Seventeenth Edition

SOCIAL SCIENCE

An Introduction to the Study of Society

DAVID C. COLANDER and ELGIN F. HUNT

ROUTLEDGE

Social Science

Now in its seventeenth edition, *Social Science: An Introduction to the Study of Society* approaches its study from a common sense perspective, rather than a formalistic perspective more common in social science. Readers will see how seemingly diverse disciplines intermingle and connect to one another—anthropology and economics, for example. The goal of the book is to teach students critical thinking and problem-solving skills that will allow them to approach social issues in an objective and informed way.

New to this edition are significant updates on:

- The election of Donald Trump and the emergence of related populist movements
- Trade policy and health care
- Issues involving migration and immigration
- Emerging developments in artificial intelligence
- Comparisons between cultural and biological evolution
- Examples, data, recommended readings, and internet questions

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Elgin F. Hunt is deceased. He was one of the early authors of this book when it began in the 1930s, and took over as sole author in the 1950s. He continued revising the book until the late 1970s, when David Colander took over.

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SEVENTEENTH EDITION

David C. Colander

Elgin F. Hunt

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Dedication

To my granddaughter, Adelaide: May you inherit a peaceful world

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Preface

Social science is taught in diverse ways. Some courses take a global perspective, some an anthropological perspective, some a psychological perspective, some a sociological perspective, and some a historical perspective—to name just a few. In my view, although each individual social science perspective has something to offer, what distinguishes the social science course is that it looks at problems from as many different perspectives as possible, relying on the scholar's educated common sense to choose the perspective that is most useful for a particular problem. The educated common sense perspective is the social science perspective.

The goal of a social science course is to convey this educated common sense perspective to students. That's not an easy task; as Voltaire once said, common sense is not so common.[1] What he meant by this is that what seems like common sense from one perspective, can seem quite stupid from another. The common sense that we are striving for is an educated common sense—a common sense that has faced vigorous competition from other perspectives. Through the competition of ideas, "common" sense becomes a more and more nuanced common sense. Eventually, with enough competition, common sense becomes educated common sense. Educated common sense involves understanding the nuance in any common sense view, and a recognition of the limits of common sense.

Educated common sense is an important concept for students to learn. At the end of an earlier edition, I included a sheet for students to grade the book and to send me suggestions for improvement. A number of students did this, and their suggestions have played an important role in shaping the book. Most, I'm happy to say, were highly positive, but a few attacked the book and the course. One particularly memorable student flunked me on just about every chapter and wrote the following:

> Until you and this so-called science become legitimized I'd rather spend time gorging myself and then vomiting. Guesses, hypotheses, maybes, might bes don't belong in college; they belong in elementary school.

That student obviously read the book, because he is correct: The book doesn't tell the student what is right or wrong, and it does report guesses, hypotheses, and maybes. But that student is wrong about what does and what doesn't belong in college. Guesses, hypotheses, and maybes are precisely what belong in college, because by the time students are in college they can be expected to have the maturity to understand that knowledge is nothing but good guesses, reasonable hypotheses, and logical maybes. Social science doesn't tell you what's

[1] Actually Voltaire was not the only person to have made this point. Many others, before and after, have made the same observation. The reason it has been said so often is that it is just common sense that common sense is not so common.

right. It presents the observations and the theories as fairly as it can and provides you with guidance and training to sift through them and make your own decisions.

The educated common sense perspective blends nuance with facts and truths into a kaleidoscope vision of the world that allows one to see it from multiple perspectives, and to be comfortable with oneself and one's ideas even as one recognizes one's faults and limitations. The goal of the course is to make students open to others' insights but also comfortable with their own insights and sensibilities that they have developed through living and reflection. The skill is often called critical thought, but I prefer to call it educated common sense because critical thought too often is associated with scholars' perspectives, and does not take adequate account of the deep knowledge and sensibility that all people discover by just living. It was that knowledge and sensibility that the original common sense term was meant to capture. Educated common sense modifies, but does not replace, common common sense. It respects knowledge of the mind, but does not make a fetish of it.

In my view colleges teach too little educated common sense. All too often our educational system rushes students into specializations before students have an overall picture—before they know where they want to go. Once they have an overall picture, specialization is necessary, but to make them specialize before having an overall picture is unfair to students. Students who specialize too early don't develop a common sense perspective; they aren't sensitive to the interrelationships and resonances among disciplines. At worst, they become slaves of their discipline's approach. At best, they have the wisdom to recognize that there are many approaches to a problem, but their lack of training forces them to recreate the wheel. Knowledge of the other disciplines would have saved them the trouble and been far more efficient.

That is why I am a strong advocate of the social science course and have been urging colleges to merge their various social science departments into one composite department that focuses more on the interrelationships among the various social sciences than is currently done. The general social science course is one of the most important courses students take in college and, in my view, it is a prerequisite to taking courses in specific social science disciplines. It puts those other disciplines in perspective.

New to This Edition

When the publishers came to me to say that it was time for another edition, I resisted, both because of the work involved and a sense that the last edition would be reasonably acceptable for another year or so. Two events changed my mind, and they are central to the revision of the book.

The first was the election of Donald Trump (and other related populist movements such as Brexit). That election influenced the way we understand both politics and culture. His election brings to the fore issues in economics (trade policy and health care), politics (partisanship, identity of parties, and the divisions within parties) culture (issues of migration and immigration such as DACA), and foreign policy (America First, sovereignty, and globalization) and required revision of all economics and political science focused chapters.

To emphasize its importance, I changed the introduction to capture the differing views on Trump's election, and the recognition that there are different perspectives that need to be acknowledged. Then I integrated a discussion of the issues Trump has raised into many chapters. For example, in Chapter 4, I updated the immigration debate, and explored the different perspectives on immigration. In Chapter 5, I addressed Trump's position on the climate change debate and his pulling the U.S. out of the Paris Climate Accord. In Chapter 16 I discussed how Trump's election reflects forces that may lead to a breaking up of standard political parties, and the emergence of a populist middle that is aligned to neither party. In

Chapter 19 I discuss Trump's America First Policy and how it fits with multilateralism. In Chapter 20 I considered Trump's trade protectionist policy, and the winners and losers from trade. And in Chapter 22 I discussed Trump's war of words with North Korea and potential for conflict. So, if you're wondering why there is another revision—you can blame it on Trump.

The second event is far less known, but, is, I believe, similarly significant. That event is the loss of the top player in the world of the game, Go, to Google's artificial intelligence program, Alpha Go. Go requires far more intuition than chess, so the computer's victory suggests that we are now able to develop algorithms that do better than humans in all types of intuitive activities and jobs in which we previously believed that humans had a unique comparative advantage. This event captures the fact that artificial intelligence is developing much faster than expected, and in the coming decade, expert systems incorporating deep learning algorithms are likely to be a force on the economy and culture as strong as mechanization was in the Industrial Revolution, or globalization was in the 1980s and 1990s.

In short, this development has enormous consequences for culture, economics, psychology and politics, and even for the way we understand humans' role in evolution. It called for substantial revisions in the technology chapter, but also in the discussion of upcoming problems in the economics chapters, and the question of finding meaning to life in the culture and religion chapters.

Those two events were, of course, not the only events that have changed the world in the last three years, and I have also made numerous changes to reflect new scholarship in specific areas. Examples, data, recommended readings and internet questions were all updated. Updates reflecting new scholarly work were also added. For example, in Chapter 2 and Chapter 5 I introduced the new work being done in cooperative and group evolutionary theory, and its implications for the relationship between cultural and biological evolution. I also discuss the new work in epigenetics and its implication of our understanding of the evolutionary process. There were also numerous changes in the political and economic chapters that occurred separately from Trump, such as the ongoing changing political structure in both China and Saudi Arabia. Both are major events with significant implications for the world.

Despite all these changes the book remains what it was in the previous edition—a relatively neutral (at least as neutral as I am able to be), hopefully educated, common sense overview and introduction to the social sciences and social science thinking about the major issues of our day.

Acknowledgments

As always, the book benefits from the suggestions of reviewers, colleagues, and students who have e-mailed me. I'd like to thank them all. For this edition, I'd specifically like to thank some great reviewers—Paul Demetriou, Havering College; Edgar Bravo, Miami Dade College Kendall Campus; Victor J. Ingurgio, University of Oklahoma, Norman; Tabitha Otieno, Jackson State University; Alex Gancedo and Harold Silva, Miami Dade College; Caroline Lewis, University of Wales Trinity Saint David; Ruth McGrath, Teesside University; and John Kilburn, Texas A&M International University, among others who wished to remain anonymous.

Over the last few editions the reviewers have included: Tabitha N. Otieno, Jackson State University; Victor J. Ingurgio, University of Oklahoma, Norman; Heather Griffiths, Fayetteville State University; Charles Matzke, Michigan State University; and Ted Williams III, Kennedy-King College, City Colleges of Chicago; William Plants, University of Rio Grande; David S. Schjott, Northwest Florida State College; Emmanuel Agbolosoo, Navajo Community College; Ali Al-Taie, Shaw University; Verl Beebe, Daytona Beach Community College; John Beineke, Kennesaw State College; Thomas J. Bellows, The University of Texas at San Antonio; Dallas A.

Blanchard, University of West Florida; Ducarmel Bocage, Howard University; William K. Callam, Daytona Beach Community College; Pam Crabtree, New York University; Bruce Donlan, Brevard Community College; Anthony Douglas, Lornan, Mississippi; William M. Downs, Georgia State University; Phil A. Drimmel, Daytona Beach Community College; J. Ross Eshleman, Wayne State University; Dana Fenton, City University of New York, Borough of Manhattan Community College; Cyril Francis, Miami Dade College North Campus; Richard Frye, Neuro-Diagnostic Lab, Winchester Memorial Hospital, Winchester, Virginia; Vikki Gaskin-Butler, University of South Florida St. Petersburg; Judy Gentry, Columbus State Community College; Paul George, Miami Dade College; Don Griffin, University of Oklahoma; Heather Griffiths, Fayetteville State University; Charles F. Gruber, Marshall University; Ghulam M. Haniff, St. Cloud State University (Minnesota); Roberto Hernandez, Miami Dade New World Center; Charles E. Hurst, The College of Wooster; Sharon B. Johnson, Miami Dade College; Kenneth C. W. Kammeyer, University of Maryland; Rona J. Karasik, St. Cloud State University; Lynnel Kiely, Truman College; H. D. Kirkland, Lake City Community College; Patricia E. Kixmiller, Miami Dade College; D. R. Klee, Kansas City, Missouri; Casimir Kotowski, Harry S. Truman City College; Errol Magidson, Richard J. Daley Community College; James T. Markley, Lord Fairfax Community College; Stephen McDougal, University of Wisconsin-La Crosse; David J. Meyer, Cedarville University; Karen Mitchell, University of Missouri; Catherine Montsinger, Johnson C. Smith University; Lynn Mulkey, Hofstra University; Roy Mumme, University of South Florida; Eleanor J. Myatt, Palm Beach Junior College; Quentin Newhouse Jr., Howard University; Earl Newman, Henry Ford Community College; Annette Palmer, Howard University; Robin Perrin, Pepperdine University; Joseph Pilkington-Duddle, Highland Beach, Florida; William Primus, Miami Dade College North Campus; Roger Rolison, Palm Beach Community College; William H. Rosberg, Kirkwood Community College; Dan Selakovich, Oklahoma State University; Henry A. Shockley, Boston University; Julie Smith, Mount Aloysius College; Ruth Smith, Miami Dade College; Scharlene Snowden, City University of New York, Medgar Evers College; Ronald Stubbs, Miami Dade College; Larry R. Stucki, Reading Area Community College; Barry Thompson, University of Rio Grande; Judy Thompson, University of Rio Grande; Elizabeth Trentanelli, Miami Dade College; Margaret Tseng, Marymount University; Edward Uliassi, Northeastern University; Angela Wartel, Lewis Clark State College; David Wells, Glendale Community College; Ted Williams, City College of Chicago; W. M. Wright, Lake City Community College; Norman R. Yetman, The University of Kansas; and George Zgourides Primus, Miami Dade College North Campus.

To my knowledge, this is the longest continuing college textbook in the United States. It began in the 1930s when some Chicago professors put together their notes and turned them into a book. It evolved through the 1940s and 1950s into a standard text, and then in the 1960s, Elgin Hunt took it over as the sole author. I took it over in the late 1970s, totally updating and revising it to reflect new developments. I have kept his name on the title to reflect the origins of the book and the fact that it is a collective effort of previous scholars, with a changing group of people working on it.

