculation about college students is true about all people. Now our theory becomes:

> Most people have enough experiences, problems, and values in common that they are capable of being friends. Pairs of people are likely to discover these common characteristics when they live close to one another.

The model is a broad, powerful statement about the world. If it is true, does it have any nonuniversity implications? Racial integration is a potential area for its application. The model predicts more friendships between blacks and whites who live in integrated neighborhoods than would be found between blacks and whites who do not live near each other; it also predicts that opinions of blacks and whites toward each other will be more positive and favorable in integrated neighborhoods.

A group of social scientists decided to test some of these predictions.[1] They chose two housing areas—one segregated and the other integrated—to see whether there were differences in friendships and attitudes. Both areas were public housing projects; and both were carefully compared to assure that other variables that might also influence interracial attitudes would be similar in both projects.

The social scientists questioned white residents of the two housing projects about their relations with their neighbors and about their attitudes toward blacks. They found that whites living in the integrated project reported far more neighborly relations with blacks than was true of whites living in the segregated project. They also found that integration produced large changes in white

attitudes toward blacks. Among those whites who had originally held unfavorable attitudes toward blacks before moving into the housing project, 92% of those in the segregated project still had unfavorable attitudes, while more than half of those in the integrated project now held favorable attitudes toward blacks. Thus the predictions of the model were confirmed.

With the extension of our speculation from college students to people and from dormitories into neighborhoods, we have not yet exhausted the possibilities for developing the model.

> ***STOP AND THINK.*** **Reread the model, and then try to think of ways in which you might reformulate the ideas to make them even more general.** ***Hint:*** **Think about the process by which friendships are formed.**

Perhaps you thought of something like this. The reason people in neighborhoods discover each other's values is because they have contact through communication. Now our model becomes:

> Most people have enough experiences, problems, and values in common that they are capable of being friends. Pairs of people are likely to discover these common characteristics when they communicate with each other.

Thus people who communicate with each other will become friends. Now we can use our model not only to predict some features of college life and some features of residential neighborhood life but also some consequences of communication through visiting, writing, telephoning, or television.

> ***STOP AND THINK.*** **Speculate about the implications of the changing communication patterns in our society; for example, grandparents no longer live in the same household as their grandchildren, and children now leave home earlier and live farther away. Use the new extended model to predict the change in friendship patterns which might result from the change in communication patterns. Some of your speculations may seem false, but this is simply a**

sign that you are doing the job well and being imaginative. At this stage it is more important to be creative than to be critical. (You are on your own on this question—no answer will be given below.)

But now suppose, finally, that a friend of yours proposes the following:

> Most people have enough differences in experiences, problems, and values that they are capable of being enemies. Pairs of people are likely to discover these differences when they communicate with each other.

Thus people who communicate with each other will become enemies.

In reviewing our original dormitory data, we see that this new model predicts that the size of enemy groups will increase over the course of the school year. That is, the number of people disliked by any one person will increase over the year. It is possible, therefore, to revise the model to take account of both effects (friend production and enemy production) by changing it to something like the following:

> Most people have enough experiences, problems, and values in common that they are capable of being friends. At the same time, most people have enough experience, problems, and values that differ that they are capable of being enemies. Pairs of people discover their common and differing characteristics through communication.[2]

At this point we have a broad, provocative speculation. We cannot stop here, however, for we now have to deal with a major problem implicit in this model: What determines the initial pattern of communication? How do two people happen to begin by discussing shared characteristics rather than conflicting characteristics? To what extent do expectations about others become self-fulfilling? That is, do friends confine their communication to things they agree on, whereas enemies discuss each other's differences?

The fact that initially prejudiced whites changed their feelings toward blacks after moving into an integrated housing project is grounds for optimism. Perhaps communications about shared values are more powerful than communications about differences.

Perhaps closeness creates strong incentives to discover shared values. Or perhaps the experience of solving joint problems (for example, dirty streets, landlord problems, school issues) creates the incentive to discover shared values.

Since our current model places primary emphasis on the pattern of communication, you might wish to add some speculations of the following kinds:

1. Friends tend to communicate about common values; enemies communicate about differing values. As a result, two people who start out being friends (either through chance or positive expectations) will become better friends; two people who start out being enemies will become worse enemies.

2. Situations in which there is general social agreement about appropriate behavior and appropriate interpretations of behavior will more likely produce communication about shared values than will situations in which there is less general agreement. Thus two persons who initially meet in a well-defined, normatively regulated situation will be more likely to become friends than if they had met in normatively unregulated situations. (Could this be a possible reason why stable societies impose relatively elaborate politeness rules for first encounters among people?)

3. Strangers would rather be friends than enemies (because enemies are more "expensive.") Thus two people initially try to communicate about shared values. "Mistakes" occur when a person guesses wrong about which values are shared, or when he is forced to communicate to an audience of several different people. Thus two persons from similar cultures are more likely to become friends than two persons from different cultures. On the average, the smaller the group within which a first encounter between two persons occurs, the more likely they are to become friends. On the average, the larger the group of strangers, the more inane the conversation. This is one reason why, counter to intuition, large parties of strangers are duller than small parties of strangers, per gallon of liquid served.

STOP. **If you have taken the time to exercise your imagination at each step of these examples, you should now have a sense of the basic nature of the model-building procedure that we are presenting and its pleasures. You may find it useful at this point to retrace the process and devote some time to your own speculations rather than ours.**

2.3 ROCKS, LAKES, AND RIVERS

Not all speculation concerns human behavior. We can play the same game with observations made about the physical world. Figure 2.1, for example, shows an excavation in Southern California. Other excavations near this particular area all show the same structure: parallel layers of rocks with smaller rocks and sand between them. Why does the excavation look like this? What kind of geological process might have produced this end result? How did the rocks get there? Why are they layered the way they are?

> ***STOP AND THINK.*** **Try to think of some geological process that might have produced this result.**

A possible process might be:

> This area is actually the bed of an ancient ocean; the layers are the result of successive deposits of rock and sand washed there by the ocean; then the land was pushed up out of the ocean by some kind of geological upheaval.