I always hire students to help me with proofreading, searching for data, reviewing what I have written so that it reflects students' concerns, and they have always done great jobs. This edition is no different, and I would also like to specifically thank Isabella Cass, a student at Middlebury College, who helped with many parts of the revision while she was studying in both China and Russia, keeping me informed of the developments in both those countries. She also updated the test bank and the answers to the end of chapter questions. I would also like to thank all the people at Taylor & Francis involved with this, including Senior Production Editor, Emma Harder and Copyeditor Anna Thomas. Dean Birkenkamp and Tyler Bay did a great job supervising and handling all the editorial issues. I thank them for their hard work. Finally, I want to thank my wife for helping me find the time to work on the book.

D. C. C.

Part I Introduction

Social Science and Its Methods

chapter 1

After reading this chapter, you should be able to:

- Define social science and explain why it is important
- List the various social sciences
- State the nine steps that make up the scientific method
- Discuss some reasonable approaches to problems in social science
- Differentiate the historical method from the case method and the comparative method
- Distinguish educated common sense from common sense
- Explain why a good scientist is always open to new ways of looking at issues

Theories should be as simple as possible, but not more so.

—Albert Einstein

On November 8, 2016, people gathered around the television at (insert just about any Eastern Seaboard College or University) expecting to cheer Hillary Clinton becoming the first woman president of the United States. The mood was happy; polls predicted a Clinton victory. As the night progressed, the mood changed. Donald Trump, her Republican opponent, who many establishment Republicans had opposed, was doing better than expected; Trump actually had a chance; Trump was leading; Trump had won! Shock and awe is about the only way to describe it. For many in that group, Trump's victory was cataclysmic—they saw it as marking an end of American democracy as they knew it.

That same evening people gathered around the television in (insert just about any southern, rural, mainly white working-class Midwestern non-university town) and had a reverse reaction. Finally, they had been heard. Someone was coming into office who would tell it like it is, drain the swamp, and stick the liberal Eastern establishment elite's political correctness up their collective wazoo, where they felt it belongs. They were concerned about justice for all, but they wanted a justice for all that included justice for them. They were tired of being considered despicable; they were tired of wishy-washy politicians whose views were so filtered that they were at best pablum of the mind. They were tired of politicians who felt they had the right to force their values and world-view on everyone[1].

Other groups dispersed around the country had different reactions. For example, there were those who would be directly affected by the policies Trump had advocated in the

[1] The phrasing is, I suspect, jarring for many readers—that's not the way textbooks sound. I use the Trumpesque phrasing in the same way that Trump uses it (as explained in his *Art of the Deal*—to jar, and to set discussion agenda on his terms). I now return to normal textbookeze.

campaign. These included black people, minorities, and immigrants, among others. Their concerns were not intellectual; their concerns were real and pragmatic. What would Trump's election mean for policy? Would immigration be ended? Would Dreamers (children who were brought to the United States illegally, but who had lived just about their entire life there) be deported? Would anti-discrimination policies be ended? . . . Welcome to social science.

Recent previous editions of this book began with a discussion of the 9/11 terrorist attacks on the World Trade Center, and its effect on society and culture. 9/11 served as a focal point for discussions of the interconnections among political, social, cultural, and economic aspects of life. It was an event that pulled the United States together. Trump's victory is a quite different event, but it also serves as a focal point of the interconnections—only this time the focus is on forces pulling U.S. society apart, not pushing it together. The United States has become polarized politically, culturally, and economically. **Social science**—the study of social, cultural, psychological, economic, and political forces that guide individuals in their actions—is the analysis of those forces that push society apart and pull it together.

Formal social science is relatively new. Nevertheless, a vast amount of information has been accumulated concerning the social life of human beings. This information has been used in building a system of knowledge about the nature, growth, and functioning of human societies. Social science is the name given to that system of knowledge.

All knowledge is (1) knowledge of human beings, including their culture and products, and (2) knowledge of the natural environment. Human culture has been changing, and knowledge about it has been gradually accumulating ever since the far distant time when humans first assumed their distinctively human character. But until rather recent times, this knowledge was not scientific in the modern sense. Scientific knowledge is knowledge that has been systematically gathered, classified, related, and interpreted. Science is concerned with learning the concepts and applying those concepts to particulars, rather than just learning a vast amount of information.

Primitive peoples acquired much of their knowledge unconsciously, just as we today still begin the use of our native language and acquire many of the basic elements in our culture unconsciously. For the most part, they accepted the world as they found it, and if any explanations seemed called for, they invented supernatural ones. Some primitive peoples believed that every stream, tree, and rock contained a spirit that controlled its behavior.

In modern times, our emphasis is on the search for **scientific knowledge.** We have divided human knowledge into a number of areas and fields, and every science represents the systematic collection and study of data in one of these areas, which can be grouped roughly into two major fields—social science and natural science. Each of these fields is subdivided into a number of specialized sciences or disciplines to facilitate more intensive study and deeper understanding. Social science is the field of human knowledge that deals with all aspects of the group life of human beings. **Natural science** is concerned with the natural environment in which human beings exist. It includes such sciences as physics and chemistry, which deal with the laws of matter, motion, space, mass, and energy; it also includes the **biological sciences,** which deal with living things. There is more to knowledge than scientific knowledge. There is also **phronesis**, or wisdom, which is a combination of knowledge acquired through philosophical reflection and inquiry, and practical knowledge that one acquires through learning by doing. Whereas scientific knowledge relies on logic, rationality and empirical proofs, phronesis relies on all those plus an instinctual feel for something, and understanding acquired through careful reflection and discussion with others. Some aspects of phronesis are instinctual; for example a bird who instinctually knows they need to migrate south for the winter, or a mother who knows instinctually how to comfort her baby, have knowledge but it is not scientific knowledge. How that knowledge is learned and how one "knows" it, is difficult to determine, but it is knowledge.

These alternative types of knowledge are important for social science since social policy is built on a blend of scientific, philosophical, and practical knowledge. Science tells us what physically is possible; philosophy and practical knowledge tells us what the goals of policy

Street Smarts and Book Smarts

Many of you are taking this course because you have to as part of your degree requirements. A number of you will be somewhat skeptical about the value of the course, and more broadly, the value of the degree. We are sympathetic to your concerns. There is not a lot in this course that will be directly applicable to finding a job, or increasing your pay. Much of it is simply educated common sense. So why is it required?

The answer is that it provides you with the beginning of "book smarts." What are "book smarts"? They are the equivalent to "street smarts"—the instinctual knowledge you get about how to operate successfully in your environment. If you put someone in a new environment, he or she will often flounder—say the wrong thing, miss a joke, interpret an action incorrectly. Over time, one gains street smarts by osmosis—by being in the street; you just know this is how you should act. This is how you can push for something.

There is a similar type of business smarts. Kids who grow up in families in business—where parents have good jobs, and come home and talk about what happened at work—absorb business smarts by osmosis. They become part of their interactions. Depending on the nature of the job, business smarts include street smarts, but they also include knowing when to dump the attitude and fit in—to do what the boss thinks needs to be done, even when the boss is, shall we say, stupid. Business smarts also include what might be called book smarts—a knowledge of how to discuss issues and how to make people realize you are smart. This course involves teaching you book smarts. It conveys to you the thinking of individuals who have been most successful in college and who advise governments and businesses.

Learning the individual facts is less important than learning the reasoning approach that these people use—in a way, it is like learning a foreign language. Making it through the course conveys to employers that you understand the process; and when you get an associate or college degree, this signals employers that you have achieved sufficient book smarts to operate in their world, which you have to do if you want a job.

You probably do not want too much book smarts. Business requires a combination of book and street smarts. People with PhDs in some fields, such as English or Humanities, are as problematic for many business management jobs as are those with no degree at all. Those with PhDs analyze things too much for most businesses. In business, what is wanted is people who understand book smarts, but who can integrate those book smarts with street smarts.

How important is such a signal? That depends. If your name is Kareem, Tamika, Rashid, Ebony, Aisha, or Tyrone, you probably need it more than if your name is Kristen, Greg, Neil, Emily, Brett, Anne, or Jill. How do we know that? Because social scientists have shown it through experiments in which they sent out resumes that were identical except for the names. Resumes with "black-sounding" names had only a 6.7 percent chance of receiving a response, while resumes with "white-sounding" names had a 10.1 percent chance. These researchers found the same amount of built-in "name" discrimination in less-skilled jobs, such as cashier and mailroom attendant, as in more heavily skills-based jobs. How do you get around this? By taking a course such as social science and getting a degree, which signals to the employer that you have "book smarts." We will talk more about these issues in later chapters, but here we just want to point out that it is issues such as these that make up the subject matter of social science.

should be; and a blend of all three tells us how to best achieve those goals. We won't spend a lot of time discussing these alternative types of knowledge other than to acknowledge their importance, and to remind you that science on its own does not lead to policy solutions. Science helps guide, but does not determine, what we should do.

I will, however, introduce you to one tool that moral philosophers use to arrive at philosophical truths—it's called the veil of ignorance or the **impartial spectator tool**. It involves removing yourself from your particular situation, and judging an issue from the perspective of someone who doesn't know which individual he or she will be, and thus will be more likely to be impartial. The goal is to escape one's particular narrow perception of the problem and to arrive at a more neutral view that is more likely to gain broad consensus. Since it is hard to look at issues from other's perspectives, the impartial spectator tool requires extensive discussions and interactions with others who come from different backgrounds and likely disagree with you.

Those discussions are to be carried out not with the goal of winning an argument, but instead with the goal of searching jointly for the truth—a method sometimes called **argumentation for the sake of heaven**—argumentation whose goal is not to win for the sake of

winning, but to further one's understanding. Such argumentation leads to what might be called philosophical and moral truths.

In adding these philosophical truths into one's insights, a third field of studies—the humanities—becomes important. Humanities deals with literature, music, art, and philosophy.

The **humanities** are closely related to social science in that both deal with humans and their culture. Social science, however, is most concerned with those basic elements of culture that determine the general patterns of human behavior. The humanities deal with special aspects of human culture and are primarily concerned with our attempts to express spiritual and aesthetic values and to discover the meaning of life. Whereas the social sciences study issues in a systematic, scientific way, the focus of the humanities is more on the emotions and feelings themselves than on the system employed to sharpen that focus. Policy requires a blending of the humanities with science.

The importance of social science goes far beyond the specific social sciences. It is social science thinking that underlies much of the law as well as our understanding of international relations and government. All these fields are the natural by-products of social science inquiry. Thus, a knowledge of social science is necessary for anyone trying to understand current world events.

Social Science

No field of study is more important to human beings than the social sciences. It helps us not only understand society, but also helps us avoid conflict and lead more fulfilling lives. Albert Einstein nicely summed it up: "Politics is more difficult than physics and the world is more likely to die from bad politics than from bad physics."

Because all expressions of human culture are related and interdependent, to gain a real understanding of human society we must have some knowledge of all its major aspects. If we concentrate on some aspects and neglect others, we will have a distorted picture. But social science today is such a vast complex that no one student can hope to master all of it. Thus, social science itself has been broken up into anthropology, sociology, history, geography, economics, political science, and psychology. (The boxes in this chapter provide a brief introduction to each of these disciplines.)

This list of social science disciplines is both too broad and too narrow. It is too broad because parts of the fields of history, geography, and psychology should not be included as social sciences. For instance, parts of history belong in the humanities, and parts of psychology belong in the natural sciences. The list is too narrow because new social sciences are emerging, such as cognitive science and sociobiology, which incorporate new findings and new ways of looking at reality. (See the box on The Evolving Social Sciences.)

Because all knowledge is interrelated, there are inevitable problems in defining and cataloging the social sciences. Often, it is difficult to know where one social science ends and another begins. Not only are the individual social sciences interrelated, but the social sciences as a whole body are also related to the natural sciences and the humanities. The strains of the old song, "The hip bone's connected to the thigh bone, . . . " are appropriate to the social sciences. To understand history, it is helpful, even necessary, to understand geography; to understand economics, it is necessary to understand psychology. Similar arguments can be made for all of the social sciences.

One of the difficulties in presenting definitions and descriptions of the various social sciences is that social scientists themselves do not agree on what it is they do, or should be doing. In preparing this chapter, we met with groups of social scientists specializing in specific fields and asked them to explain what distinguishes their field from others. There was little agreement among specialists in a particular social science, let alone among all social scientists.

The Evolving Social Sciences

The themes of this book are evolution and change. Thus, it would be surprising if the divisions among the social sciences that currently exist still remain ten years from now. Indeed, with the development of new technology and technological advances in the physical sciences, the distinction among the various sciences is blurring and new sciences are developing. As these fields develop, the boundaries of the various social sciences change.