This imagined process is a speculation about a prior world. *If* the real world had once been like our model world, then the observed facts would have been a logical consequence. Thus we have found a model, a process, that accounts for the facts.

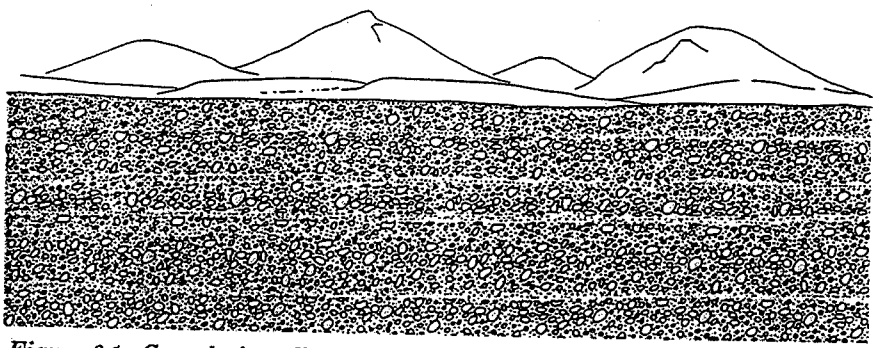

Figure 2.1: Gravel pit wall with stratified layers of rock. There are mountains in the background. Adapted from Geology Illustrated *by John S. Shelton. W. H. Freeman and Company. Copyright © 1966. Reproduced with permission.*

If our speculation about the prior world is true, are there any other facts that we should also observe?

> ***STOP AND THINK.*** **Think of some other consequences that follow from the model. What are its other observable geological implications? Try to think of at least one other implication before you continue reading.**

If this were an ancient ocean bed, there should also be marine debris as well as rocks, for example, fossils of some kind. A careful examination of the excavations, however, shows no fossils or other marine debris. This causes us to doubt the ocean-bed model. A further cause of doubt is that the surface of the ground is exactly parallel to the rock layers exposed by the excavation. It is unlikely that the land would have been raised exactly straight up out of the ocean or that subsequent erosion of the surface could have worn it exactly parallel to the former floor.

So our speculation, or model, about the origin of this area is in trouble. The model correctly explains the layers of rocks, but, unfortunately, it also predicts two things that are not true. Thus it is unlikely that our model is correct. Let us try to think of some other model that might have generated the observed result.

> ***STOP.*** **Can you think of an alternative?**

An alternative possible model is:

> The area in the picture was formed by rocks washed down from the mountains in the background; torrential rains and flooding carried the rocks from the mountains; successive layers represent successive floods.

Could this alternative version of the prior world have created the known results? It does explain the layers of rocks; it predicts the lack of marine fossils; and it also predicts that the surface should be exactly parallel to the rock layers, since the process is presumably still going on in a slow fashion. But is there anything

else that this new version of the prior world would predict? If the process we have imagined were true, would it have led to any other results?

***STOP AND THINK* about this for a moment.**

If the model were true, we might also expect that the type of rocks in the excavation will be the same as the type of rocks found in the mountains. We might also expect that excavations closer to the mountains will show larger rocks than the ones in the drawing, since the large rocks could not have been washed so far. And, finally, we might also expect to find a very slight upslope from this area toward the mountains. All three of these predictions were confirmed by field work. The last model then appears to be a reasonable speculation.

2.3.1 A MODEL OF THE MODEL-BUILDING PROCESS

You should now have some notion of what a model is and how models are created. A model is a simplified representation of the real world. Models are created by speculating about processes that could have produced the observed facts. Models are evaluated in terms of their ability to predict correctly other new facts.

Models are simplified representations of the world because it is impossible to represent the full complexity of the world (notice that the geological model did not specify the dates of the floods, the amount of water in each, the types of rocks washed down, the names and ages of any trees that might have been uprooted, and so on) and also because minute details are unnecessary. Our simple model has only enough detail to make it applicable to other situations.

If you think back over the procedure we used to build the model, it works as follows (though usually not nearly so neatly) :

Step 1
Observe some facts.

Step 2
Look at the facts *as though they were the end result of some unknown process (model)*. Then *speculate about processes that might have produced such a result.*

Step 3
Then *deduce other results* (implications/consequences/predictions) *from the model.*

Step 4
Then ask yourself *whether these other implications are true and produce new models if necessary.*

First we started with some facts (the rock formations exposed by the excavation) that we wanted to explain. Next we constructed an imaginary model world (the ocean bed) that could have produced these observed facts. We then asked if there were other consequences or predictions implied by the imagined model world. We found two such predictions (presence of fossils and surface irregularity) but discovered that neither prediction was confirmed in the real world. So we rejected our initial guess about the prior world and imagined an alternative prior world (floods from the mountains). This alternative model not only accounted for all of the known facts, but from it we also predicted three new results, which were all confirmed. Thus we now feel confident that the process we imagined is what actually produced the result that we wanted to explain. Therefore, we have a good model because it explains why the rocks in the excavation look the way they do.

The explanatory procedure should now be relatively clear: It involves a constant interplay between the real world and the model world. The main difference between this explanatory procedure and the kind of thinking we usually do is that this procedure is more systematic and more creative. In ordinary thinking when we have a result to explain, we are usually content to think of some simple explanation and then stop. This is incomplete thinking; it stops before the process is fully carried out. The real fun is to continue thinking and see what other ideas the explanation can generate, to ask ourselves: *If this explanation is correct, what else would it imply?* Once you learn to do it easily, you will find genuine creative enjoyment associated with this interplay between explanation and prediction.

2.4 RESPONSIBILITY CORRUPTS

Governments frequently appoint task forces or commissions to study serious, complex issues such as crime, unemployment, education, narcotics, or student unrest. Sometimes such commissions are appointed because the sheer complexity of a problem makes concentrated, impartial study a necessity. Sometimes they are appointed for political reasons in an effort to bury a currently controversial, but probably short-lived, issue. And sometimes they are appointed to rubber stamp and legitimize a program that an administrator has already decided he wants to implement. The make-up of these commissions is usually very diverse: One often finds conservative businessmen, lawyers, professors, civil servants, and liberal labor union leaders all mixed together. In spite of the complexity of the issues being investigated, in spite of the variety of motivation for appointing the commissions, and in spite of the diversity of their memberships, there is a common pattern in the final reports of task forces or commissions. They often end up criticizing the policies of the government that appointed them; they usually make recommendations that can be characterized as moderate; and the members usually agree unanimously or nearly unanimously. That is, the diversity of opinions on the commission is usually resolved in a moderate, action-oriented direction, apparently by changing the opinions of the participants, particularly those of the more doctrinaire members.

For example, the report of President Nixon's Commission on Campus Unrest was published in 1970. Among the commission members were a police chief, a governor, a newspaper editor, an attorney, a law school dean, a retired Air Force general, a university president, a professor, and a graduate student. The commission did not issue the kind of report that might have been expected, given the probable initial biases of its members. The report expressed a good deal of criticism not only toward students but also toward the government and universities. It said:

> Most student protestors are neither violent nor extremist. . . . The roots of student activism lie in unresolved conflicts in our national life, but the many defects of the universities have also fueled campus unrest. . . . The university's own house must be placed in order. . . . Actions—and inactions—of government at all levels have contributed to campus unrest. The words of some political leaders have helped to inflame it. Law enforcement officers have too often reacted ineptly or overreacted. At times, their

> response has degenerated into uncontrolled violence. . . . We recommend that the President seek to convince public officials and protestors alike that divisive and insulting rhetoric is dangerous.

In the next few pages we will show the kind of thought processes carried out by one of the authors as he tried to understand why commissions behave the way they do. Some of the steps that follow took longer to formulate than others, and some are slightly expanded to make the thinking more explicit.

> ***STOP.*** **Think about the observation. Why would commissions be moderate (and critical) in their reports? See if you can form some speculations of your own.**

The reading of the newspaper story about the commission on student unrest and the observation that moderation and a tendency to criticize the government were common to such commissions was the observed *result* I wanted to explain. I asked myself *how* such a result could occur; what *process* could have led to this result? Thus my first try at an explanatory process was:

> People on commissions who hold diverse opinions ultimately decide to compromise a little bit. They do so in a kind of trading process in which each gains a little and each gives up a little. Thus the final report represents a middle ground among the diverse views.

I next tried to broaden the model, to make it more general and abstract. The first step was to look at all of the verbs and nouns in the model to see if they could be made less specific. "Commission" and "final report" were broadened first, since it seems possible that the compromise process is true of all group behavior. My second try was:

> People who hold diverse opinions will tend to compromise their differences and end up supporting some opinion in the middle, in order to obtain common agreement.

Notice that "commissions" was dropped altogether and that "final report" was broadened to become "opinions." This model is broader than the first try, though it is limited to opinions. Could

any other verbs or nouns be broadened? It seemed possible that behavior might be changed as well. So the language was broadened to include actions as well as opinions. The third try was:

> People with conflicting goals and opinions will tend to compromise their differences in order to obtain common agreement.

The third try was substantially broader than the first, and I now had a model with applications in the whole area of human decision making. Does the model work? Are its predictions correct?

The simplest prediction is that we should observe evidence of compromise in the final reports of task forces. There was such evidence of compromise—the reports always seemed to endorse some position in the middle of the spectrum of original opinions held by the participants. But something else was also apparent. There were rarely any strong dissenting "minority reports." Nor were there many instances of commission members "repudiating" a report upon their return to private life. Perhaps most of the participants had actually *changed* their opinions rather than simply compromised them for the sake of the report. If this were true, it was not a result that would be predicted by the model. Some other process must be involved, therefore, and the model must be modified to take account of it or else be discarded in favor of a different model.

> ***STOP AND THINK.*** **How would you modify the model? What sort of process might lead to an actual change in personal opinions?**

Why would the opinions of the people on the commission be changed as a result of their participation in the activities of the commission? My first try at a new model was something like this:

> It is easier to hold extreme views if you are not confronted with their consequences and if you are not exposed to alternative views. People on commissions do have the strong possibility of having their reports implemented and hence are forced to think about the actual consequences of their decisions. It is hard to cling to extreme ideas when faced with the possibility of human misery resulting from them.[3]

This seemed to be an interesting beginning, and I next tried to broaden it. The model should apply to all decision-making situations, not only to commissions, and it should apply to actions as well as opinions. A second try was:

> People in positions of responsibility tend to moderate their beliefs and actions as a result of confrontation with actual consequences and exposure to alternative ideas.

The model now suggests a reason why idealists, of either the right or the left, tend to modify their ideological purity and become more moderate once they are given real world responsibilities. What about other possible predictions from the model? It predicts the same moderating effect on successful candidates for public office, and there is at least some casual evidence of this if we look at campaign utterances and compare them with subsequent actions while in office. It also predicts that leaders of radical movements (of either left or right) will tend to disappoint their fellows if they achieve office in a larger sphere. They will probably be viewed as "sell-outs" to the establishment.

For other predictions I tried to think of examples of offices with differing amounts of responsibility and power. The model says that it is easier to maintain extremist views in relatively powerless offices. Thus the president of a local chapter of a minor political social group can easily maintain right-wing views in spite of being president. Likewise, an antibusiness member of Congress may have his views only slightly moderated by his being a congressman, for he is only one vote out of 435. But the model does say that a congressman will exercise the greatest moderation of his views in those areas in which he has committee assignments (since committees are more powerful and carry greater responsibility); and similarly the model predicts that on those occasions when Congress overrules a committee, the congressional action will be more extreme (in either direction) than the committee recommendation. Finally, the model predicts that really powerful and responsible positions such as Chief Justice of the U.S. Supreme Court or President of the United States will have the most effect upon the men or women who hold them.

STOP. **Review the argument and the derivations. Are there other speculations that might explain our original**

observation? Are the others better or worse than this set of ideas?

2.5 THE CASE OF THE DUMB QUESTION

Suppose you are sitting in class when the person next to you asks a really dumb question. This is your observed fact. Can you imagine a process that might produce such an observed event? Let us suppose that you also know that the person next to you is a football player. Then you might begin with a simple model, particularly if you are not a football player:

> Football players are dumb.