Interaction among the various social sciences is creating new fields, such as economic psychology, psychological economics, and sociopolitical anthropology. In economics and political science, too, a group of economists is calling for the reintegration of these two fields into political economy, and some schools do have departments of political economy.

Change is also occurring in the natural sciences, and there is interaction between the natural and social sciences. New developments in genetic theory, which will be discussed in Chapter 2, have caused many to believe it is time for a new social science, called cognitive science, which combines psychology, linguistics, philosophy, social anthropology, and molecular biology. Although it is still in the process of formation, a tentative definition of **cognitive science** is the study of how the mind identifies problems and how it solves those problems. For instance, there are more ways to write the letter *s* than there are people who know how to write that letter (all people who write, plus the printing press and computer software and innumerable typefaces designed for them). Let us identify the problem as how to recognize the letter *s* when we see it. We know the result of the exercise: Everyone who knows how to read can instantly recognize most renditions of the letter *s* (the handwriting of a few college students and some physicians excepted). But we do not currently know *how* we do it. Or, how do you distinguish the face of your roommate from the face of your mother, from the face of the letter carrier, from the face of Brad Pitt? There has been speculation about how the mind works for almost as long as there have been minds, theories, and even experiments, but few specific riddles have been conclusively solved. Cognitive science is making inroads in answering such questions.

A cynic once said, "Economics is what economists do." If we replaced "economics" and "economists" with any of the other social sciences and its practitioners, we would have as good a definition as possible. Unfortunately, it would not be very helpful to those who do not know what social scientists do.

One important difference among the individual social scientists did come out of these discussions: Even when two social scientists are considering the same issue, because their training is different, they focus on different aspects of that problem. Geographers fixate on spaces and spatial relativities, economists on market incentives, and political scientists on group decision making. Thus, although we might not be able to define, unambiguously, the domains of the various social sciences, we can give you a sense of the various approaches as we consider issues from various perspectives throughout the book.

The study of social science is more than the study of the individual social sciences. Although it is true that to be a good social scientist you must know each of those components, you must also know how they interrelate. By specializing too early, social scientists can lose sight of the interrelationships that are so essential to understanding modern problems. That is why it is necessary to have a course covering all the social sciences.

To understand how and when social science broke up, you must study the past. Imagine for a moment that you're a student in 1062, in the Italian city of Bologna, site of one of the first major universities in the Western world. The university has no buildings; it consists merely of a few professors and students. There is no tuition fee. At the end of a professor's lecture, if you like it, you pay. And if you don't like it, the professor finds himself without students and without money. If we go back still earlier, say to Greece in the fifth century B.C., we can see the philosopher Socrates walking around the streets of Athens, arguing with his companions. He asks them questions, and then other questions, leading these people to reason the way he wants them to reason (this became known as the *Socratic method*).

Times have changed since then; universities sprang up throughout the world and created colleges within the universities. Oxford, one of the first universities, now has thirty-eight colleges associated with it, and the development and formalization of educational institutions has changed the roles of both students and faculty. As knowledge accumulated, it became

more and more difficult for one person to learn, let alone retain, it all. In the sixteenth century, one could still aspire to know all there was to know, and the definition of the Renaissance man (people were even more sexist then than they are now) was one who was expected to know about everything.

Unfortunately, at least for someone who wants to know everything, the amount of information continues to grow exponentially, while the size of the brain has grown only slightly. The way to deal with the problem is not to try to know everything about everything. Today we must specialize. That is why social science separated from the natural sciences and why social science, in turn, has been broken down into various subfields, such as anthropology and sociology.

There are advantages and disadvantages to specialization, and many social problems today are dealt with by teams of various social scientists. Each brings his or her specialty to the table. For example, one of the authors is an economist but works on projects with geographers, sociologists, anthropologists, political scientists, and psychologists. He wrote his most recent book with a physicist. More and more interdisciplinary majors are being created; one of the authors of this book teaches in both the economics department and the international politics and economics department at his school. Interdisciplinary graduate schools of public policy have grown enormously. In these programs, students study all the social sciences while specializing in one. Figure 1.1 provides a graphic overview of the evolution of knowledge and the present social sciences starting with Greece; we could have started earlier, since the Greeks took much of their knowledge from the Middle East and Asia, but we had to cut it off somewhere. (The appendix at the end of this chapter expands on the ideas in this diagram.)

Anthropology

Anthropology is the study of the relationship between biological traits and socially acquired characteristics. Sometimes called the study of humans, it consists of two broad fields:

1. Physical anthropology
2. Cultural anthropology

Some of the concerns of physical anthropology are:

- Influence of the evolution of the natural environment on the physical characteristics of humans
- Human evolution: how modern *homo sapiens* evolved from earlier species

Some of the concerns of cultural anthropology are:

- Archaeology, or the remains of extinct civilizations that left no written records
- Organization of preliterate societies
- Characteristics of subgroups or subcultures within contemporary society

Among the topics that interest anthropologists are excavation of formerly inhabited sites, fossils, the gene pool, technology and artifacts, linguistics, values, and kinship.

Social Science as a System of Rules

Today the amount of knowledge is increasing faster than ever. How, then, can a unified social science theory ever be formulated? The answer is found in abstraction and the ability to discover rules or relationships (rather than simply facts) and rules relating rules to other rules.

To understand the importance of knowing rules, think back to grade school when you learned addition. You didn't memorize the sum of 127 and 1,448. Instead you learned an algorithm (a fancy name for a rule) about adding ($7 + 8 = 15$; write down the 5 and carry the 1 . . .). Then you had to memorize only a few relationships. By changing the number system from a base ten system to a binary system (0 and 1 are the only numbers), you cut substantially the amount of memorization (all you need to know is $0 + 0 = 0$; $0 + 1 = 1$; and $1 + 1 = 10$) and you could apply the same rule again and again, adding all possible numbers (an insight that played an important role in the development of the computer). Knowing the rules saved you from enormous amounts of memorization, but nonetheless gave you access to a large amount of information.

Another way to look at the problem is to think of the library. If you have a small library, you can know nearly everything in it, but once your library gets larger, you will quickly find that having more books makes it harder to know what's in there. However, if you put in place a filing system, such as the Dewey

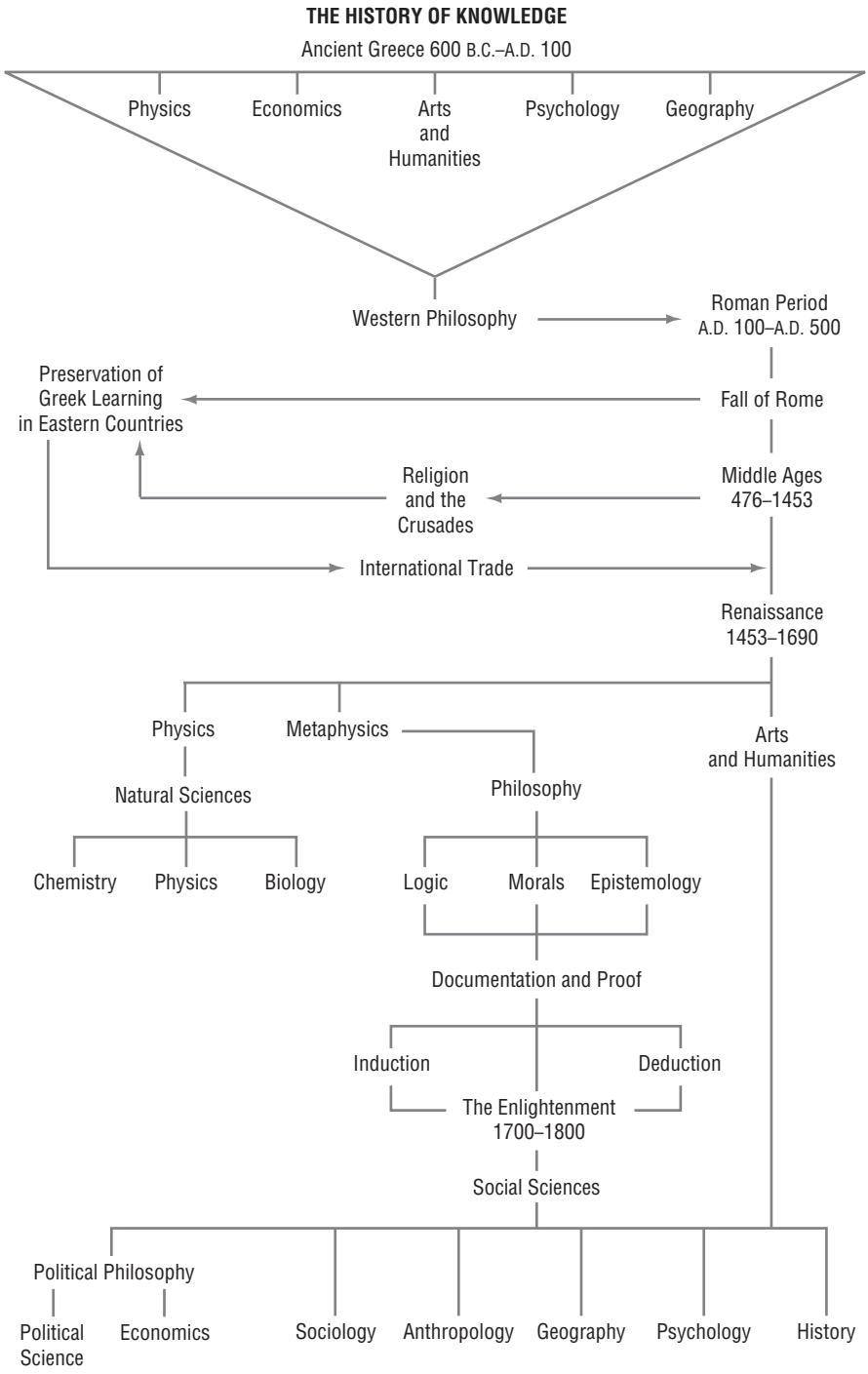


Figure 1.1

***Knowledge at a glance**. The development of knowledge is messy, but assuming that a picture is worth a thousand words, we offer this sketch of the development of knowledge. Maybe it's worth five hundred words.*

Sociology

Sociology is the systematic study of relationships among people. Sociologists assume that behavior is influenced by people's social, political, occupational, and intellectual groupings and by the particular settings in which they find themselves at one time or another. Sociologists differ in their approach. Their three major choices are:

1. Functionalism
2. Conflict
3. Interactionism

Sociology's vast subject matter can be identified as a study of people:

- Where they collect
- How they socialize and organize
- Whom they include in and exclude from their groups
- What they do to their environment
- When they confront formulas for control, such as politics, law, finance, religion, education, and social pressures
- Why they change

Geography

Geography is the study of the natural environment and how the spatial interactions of individuals influence social and cultural development. Some of the concerns of geography are:

- Ecology
- Climate
- Resources
- Accessibility
- Demography

Geography has practical applications manifest in:

- Maps
- Trade patterns
- Industrial and agricultural decisions
- Settlement of population
- Aggression and acquisition

decimal system or the Library of Congress system, you can access the books through a filing system. The rules of the filing system give you the key to great amounts of information, just as the rules of addition, subtraction, or algebra do. General rules, once learned, can be applied to large numbers of particulars. The higher you go (rules about rules about rules), the more you can know with less memorization.[2]

All this is relevant to social science because social science is held together by rules or relationships. If there is to be a unified social science theory, it will be because some student started thinking about rules and how the rules of the various social sciences can fit together. If you understand the general concepts, you can apply them in a variety of circumstances. Thus the future "unified social scientists" will not necessarily know all the facts of a particular social science. Each of the specialties will retain its identity and will likely become even more specialized. But as that specialization occurs, it creates the need for a new specialization that concentrates on tying together the various component parts of social science. The new unified social scientists will know the general rules of the individual social sciences and the rules of how one social science interacts with another, but they will not know all the specific facts of any one of them.

The preceding argument is a heavy one to throw at you in the first pages of a textbook because it asks you not only to know the lessons of the individual social sciences, but also to go beyond and strive for an understanding of their synthesis. Going beyond is ultimately what learning is all about and what makes it so challenging. We would like to be able to say that we can guide you to a unified social science theory, but the truth is that all we can do is give you a boost and encouragement. After surveying the social sciences, you can decide in which one, if any, you want to specialize; whether you should work toward tying them all together; or whether you should bag the whole approach and go into a pre-med program.

The Scientific Method and Its Application

The **scientific method** is a set of rules about how to establish rules. The use of the scientific method is perhaps the most important tool you can have in studying social science because it enables you not only to learn the lessons of the individual social sciences,

[2] It was an architect, Ludwig Mies van der Rohe, who compressed such exposition into a famous statement, "Less is more."

History

History is the study of past events. It is a social science in the sense that it is a systematic attempt to learn about and verify past events and to relate them to one another and to the present. Every event has a historical context within which we commonly say the event must be studied. The subject matter of history is everything that has already happened. The study of history involves:

- Identifying
- Classifying
- Arranging
- Patterning

The fruits of the study of history are:

- Imposition of order
- Appreciation of variety
- Possibilities of prediction
- Realization of limitation

but also to go beyond and strive for an understanding of their synthesis.

Conditions Favorable to Scientific Inquiry. Scientific inquiry is possible only in a society in which certain attitudes are developed or tolerated. Successful scientific investigation requires from the investigator not only intelligence but certain mental attitudes as well. One of these is curiosity, which makes people ask two questions: Why? and How? Another is skepticism, which makes people reexamine past explanations and reevaluate past evidence. To reexamine and reevaluate, investigators need objectivity, which enables them to seek impartially for the truth, to make every effort not to allow personal preconceptions, prejudices, or desires to color the observed facts or influence the interpretation of those facts. When these three attitudes—curiosity, skepticism, and objectivity—come together, scientific inquiry can flourish.

In preliterate tribal societies, the obstacles to the development of scientific methods of inquiry are very great. Such societies are much more bound by custom and tradition than are modern societies. The traditional way of doing things is regarded as the only right way. Moreover, any serious deviation from established procedures is likely to be regarded as a danger to the group.

We cannot classify Europe in the Middle Ages as either preliterate or tribal. Nevertheless, respect for tradition, for ancient authorities, and for religious dictates was so strong then that the growth of a scientific spirit was stunted. The free development of modern science had to wait until such events as the Crusades, the Renaissance, the great voyages of discovery, and the Reformation had loosened the hold of tradition.

Nature of the Scientific Method. Modern science is based on the assumption that this is an orderly universe, ruled by the law of cause and effect. Any given set of circumstances always produces the same result. If seemingly identical situations have different results, they were not really alike; some significant difference existed and was overlooked. Further investigation should disclose what this difference was.

Science offers no final explanations of the universe and its phenomena. Time, space, matter, energy—existence itself—are mysteries the ultimate nature of which is probably forever beyond the grasp of the human search. But an accepted scientific theory may be regarded as an explanation, up to a certain point, of a scientific law.

Scientific investigation is seldom simple. Each field of knowledge has its special problems, and investigators must always adjust their methods to the peculiarities of the situation they are dealing with. A method of investigation that is of great importance in some fields is the setting up and carrying out of controlled experiments.

The Experimental Method and Its Limitations. The **experimental method** is a method of separating out causal factors. It consists of running an experiment many times with only one variant. If the results of the experiments are different, that one variant is most likely the cause.[3] In chemistry, physics, and biology, such controlled experiments play an important role in

[3] But it is always possible that some other factor was not "held constant." If you remember chemistry experiments in high school, you know how hard it is to keep all other things constant.

The Saga of Hans, the Thinking Horse

The scientific method can be seen in the saga of Hans, the Thinking Horse. Around 1900, according to reports published in a Berlin, Germany, newspaper, there was a horse that was good at math, and when his owner asked him math questions, the horse could answer by tapping out the correct number with one of his front hooves. People who witnessed the horse's ability were puzzled, and they called in a number of social scientists to investigate the phenomenon. To their amazement, they found that not only could Clever Hans, as he was known, add and subtract when his owner asked him, but he also could calculate square roots. The social scientists were convinced that, against all odds, they had indeed been shown a thinking horse.

Another social scientist, though, a skeptical young psychologist by the name of Oskar Pfungst, had a different idea. He retested Hans, asking a set of questions to which Pfungst himself did not know the answers. He discovered that although Hans succeeded on nearly every question if the questioner knew the answer, the horse failed nearly every question when the questioner did not know the answer. A social scientist's skepticism had shown that Hans could not really reason, even though it seemed as if he could. This true story demonstrates the important trait of skepticism. The scientific community declared that Hans was just a horse.

But a quality those scientists did not show was imagination. Even though Hans could not think and reason, he had an amazing ability: He could almost read minds. When it came to people who knew the answers to the questions they were asking, he could monitor changes in his questioners' posture, their breathing, their facial expressions, and their inflections and speech patterns. He could interpret the signals they were sending and then provide the responses they wanted. This is an ability that some humans have—although generally to a lesser degree than Hans—and it is an ability that can supplement thinking. Yet it was only at the end of the twentieth century that comparative psychologists showed the imagination to start analyzing this kind of ability in detail.

The lack of imagination exhibited by some scientists in the past limited the scope of the scientific programs they followed. A good scientist must have both skepticism and imagination.

discovering facts and testing hypotheses. In these sciences, an investigator can create a situation in which all the significant factors that bear on a problem can be controlled.

There are, however, limits to the use of the experimental method when a scientist cannot control the situations that are significant for the solution of problems. In the social sciences, less use can be made of the method of controlled experiment, except in dealing with certain relationships that involve rather small groups, because the investigator cannot control the situations. For example, one way to prove or disprove the proposition that high tariffs bring prosperity would be to apply very heavy tariffs to all goods entering the United States for a considerable period of time, while holding constant all other factors affecting business activity. If a sustained increase in prosperity followed, we would then have substantial evidence to support the thesis that high duties are a cause of prosperity. No investigator, let us say an economist, can control the country's tariff policy; and even if she could, while the high tariff was in effect many other social changes would be taking place, such as strikes, the establishment of new industries, and perhaps even wars. Some of these other changes would doubtless have much more influence on the state of national prosperity than would the high tariff and would make it impossible to separate out the effects of the high tariff from the effects of all these other events.

Most problems of interest to social scientists involve very large groups of people, often society as a whole. Controlled experiments cannot be used to solve such problems. When, however, social scientists can gain insight into a problem through laboratory and field experiments, they can, at least partially, control the environment. For example, often firms on Google use field experiments, randomly varying the way an advertisement is presented to people. One ad might state "one-half off"; the other might state "50 percent off." Although these have the same meaning, the way people respond to them is not necessarily the same. The firms then analyze the results and structure future ads to reflect the presentation that was most effective. Every time you are on the Internet, you provide opportunities for firms to conduct field experiments to figure out how to make more money off you. Social scientists also study

natural experiments, which occur when two similar areas or entities choose different policies, and the effects of the different policies can be systematically studied. With natural experiments, researchers do not get perfect control, but they get some.

Additionally, social scientists use laboratory experiments, in which they have people come into the lab, where they study their behavior, and then relate that behavior to other information they can find about them. One of the most famous of these is known as the Stanford Marshmallow Experiment, in which psychologists studied 4-year-olds' ability to delay gratification. They gave each child a marshmallow, but promised him or her two if the child would wait twenty minutes before eating it. They then studied the progress of these students for the next twenty years, and found that those students who could delay gratification were psychologically better adjusted, more dependable persons, and received higher grades than those who could not.

In the future, with further advances in computer technology, social scientists will study policy issues using virtual social systems in which a computer model of numerous interacting individuals creates a virtual system that can analog what occurs in the real world. Because of the complexity of social systems, such virtual systems remain a hope for the future, not a reality.

Social experiments are sometimes called experiments, but unless they have a "control" that followed a different path and hence can be studied as a natural experiment, they are not what we mean by experiment. A social experiment is simply the introduction and "trying out" of new social policies. For example, Oregon's change in the financing of health insurance or Florida's experiments with vouchers for financing education might be called social experiments. The distinction involves the ability to have a control and to be able to replicate the experiment. The less the control, and the less the ability to repeat the experiment, the less sure we are of the results.

Methodology and the Social Sciences

Because it is so difficult to experiment in social science, some people have insisted that it is not science. Except for the prestige carried by the word, whether we call the study of society a science is not important. It is merely a question of definition. If we mean by *science* the natural sciences only, then social science is not true science. If we mean by science only the so-called exact sciences, then again social science is not included. If, however, we use the term *science* broadly, to include all systematic attempts to expand knowledge by applying the scientific method, then social science definitely must be included in the scientific family. What is really important is that social scientists have discovered many significant relationships that are sufficiently dependable to add greatly to our understanding of social behavior and to serve as useful guides in dealing with some social problems.

There has been much debate about the correct methodology to be used in social science. Thomas Kuhn, a famous philosopher of science, defined a **paradigm** as a scientific theory and the core of beliefs that surround it. He argued that scientific progression occurs by paradigm shifts in which, for a long time, scientists will resist change and hold on to an old theory even as evidence mounts up against it, and even when another theory better fits the data. Eventually, however, the evidence in favor of the new theory is so

*E*conomics

Economics is the study of the ways in which men and women make a living, the most pressing problem most human beings face. It considers the social organization through which people satisfy their wants for scarce goods and services. Its subject matter is often summarized as:

- Production
- Distribution
- Consumption

Some of the topics it includes are:

- Supply and demand
- Monetary and fiscal policy
- Costs
- Inflation
- Unemployment

Economics seeks to explain, guide, and predict social arrangements by which we satisfy economic wants.

Political Science

Political science is the study of social arrangements to maintain peace and order within a given society. It deals with government, and its interests are:

- Politics
- Laws
- Administration
- Theory of the nature and functions of the state
- International relations

It has both a philosophical and a practical base. It examines the theory of systems of government, but it also studies actual practices of governments, which:

- Levy taxes
- Prohibit
- Regulate
- Protect
- Provide services

Psychology

Psychology deals with the mind and personality of the individual. It is a social science because humans are social creatures. It focuses on the individual and physical processes, such as:

- Biological structure
- Development and maturation

Of the various branches of psychology, the most relevant to social science is social psychology. Social psychology is the study of the individual's behavior as it influences and is influenced by the behavior of others. Some specific topics that interest psychologists and social psychologists are:

- Socialization
- Environment and heredity
- Adjustment and maladjustment

Psychologists deal with natural phenomena such as emotion, memory, perception, and intelligence.

great that suddenly scientists shift their thinking. The process can be likened to the way a drop of water forms on a faucet. It grows larger and larger until it falls. A good example in the sciences is Einstein's relativity theory in physics, which was initially scoffed at but was later adopted because it was consistent with a wider range of physical phenomena than was the earlier gravitational theory of Sir Isaac Newton.

Social scientists have discussed at great length whether Kuhn's theory of paradigm shift is appropriate for the social sciences. If it is, it gives legitimacy to competing theories. If it is not, then the generally accepted theory can be considered the best. The issue has never been resolved, but our understanding of the relevance of theories has advanced.

Imre Lakatos, another famous philosopher of science, has extended Kuhn's arguments by saying that in social science there are generally many competing theories, each being extended through competing **research programs,** or groups of scientists working on a particular problem. For example, in psychology there are the behaviorists and the Freudians. In sociology there are functionalists, conflict theorists, and interactionists. We could cite different theories within each social science. Advocates of each of the research programs compete for researchers. The group of researchers most successful in competing for followers is the one most likely to grow.

Other philosophers of science go further. Some, like Paul Feyerabend, argue that all methodology is limiting and that the correct methodology is no methodology. Still others argue that sociological issues, such as what is likely to advance a scientist's career, rather than the truth of a theory, determine what the scientist believes.

In this book, we emphasize the competition among various theories. By doing so, we hope to show how, in social science, controversy plays an important role in the development of our knowledge.

Probably the best way to understand the scientific method is to consider a couple of examples that do *not* follow the scientific method. For instance, consider astrology or numerology. These pseudostudies hold that by analyzing the alignment of the stars or the position of certain numbers, individuals can discover or predict events that will affect them. However, the accuracy of the discoveries or the reliability of the predictions has never been satisfactorily demonstrated to most social scientists. Even though we might turn to our horoscopes and say, "Aha! That seems to fit my character or my experience," if we critically consider these predictions, often we see that the statements are so broad that they can be applied more or less appropriately to a wide range of happenings or possibilities. This is not to say that the social sciences always avoid that. Economics, for instance, often comes up with predictions from large, highly

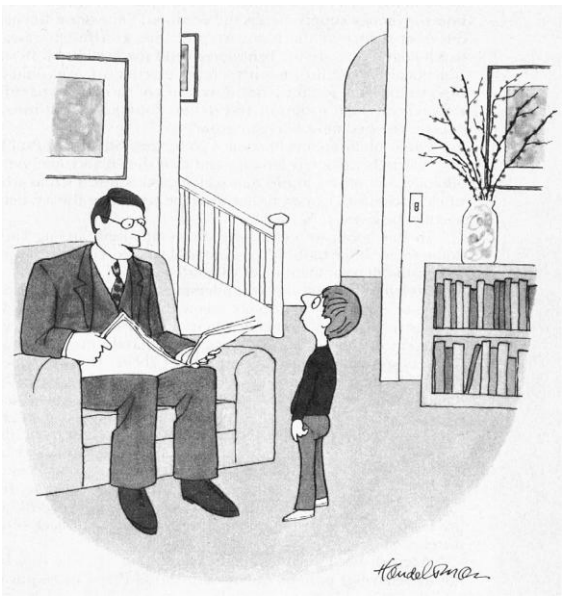
sophisticated mathematical models (called *econometric models*), and some of these predictions are no better for steering a course than back-of-the-envelope estimates.