Using this as a base, can we generalize it into a more interesting idea? You might want to begin by broadening "football player" to "athlete," producing the following new statement:

> Athletes are dumb.

The change has made your model more general (but not necessarily more correct), but the model still has no sense of process. Why might athletes appear dumb? Is appearing dumb an inherent characteristic of people who are good at sports? Is it due to something that happens after people take up sports in a serious way? Or is there some other explanation?

STOP AND THINK. **Is there some possible process that would make athletes appear dumb?**

One possible model for our observations might be:

> Being a good athlete requires large amounts of practice time; being smart in class requires large amounts of study time. The amount of free time is so limited that you cannot both study and practice well.

This is a much more general explanation. It makes a variety of interesting predictions. Not only does it explain why athletes appear dumb in class, but it also predicts that any time-consuming activity

will produce the same effect. Thus people who spend large amounts of time on student government or the school paper will also appear dumb in class. Of course, this is not the only possible model. An alternative might be:

> Everyone wants to feel successful. Achieving recognition in any one area is enough to make most people content.

According to this model, athletes will not work hard to achieve recognition in academic work because they already have recognition as athletes. Thus they will appear dumb in class. It also predicts that other individuals who are successful in school in important activities (for instance, student politics, social events) will appear dumb in class.

Or you might have imagined a quite different process:

> We tend to be jealous of success in others. When we are jealous of someone, we attempt subconsciously to lower his apparent success in class by interpreting his questions as "dumb."

According to this model, athletes (who are correctly identified as athletes) will ask questions that appear simplistic to other persons (who are relatively unsuccessful in athletics). Other individuals who are successful in other nonacademic pursuits will also ask what appear to be dumb questions.

> ***STOP.*** **Now we have three different models explaining the dumb football player, and undoubtedly you have thought of others. Which of the models is best? We will consider this question in the next chapter, but you might think a little about it now.**

2.6 THE CASE OF THE SMART WOMEN

The data collected to test the various ideas of this partially true story were often casual and nonrigorous. A social scientist noticed that women having a particular religious background tended to do better academic work at his university than women having other religious backgrounds. Religion Z maintains a private educational

system that many of its members attend instead of public schools. The Z schools have a certain amount of religious content, are often relatively strict, and are usually segregated by sex.

> ***STOP.*** **Why do Z women do better academic work than non-Z women? What kind of process could produce this result?**

The social scientist who made the initial observation immediately thought of two possible explanations:

> ***Model 1.*** Z women are inherently smarter than non-Z women.
>
> ***Model 2.*** There is something special about Z high schools that prepares students better for college work.

Model 1 is not a good model because it has no sense of process to it. Nonetheless, there is a possible test to check it out. We might simply give IQ tests to random samples of Z and non-Z girls in order to test the assumptions of the model. As a general rule, however, we will discourage assumption testing as a way of validating models. A little bit of imagination devoted to looking for testable predictions will generally be more profitable. In this case we suspect, from general biological knowledge, that if there were a systematic genetic-linked difference between the intelligence of Z women and that of non-Z women, there would be a similar systematic difference between Z men and non-Z men. Now we can avoid the tedious task of administering intelligence tests to everyone. Instead, we simply (and cleverly) check to see if Z men have better grade records than non-Z men. We do so and discover that there is no difference between the two groups of men. This leads us to doubt Model 1.

Model 2 asserts that there is something superior about the Z schools. But if this were true, then again we would expect Z men to be outstanding compared to non-Z men. Perhaps it is only the Z women's schools that are special, however. Casual conversation with Z men and women did not reveal any plausible differences between the Z schools that they attended. Thus Model 2 does not seem valid

either, although we might want to keep it in mind. The differences between schools might be subtle. Are there any alternative models?

> ***STOP AND THINK.*** **What other explanations might there be for the social scientist's observation?**

If you have read any modern discussions on educated women, you might have thought of the following model, which was also suggested by one of the Z women:

> ***Model 3.*** Men seem to confuse masculinity and intelligence; a smart woman is threatening to them. So when a woman shows her intelligence, she gets criticized or ignored. After a while, women who want male approval learn to act dumb so as not to offend men. Since the Z schools are segregated by sex, their women graduates haven't been conditioned to be quiet in class and play dumb. With only other women around they get more chance to develop their intellectual potential.

Is this a good model? The process is certainly clear, and it does account for the original observation of disproportionately smart Z women and average Z men. Can we now make some interesting predictions? The essential variables in the model seem to be the degree of contact with men and the values of the men contacted. This in turn suggests some possible natural experiments:

1. Z women should gradually, over time, become conditioned by their new college environment. So the difference between Z women and non-Z women should be much smaller in senior classes than in freshmen classes.
2. There are many noncoeducational colleges. Graduates of women's colleges should do better in graduate school than women graduates of coeducational colleges.
3. Some women are largely indifferent to additional male approval, perhaps because they are strongly career oriented, perhaps because they are certain of their standing (either high or low) among men. Women in career-oriented programs will do better than women in liberal arts programs; women who are married will do better than women who are not; women who are distinctively unattractive to men will do better than others.

STOP. **Is Model 3 a good one? Or are there other models? Perhaps professors like the way in which Z women deal with teachers. Maybe you can think of some other explanation. See what predictions you can derive from your own model.**

2.7 ON BECOMING A SOCIAL SCIENTIST

Recruitment into college majors is not a random process; rather, there are systematic biases in the motivations, attitudes, and abilities of students who select certain majors. Students make choices that at least in a modest way match their expectations about a field with their own aspirations and their own views of their personal abilities. Counseling from parents, friends, and teachers guides a student into a commitment that is relatively consistent with his talents. As a result, students with greater interest and aptitude in art are disproportionately represented among art majors, and students with greater interest and aptitude in mathematics are disproportionately represented among mathematics majors. In a reasonably efficient "market" these simple mechanisms serve to attract students to interests and careers that are generally consistent with their abilities; but, as we know well from an examination of the ways in which sex biases permeates such a system, the market is far from perfect.