A good social scientist generally takes an agnostic (not believing but also not disbelieving) position about claims until they can be tested and retested. Consider, for example, parapsychology, which argues that people can transmit certain information independently of all conventional forms of communication. There is an entire professional association devoted to studying parapsychology issues, such as the ability to transfer thoughts and feeling by means other than the standard senses, and the ability to communicate with the dead. Most social scientists remain unconvinced. They hold that, to date, the theories have not been sufficiently demonstrated. In stating that these theories have not been tested, a good social scientist is not dogmatic. It is possible that we social scientists have become so tied to our way of looking at the world that we are unable to consider the possibilities of other ways. Who is to say that the tests we accept as conclusive are the "right" tests, or that our training has not biased the tests?

Ultimately, however, we must make a working judgment about what is and what is not an acceptable test, and social scientists' methodology is an expression of that working judgment. It should, however, be presented as a working judgment, not as a set of definitive criteria of what is true and what is false. That is why, generally, good social scientists remain agnostic over a wide range of issues that they just do not have time to investigate. Thus, in many ways, what you will get out of a study of social science and an understanding of its methods is a healthy understanding of the limitations of your powers to know.

The Methods of Social Science

The basic procedures of the scientific method are as important in social science as in physical science. Social scientists must observe carefully, classify and analyze their facts, make generalizations, and attempt to develop and test hypotheses to explain their generalizations. Their problem, however, is often more difficult than that of physical scientists for two reasons. First, facts gathered by the social scientist—for example, those concerning the cultures of different peoples—have similarities, but each fact may also be unique in significant respects. Facts of this kind are difficult to classify and interpret. Further, as we have already noted, the generalizations or laws that the social scientist can make are likely to be less definite and certain than those of the physical scientist.



"I'm a social scientist, Michael. That means I can't explain electricity or anything like that, but if you ever want to know about people, I'm your man."

The second reason is that social scientists are generally interested in more than just knowing scientific truths; they are interested in policy. As we stated above, policy requires going beyond science and incorporating moral judgments, which are much more difficult to come to agreement on, into the analysis. This often makes social science policy much more difficult than physical or natural science policy. For example, in the physical sciences we might study the laws of physics—if two objects crash the force exerted by either of the two objects will be equal even if one is much heavier than the other—this is Newton's Third Law of motion. It seems counterintuitive, but once one understands the framework physics uses for understanding relationships among objects, it is almost obvious. No one is going to argue with it.

Now consider economists' law of supply and demand—that if supply exceeds demand, there will be pressures for the price to rise. This law is also obvious once one understands economists' framework. But it is not so easily accepted. Often people don't want the price to rise, and have established institutions to prevent it from doing so, or to implement policy that prevents the rise. That can be done, but it will have consequences, and economists' job as scientists is not to say that policy to hold down price is good or bad. Instead, their role as scientists is to explain—here are the consequences if you do that. Their role as policy advisors is different, and more complex. To decide whether a policy to hold down price is good policy requires an introduction of goals of policy which is determined in moral philosophy—the normative branch of social studies. The policy issue is not resolved by science.

When the physical sciences become closely tied to policy, physical scientists also find that they are mired in conflict and debate just like the social sciences. Consider climate change and global warming. Physical scientists are agreed that global warming is occurring and that the most likely cause is humans' use of fossil fuel. That is a question in the realm of science. What to do about it—the policy implications—requires going out of science and integrating moral philosophy into the analysis. Should we care about global warming? Who should change their actions to stop it? What is the time frame within which we should respond? These and hundreds of similar questions have no easy answer, but they have to be answered if scientists are to provide policy guidance. Science does not deal with such questions. The philosophical way of answering those questions is argumentation for the sake of heaven—having all sides come together to honestly debate the issue in a spirit of mutual acceptance.

The blending of the two roles of a social scientist often leads to difficulties. For example, climate change scientists often have strong views about policy, which is a problem because the science and the policy can become intertwined. When a scientist takes a strong view on a policy question, it leads to a loss of objectivity (or at least in others' perceptions of the scientist's objectivity) of the scientific conclusions. Are the policy views influencing his or her interpretation of the scientific evidence in such a way as to favor his or her policy conclusion. Just as one has a difficult time remaining neutral when judging one's own children relative to others, so too does a scientist have a difficult time judging empirical evidence that relates to a policy he or she believes is necessary.

Because of the blending of science and policy in climate science, the debate has become toxic in both the science and the policy, with both sides not arguing for the sake of heaven, but arguing for the sake of winning and making points, in the same way that many policy debates in social science have become toxic. The same type of problem often exists in social sciences when policy and science become blended. To avoid that toxicity it is important to separate science and policy, and for scientists, in their role as scientists, to have no policy view, or when they have a policy view, to be sure that they have other scientists with opposing policy views on their scientific research team to keep them honest. Often a good social scientist makes all sides mad at him or her.

An Example of the Social Science Method

Let's take an example of the use of the social science method—Joseph Hotz's study of the implications of teen pregnancy. First, he studied all the writing on teen pregnancy. Then he set up the following hypothesis: Teen motherhood causes the mothers to be economically and socially worse off than they otherwise would have been. To test this hypothesis, he used data that had been collected over many years tracking the lives of teenage women. From that he extracted two groups—a set of teenagers who had become pregnant and borne the child and a set of teenagers who had become pregnant but had miscarried. He then compared their economic and social positions when they were in their mid-thirties. If teen motherhood caused the mother to be worse off, then the teens who had borne their babies should have been in a worse position than those who miscarried. They weren't. He found no significant

difference between the two groups: Both were low-income, significantly dependent on welfare benefits, and had completed the same number of years of school. The initial hypothesis was false. Teen pregnancy did not make mothers worse off; it was simply a symptom of a larger set of problems. This larger set of problems was so severe that whether mothers had borne a child in their teens made little difference to their economic and social positions.

Hotz's findings were published as the government was conducting a costly campaign against teen motherhood, and his conclusions were unpopular with both liberals and conservatives. Liberals did not like them because his study suggested that much of the family planning advice and sex education developed by liberals was of little help in improving these women's lives. Conservatives did not like them because his study implied that more substantive changes than simply eliminating teen motherhood were needed to improve these women's lives and break the cycle of poverty. But good social science methodology is not about pleasing anybody—it is about understanding social issues and social problems.

Although Hotz's experiment was not fully controlled, it was as close as one could come to a controlled experiment in the social sciences. It selected similar groups to compare in such a way that no obvious reason existed as to why these two groups should differ.

Other Social Science Methods

In addition to the experimental method, social scientists use a variety of different methods. These include the historical method, the case method, and the comparative and cross-cultural methods.

The historical method. Because most social developments—such as the government of the United States—have unique characteristics, in order to understand them as fully as possible the social scientist must rely heavily on a study of their historical background. We can never understand completely how any historical situation came to exist, because there are limits to our historical knowledge and causes become increasingly complex and uncertain as we trace them further into the past. We can, however, make both historical events and present social situations much more intelligible by using the **historical method**—tracing the principal past developments that seem to have been directly significant in bringing about a social situation. To trace these past developments, a historian will use many of the same methods as other social scientists, such as collecting birth and marriage certificates and classifying those data.

It has been noted that history never really repeats itself. Nevertheless, present and past situations often have such striking similarities that a knowledge of the past can give us insights into present situations and sometimes into future trends.

The case method. Writers on the methodology of social research have devoted a great deal of attention to the **case method**—its characteristics, its variations, the uses it can serve, its advantages, and its limitations. Here we only describe its basic nature. The case method involves making a detailed examination and analysis of a particular issue or problem situation. This can involve a case study of a single person, such as that by a psychologist of his or her client; a single area or town, such as a sociologist's study of why a town changes; or even a study of whole countries, such as an economist's study involving comparisons of various countries.

A case study can be intended to discover how to bring about desirable changes in a particular problem situation: for example, to find the most effective ways of upgrading or rehabilitating a slum area. More often, the chief purpose of a case study is to throw light on many similar situations that exist in a society. The hope is that an understanding of one or a few cases will illuminate the others and thus aid in solving the social problems they present. The case or cases selected should be typical of the group they purport to represent.

The preceding requirement can be a limiting factor in the usefulness of the case method. Suppose we wanted to make a study of the class structure of U.S. society as a whole. Obviously, it would be easier to select as cases for study several relatively small and isolated cities in various sections of the country. But it is questionable whether these would give us a true picture of the country as a whole, because today a great proportion of our people lives in large metropolitan areas where the class structure is likely to be much more complex than in smaller and more isolated communities. However, to study and describe in detail the class structure of such an area may be prohibitively difficult and expensive, and therefore impractical.

The comparative and cross-cultural methods. The **comparative method** was formerly often employed in the hope of discovering evolutionary sequences in the development of human institutions—that is, patterns of social development or progress that would be universal. For example, it was sometimes assumed that definite stages existed in the development of governmental institutions, and it was thought that these stages could be discovered by comparing a society at one level of development with some other society at a different level. Today, this attempt to find patterns of social evolution that can be applied to all societies has been largely abandoned.

Comparison of different societies, however, still plays an important role in anthropological studies through what is called the **cross-cultural method.** This method consists of making detailed studies of the cultural patterns of a number of societies for the purpose of comparing the different ways in which their people meet similar needs. These studies sometimes show surprising similarities in the cultural traits of widely separated peoples who appear to have had no direct or indirect contacts with one another.

Comparison of the characteristics of different societies involves problems. At times, it is difficult to decide whether two or more societies are independent or should be treated as one. Or consider definitions: If we are comparing the family institution in different societies, we must define *family* broadly enough to cover cultural variations, yet specifically enough to make comparisons meaningful. Sociologists do not always agree on just what a family is. Again, if we are comparing unemployment in urban-industrial societies, we must agree on what we mean by *unemployment*. For example, in the early 1980s, the unemployment rate in Mexico, computed by U.S. standards, was approximately 30 percent. Mexican economists, however, argued that this figure was meaningless because Mexican work habits and culture were different from those in the United States. Much of what was measured as unemployment, they said, was actually individuals working at home and not earning money in the marketplace. Thus, although they had nonmarket jobs, they had been counted as unemployed.

Educated Common Sense in the Social Sciences

Probably the most important lesson to remember when conducting any research is that you should use what might be called an **educated common sense.** To see the difference between common sense and *educated* common sense, consider the problem: Does the earth circle the sun or does the sun circle the earth? Uneducated common sense tells us that the sun circles the earth, and that common sense conclusion became built into society and society's view of itself throughout the Middle Ages. To believe otherwise was heresy. In 1540, Copernicus tried to fit that common sense view with observations that classical Greeks had made of the heavens. As he went about this task, he discovered that he could get a good fit of the data with the theory only if he assumed the earth moved around the sun. His was an educated common sense—rational thought based on observation and the best information available. It was that kind of educated common sense that ultimately led to the scientific method. As specialization makes us focus on narrower and narrower issues, it is important to keep in the back of our minds that scientific analysis has made us look at only part of

the problem and that we must also use our educated common sense to interpret the results reasonably.

The Use of Statistics

Whenever possible, social scientists rely on quantitative data—data that can be reduced to numbers—but often quantitative data are not available, so social scientists must rely on qualitative data such as interviews or heuristic summaries of information in the literature. When using qualitative data, it is much more difficult to draw specific inferences from the data, because the "facts" one finds depend on how one interprets the qualitative data. One way to partially overcome such "interpretive problems" is the "Delphi method" in which another specialist in the field reviews your interpretation and then you modify your interpretation in response if you see fit, explaining your reasons for accepting or rejecting the suggested modifications. Another way is to translate the qualitative data into quantitative data, creating "proxies" (stand-ins) for any missing quantitative data, although that often simply hides the interpretative issues rather than eliminating them.

If quantitative data are available, social scientists rely on **statistical analysis**—information in numerical form that has been assembled and classified—to provide the social scientist with the information needed to understand social relationships and processes. Statistics do not enable us to measure directly such basic social values as good citizenship, happiness, or welfare, but they are useful in measuring other factors that underlie social life, such as the size of the population of a country, or the number of families whose incomes fall below some level that we set as the minimum for decent and healthful living. Statistical relationships also give us insights into social problems. If we find that the proportion of males in juvenile detention centers who come from broken homes is substantially greater than the proportion of males in the population at large who come from such homes, this suggests that broken homes may be an important factor contributing to juvenile delinquency. But statistics must always be interpreted with care, for it can be easy to read into them conclusions they do not justify. Also, it is sometimes possible to manipulate them so that they appear to show what we want them to show.

Although statistics measure the results of social activity and highlight trends, they have other useful functions: testing theories and discovering relationships. For example, **correlation** is the relationship between two sets of data. A high positive correlation between sets of data means that if an element in one set rises, its corresponding element in the other set is also likely to rise. Other statistics determine how sure we are of a relationship. We do not discuss these statistics because an introductory social science course is not the place to learn them, but it *is* the place to learn that such techniques of testing relationships exist, and they may be worth your while to study at some point in the future.

If we are going to use statistics, we must have data. Data are the raw numbers describing an event, occurrence, or situation. Social scientists' data come from measuring and counting all occurrences of a particular happening. For example, we might find, "In 2019, there were x number of murders and y number of suicides." One way to get data is to conduct a **survey,** a method whereby data are collected from individuals or institutions by means of questionnaires or interviews. For instance, we might conduct a survey in which selected people are questioned or polled on such matters as their incomes, their beliefs on certain issues, or the political candidate for whom they intend to vote. Statistics can tell us how large a portion of a group must be surveyed before we can be reasonably sure that the results will reflect the views of the entire group. Such techniques are used extensively in surveys such as the Gallup or Harris public opinion polls.

The use of statistics has been greatly facilitated, and therefore greatly expanded, by the computer. The computer has made it possible to record, arrange, and rearrange voluminous information quickly and analytically. Today, enormous amounts of data and other resources are available to anyone with a computer or other access to the Internet.

With the expansion of social data and the large increase in computing power, it is increasingly possible for social scientists to look for relationships in the data alone, rather than to be guided in that search by theories. Using highly sophisticated statistical techniques, social scientists analyze data, looking for patterns. After they find a pattern, they fit that pattern to a theory. For example, social scientists Stephen Levitt and John Donohue searched the data and found a relationship between the passage of the abortion rights law in the United States and a decrease in crime in later periods. Based on this evidence, they argued that because abortion reduced the number of unwanted children, those children who were born had more guidance, and that it was the law making abortion legal, not any change in law enforcement or increase in the number of inmates jailed, that was mostly responsible for the decrease in crime rates that the United States experienced in the 1990s.

Whenever making such claims, social scientists should be very careful not to confuse correlation—the simultaneous movement of two variables—with **causation**—in which change in one variable brings about change in the other variable. The difference can be seen in the following example. When it is expected to rain, more people carry umbrellas, so umbrella usage and rain are correlated. But the fact that people carry umbrellas does not cause it to rain, or so most of us believe.

The Interdisciplinary Approach

Modern industrial societies and their problems are becoming increasingly complex, and because no one person today can master all the social sciences, growing emphasis is placed on the interdisciplinary approach to many social problems. The **interdisciplinary approach** means that a group of social scientists with different specialties will work together on a particular problem, not all aspects of which any one of the group fully understands. For some problems, such as those surrounding pollution, it may be necessary to call in, say, a physical scientist, a geologist, and an engineer. But in facing all of these problems, the need for educated people who have a broad sense of problems and interrelationships—who understand the need for a unified social science—is becoming more and more evident.

Though few social relationships can be reduced to exact and invariable laws, human beings in large groups everywhere show great likenesses of behavior when conditions are really similar. Thus, there is reason to believe that we can, through systematic study and research, greatly increase our understanding of the nature and development of human societies, and to hope that the attitudes fostered by the interdisciplinary approach itself and the knowledge to which it leads us can ultimately result in greater tolerance and cooperation among diverse groups and among nations.

The Impartial Spectator and the Veil of Ignorance

As I discussed above, to move from an understanding of the social system—the goal of social science as a science—to guidance on social policy, social scientists need to add values to the analysis—not his or her values, but the values of the group or person he is advising. For example, in advising a society, one uses "society's goals" and explores how to achieve those goals in a way that is consistent with society's values. Science does not determine those values or goals, moral philosophy does. The impartial spectator tool, and the related veil of ignorance, are tools that we will be continually reaching back to in our policy discussions. For example, to many it seems obvious that most tax revenue should come from the rich. But how about from the perspective of a rich person who spent all her time working, while others played? What will she think of her paying more? Most will want to give her likely view—that it would be improper for her to pay more in tax—some weight in the decision of who should pay taxes, and what is fair.

Drawing Policy Implications from Social Science

Much of the relevance of social science is for its policy implications. While we will focus on the scientific aspect of social science—where the goal of study is to understand for understanding's stake, not to solve a problem, throughout the book we will discuss how a social scientist relates that scientific knowledge learned to policy. Here, we will consider some of the key heuristics (general rules) that guide that application.

1. *Put Yourself in All Person's Shoes.* Probably the most important rule about drawing policy implications from social science insights is the "put yourself in all person's shoes" rule. The natural way to approach policy is to approach it from your perspective. The social science approach says that is the wrong way to think about policy—you have to think about it from an outside perspective, not from your perspective alone. Think of yourself as observing the entire social system, and having the ability to put yourself in all other people's shoes. After you have done that, you can pull all the different perspectives together, and come up with a solution that is based on all perspectives, not just yours.
2. *Recognize your inherent bias and adjust for it.* It's impossible to fully take an outside perspective, which leads to the second rule—recognize that you will likely be biased toward your own perspective, and attempt to honestly communicate with people who have different perspectives. Bend over backwards to be open to multiple views.
3. *Distinguish differences in interpretation of facts from differences in normative judgments.* Perspective is based on both interpretation of facts, and on normative judgments you make. Differences in readings of the facts can, in principle, be eliminated by scientific study, and that is what much of what social science does. It discusses facts—information that is true to the best of our current understanding. Differences in normative views can be discussed, but they are not resolvable by science—thus one can expect differences about policy even if all people interpret the facts in the same way. But those differences are likely to be far smaller than they would be if people didn't follow a social scientific approach to policy.
4. *Be Humble.* Even if you follow the above three rules as best you can, there is no way that you are going to be able to fully communicate in a way that you gain other people's perspective, which leads to the final rule—be humble in your policy suggestions—be very hesitant to say, "This is the right policy, and another policy is the wrong policy." Say instead, "Based on the knowledge I have now, this is, in my estimation, the best policy I can come up with now." Be open to criticism and discussion.

Discussing such issues openly and honestly in an environment that encourages argumentation for the sake of heaven is about the only way to come to an agreement on what is meant by social goals, which is why that discussion is a necessary part of social policy.

Values, Terminology, and Rhetoric

This chapter began with a quotation from Albert Einstein, who said, "theories should be as simple as possible, but not more so." The same thing could be said about ideas and the expression of those ideas. Unfortunately, specialists have an incentive to develop a terminology that is anything but simple and that often obscures rather than clarifies. One of the many social science teachers who has written us about this book (and in doing so, these teachers have played an important role in its development) described a history conference she attended where "we were treated to such goodies" as

> The sociopolitical internecine amortizations of agronomous proletarization, if solely counterproductive of Jurassic multi-dimensional interstitial extrapolated Augustinian and Aristotelian epistemological diagrammetric middle-sector dichotomies, as measured in the context of paradigmatic vestigiae (though challenged none too effectively, if I am not remiss in saying so, by Freylinghausen's hypothesis delivered at the University of Bordeaux in April 1896) are existentially and polaristically categorized by Nordlinger's Metternichian thermodynamics as

> tangentially interrelated with studies promulgated by Darffenstangenovich on a scale of one to twenty factored to the 24th power.

Although she may have used a bit of literary license in transcribing the conference proceedings, her point is well taken. She was attending a conference on her specialty; yet she did not understand what was being said. It happens all the time, not only to students, but to teachers as well. Although there may be valuable ideas in what many specialists have to say, we can't profit from them if we can't understand them, or if we must spend hours translating them.

In his wonderful book *The Sociological Imagination*, C. W. Mills made precisely this point. He argued that in many social sciences, "high theory" is top-heavy with jargon. As an example, he interpreted sociologist Talcott Parsons's terminology: He reduced it by 80 to 90 percent and at the same time made it more intelligible. Mills was not making the point that Parsons's insights were not good ones; to the contrary, Mills believed that Parsons was a brilliant sociologist. But Parsons's language obscured his brilliant ideas.

Another characteristic of language is that it embodies value judgments and preserves ways of looking at problems. There is no way to be completely objective; to paraphrase Einstein, the goal is to be as objective as possible but not more so. A good social scientist recognizes the limits of objectivity and is always open to dealing with reality by alternative modes of expression and new ways of looking at issues.

Conclusion

If this chapter has succeeded in its intended purpose, it should have given you a sense of what it means to be a social scientist. As you saw, the social sciences are evolving: They interact and they move among the humanities, the natural sciences, and the individual social sciences, depending on who is working with them. They are fluid, not static, and that fluidity will present problems to anyone who attempts too fixed a definition of any of them.

The ability to handle the fluid definitions, to recognize the shadows as well as the objects without flinching, is an important characteristic that good social scientists exhibit—one which, if learned, will serve you well as you study this book and play the game of life.

Study and Review

Key Points

- Social science is the name given to our knowledge about the nature, growth, and functioning of human society.
- The scientific method is a set of rules about how to establish rules.
- A good social scientist generally takes a wait-and-see position about claims until they are tested and retested.
- A reasonable approach to a problem in social science is to observe, define the problem, review the literature, observe some more, develop a theoretical framework and formulate a hypothesis, choose the research design, collect the necessary data, analyze the results, and draw conclusions.
- Three typical methods in social science are the historical method, the case method, and the comparative method.
- It is important to use educated common sense in the social sciences.
- A good social scientist is always open to new ways of looking at issues.

Some Important Terms

argumentation for the sake of heaven (3)
anthropology (6)
biological science (2)
case method (15)
causation (18)
cognitive science (5)
comparative method (16)
correlation (17)
cross-cultural method (16)
economics (11)
educated common sense (16)
experimental method (9)
geography (8)
historical method (15)
history (9)
humanities (4)
impartial spectator tool (3)
interdisciplinary approach (18)
natural science (2)
paradigm (11)
phronesis (2)
political science (12)
psychology (12)
research program (12)
scientific knowledge (2)
scientific method (8)
Social science (2)
sociology (8)
statistical analysis (17)
survey (17)

Questions for Review and Discussion

General Questions

1. What is scientific knowledge? How does it differ from knowledge acquired "unconsciously"?
2. What is the relationship between phronesis and scientific knowledge?
3. What is the impartial spectator tool, and why is it important for social scientists?
4. What distinguishes argumentation for the sake of heaven from other types of argumentation?
5. Name the principal social sciences and define the field with which each deals.
6. Why would it have been difficult to carry on scientific investigation in primitive societies or even in the Middle Ages?
7. Why is social science policy more difficult than natural science policy?
8. Are there any advantages to having competing research programs?
9. Why is it difficult to formulate precise laws in the field of social science?
10. In what sense is social science scientific?
11. Why is it often impossible to study social problems by means of the experimental method?
12. Explain the ways in which the problems of social science differ from those of the exact natural sciences.
13. What are the advantages of the interdisciplinary approach to the study of many social problems?
14. Social science has been broken down into specialties. Why is it a problem to put them back together through a unified theory?
15. What new social science fields do you think will be important ten years from now? Why do you think so?

Internet Questions

1. In his Ted Talk (https://www.youtube.com/watch?v=FLbEKpL-5Z0), Brian Epstein argues that there are two types of questions that scientists ask: what is it questions, and how does it work questions. Which type does he believe that social scientists are not asking?
2. The website https://www.sciencebuddies.org/science-fair-projects/engineering-design-process/engineering-design-compare-scientific-method distinguishes the scientific method from the engineering method. How do the methods differ?
3. Go to the society portal of Wikipedia (https://en.wikipedia.org/wiki/Portal:Social_sciences) and choose the branches of geography category. How many different types of geography are listed?
4. Take the survey about alcohol use at www.alcoholscreening.org. After taking the survey, look at the feedback you are given based on your answers. What can the results for this survey be used for?
5. In Steven Levitt's defense of his abortion study, (http://freakonomics.com/2005/05/15/abortion-and-crime-who-should-you-believe/) what was one of the alternative suggestions for the increase in crime? What was the alternative argument that critics use to explain why the crime rate has decreased? Did Levitt agree with the alternative argument?

For Further Study

Books to Explore

Easterbrook, Greg, *It's Better than it Looks: Reasons for Optimism in an Age of Fear*, New York: Hachette Books, 2018.