STOP. **Think about how you might form a model of the process by which people become committed to a field of study.** ***Hint:*** **Maybe they learn to like what they are good at.**

Consider the following simple model of the process:

1. There exists a set of alternative fields (for example, political science, history, mathematics).
2. There is a set of basic ability dimensions (for example, verbal fluency, problem solving, imagery). Success in the various fields depends upon the possession of some combination of these talents; the talents leading to success in the various fields overlap considerably, though they are not identical. There is also a random component (error) in success within each field.

The magnitude of the random component varies from field to field.

3. Each child is characterized by a value (score) on each basic ability dimension. Although the correlation among these values is strongly positive, it is not perfect.
4. Initially, a child has no preferences among these fields; children develop preferences on the basis of experience, tending to prefer those in which they are successful; they modify subsequent experiences (insofar as possible) to increase the time spent in fields that are preferred.

Within the model the process by which preferences are developed is simple. A child is presented with a series of opportunities to choose an academic interest; a choice is made on the basis of initial preferences; some level of success or failure is experienced, depending on the relation among the child's abilities, the abilities necessary for success in the field, and some random component; preferences among the various alternative interests are modified on the basis of success.

Such a model is hardly adequate to explain all features of the choice of major; it does, however, capture (or at least is consistent with) the major features of currently received doctrine about (1) individual abilities, (2) the relation between talent and performance in a field, and (3) individual learning of preferences.

STOP AND THINK. **What does the model leave out? Are there important factors omitted by this simplification?**

You may have noted two conspicuous factors that have been ignored by our gradual commitment model.

1. *Market Value.* A strict adaptation model ignores anticipations of future economic and social successes associated with various occupations and thus with various fields. At least some of the enthusiasm for medicine as a career stems from expectations on the part of students (and their parents) of the economic and social position that such a career confers.
2. *Social Norms.* The appropriateness of certain fields (and cer-

> tain talents) for certain people is regulated by social rules as well as by adaptation to intrinsic talent. Most conspicuous among rules are the regulations related to ethnic group status and sex. Moreover, expectations with respect to the match between ethnic group or sex on the one hand and performance on the other form a major filter for the interpretation of succcess.

This description of an individual adaptation model subject to the outside press of the market and social norms is reasonable. It is also prima facie efficient and neutral; the process will tend to match up abilities and interests.

The model also predicts some other things. For example, it predicts that the speed of commitment by an individual to a field will depend on the variance of abilities in the individual (that is, those whose abilities are relatively specialized will become committed earlier than those whose ability levels are relatively equal for a wide range of fields); on the relative specialization of the field (that is, fields requiring abilities that are not required by other fields will tend to secure commitment relatively early); on the general level of ability of the individual (that is, those with relatively high ability will tend to become committed before those with relatively low ability); and on the magnitude of the random component in determining success in a field (that is, fields with a high random component will tend to secure later commitment and to attract relatively less able individuals).

According to this model, the social and behavioral sciences, for example, will tend to recruit those students with high abilities in relevant areas, although it will lose some students having high social science ability to other fields when those students also had high abilities relevant to the other fields (particularly to fields with heavy overlap in the abilities required for success). Subject to "errors" in allocation due to chance elements in rewards, time limitations on experience, variations in market values, and social norms, the process allocates students to the places in which their abilities lie.

The errors of allocation, however, are important. If we are interested in understanding some features of how one becomes a social science major, we may be particularly interested in discovering features in the process that might produce systematic errors in the choice of social science.

STOP. **Review the process we have specified. Can you see any way in which the selection of a social science major might be systematically biased?**

If our model is correct, development of interest in behavioral and social science is subject to several sources of error:

1. Virtually nothing of the behavioral and social sciences is taught in the first 12 years of American schools. The exceptions are small and somewhat misleading: Geography (that is, maps, place names, and the distribution of natural and human resources), civics (that is, constitutional and legal forms), and modern history comprise the normal fare (perhaps supplemented with an exposure to sex and family living). In some schools there is an effort to introduce a bit of economics, psychology, cultural anthropology, or sociology; but these efforts touch an insignificant number of students rather late in their precollegiate days. "Social studies" in the American school is frequently history with an hour's discussion of current events on Friday.

2. The skills required in the social and behavioral sciences are far from unique to those fields. If we assume that the skills required for a modern social or behavioral scientist include the skills of analysis, model building, hypothesis forming, speculation, data interpreting, and problem solving, it is clear that social science deals in widely demanded skills. In particular, it seems obvious that such skills are highly correlated with the skills involved in mathematics, natural sciences, history, and creative writing.

3. Social norms leading students toward social science tend to be antianalytical. The behavioral sciences are associated (quite appropriately) with human beings and social problems. As a result, they are associated (quite inappropriately) with a rejection of things, quantities, abstractions, and special skills. The norms tend often to be relatively "antiprofessional."

4. The social sciences appear to have a relatively high random component in their evaluation procedures. The reliability of grading appears to be less than in some other fields. As a result, students of relatively low ability do, on the average, better in social science than in other fields—even if the average preformance and average ability levels are held constant.

When we superimpose these facts on the basic model, we obtain a series of predictions about possible errors in the choice of social science as a field of interest:

1. Since the abilities appropriate to the social and behavioral sciences are similar to, or correlated with, the abilities appropriate to fields more commonly offered at the precollegiate level (for example, mathematics, natural science, history, English), many students with high potential for work in social science will have learned to prefer (and have a commitment to) another field by the time they come to college.
2. A disproportionate share of those students who say they want to be social scientists on entering college will be "residual students," students who have not as yet found a field for commitment. In effect, this means that many will be students who are not particularly good at mathematics, physics, chemistry, English, history, or biology.
3. Insofar as a student has learned to prefer social science in his precollegiate training, he will have learned to prefer social science in terms of some combination of current events, social and human problems, and institutional description, or (disproportionately) because of error in the earlier evaluation scheme.

The fundamental conclusion can be stated in a grossly simple way: If our model is correct, many social science students will be either inept at necessary skills or persuaded that those skills are irrelevant; many students with the skills necessary for social science will be strongly committed to competitive fields long before college or graduate school. This will be true in general, but it will be less true of individuals (for instance, women, blacks) who are channeled into social science by social norms than of other groups; it will be less true of fields that provide good economic prospects (for instance, economics, law) than other fields.

We have pondered the implications of such a model for the teaching of social science. As teachers, we have sometimes feared that some of our students might be expecting the wrong things from social science; that some students who would be good social scientists never took the right courses; and that some of the enthusiasm and intelligence of our students was buried beneath learned instincts for pedantry. This book, in fact, is a partial response to these concerns.

We have also pondered the implications of the model for understanding why we became social scientists. Was it really because we were not very good at anything else? We do not think so, and we have taken solace in the observation that good models of

human behavior are rarely precise interpretations of individual actions.

For example, suppose one of our models generates the following prediction: Wealthy people tend to be more politically conservative than poor people. This is a good prediction about human behavior. But it does not necessarily describe an individual. Former Mayor Lindsay of New York is both wealthy and liberal. So are many other people. We do not expect such a model to predict individual human behavior; we only expect it to predict appreciably better than chance. If we questioned wealthy people about their political views and discovered that 60% were conservative, while only 20% of poor people were conservative, we would say that the model did a reasonably good job of predicting aggregate human behavior.

The prediction that wealthy individuals will tend to be politically conservative is still useful and interesting even if you know some wealthy individuals who are not. Thus if you were soliciting votes for a liberal cause, you would know that your chances of obtaining support from wealthy people would be relatively low. You might concentrate your efforts on other segments of the population and advertise in *Newsweek* rather than in the *Wall Street Journal.*

Thus although our model of how errors are made in the discovery of an interest in social science suggests that there will be more mistakes in social science than in some other fields, it does not necessarily apply to us, or to you. On the other hand, even if it does apply and we are here for all kinds of "erroneous" reasons, we have nevertheless rather grown to like it; and you might also.

2.8 *THE POLITICS OF POPULATION*

Human societies sometimes face a population problem. A population problem exists when it is generally agreed within the society that the natural processes of birth and death are creating economic or social difficulties and should be modified. Historically, different societies have reacted to this situation in different ways. For example, some societies have increased the average life expectancy of their citizens through improved health-care systems. Some societies have increased the death rate selectively with respect to age, sex, and social class through wars, infanticide, or inefficient health care. Some societies have decreased, or increased, the birth rate through modifying social norms with respect to homosexuality

or marriage, through encouraging women to work outside the home or to stay home, through contraceptives, or through moral persuasion.

> ***STOP.*** **Since this kind of question is profoundly important ethically, we might wish to speculate about the process by which societies arrive at different solutions to the population problem. Under what circumstances will societies engage in infanticide, birth control, medical research, women's liberation, or war? What is the process involved?**

A possible way of looking at the problem follows. Since any population is limited by some kinds of scarce resources, a society decides who will share in those resources. One aspect of that decision is the question of who will live and who will not. Any combination of policies with respect to health care, birth control, work, war, and social norms is a decision about whose life will be relatively favored in the society and whose will be relatively unfavored. In this sense every society discriminates in favor of some people and against others.

Suppose we think of society as consisting of various age groups (for example, old people, young adults, children, unborn). Various possible population control procedures clearly have different consequences for the different age groups. A society that invests money in research on cancer and heart disease, for example, discriminates in favor of middle- and old-age people. A society that practices infanticide discriminates against babies. A society that practices birth control discriminates against the unborn.

If we look at the problem this way, our task becomes that of identifying a process by which a society might come to discriminate in one way or the other.

> ***STOP AND THINK.*** **Can you form any hypotheses about the decision process within a society?**

You might have said something like this:

> Individuals and groups within a society pursue their own self-interests. It is in the interest of every individual to promote

discrimination in favor of his own age group and other age groups to which he expects to belong. Each group of individuals within the society has a certain amount of power. The greater the relative power of a group, the greater the discrimination in its favor.

A moment's reflection on the power structure within societies immediately suggests two predictions:

1. All societies will tend to discriminate against the unborn. That is, faced with an overpopulation problem, they will tend to prefer birth control to increasing the death rate.
2. The broader the sharing of power within the living society (for example, the more democratic it is), the greater the discrimination against the unborn.

The first of these predictions sounds interesting and provocative, but it is not easy to evaluate. The second, however, can be examined. A social scientist who did not have this specific problem in mind has invented a measure of the democracy of a political system and has applied it to some modern political systems. His results are presented in Table 2.1 along with crude birth and death rates.

Our model says that relatively democratic countries will discriminate more against the unborn than will relatively undemocratic countries. This means that we would expect to find that relatively democratic countries had relatively low birth rates and relatively long life expectancies. Is this the case?

STOP. **Think about how you would decide whether these data support the model.**

One procedure that might have occurred to you is to plot pairs of observations as we have done in Figures 2.2 and 2.3. In Figure 2.2 each country is a point. Each country is located on the figure according to the democratic index for that country and the crude birth rate for that country.

STOP AGAIN. **What does the model predict about such a figure?**

TABLE 2.1 Democracy, Birth Rates, and Death Rates

COUNTRY	*DEMOCRATIC INDEX*	*CRUDE BIRTH RATE*	*DEATH RATE 60–64 YR. OLD (MALES)*
Great Britain	236.3	18.3	27.6
France	231.4	17.7	26.1
Finland	229.2	16.9	34.6
Sweden	225.8	15.9	18.6
Netherlands	220.9	19.9	33.1
Belgium	214.9	16.4	29.1
Japan	212.7	18.6	—
Luxembourg	210.1	16.0	24.7
Norway	209.7	17.5	16.5
New Zealand	209.4	22.8	26.3
Denmark	205.7	18.0	19.3
Israel	203.2	25.8	26.8
W. Germany	199.4	17.9	—
Italy	198.6	19.2	21.8
Canada	196.8	21.4	23.5
United States	190.9	19.4	29.2
Venezuela	188.3	—	—
Austria	186.9	17.9	—
Chile	184.6	32.8	—
Ireland	181.4	22.1	27.0
India	172.7	—	—
Switzerland	169.3	18.8	25.6
Mexico	121.9	44.2	41.8

Source: Deane E. Neubauer, "Some Conditions of Democracy," *American Political Science Review* 61 (1967) 1002–1009. Reprinted with permission.