Greene, Brian, *The Fabric of the Cosmos*, New York: Knopf, 2004.

Hecht, Jennifer Michael, *Doubt: A History: The Great Doubters and Their Legacy of Innovation*, San Francisco, CA: Harper, 2004.

Mills, C. Wright, *The Sociological Imagination*, New York: Oxford University Press, 1959.

Pinker, Steven, *Enlightenment Now: The Case for Reason, Science, Humanism and Progress*, New York: Penguin RandomHouse, 2018.

Repcheck, Jack, *Copernicus' Secret: How the Scientific Revolution Began*, New York: Simon & Schuster, 2007.

Salganik, Matthew J., *Bit by Bit: Social Research in the Digital Age*, Princeton, NJ: Princeton University Press, 2017.

Tilly, Charles, *Why*, Princeton, NJ: Princeton University Press, 2006.

Wilson, Edward O., *Consilience: The Unity of Knowledge*, New York: Knopf, 1998.

Internet Sites to Explore

"http://www.americananthro.org/AdvanceYourCareer/Content.aspx?ItemNumber=2150" American Anthropology Association.

"http://psychology.oxfordre.com/" Oxford Research Encyclopedia of Psychology.

"http://www.politicalresources.net/" Political Resources on the Internet.

"http://www.socioweb.com/" Sociological Resources on the Internet.

"https://www.frbatlanta.org/education/publications/extra-credit/2012/spring/i-want-to-study-economics-but-what-do-economists-do.aspx" What Do Economists Do?

Historical Roots of Social Science

appendix

Natural scientists tell us that the world has been around for some 6 billion years and that living things have been around for at least 3 billion. We will go back, however, only about 2,600 years, when Western philosophy began on the fringes of ancient Greece (some theorists hold that the Greeks responded to ideas from Eastern civilizations, but there are limits to even our broad sweep). The Greeks came to realize that their ancient account of how the world was created and administered—by an enormous collection of gods, or pantheon—was not the only possible explanation. They are credited with being the first to establish rational theory, independent of theological creed; to grasp rational concepts and use them as a way of looking at reality and seeing logical connections; and to be empirical and antimystical. Two great Greek thinkers of the fifth and fourth centuries B.C., Plato and Aristotle, are responsible for establishing a basis for knowledge as we know it and deal with it today.

The philosophical debates of the Greek period were in many ways the same ones that go on today, explaining how, when all things change, things must also be simultaneously unchanging; otherwise, something would have to be created out of nothing—a logical impossibility. These ideas would later develop into modern physics, including the laws of thermodynamics and the proposition that matter can neither be created nor destroyed—merely transformed. The Greeks also considered many of the issues that later became the social sciences; for example, they considered the role of the state (political science), the way minds interact with society (psychology), and individuals' interaction within the market (economics). Thus, the history of the social sciences begins with the Greeks. The history, however, is not continuous.

Much of the Greek contribution to knowledge would have been lost (Who knows what other contributions actually have been lost?) were it not for its preservation by Eastern civilizations. On their forays into the East during the Crusades (the religious wars from 1095 to 1272 in which Christians in Europe attempted to capture Christianity's traditional territory in the Middle East), Europeans became reacquainted with the learning of the ancient Greeks, and they brought back the body of ancient Greek learning to Europe, where it was generally available by the twelfth century. These ideas spread slowly throughout Europe over the next three hundred years, and by the middle of the fifteenth century, rediscovery of Greek civilization in Europe was widespread. Because the period from about 1453 (the fall of Constantinople) to the end of the seventeenth century was characterized by the rebirth and proliferation of ancient knowledge, it became known as the **Renaissance** (a French word meaning "rebirth").

The Renaissance must have been a wonderful time for scholars. The totality of knowledge was still comprehensible by the human mind. An ideal in the Renaissance was that an educated person could know everything and exercise all skills and social graces. A true Renaissance man was willing to take on all comers on any issue.

As the store of knowledge grew, it became harder and harder to know everything, and so people began to specialize. A natural division opened, one between the humanities (the study of literature, music, and art) and physics. The physics part of this division was not refined enough, and soon physics was broken up into empirical studies (which developed into the various natural sciences) and metaphysics (nonempirical studies that developed into philosophy).

The Renaissance was preceded by the **Middle Ages** (a period from roughly A.D. 476, and the end of the Roman Empire, to A.D. 1453, the defeat of Christian religious armies in Constantinople by the Islamic Turks). In the Middle Ages, religion was so central to life that the study of religion was taken for granted, and it tied together all the other fields of study. For example, painters painted religious pictures, musicians wrote religious music, and the study of literature was the study of the Bible and its commentators. Questions that today seem the obvious ones, such as "Why are people divided into classes?" and "Why are the poor poor?", were simply not asked. Things were the way they were because that was God's will. Once one knew God's will, the issue was how to carry it out. For example, medieval

scholars believed in a "just" price and that collecting interest on savings was immoral. They taught those principles and condemned those who did not follow their teachings.

As the Renaissance dawned and continued, that religious tie provoked tension as scholars in the various fields of study came to conclusions different from the church's doctrines, beginning a long conflict between religious learning and beliefs and so-called rationalist learning and beliefs.

The tension between religious explanations and rationalist explanations was (and still is) inevitable. The rationalist approach places human reason above faith. In a rationalist approach, one looks for logical connections and is continually asking the question "Can you prove it?" This meant that somehow the rationalists had to figure out what it meant to prove something. A religious approach places faith above reason. A religious explanation had no need to prove anything: Explanations were accepted on faith.

Throughout the Renaissance, rationalism more and more replaced religion as the organizing principle of knowledge, and as it did, the various fields of knowledge became divided along rationalist lines. The humanities still reflected religious issues; the rationalist revolution came much later to the humanities. To the degree that they were considered, most of the issues we now classify under social science were studied as part of history. History was part of literature and the humanities. It was simply a documentation of what had happened—it never asked *why* something happened. To ask why meant failure to accept God's will. Thus, it was primarily from philosophy, not history, that most of the social sciences emerged.

The natural sciences and philosophy divided along modes of inquiry and answers to the question "Can you prove it?" The study of philosophy itself evolved into a variety of fields, such as logic, morals, and epistemology (the study of knowledge).

The Enlightenment

The **Enlightenment** is the period in which rationalism definitively replaced religion as the organizing principle of knowledge. The Enlightenment began between A.D. 1650 and A.D. 1700 and continued for about one hundred years. It is in this period that the development of the social sciences took hold and flourished.

By the time of the Enlightenment, it had become evident that to know everything—to be a Renaissance scholar—was impossible. Not only was it impossible to know everything, but it also was impossible to know everything about just one subject—say, all of physics or all of philosophy. Individuals began to specialize their study. For instance, chemistry and astronomy were separated from physics.

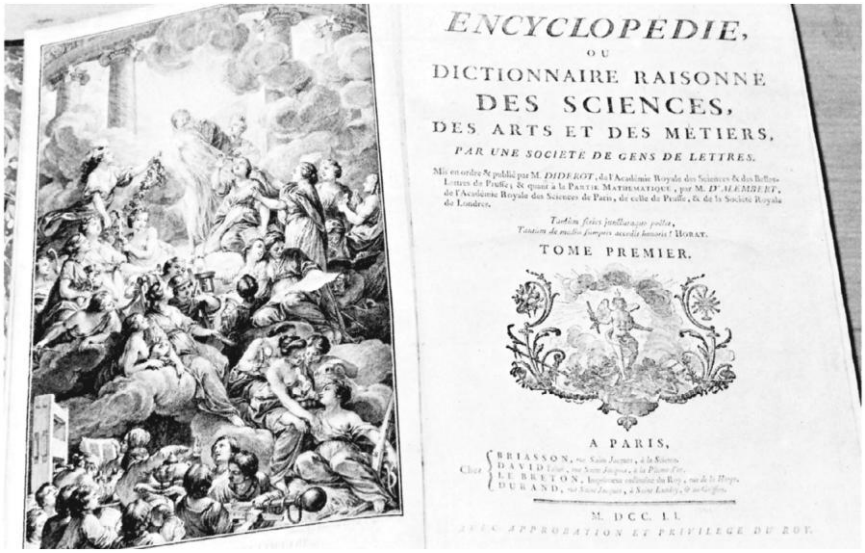
As philosophers delved into their subject, they further divided philosophy into parts. One part was metaphilosophy, the study of issues that most scholars agreed were not empirically testable. One such issue was: Because God is all-powerful, can he create a rock so heavy he cannot move it? The other division of philosophy dealt with issues that could, in principle at least, be empirically tested. For instance: What type of political organization of society is preferable? It is from the second division that the social sciences evolved. (They were called sciences because they were in principle meant to be empirically testable.)

The Enlightenment spawned social science because the Enlightenment rejected the assumption that the classical world of the Greeks and the Romans was perfect. In the Enlightenment (roughly the whole of the eighteenth century), there was a general belief that civilization had improved and so too should the thinking about civilization. Moreover, in the seventeenth century, just preceding the Enlightenment, there was continual turmoil—a long drawn-out war between France and England and a religious conflict between Catholics and Protestants about how to interpret God's will. That fight broke down the religious explanations and made people very much aware of social problems. Which of the two explanations, Catholic or Protestant, was right? Why were they fighting? What could be done about it? The social sciences developed as individuals attempted to explain those social problems and suggest what could be done to solve them.

Although the existence of social problems that require solutions may seem obvious to you, it was not always so obvious. This view is the product of the Enlightenment, which established the "three humiliations" of human beings. These are:

1. The earth is not the center of the universe.
2. Humans are creatures of nature like other animals.
3. Our reasoning ability is subject to passions and subconscious desires.

Before we experienced these humiliations, thinkers could rely on an order they believed was established by God. Social problems were set up by God and were to be accepted or endured. Only after the beginning of the Enlightenment did people begin to believe that society and culture are themselves products of history and the evolution of culture—that they had changed and would continue to change.



Frontispiece from Diderot's Encyclopédie*, written during the Enlightenment.*

As is often the case, the change in viewpoint had a paradoxical counterpoint, and human beings' "humiliation" was accompanied by a belief in human beings' power. If society could change, then the change could be, at least to some extent, guided and directed by human beings.

Since its conception, social science has entwined these two aspects. Sometimes it is simply trying to understand, and it accepts our limited powers and our place in the cosmos, and at other times it is trying to change society.

From Philosophy to Social Science

The evolution of philosophy into the social sciences can be seen in France, where philosophers joined to produce an encyclopedia, edited by Denis Diderot and Jean d'Alembert, which appeared over a span of several years in the mid-1700s. The full title of this encyclopedia proclaimed it to be a rational dictionary of science, art, and industry. Unlike earlier compilations, it contained systematic articles on humans, society, and method, and a number of the first definitions of the social sciences can be traced to this mammoth work.

There are many ways to look at social problems, and as scholars began considering human beings in reference to their social environment, the diversity soon became apparent. The history of each of the social sciences becomes hopelessly tangled with that of each of the others at this point. In the Enlightenment, scholars were debating one another and ideas were quickly evolving. To capture even a flavor of the interaction and debate leads to a formidable morass, hardly conducive to a social science course. So we will stop our consideration here.

Some Important Terms

Enlightenment (24)
Middle Ages (23)
Renaissance (23)

Human Origins

chapter 2

If a single cell, under appropriate conditions, becomes a man in the space of a few years, there can surely be no difficulty in understanding how, under appropriate conditions, a cell may, in the course of untold millions of years, give origin to the human race.

—Herbert Spencer

After reading this chapter, you should be able to:

- Summarize Darwin's theory of evolution
- Explain the role of mutation in the theory of evolution
- Relate DNA to genes and genetic engineering
- Distinguish between the theory of punctuated equilibrium and the theory of continuous equilibrium
- Summarize briefly the evolution of human beings over the last 30 million years

Our ancestors in the not-so-distant past believed that the globe we live on was the major focus of the universe and that all the heavenly bodies revolved around it. Today, we know that it is only an infinitesimal part of the cosmic universe of space and matter. To human beings, however, this tiny part is more important than all the rest, for the greatest concerns of human beings are themselves, the planet on which they live, their origin, their destiny, and their relationships with each other. Even if they hope for a future life in some far-off heaven, they still long to make their earthly life meaningful and satisfying.

Human beings are first of all social creatures. They normally spend their entire lives in association with other human beings and as members of various organized social groups. The quality of association and membership varies according to the nature of the social group. For members of a family, association normally is constant and close, but as residents of a town or city, human beings' association with the majority of the other residents is only occasional and often impersonal. Modern technology is both increasing and decreasing that association. As social networks (such as Facebook) become central to people's lives, they spend less physical time with their families and geographic neighbors, but they often establish associations with people all over the world.