According to our model more democratic countries will discriminate *more* against the unborn. Thus a high democratic index should lead to a low birth rate. This appears to be generally true. One quick and inelegant way of checking is to draw a vertical line through the middle (*median*) value with respect to birth rate. These are the dashed lines in Figure 2.2. These lines divide the space into four rectangular areas. If our model is correct, we should find that the points are concentrated in the upper left and lower right areas. If you check, you will find that there are fourteen points in these two areas and only four points in the other two.

In Figure 2.3 each country is again a point. Here the points are located according to the democratic index for that country and the crude death date for 60–64-year-old males in that country. We have drawn the equivalent dashed lines.

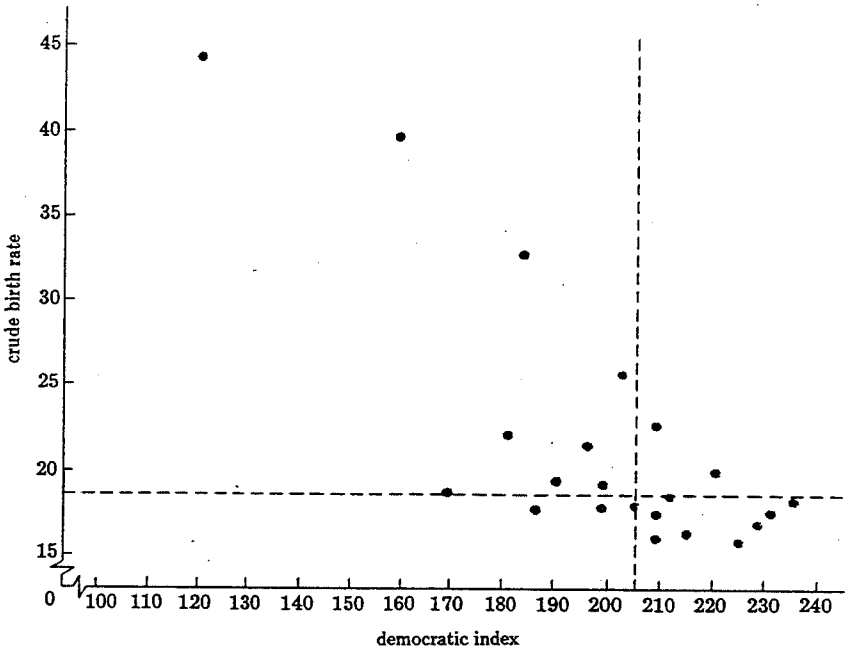

Figure 2.2: Democracy and birth rates.

STOP. **What does the model predict?**

Our model predicts that the more democratic countries will discriminate *less* against 60–64-year-olds. Thus we predict that a high democratic index will be associated with low death rate. This does not appear to be true. Our data arrange themselves so that there are exactly four points in each of three of the quadrants and five points in the fourth.

STOP. **Can you generate any other predictions that might be wrong? So far we have talked mostly about good predictions, but much of the art of model building lies in finding bad predictions.**

At least one other problematic prediction occurs to us. We have talked entirely about age groups and the relatively weak

political position of the unborn. In effect, we have developed the implications of a pure political model in which the powerful discriminate against the less powerful. There are other political groups that are relatively weak. Consider blacks in the United States, who have, by almost any plausible measure, less political power on the average than whites. Thus, according to the model, you would expect that age-specific death rates would be higher and age-specific birth rates lower among blacks than among whites. In fact, the first proposition is true, but the second is not.

One possible explanation is that this is something unique to the problems of blacks in America. However, this thought can be quickly dispelled. Spanish-speaking Americans also have less political power on the average than do Anglos. Yet birth rates and death rates are both high among Spanish-speaking Americans. Such a situation appears to have been true historically for many minority groups within the United States. American society seems systematically to discriminate against living members of ethnic minority groups and against unborn children of dominant social groups.

Thus it is possible that our model is simply wrong. One of the important realities of model building is that not all predictions

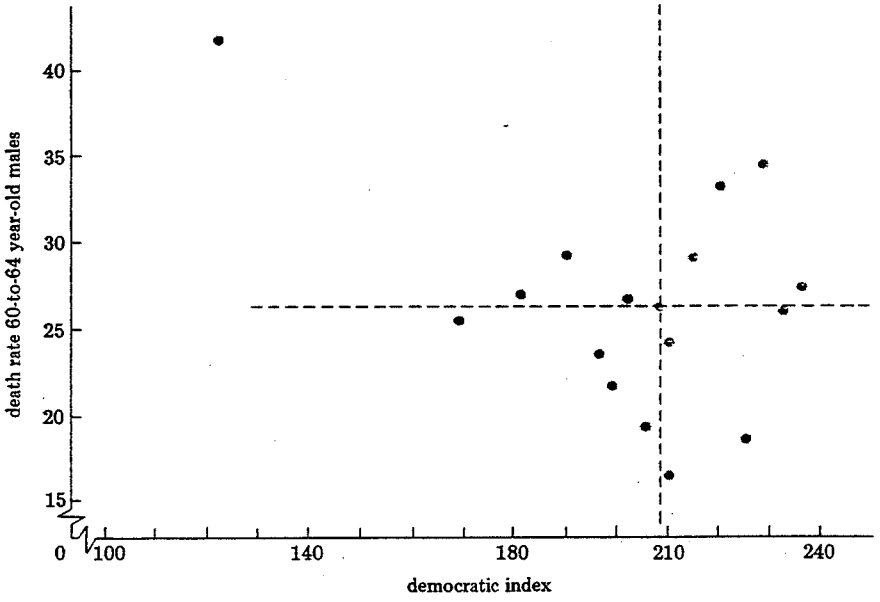

Figure 2.3: Democracy and dezth rates.

are correct. Indeed, as we will suggest in more detail in the next chapter, although we enjoy being right, most theoretical development comes from being wrong.

2.9 *THREE RULES OF THUMB FOR MODEL BUILDING*

Model building as you have done it in this chapter is not a novel activity. It is something we all do all the time. We speculate about things that happen to us or that we see happening to others. It is not mysterious, but it probably can be improved by a little attention to some elementary rules. In Chapter Three we will suggest some more detailed rules of thumb. Here we will simply note three general rules that we have been using repeatedly in making the speculations in this chapter. They are probably sensible much of the time, though they are not absolute truths.

> ***Rule 1: Think "Process."*** *A good model is almost always a statement about a process, and many bad models fail because they have no sense of process. When you build a model, look at it for a moment and see if it has some statement of process in it.*

Example

Your chemistry professor shows up in class but has forgotten to bring along last week's homework papers. He apologizes, and you turn to the person next to you and say, "What can you expect from absent-minded professors?" This is your explanatory model for the professor's behavior. This is a common, ordinary, but poor model. Look at it for a moment. Where is the process? One way to put a process into the model is to ask *why* professors are absent-minded. If you think about it for a moment, you will be able to think of a number of processes that might produce absent-minded professors.

> ***Model 1.*** Busy people try to devote their limited time to the things they consider most important. The professor does not consider teaching important, and so he did not bother to go by his office and find the homework papers.
>
> ***Model 2.*** You become a professor by learning to be a good problem solver. Good problem solving involves almost single-

minded concentration. So the professor occasionally forgets to do one thing because he is concentrating on another.

The models are different from each other, but each involves a sense of process, or relationship. One way to be certain that your models involve a sense of process is to see if you can derive general relational statements from them, that is: The greater X is, the greater Y will be. Thus Model 1 contains the following general relational statement: The busier someone is, the more likely he is to concentrate on important things. And Model 2 contains this general relational statement: The tougher the problem and the harder someone is concentrating on it, the more likely he is to forget other things.

> ***Rule 2: Develop Interesting Implications.*** *Much of the fun in model building lies in finding interesting implications in your models. In the problems associated with this course you will repeatedly be asked to develop interesting implications from some model. Whether something is considered interesting obviously involves a judgment, but there is a good strategy for producing interesting predictions: Look for natural experiments.*

Example

An uninteresting prediction from Model 1 would be: Make the professor value his students more, and he will then become less absent-minded. Or from Model 2: Get the professor to work on easier problems, and he will become less absent-minded. These are relatively uninteresting because they ask us to run an experiment in a situation in which we probably cannot.

The way to find more interesting predictions is to think about the process involved in each model and then look for natural instances in which the key variables in the process vary. In Model 2, for example, it is not simple to vary the difficulty of the professor's problems, but you can easily find instances of similar situations and hence can predict that people (business executives, architects, football coaches) in other occupations that demand concentrated, abstract thought will occasionally forget things, too. Or you can predict that the professor will be just as absent-minded when engaged in his laboratory research as when he is engaged in teaching.

Or, for Model 1, you cannot easily make the professor value

some given class of students more, but you can search for natural occurrences of this event. For example, if you believe that he values the students in his graduate research seminar more than the students in his freshman introductory class, you would predict less absent-minded behavior with respect to the graduate students. Suppose you did make such observations and discovered that he was equally forgetful in his graduate classes; and furthermore that his freshmen lectures are well prepared, that he seems to have great quantities of careful notes, and that he often spends so much time answering questions after the freshman class that he is late for his next class. You would then be highly skeptical of the truth of Model 1.

> ***Rule 3: Look for Generality.*** *Ordinarily, the more situations a model applies to, the better it is and the greater the variety of possible implications. Finding generality involves the ordinary process of generalizing nouns and verbs.*

Example

Expand "college professors" to "busy people"; expand "forgetting homework papers" to "forgetting anything"; expand "bringing papers" to "one kind of work." Finding generality also involves asking repeatedly why the process we have postulated is true. We ask: Is there another model that, if true, would include our model as an implication? That is, we look for a more general model that predicts our model and other things as well. Model 2, for instance, can be generalized to a large family of learning models that can be formulated to predict what would happen if people learned to be good social scientists (see Section 2.7) or executives (see Chapter Six).

From such simple heuristics, a little experience, some playfulness, and a bit of luck come good models, and some bad ones. Indeed, it is the creativity with which we specify bad models that leads us to good ones.

References

Herbert A. Simon, *Models of Man* (New York: Wiley, 1957).
Arthur L. Stinchcombe, *Constructing Social Theories* (New York: Harcourt Brace Jovanovich, 1968).
Josephine Tey, *The Daughter of Time* (London: Macmillan, 1951).

Notes

[1] Martin Deutsch and Mary Evan Collins, "Interracial Housing," in William Peterson, ed., *American Social Patterns*, (Garden City, N.Y.: Doubleday, 1956).

[2] Actually, the process implicit in this model should be clarified somewhat. We are *not* saying that out of every 100 people there are 70 who are inherently like us and who could become our friends and 30 people who are inherently different from us who could become our enemies; and communication allows us to identify the two different groups. Rather, the model says that almost anyone is capable of becoming either a friend or enemy, depending on whether you communicate about your similarities or your differences.

[3] Note an alternative theory: People on commissions want to have their reports implemented. They believe (from experience?) that extreme reports rarely are implemented.

Problems

A Note for Instructors. The problems in this book are designed to stimulate thought. For many of the problems, especially those in Chapters 2 and 3, there are no unique correct answers; rather, there are only thoughtful and nonthoughtful answers, or creative/noncreative answers. The amount of written material in the book has deliberately been kept terse to allow more time for thought. In effect, we postulate a Gresham's Law of Study: Faced with a choice of reading about something versus thinking about it, people will choose reading. Reading drives out thinking. Reading is a well-defined technology at which most of us are relatively competent; it provides easily recognized benchmarks of progress and completion, and it can be accomplished with certainty in some easily predicted time period.

Reducing the necessary reading time is only part of the solution, though. We also need to make thinking more attractive and rewarding. One way to do this is the formation of small problem-set groups. Each group meets outside of class to discuss the problems and ultimately turns