Physical geography is still important and most people still define themselves as members of a larger society, all bound together to some degree by a common language, common interests, geographic areas, ways of living, common loyalties, and reliance on a common national government for their defense and for much of their general welfare. To a great extent, the ability of people to live happy and satisfying lives depends on the nature of the society they live in.

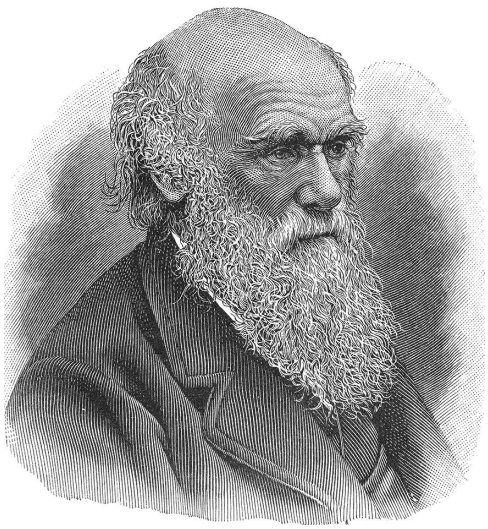
The Origin of the Human Species

Where and when the human species originated is not known with absolute certainty, but the conventional view is that it was in Africa some 5 to 7 million years ago. Modern scientists believe that millions of years ago, the process of evolution produced our first human ancestors when a humanlike creature branched off from the apes. They believe that then a long series of changes created a group of hominids who displayed over time more and more of the basic physical characteristics that distinguish modern human beings from all other forms of life. Fossils of humanlike species have been found that date back about 5 million years, and research in this field is progressing so rapidly that it is possible that by the time you read this even older evidence will have been found. After splitting off from apes, humanlike species are believed to have continued to gradually change to other types of humanlike species in the evolutionary process.

Darwin and the Theory of Evolution

Evolution in its broadest sense refers to any process of progressive change. Thus, one may speak of the evolution of the novel, of art, or of religion. But when used without qualification, evolution ordinarily means organic evolution, or the theory that all the complex life forms of today have descended from earlier ones that existed long ago, and that they are continually evolving to adapt to their changing surroundings. The theory of evolution was popularized by the English biologist Charles Darwin, who devoted his life to systematically finding evidence to support the concept of evolution and to explaining natural selection, which he believed was the mechanism by which evolution was accomplished.

Darwin, in the capacity of a naturalist, made a five-year voyage with a British surveying expedition on the ship *Beagle* (1831–1836). During this time, he had unusual opportunities to study a great variety of plant and animal life. He was puzzled by the similarities and differences he found and by the progressive steps that often seemed evident in going from the simpler to the more complex forms of life. Ultimately, he developed his theory of natural selection to explain these relationships. The first major work in which he presented his conclusions was *On the Origin of Species* (1859). Later, in another famous book, *The Descent of Man,* he dealt specifically with the evolution of the human race.



Charles Darwin.

Though Darwin was largely responsible for the widespread acceptance by scientists of the concept of evolution, he was neither the first to suggest the idea nor the first to be impressed by the remarkable physical similarity of human beings to certain animals. As far back as the fourth century B.C., Aristotle believed in the gradual development of complex organisms from simpler ones, and a generation before Darwin, the French zoologist J. B. Lamarck had published a theory of evolution. Although flawed, it had many insights. Also, a hundred years before Darwin, the great Swedish naturalist Carolus Linnaeus (1707–1778) organized the various species by similarity of their physical attributes. In doing so, he invented the term *primates*—a group of animals including human beings, apes, and monkeys—whose outstanding characteristics are their larger, complex brains, high intelligence, and hands and feet adapted for grasping. In his studies, Linnaeus could not overlook the resemblances among these three kinds of creatures.

Natural Selection. Darwin's concept of evolution was based in part on **natural selection**, the proposition that individual members of the various species that have characteristics more favorable for meeting the conditions of life are more likely to survive and pass on their characteristics to future generations. Darwin believed that every species is characterized by the appearance of such individuals; thus, the direction that evolution takes is largely determined by "the survival of the fittest."

Genetics studies how the hereditary characteristics of species and individuals are transmitted biologically to their offspring. The precise process of how evolution occurs is still unsettled, but it generally is believed that genetics plays an important role.

The foundation work in genetics was done by Gregor Mendel in the late nineteenth century.[1] He discovered that plants and animals have what he called inheritance factors, now known as **genes,** which he defined as discrete units within cells that retain their original character for generation after generation. Because of this retention, these genes determine the characteristics of future generations. Thus, the study of evolution is closely connected to the study of genetics.

Mutation. Genetics explains the way we are, but it does not explain why and how we change. That occurs through a process called **mutation:** random genetic changes that lead to new characteristics. In mutation, an offspring may have quite different characteristics from those of its parents. Although we do not completely understand why these mutations occur, we do know that if the resulting offspring survive, their new characteristics can be passed on to future generations.

Mutations are random. They seem to be accidents, partial failures of the process by which a species is able to reproduce its kind. We also know that the incidence of mutations is increased by exposure to certain chemicals or types of radiation. Most mutations are neutral, but some are fatal and some are beneficial to the offspring. Beneficial mutations make evolution possible. Over long periods of time, evolution can bring about great changes in the character of a plant or animal species, and in the process the structure and biological functioning of the species often become much more complex.

Examples of changes in a species that seem to be the result of gene mutations and the operation of natural selection (survival of the fittest) are not difficult to find. The peppered moth in Great Britain is a case that has been studied in detail. This moth spends much of its time clinging to trees and is a favorite food of some birds. Until the middle of the nineteenth century, all peppered moths found by naturalists who collected specimens seem to have been light in color. Because the bark of the trees was usually light and often lichen-covered, this served as protection by making it difficult for the birds to see them. But after the Industrial Revolution had been under way for some time, so much soot fell in some areas of central Britain that the tree trunks and branches became darker. This made dark moths harder to see than light ones, and therefore the dark moths lived longer on average and produced more progeny. Because moths go through a great many generations in a relatively short period of time, in some of the more highly industrialized areas of Britain, natural selection almost completely replaced the light peppered moths with the dark ones.

Genes contain two **alleles**, one from each parent, that affect particular characteristics. In sexually reproducing organisms, the alleles transmit characteristics from the parents to the offspring. A **dominant allele** controls the characteristic that is transmitted to offspring. A **recessive allele** will not transmit its characteristics unless both alleles in the pair are recessive. If two recessive alleles are paired, they will determine the characteristic affected. The peppered moth presents a relatively simple example of the operation of natural selection. The color of

[1] As is the case with many major scientific breakthroughs, the significance of Mendel's work was not immediately understood. Although he published his results in 1866, their importance was not recognized until 1900.

Theories, Proofs, and the Darwinian Story

The peppered moth example has been cited in this text and in most other textbooks about evolution for at least the last twenty years. Why do textbook authors choose this example? We do so in large part because it fits the Darwinian story of evolution so well. Recently, social scientist Michael Majerus pointed out that the moth photos, on which much of the story was based, were staged and that there were serious design flaws with the original peppered moth experiments.

Despite the problems he found in the experiment, Dr. Majerus, and most moth experts, believe that the basic story about the peppered moths holds up and that the story they tell is "qualitatively right." But the recent discussion of the problems with the original experiment provides good insight into the scientific method. The scientific method directs scientists to question everything because there is always a chance that a "proof" will slip through the cracks, leading to false beliefs, especially when a theory comes to be strongly believed by most scientists. The problem is that when reports of observations fit the way we already think, we tend to be less questioning than we otherwise would be. After reviewing the broader evidence, almost all scientists continue to believe that some version of the Darwinian story of evolution holds, but they are continually testing it in order to refine and improve it so that it better fits the empirical data.

However, many people in our society—especially those with a strong Christian affiliation who interpret the Bible literally—are hesitant to accept accounts of evolution. The debate between those who accept it and those who do not is unlikely to be resolved. Science relies on empirical evidence to settle such disputes, and almost all empirical scientists believe that the preponderance of empirical evidence on evolution supports some version of the theory of evolution. True, the evidence is incomplete, and science has no explanation for the ultimate beginning of everything, and there is always the possibility that scientists are collectively fooling themselves—they have done so before. Scientists admit to this possibility because good science requires them always to be skeptical even about issues they think they know; but what will convince them is contradictory empirical evidence, not arguments about the limitations of human knowledge.

Whereas good scientists are always on the lookout for contradictory evidence, good religious people are not. Almost all religions, and certainly the Christian religion, require people to accept things on faith. Religious beliefs are supposed to be held regardless of the empirical evidence—the more the empirical evidence contradicts the foundation of faith, the stronger the faith must be. This means that the two sides do not have a common method of resolving the debate.

Whether scientists should have a more open mind to additional hypotheses that complement or are in addition to evolution, but do not contradict it—such as the hypothesis that there is an intelligent design underlying the evolutionary process—is an open question. The problem with these hypotheses is that it is difficult, and perhaps impossible, to find empirical evidence that would lead us to choose one hypothesis over another. Other than the fact that we exist, and that our existence may have some cause, there seems to be no test of the intelligent design hypothesis. Thus, most scientists tend to find the arguments made by Ben Stein in his documentary, "Expelled: No Intelligence Allowed," as primarily propaganda for a particular faith rather than an argument for a serious scientific addition or alternative to the theory of evolution. That said, the close-mindedness and unwillingness of some scientists to even address the issue, or to allow people to put their ideas forward, goes against the openness that is essential to scientific inquiry. Lastly, science has no explanation for existence; evolution is a theory of change, not a theory of existence.

these moths is known to result from a dominant allele, or a pair of dominant alleles for dark color, and a pair of recessive alleles for light color.

Human characteristics result from this same combination of dominant and recessive alleles. In the case of eye color, brown eyes are dominant and blue eyes are recessive. A person must have two recessive alleles to have the recessive characteristics; otherwise, the dominant characteristics prevail.

The first human beings, or their humanlike precursors, probably evolved in tropical regions where survival was possible without clothing. It is likely that they had very dark skin because light skin would have given little protection against the burning rays of the sun. There is debate about whether these people spread into other parts of the world or, instead, whether people developed independently in various parts of the world. Whichever the case, it is

believed that in time they became capable of spreading out from Africa, eventually to most of the world. This was probably because their physical characteristics changed. For instance, early hominids probably did not walk upright, but when they developed that ability, they could travel more efficiently. More important, perhaps, was their development of tool making. With tools, they could hunt or scavenge other animals, so they could consume more protein and fat than their low-energy vegetarian diet would have provided. Not only their bodies but also their brains would have been changed with more energy. The brain needs lots of energy to grow. As their diet expanded, hominids could physically and intellectually expand their territory.

Although all early hominids were probably dark-skinned, as they moved, that changed. In the most northern of the territories into which they expanded, the sun was very weak, especially in the long winters, and was often hidden by clouds or fog. Dark skin, which had been an advantage in warm, sunny climates, became a disadvantage because the sun's rays, by penetrating human skin, help produce vitamin D, which is an essential element in nutrition. Populations that remained in these colder regions for very long periods of time—perhaps 100,000 years or more—seem gradually, through gene mutations and the process of natural selection, to have developed much lighter shades of skin.

Limitations of Natural Selection. Natural selection does not completely account for all evolutionary changes. In small groups, some such changes may result from gene mutations that are harmless but do not create characteristics that contribute to survival. But other characteristics developed by such groups may increase their chances of survival, and so they grow in number and spread over wider areas. Natural selection may explain the dark skins of black Africans and the lighter skins of northern Europeans, but it is not an obvious explanation of some other group characteristics, such as the different construction of the eyes in Asian and Occidental people, nor does it account for as much similarity as exists. Therefore, work in this area will likely continue.

Recent Developments in Genetics

In recent years, scientists have significantly extended our knowledge of genetics. Whereas once it was thought that genes were the building blocks of life, today scientists have unraveled the gene and discovered a small building block, **DNA,** or deoxyribonucleic acid, the basic chemical building block of genes. Scientists had known for a long time that DNA existed, but it was only in 1953 that James Watson and Francis Crick unraveled its double helix structure, discovering that DNA resembled a spiral staircase. They found that each of the steps serves as a code word and determines how amino acids are linked into the proteins of which all living things are made. It was like discovering the blueprint for life (but not how life was originally created or what force had drawn the blueprint).

Once DNA was reasonably understood, the next step for scientists involved gene-splicing, and changing the blueprint. This opened up a whole new field. If scientists could change a gene, they could exercise some control over living organisms by cloning—that